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2014

## 16th Annual Student Academic Conference

Minnesota State University Moorhead

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SAC  
2014



*Tuesday, April 15, 2014*

MINNESOTA STATE UNIVERSITY MOORHEAD PRESENTS

# 16<sup>th</sup> Annual Student Academic Conference



*Since 1999*



MINNESOTA STATE UNIVERSITY  
MOORHEAD®



**Greetings:**

Our annual Student Academic Conference is a Spring Semester highlight. Since 1999, it has provided an outlet for student research and creative work. Over the years thousands have shared their knowledge in an environment that encourages inquiring minds and faculty mentoring. It's an activity that underscores our mission statement:

'Minnesota State University Moorhead is a caring community promising all students the opportunity to discover their passions, the rigor to develop intellectually, and the versatility to shape a changing world.'

The conference offers a stage for new ideas from the next generation of researchers and leaders. It advances intellectual development and challenges students to effectively communicate their knowledge. Defending research in a supportive community of student and faculty scholars is a great way to experience personal and professional growth.

Congratulations to the student participants, faculty mentors, and the Student Academic Conference planners.

A very good idea has become a wonderful tradition!

Edna Mora Szymanski

A handwritten signature in black ink, appearing to read 'Edna'.

President

Minnesota State University Moorhead

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**Publication credits:** Richard Lahti (chair of the Student Academic Conference Committee), Meghan Feir (project coordinator, writer and editor), Katie Faken (designer), Ande Sailer (photographer), MSUM Marketing intern Danielle Rebel (writer), and MSUM Marketing student photographers Morgan Prouty, Jessica Stenzel and Nick Watson



# 16<sup>th</sup> Annual Student Academic Conference

Tuesday, April 15, 2014

<b>7:30 a.m.</b>	Poster Set-Up – Registration/Information Table <i>CMU Main Lounge</i>
<b>9:30 a.m.</b>	Presentation Session 1 and Poster Session 1 <i>Various CMU Rooms and Poster Display Area</i>
<b>10:50 a.m.</b>	Break
<b>11:00 a.m.</b>	Seating for the Luncheon <i>CMU Ballroom</i>
<b>11:15 a.m.</b>	Luncheon Starts (Welcome and Introductions) <i>CMU Ballroom</i>
<b>12:00 p.m.</b>	Keynote Speaker – Ruth Lumb <i>CMU Ballroom</i>
<b>12:25 p.m.</b>	Student Panelists <i>CMU Ballroom</i>
<b>1:00 p.m.</b>	Presentation Session 2 and Poster Session 2 <i>Various CMU Rooms and Poster Display Area</i>
<b>2:20 p.m.</b>	Break
<b>2:30 p.m.</b>	Presentation Session 3 and Poster Session 3 <i>Various CMU Rooms and Poster Display Area</i>

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### Conference Participants and Attendees:

If you're like me, previewing the Student Academic Conference program has renewed your optimism about our future and our prospects for solving the serious challenges facing our planet. A cursory review of the conference program reveals that our students are tackling problems such as cancer, diabetes, global warming, sustainability, racial and gender inequality, and child welfare. In short, the Student Academic Conference provides ample evidence that Minnesota State University Moorhead is a place where faculty and students work together to address some of the most important problems we face. And, frankly, I feel better knowing that our future is in your hands.



The conference and the research it showcases also have important implications for the future of the students who participate. If you mentored a student who is participating in the Student Academic Conference, you have contributed to that student's academic and personal development in ways that will have important, long-term effects. If you are a student who is presenting the results of a research project, your research experience has increased the likelihood that you will succeed at MSU Moorhead and beyond. You have also contributed to the spirit of discovery, creativity, and innovation at the University — a spirit that enriches us all and just might change our world.

Congratulations, and thank you.

A handwritten signature in black ink that reads "Anne Blackhurst". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Anne Blackhurst  
Provost and Senior Vice President for Academic Affairs



# Ruth Lumb

*The Transformative Power of Student Academic Research in Today's Era of Globalization*

## Biography

Dr. Lumb is a Professor of Marketing in the School of Business, Minnesota State University Moorhead, and also a Professor in the School of Management, Xi'an University of Science and Technology, China.

Dr. Lumb's major research interest is globalization and its effect on consumers and countries. Many of her published articles are in this area. She recently received a research grant from the Chinese Government to further enhance her research related to the effects of globalization on China. She was the first international professor at Chongqing Technology & Business University, China, and set up the curriculum for their School of Business. Dr. Lumb has developed exchange programs at Xi'an University of Science and Technology and Chongqing Technology & Business University, both in China. She developed the first virtual classroom for the School of Business between students from MSUM and Xi'an University of Science and Technology. Dr. Lumb has developed and conducted workshops for the Federal Government of China, served as a consultant to China International Trade & Investment Corporation and is a former partner of a Sino-American joint venture.



**I** believe that all students should be given a chance to be engaged in opportunities that stimulate curiosity about the world. We need to provide students with the skills to live and work successfully in today's complex global environment. The goal at MSUM is to expand and enhance the programs that have the greatest potential to develop citizens who are able to make sense of today's complex global environment and prepare them to succeed in today's highly competitive era of globalization. One avenue to achieve this is through student academic research, a student-centered learning opportunity where students play a crucial role in the success of their learning experience.

This year, 2014, marks the 16th annual Student Academic Conference at MSUM. Since its inception, there has been a technological revolution that has made it possible to partner in collaborative research projects, not only with

students from other universities throughout the country, but also with students from universities throughout the world. Student participants from previous Student Academic Conferences indicate that their participation in research projects and the conference have positively transformed their lives. Today, these collaborative student research projects and the dissemination of the information obtained are having a transformative effect and have the potential to make a difference around the world.

**“I believe that all students should be given a chance to be engaged in opportunities that stimulate curiosity about the world.”**

*– Ruth Lumb*



## Student Panelists

### *Student Academic Conference 2014*

Student panelists represent outstanding academic achievement and demonstrate a passion for learning in and out of the classroom. Each panelist will prepare a reaction to the keynote speech. Their responses will be delivered following the keynote speaker's address.



## Kelsey Ihringer

*MSUM Senior*

*Major: English Education and Psychology*

I am currently a double major at Minnesota State University Moorhead, studying secondary English education and psychology. Since my freshman year, I have been working closely with psychological and developmental research in the Baby Lab. Since then, I have become very involved within the psychology department: coordinating for the Baby Lab and fulfilling the role of president for the Psychology Club. I co-presented two years ago at the Student Academic Conference, and I am presenting my own research this year. My current research explores how mothers' different attachment patterns affect her and her infants' eye gaze patterns when looking at emotional expressions. I plan to graduate in 2015. As of right now, I am undecided whether to go to graduate school. If I attend graduate school, I will be looking for something close to home in the Midwest.





## STUDENT PANELISTS



### Maggie Olson

*MSUM Senior*  
*Major: English Literature*

I am a junior English major with an emphasis in literature. Because of my interest in dramatic literature, I have worked in conjunction with the Theatre department on my two previous presentations at this conference. My first presentation, "The Merry Wives of Windsor: Adapting Shakespeare for Contemporary Audiences," served as a starting point for "The Merry Wives of Wahpeton," a script I adapted and directed at the Fargo-Moorhead Community Theatre. I developed the second presentation, "Othello: Cross-Disciplinary Teaching in English and Theatre," during my year as a teaching assistant in the Theatre department. This year I'll be presenting "Stones, Streams, and Strings: Metaphors in Sarah Ruhl's 'Eurydice.'" After completing my bachelor's degree at MSUM, I will pursue my doctorate to become a college English professor.



### Marissa VanVleet

*MSUM Senior*  
*Major: Art Education*

As a current art education major at MSUM, I am passionate about the arts and about students. I am currently pursuing a Bachelor of Fine Arts in art education with a minor in psychology. I have lived in North Dakota my whole life and spent most of my childhood in Bismarck. I have never been a part of the Student Academic Conference before, and I am excited to have the chance to present with my peers. Last semester, one of my education classes sparked the desire to do more research on homelessness in the school-age population. Since then, I have been involved at Churches United for the Homeless, and I am attempting to learn ways in which we can foster growth and independence in the students there. This year I will be presenting on collaborative art projects done by at-risk and homeless youth, which give them the tools to be catalysts for social change. After I graduate, I hope to continue working with at-risk youth and gain experience in the teaching field. Eventually, I would like to attend graduate school to become a licensed art therapist and continue to actively participate in my future communities.



## Megan Thorwick

*MSUM Senior*

*Major: Business Administration*

I am currently a senior at MSUM pursuing a degree in business administration with an emphasis in management. Although I studied copious areas of business, I prefer the organizational and instructional role above all others. I am originally from Maplewood, Minn., but have since adjusted to living in a significantly smaller area up north. My love of sports has allowed me to be a participant on the Women's Division II Soccer team for the past two years. Along with sports, I have a passion for research. I have never participated in the Student Academic Conference, although I have worked alongside business faculty members on research projects through my Honor's Apprentice Scholarship. This year, I collaborated with Dr. Lumb with research on Chinese tour managers and guides and their perceptions of inbound tourism. Eventually, Dr. Lumb wishes to submit our research for publication. I am thrilled to be joining Dr. Lumb this May on the China Business Trip, where I will be able to meet her contacts in China firsthand. I am looking forward to the experience abroad, as I am looking to gain international experience for the future.



## Ashley Ramstad

*MSUM Senior*

*Major: Philosophy*

I am a senior here at MSUM majoring in philosophy. I was born in New Rockford, N.D., but spent most of my childhood years in Fargo. I have a previous degree in public relations and advertising. I chose philosophy because I love anything that questions our existence, and I find the more I learn, the less I actually know. I also enjoy doing anything that involves learning something new, whether it is intellectual or physical. My two current hobbies I took up this year are chess and longboarding. I presented at the conference last spring and had a wonderful experience. I am currently in the process of applying to a few graduate programs along with law school. I am very excited to see what the future will bring me, but I definitely will miss MSUM as it has been a great experience.



# Emily Bublitz

Major: Psychology and Communication Studies  
Year in School: Senior Hometown: Watertown, S.D.

*Move It and Lose It: Reframing perceptions about exercise*



> By Meghan Feir

**W**ith obesity affecting more than 78 million adult Americans in 2013, there is no question a need for practicing healthier habits has arisen.

Emily Bublitz, a Dragon Mentor and senior at MSUM, will be showcasing her presentation “Move It and Lose It: Can Reframing Exercise Increase One’s Intentions to Work Out?” at this year’s Student Academic Conference on April 15. In her presentation, she will use the theory of planned behavior to support her main argument that retraining the way your brain perceives exercise can support healthy endeavors in the long run.

With a passion for running, Bublitz ran three half marathons amidst her busy schedule last year, so this topic is a natural fit for the senior. “There are so many positives and benefits from exercising. From your health to your emotions, it just has an overall positive effect.”

During the presentation, Bublitz will give college undergraduates reframed information to study the effect of temporal framing on exercise intentions. By taking the theory of planned behavior and applying it to a person’s exercising habits, Bublitz hopes to demonstrate reframing how someone perceives increments of exercise, from hours to minutes, will keep them motivated and help them continue a consistent workout routine.

Although Bublitz will be using exercise as her test field in this study, the theory of planned behavior can be applied to everyday life. “You can take this theory and apply it in various settings – in health communication, in advertising,” Bublitz said. “Whether it’s studying for a test, getting the 4.0 you’ve always wanted, graduating from college, or becoming healthier, it’s really practical. By reframing a message, you can do what you’ve always wanted to do. You just have to look at it in a different way.”

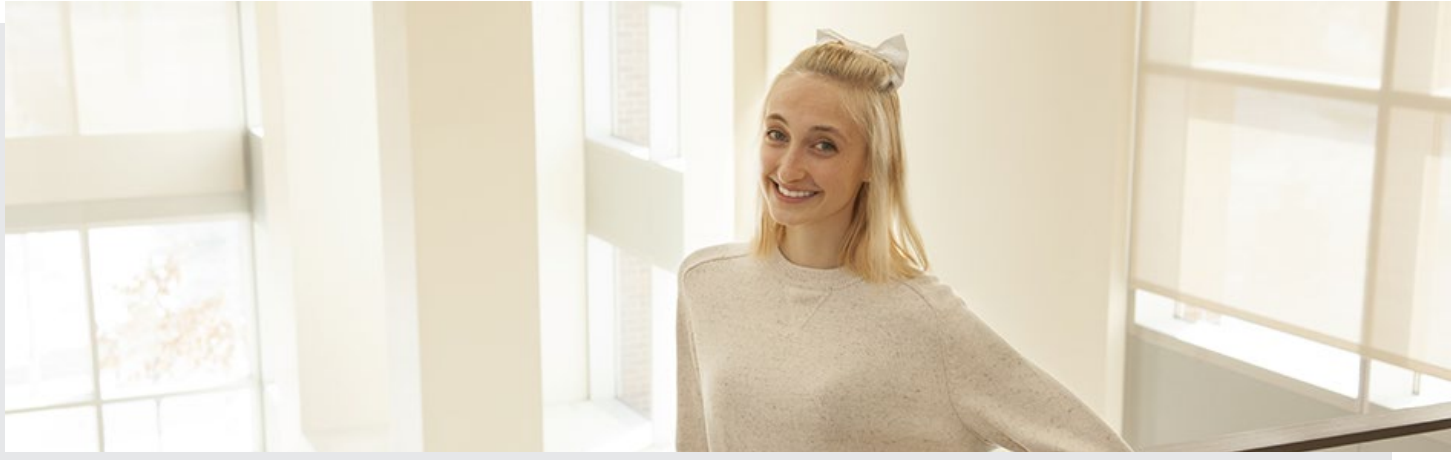
**“There are so many positives and benefits from exercising. From your health to your emotions, it just has an overall positive effect.”**

**– Emily Bublitz**

# Jordan Pinneke

Major: International Studies and Sustainability  
Year in School: Sophomore Hometown: Apple Valley, Minn.

## *The War Over Water: Student to present on water resource sharing*



> By Danielle Rebel

Sophomore Jordan Pinneke is the epitome of the phrase, “so much to do, so little time.”

Whether it is with her secretarial position for the Sustainable Campus Initiative Committee, her job as an administrative assistant at the Office of Campus Sustainability, working as an RA on campus, or as a desk attendant at the Recreation and Outing Center, Pinneke rarely has a spare moment.

On top of it all, the international studies and sustainability major found time to do research outside of class, and will present at the MSUM and State Student Academic Conferences April 14 and 15.

“It’s been said that the next world war will not be over oil, but over water resources, because those sources are so scarce,” Pinneke said.

Her presentation, called, “The Violation of Human Rights with the Privatization of Water,” delves into the topic of water resource sharing, which the United Nations has declared a human right.

“I’m hoping to shed light on the topic,” Pinneke said. “(People) just turn on their tap without realizing where it’s coming from. I want people not to take (water) for granted.”

Having access to clean water is something those living in developed countries are accustomed to. It’s an integral part of daily life. Turning on

the tap to brush our teeth, fill a glass or take a shower is something done with ease. Yet those in third-world and developing nations are fighting for the right to gain access to clean water – something that Pinneke says is being hindered by transnational companies.

The topic first sparked Pinneke’s interest in professor Andrew Conteh’s Introduction to Global Issues class. She says that he, “definitely has the resources to help” with her research.

After first meeting Conteh at last year’s Student Academic Conference, Pinneke is looking forward to making more connections with students, faculty and staff at this year’s conference.

“It brings a lot of intellectuals together,” she said. “It’s the one time of year that people who have done research can get together and share what they’ve done.”

Pinneke hopes her research and experience will lead to a career with the United Nations.

“It has definitely introduced me to what the UN does,” Pinneke said.

**“I want people not to take (water) for granted.”**

**– Jordan Pinneke**



# Loza Tadesse

Major: Physics and biology

Year in School: Sophomore Hometown: Addis Ababa, Ethiopia

*Student accepted into MIT summer program*



**"Never hesitate to shoot for a bigger star."**

**– Loza Tadesse**

> By Danielle Rebel

**G**reatness is often born from wild, far-fetched ideas. For Loza Tadesse, this was exactly the case.

The international student from Ethiopia is studying physics and biology at MSUM. Earlier this year, she was hired in the biosciences department – not as a researcher, but to clean the fish tank.

"That's when I first got interested in the fish," Tadesse said. "I'm really interested in cardiology-related research."

Being around the zebra fish in the biosciences department each day sparked an idea in Tadesse. After doing some research, she further developed the idea, which she will be presenting at the Student Academic Conference April 15.

"I'm modifying an ECG (electrocardiogram) that is already here," Tadesse said. "Zebra fish are now top in medical research because they resemble the various human body systems, including the heart. I am trying to make the heart ECG recoding procedure less invasive."

Tadesse, who has been working with professors Ananda Shastri and Brian Wisenden, has had great success thus far, and hopes to find continued success as she moves forward in her research.

"It's a new topic, and if we're successful it can help many other researchers," Tadesse said. "It might be a starting point for me, as well."

After graduation, Tadesse hopes to become a full-time researcher. She says her success with the zebra fish project would lay the base for her future and be an instrumental help in the medical world.

Without the help of resources around her, Tadesse says her research would not have come this far.

"I'm just so blessed with the professors, their cooperation, and the resources we have here at MSUM," Tadesse said. "My goal (in presenting at the Student Academic Conference) is to describe what we have and to motivate other students to follow their other research ideas as well."

Tadesse's research won't end after presenting at the Student Academic Conference. She was recently accepted into MIT for a summer internship.

"It was a really competitive opportunity, but finally, thank God, I got in," she said.

Though the zebra fish project is her first large-scale research, Tadesse got word of her acceptance into the MIT summer program only 10 days after the application deadline. The acceptance rate into the program is less than 10 percent.

Many world-renowned scientists live and breathe in MIT labs. One such scientist is Dr. Robert Langer, who has been repeatedly named a top worldwide innovator in publications like "Forbes" and "Time Magazine."

"Having a chance to work in the labs of such well-known people is such an amazing opportunity," Tadesse said.

For those who are hesitant to apply for prestigious internships and research opportunities, Tadesse has one piece of advice.

"Never hesitate to shoot for a bigger star," she said. "Unless you do it you'll never know what is to come. Give it your all and it will pay off."

# Iwnetim Abate

Major: Physics

Year in School: Junior Hometown: Debere Berhan, Ethiopia

*Making Strides: Physics student scores prestigious internship in fuel cell lab*



> By Danielle Rebel

**H**alf a world away, a young Iwnetim (Tim) Abate dreamed of a world free from global warming.

Years later, Abate is taking part in making his dream a reality.

The junior physics major at MSUM is making strides in the field of physics and engineering. Abate, an international student from Ethiopia, is already making a name for himself, scoring prestigious internships and winning major awards in his field.

The last two summers, Abate interned at the California Institute of Technology, working under Sossina Haile in her fuel cell lab.

“When I was working there I was exposed to a new kind of engineering,” Abate said. “Now I want to do it in the future.”

Abate worked on creating a fuel cell that is more efficient than those currently used, ultimately reducing emissions altogether.

“Solid oxide fuel cells are a kind of fuel cell which converts chemical energy to electrical energy,” Abate said. “They have zero carbon dioxide or toxic emission so they are environmentally friendly devices.”

Energy efficiency strikes close to home for Abate, whose home country is constantly struggling to maintain the flow of energy.

“There are still cities in my country where they don’t have electricity for days,” Abate said. “I want to be a part of the people who will make my country self-sufficient in energy.”

Abate is diligently working toward his goal. In addition to his impressive internships, Abate is presenting his research at this year’s Student Academic Conference at MSUM on April 15.

“I just want to share how science is beautiful,” he said. “If you have some solution to global warming, it can help the whole world.”

He said his foundation in science came from his education in Ethiopia, but is being solidified through his education at MSUM.

“I’m learning the principles at MSUM,” Abate said. “They offer them in a way that you’re able to apply them.”

And it is because of MSUM that Abate was able to continue his education in the U.S.

“I pay cheap, but the experience I’m getting out of (MSUM) isn’t,” Abate said.

Abate will also be presenting two other research projects at the Student Academic Conference. He has been working with professor Ananda Shastri of the Physics Department, and professor Damiano Fulghesu of the Mathematics Department to develop his research in the two fields.

**“I want to be a part of the people who will make my country self-sufficient in energy.”**

**– Iwnetim Abate**



# Zebulon Hallman

Major: Paralegal and Economics  
Year in School: Senior   Hometown: Volga, S.D.

*The economics of gaming*



> By Danielle Rebel

**L**eague of Legends” and “World of Warcraft” may seem like simple ways to pass the time for most, but for Zebulon Hallman, these online games offer a unique insight as to how the world works.

Hallman, a senior paralegal and economics major, has spent the semester studying the economics of online games. He will be presenting his research at MSUM’s Student Academic Conference on April 15.

“Basically, I’m studying why people play these games, number one, and number two, the multiple structures these games are using,” Hallman said. “It’s the relationship between game developers and players, and how game developers charge players in order to play.”

The presentation, titled, “The Economics of Online Games: Blurring the Lines of Reality,” focuses on the changes that have occurred over the years when it comes to player fees.

“When playing these games, I’ve actually seen different ideas and structures that are happening,” Hallman said, “from subscription-based, to free-to-play, to charging individuals for different items like weapons and armor. I’ve actually seen some new structures now, where it’s kind of a player-driven economy.”

Hallman’s passion for gaming started at a young age, when he began playing the original Nintendo console, the Nintendo Entertainment System (NES). Since then, his attention has turned toward online games such as “World of Warcraft” and “Call of Duty.” This dedication to gaming has enabled him to put a great deal of time and effort into the research, and not get tired of the subject.

“I just picked a topic that was fun for me, and hopefully fun for other people,” he said. “I want to inform people about gaming and teach them something new.”

The presentation looks at economics from a different viewpoint, which Hallman said is something he has enjoyed while preparing his research.

“In economics, we normally think in data and numbers, and as of right now there’s not too much data out there about these video games and structures,” Hallman said.

**“I want to inform people about gaming and teach them something new.”**

– Zebulon Hallman

# Jacob Clauson

Major: History

Year in School: Senior Hometown: Enderlin, N.D.

*The medical turning points of the Civil War*



> By Meghan Feir

The Civil War was a turning point in various ways, and, as senior Jacob Clauson will explain in his presentation for the Student Academic Conference on April 15, it was also a time of greater exploration with medical practices.

Before doctors were concerned about bacteria and sterilization, soldiers across battlefields were treated with tools that had only undergone a quick swipe with a rag, bacteria festering on their accouterments. When the death toll began increasing steadily during operations, a greater interest in prevention was sparked.

Clauson will highlight “Just how backwards medical treatment was before the Civil War and the years leading up to it. They were bleeding people, running needles through their wounds – really weird, almost medieval treatments,” Clauson said. “I didn’t think it would be so backwards in the early 1800s, but it was. It all started evolving around the Crimean War and Civil War and took a big leap forward.”

During his presentation titled “Civil War Medicine,” Clauson will specifically discuss the experiences of the First Minnesota Regiment at the Battle of Gettysburg. “(His presentation) looks at wounds they may have sustained and the medical treatment involved during the Civil War to help deal with those wounds.”

Minnesotans may have a heightened interest in this troop’s trials and experiences due to the state bond they share with this regiment.

“There’s always the blood, gut and gore, big-pile-of-feet aspects of it,” Clauson said, “but I followed the First Minnesota Regiment, so hopefully there’s a home feeling there for all the Minnesotans.”

Though Clauson himself is a native North Dakotan, researching this troop still held a sense of locality.

“There are many people you may be connected to, and the Civil War really was the stepping stone to better medical technology,” Clauson said. “We have that era to thank for some of the things we have now. They became more concerned with washing their hands before medical procedures, they became more standardized and things just improved, not only for soldiers and people on the battlefield, but for civilians, as well. Everything that happens on the battlefield will, in one way or another, transpire to civilian life, so we have them to thank for that.”

**“Everything that happens on the battlefield will, in one way or another, transpire to civilian life, so we have them to thank for that.”**

**– Jacob Clauson**





# Mikaela Hanson & Hermella Alemneh

*Personality and genetics: Students research the effects of cortisol*

> Mikaela Hanson  
Major: Biology  
Year in School: Freshman  
Hometown: Avon, Minn.



> Hermella Alemneh  
Major: Biochemistry and Biotechnology  
Year in School: Sophomore  
Hometown: Addis Ababa, Ethiopia



> By Meghan Feir

**H**ermella Alemneh and Mikaela Hanson are using zebra fish in a research project that could have a direct correlation in the way we understand how hormones play a vital role in human personality outcomes.

Alemneh and Hanson’s presentation title, “Does A Stressed Mothers’ Hormones Contribute to the Personality of Their Offspring?” encapsulates the main topic they are researching, which they will be presenting at this year’s Student Academic Conference on April 15, complete with a fish tank.

Using a maze, the two classmates determined how bold or shy each zebra fish was by testing if they would go forward in a maze without knowing whether food or a predator would await them at the end of the tunnel.

“You don’t think about fish having personalities – it’s more of a humanistic trait – but all animals have personalities,” Hanson said. “When I was talking to Dr. Wisenden, they had done previous research kind of like this, looking at whether you inherit your personality or if it’s more epigenetic.”

**“You don’t think about fish having personalities – it’s more of a humanistic trait – but all animals have personalities”**

**– Mikaela Hanson**

**“At the Student Academic Conference, there are going to be students that are not science majors, but they can easily relate to the topic with the bold and shy fish.”**

**– Hermella Alemneh**

Alemneh and Hanson conjecture that the personality of each fish can be directly linked with the atmosphere surrounding the mother’s pregnancy. If the mother spent the majority of her pregnancy in a safe environment and had enough to eat, her offspring will likely be bold. If cortisol levels in the mother were high due to consistently taxing experiences, the chance that she will produce shy, apprehensive offspring is more probable.

Cortisol, something referenced often in weight-loss commercials, is a hormone secreted by the adrenal glands. It plays a vital role in how our bodies manage stress.

The classmates’ research could potentially support the importance of women regulating cortisol levels before and during pregnancies, if not for their own sake, for their future children.

“At the Student Academic Conference, there are going to be students that are not science majors,” Alemneh said, “but they can easily relate to the topic with the bold and shy fish.”

For more information about the Student Academic Conference, visit [mnstate.edu/sac/](http://mnstate.edu/sac/).

Notes.....



## ACCOUNTING

### **Abby Kack & MacKenzie Barry**

*The Accounting Fraud of Lehman Brothers*

Faculty Mentor: Sheri Erickson

Lehman Brothers was a globally recognized financial services firm until its demise in September 2008. The collapse of Lehman Brothers had a huge impact on the United States economy due to filing Chapter 11 bankruptcy; the largest bankruptcy filing in United States history. Lehman's bankruptcy caused all major market indexes to reach present day lows. The collapse of Lehman Brothers can be attributed to accounting fraud by creating Repo 105 transactions. Repo 105 was an off-balance sheet device that created short-term deposits that were classified as a sale. Therefore, Lehman Brothers was found guilty of liquidating assets that could not readily be sold. The fraud of Lehman Brothers directly relates to the three points of the fraud triangle: opportunities, incentives/pressures and rationalizations/attitudes.

### **Joshua Rubink & Trevor Johnson**

*The Fraud Triangle and its presence in Enron*

Faculty Mentor: Sheri Erickson

This essay examines the fraud triangle and how it was present in Enron. Enron was one of the most successful companies of its time until its collapse in 2001. The Enron scandal was the second largest of its time and affected millions of Americans. The scandal not only affected people, but was also a big influence in changing accounting. To illustrate the fraud triangle and its presence in Enron, this essay analyzes published research on the fraud triangle and the Enron scandal. All three factors in the fraud triangle lead to the fraud, and there were so many opportunities for Enron executives to falter to them. After the collapse of Enron, companies were forced to comply with a new law called the Sarbanes-Oxley Act, which also created the PCAOB or Public Company Accounting Oversight Board.

### **Karma Ghale, Rajesh Ghale & Sonam Gurung**

*Threats to Computer Security*

Faculty Mentor: Lori Johnson

With improvement in technology, storing important documents and data can be done electronically. Gone are the days when you would have to go through cabinets of files to look for a document. Storing these documents and data has been made easy, but how secure are they? Computer hackers and predators can break into your computer and steal, change or destroy your important information without your consent and knowledge. We shall discuss how these hackers and predators get in to your security system. We shall also discuss how to detect these threats and how to prevent future computer threats.

### **Chunlai Liu**

*Lean Production in Financial Services*

Faculty Mentor: Kim Mollberg

In this presentation, I will talk about the definition of lean production; present an example for adopting lean production: Toyota company's Kaizen manufacturing philosophy; discuss why financial industries adopt lean production; compare lean production with a traditional production approach; and list the benefits for financial services industry to use lean production approach.

### **Rojan Shrestha, Graduate Student**

*Healthsouth Scandal*

Faculty Mentor: Sheri Erickson

By 2003, Healthsouth was the largest publicly traded healthcare company in the U.S. The company recorded almost \$4.5 billion in revenue. Later that year, its founder, Richard Scrushy was believed to have inflated the profits of the company by almost 1.4 billion. The stock price of the company plummeted and thousands of investors lost millions of dollars in the process. Aaron Beam, the co-founder and the first CFO of the company, pleaded guilty to his role in the Healthsouth scandal. Former CEO Richard M. Scrushy denied any part in the fraud. In 2005, Scrushy was acquitted of all the 36 counts of accounting fraud in relation to Healthsouth, and he continues to maintain his innocence. Most white-collar crimes are usually set off when people begin to rationalize their incorrect acts and practices. The basis of this paper is to present a real-life example to illustrate how rationalizing improper practices eventually leads to hardcore fraud.

### **Ryuichi Kitagawa, Chu-Yen Pai, Devin Koerner & Xidong Feng**

*Anonymous Hacking*

Faculty Mentor: Lori Johnson

Anonymous hacking is a problem that has largely increased and will keep increasing as our world becomes more technology driven. While a lot of active hackers are only "Script Kiddies," or hackers with little knowledge of programming, there are also groups of individual hackers, such as the group Anonymous. There are several types of ways that one can hack into a system, such as password cracking, phishing, Trojan horses and computer viruses. There are many steps you can take to protect yourself and your computer, like regularly updating your software, installing a firewall, install anti-virus software, and using secure passwords and changing them frequently.

### **Caleb Grundyson, Sara Williams & Kayla Sprouls**

*Tax security concerns in the 21st century*

Faculty Mentor: Lori Johnson

As the world quickly transforms into a digital world, our financial system has been forced to change from a system that relies on paper and pen to one that has to use computers to report and record financial data. Our tax system is very different than it used to be. This new technology has created opportunities for people to commit new forms of fraud. There are issues with both identity security and tax fraud. People are able to hide income in new ways because so much business is done online, which is highly unregulated by local and federal governments. We are also using our mobile devices to file taxes. How safe is that? In this new world, there are new challenges for both tax preparers and citizens. In this presentation we will discuss the challenges of handling sensitive information and reporting income and purchases from online business for tax preparers. We go over possible solutions for a tax firm to keep these risks controlled.

### **Nancy Stigen, Graduate Student**

*GE Imagination at Work*

Faculty Mentor: Sheri Erickson

General Electric is a company involved in many diverse products, financial institutions, software, healthcare, home improvements, mining and gas and oil. It is a global company with more than

300,000 employees and operations in over 140 countries. On August 4, 2009, the Securities and Exchange Commission filed a civil suit against GE alleging that the company misled investors by reporting materially false and misleading financial statements. “The SEC alleged that GE used improper accounting methods to increase its reported earning or revenue and avoid negative financial results.” In the complaint filed, the SEC alleged five violations: Improper treatment of commercial paper hedging, improper shortcut treatment under FAS133 for swaps, improper recognition of revenue from locomotive “Bridging Financing” transactions, aircraft engine parts errors and sale of GE securities during relevant period.

**Gwendolyn Genz & Sherry Carlsrud**  
*Cryptography*

Faculty Mentor: Lori Johnson

Cryptography is the science of securing messages. This presentation will provide a very brief overview of some of the most common techniques of securing messages, along with some basic terminology used in the field of cryptography.

**Mindy Sorenson**  
*Tax Knowledge for Independent Consultant*

Faculty Mentor: Kim Mollberg

Independent sales seem to be increasing in popularity. Many people have little understanding of how these small independent sales businesses affect their personal tax liability. I am preparing a study based on an independent consulting business. I will go through the steps of understanding the income compared to the expenses that will be incurred with a consulting business. I will walk through the schedule C tax form and how to deduct expenses in relation to the income presented on a 1099 tax form. Also, there will be information based on how to prepare for the taxes that will be incurred.

**Alexandra McIntyre, Mindy Sorenson & Michael Badinger**

*Mobile Devices: Preventive Controls are Essential*

Faculty Mentor: Lori Johnson

Does your mobile phone have the necessary tools to keep your information safe? The popularity of mobile devices have skyrocketed in the last five

years, which increasingly makes them a target of malicious intent. The possibilities of what we are able to do with mobile devices seem endless, but there is a catch – they have the possibility to expose our personal information in ways undreamed of just a decade ago. Our group will go into specific examples of how our phones can be attacked through carelessness and misfortune. We will also discuss ways to prevent our mobile phones from being hacked, as well as mitigate security breaches through various controls.

**Kasie Weber**  
*Financial Advisory Consultants, Inc.*  
*& The Fraud Triangle*

Faculty Mentor: Sheri Erickson  
James P. Lewis Jr., the owner of Financial Advisory Consultants Inc. out of Lake Forest, Calif., guaranteed investors annual returns of 18 percent to 40 percent. Lewis claimed that he earned his profits by buying and selling distressed businesses, leasing equipment to medical offices, and financing medical insurance premiums. Lewis paid investors by taking the funds of others, known as a Ponzi scheme. Lewis’ books stated that he owed investors about \$814 million, although most of that was fictitious investment profit. In 2005, Lewis was accused and plead guilty of fraudulently raising \$311 million from investors over 20 years. In 2006, Lewis was convicted and sentenced to 30 years in prison and was ordered to pay back the \$156 million he stole from about 1,600 investors over the 20 years. The purpose of this presentation is to inform viewers about how James Lewis Jr. used the elements in the fraud triangle to conduct the fraud and steal money from the investors of Financial Advisory Consultants Inc.

**Bret Sheeley**  
*The Adelphia Communications Scandal and How It Relates to the Fraud Triangle*

Faculty Mentor: Sheri Erickson

John Rigas founded Adelphia Communications in 1952 in the small town of Coudersport, Pa. The company grew through acquisitions aided by Rigas’ shrewd business acumen. Adelphia eventually reached annual revenues of \$3.6 billion and was the sixth largest cable provider in the country. The company seemed incapable of doing wrong. John Rigas was revered in the cable

business. He was one of the first in the industry to start stringing wires and urging customers to discard their rabbit ears in the early 1950s. A community-oriented philanthropist, Rigas was inducted into the Cable Television Hall of Fame in 2001. In March 2002, however, Adelphia’s rise was cut short. The company revealed it had borrowed nearly \$2.3 billion through various family-owned partnerships off of its balance sheet. An SEC investigation followed. John Rigas, along with his two sons, who held executive positions at the company, faced several fraud charges. How could a crime of such magnitude occur? And why did it happen? By relating the Rigas’ case to the Fraud Triangle, an academic model that explains the criteria necessary for fraud to take place, a better understanding can be gained of how the fraud was perpetrated and what preventative measures can be implemented to prevent a crime of such magnitude from occurring again.

**Amanda Feils, Rachel Karst & Roseanna Wilts**

*For Mobile Deposit Only*

Faculty Mentor: Lori Johnson

Has the Idea of mobile deposit scared anyone? Is it safe? How does it work? In this presentation we will discuss the security measures taken to make mobile deposit safe and secure for all users. We will take you through the steps to deposit a check using a mobile device. We will also look into the structure behind what makes this system work and the amount of time it takes for the funds to be available for use. Even though much of the systems are similar, all of the information provided will be specific to Gate City Bank’s mobile deposit program.

**Theresa Stahl**  
*Security of Mobile Devices*

Faculty Mentor: Lori Johnson

Mobile devices are a critical tool in today’s world. Both businesses and individuals rely on them to remain in contact with others when away from their home or office. Mobile devices have increased convenience and workplace productivity; however, these benefits are not without risks. Mobile devices are a source of security incidents. Contributing issues are losing devices, malware, and external breaches. As society and business



continue to rely on the availability of systems, mobile device usage will continue to escalate along with the features the devices offer. This makes it critical that risk management is applied and security controls are implemented in order to maximize the benefits and minimize the risks associated with mobile devices.

**Austin Robischon, Luke Schaunaman & McCahen Schweitzer**

*Improving Internal Controls: Volunteer Tax Preparation Site*

Faculty Mentor: Lori Johnson

Internal controls are an integral function in the field of accounting for security and integrity reasons. Our research is directed towards the question of how the security and integrity of volunteer tax sites can be improved. In our project we work to incorporate professional standards (Statement on Standards for Tax Services) into a volunteer controls structure. These standards improve operations performed by volunteer tax preparers to a level that is in-line with professionals, including: ethical responsibility, recommendations, completeness of information, qualified authorization processes, error recognition and resolution, and confidentiality.

**Andrea Christenson, Trent Wilson, Callie Larson & Shannon Deutsch**

*Mobile Security*

Faculty Mentor: Lori Johnson

Mobile devices are integral to our daily lives, we use them constantly and they are a great tool for an individual to have. Essentially everyone has a mobile device. However, they also present certain risks to individuals who use them. Attackers can use information stored on a mobile device for their benefit. There are solutions to the problems presented by the gap in security of our mobile devices. In our presentation we seek to address the security risks of mobile devices, how attackers can use information gathered from mobile devices and what we can do to protect ourselves from these risks.

**Eric Kolden, Filecia Wietzema & Joseph Nelson**

*Mobile Devices in the Workplace*

Faculty Mentor: Lori Johnson

Mobile Devices in the workplace are a growing concern with the daily advances in technology.

Mobile devices cause certain risks that we should all be aware of and understand. Some of the risks include communication interception, malicious code, device attacks, physical access and insider threats. These risks could potentially cause a company to lose valuable information or expose them to potentially harmful malicious threats. Carrying company information on your mobile device is not a wise idea. If your device is attacked you may not be protected. In order to better accommodate the use of mobile devices in the workplace there needs to be more awareness and training on how to safeguard information and protect yourself from potential threats. Overall, our goal is to educate companies and people on the preventative controls to take in protecting themselves from the risks involved in using mobile devices.

**Morgan Ellis, Nicole Weiss & Carmen Borgen**

*How Safe are You: Mobile Security*

Faculty Mentor: Lori Johnson

Our presentation will cover the topic of mobile device security and fraud in today's technological world. Recent news articles have shown that information security threats are on the rise. With advancements in technology, the vast majority of Americans own cell phones, which are highly susceptible to information fraud. It is increasingly important to protect your mobile device information from potential hackers. The topics we will cover during our presentation include fraud statistics, common security mistakes and fraud prevention. By attending our presentation, we hope that you gain awareness of the risks of carrying a cell phone.

**Heather Brostrom & Sierra Hoheisel**

*Security of Mobile Devices*

Faculty Mentor: Lori Johnson

Security is an important feature in mobile devices. Security can impact how much information can be stolen by others. Security flaws are seen in every single mobile device. Security features can easily be added to any mobile device; whether through the phone provider or another service provider. Recently, Apple has had to disappoint their customers by revealing to them that they have a major security flaw within their mobile devices. Apple customers with mobile devices using unsecured wireless internet connections are opening their

device to being hacked. The hacker, commonly known as "man in the middle attack," can look at the previous transactions the user has made. Information the user thought was safe like credit card numbers can be taken.

**Mariah Tvrdik & Seth Maas**

*Identity Theft and the Hiring Process*

Faculty Mentor: Lori Johnson

Technology has changed how businesses conduct the hiring process by streamlining over the World Wide Web. Online applicants have flooded employers by the thousands with electronic resumes. Human resource departments now widely use hiring software and technologies to aid the hiring, selection and assessment process of new applicants. These new online processes have inherent vulnerabilities. There is a real risk of identity theft for any online applicant just the same as identity theft by credit or debit card. Applicants leave their contact information on every resume and through the online application database, which is potentially enough information for an identity thief to wreck havoc that lasts a lifetime. Safeguards need to be in place to prevent information theft of employer's application databases such as encryption of data files. Although the pros outweigh the cons for the technological advancement of the hiring process, the cons should be carefully disclosed to each and every online applicant or user.

**Bridget Jackson & Aimee Mazoyo**

*Hiring on the Go: The Use of Technology*

Faculty Mentor: Lori Johnson

Technology is becoming an everyday part of the hiring process when applying for a job. Technology makes the application process faster for applicants, lowers employer's costs to screen applicants and provides efficiency for employers and applicants. Technology also can cause employers to filter out possible qualified applicants and applicant's information to be put at risk. The use of technology in the application process is positive. We are looking at the use of technology in the application process and weighing the advantages and disadvantages it provides. While technology may have negatives within the application process, most of them can be overcome. Technology will continue to be used in the application process and understanding the potential negatives will allow success.

**Jade Krause & Maggie Wiener**

*Anonymous Hackers*

Faculty Mentor: Lori Johnson

The Anonymous Hackers is a formless group that conducts multiple hacking campaigns at any time, some with a few participants and some with hundreds. Anonymous Hackers have secretly accessed U.S. government computers in multiple agencies and stolen sensitive information in a past campaign. In the past, Anonymous' members has also disrupted eBay Inc. PayPal and has also launched more complex attacks against Sony Corp. and security firm HBGary Federal.

**Lucas Moderow, Edward Yamba, Ryan Bryngelson & Jessica Ferrian**

*Anonymous Hackers*

Faculty Mentor: Lori Johnson

This presentation will be on anonymous hacking – people gaining unauthorized access to data.

**Michael Benusa & Samantha Resler**

*Enron and the Formation of The Sarbanes-Oxley Act*

Faculty Mentor: Lori Johnson

This presentation will discuss how the bankruptcy of Enron in 2001 was a determining factor in the formation of the Sarbanes-Oxley Act formed in 2002. The causal effect Enron had on the formation of the Sarbanes-Oxley Act is important in understanding why the act is so important to United States corporations and public companies. The presentation will include documents and court records from the Enron case and excerpts directly from the Sarbanes-Oxley Act. The results of the research will present a clear picture of what happened inside Enron to bring about the Sarbanes-Oxley Act and why its enactment has been necessary and useful in business.

**Kendra Veazie & Darla Dewald**

*Internal Controls: Fraud Alert!*

Faculty Mentor: Lori Johnson

This project involves looking at fraud cases and determining what kinds of internal controls could have prevented them. The fraud cases that will be examined are the Waste Management Scandal (1998), Worldcom Scandal (2002) and the Enron Scandal (2001). These cases will be compared to the Sarbanes Oxley Act of 2002. Segregation of duties, management operating style, commitment to integrity, ethical values,

methods of assigning authority, responsibility, and human resource standards are the main focus of internal controls. The goal is to portray how important good internal controls are to the success of a company and how these fraud cases have changed the accounting world of today.

**Rebecca Moe & Tyler Walsh**

*BYOD=MDM*

Faculty Mentor: Lori Johnson

With mobile devices flooding the market and our personal lives, it is no wonder they have started becoming a part of the mainstream business world. People have become so used to immediate response technology, in order for many businesses to compete, they are engaging more and more in the use of such gadgets. The convenience and accessibility of this new technology has brought with it a whole new set of security issues. For many companies, fighting the addition, or trying to block access with these devices, has proved to be rather unsuccessful. Instead, there are different policies and safeguards that businesses can put in place to help minimize the exposure of their data in what is quickly becoming a technologically borderless world.

**Miranda Richter & Tyler Seeger**

*Securing Mobile Devices*

Faculty Mentor: Lori Johnson

With the rise of mobile computing technology and the devices that support it, the security of these devices is of ever-increasing importance. Our presentation will discuss the utilization of these devices, and the impacts their use can have on the security of the data they contain and transmit. We seek to inform our audience of commonly used and appropriate practices that can be utilized to maintain data security and integrity. Our presentation will cover a broad range of concepts, from simple solutions such as password setup and use, to more complex topics like data encryption and remote wiping technology. We will cap off our presentation with some insights into some of the new technology and trends being released to aid in mobile computing security.

Throughout the history of the world, war has ravaged mankind persistently for over millennia, and has been an important element of most cultures around the world. In most societies, war was despised and seen as a necessary evil for their survival, while for others, war was a vital aspect of everyday life, one of the pillars that held together the ceiling of culture. Several warrior cultures have left their mark on the world and in history, but none have been more successful in integrating war into their society than the fearless Meskwaki. From the Fox Wars to Iraqi Freedom, the Meskwaki warrior has shown time and again that they are a mighty and unbreakable people both in battle and in everyday life. The following presentation will explain how important war was to the Meskwaki, how it shaped their culture and how it affects the lives of present-day Meskwaki people.

**Danielle Truitt**

*Sandy Lake Ware of the Red River Valley*

Faculty Mentor: George Holley

Archaeologists describe Sandy Lake Ware as a kind of pottery commonly found in northern and central Minnesota. The term 'Sandy Lake' is derived from Big Sandy Lake, located in Aitkin County. Two sites were discovered here that contained cordmarked jars tempered with grit and shell. Leland Cooper and Elden Johnson were the first to define this ceramic category. Sandy Lake pottery appeared during a period known as the Terminal Woodland Period, which dates about AD 1200 to 1750. Many of the Sandy Lake sites have yet to be studied and fully analyzed. I am examining the distribution and content of Sandy Lake sites in the Red River Valley in an attempt to characterize the occupation.

**Carra Strader**

*Cannibalism*

Faculty Mentor: Erik Gooding

I will be researching the ritualistic behavior of cannibalism in different cultures, focusing on exocannibalism and endocannibalism. Exocannibalism is the practice of eating human flesh from a different society, while endocannibalism is the practice of eating human flesh from the same society. The practice of endocannibalism is normally for funerary or mortuary purposes. In some cultures, it is believed that ingesting the flesh or ashes of

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**ANTHROPOLOGY**

**Joao Marcelo da Cunha**

*Gods of War: The Warrior Ethos of the Meskwaki People*

Faculty Mentor: Erik Gooding



the loved one is the ultimate resting place for the deceased. Exocannibalism is practiced for various reasons, including the belief that by ingesting the flesh of the enemy the person will absorb part of the enemy's power. It is also perceived as an act of aggression and the ultimate act of violence. My main objective for this research is to give insight to the ritualistic behavior of cannibalism.

### **Leena Radeke**

#### *Dating the Rotenberger Site Through Decorated Ceramic Analysis*

Faculty Mentor: George Holley

Minnesota State University of Moorhead field school and volunteers conducted archaeological excavations in 2012 and 2013 at the Rotenberger site (32RM226) located along the Sheyenne River in Ransom County in southeast North Dakota. The occupation seems to date from the Late Prehistoric period (900-1700 AD) with numerous decorated ceramics. Decorated ceramics comprise incised and punctated designs on the exterior of containers. Some of these designs may be related to two successive archaeological cultures further east in Minnesota, which date from 1200-1500 AD. We suspect that the primary occupation of the Rotenberger site dates from this time span. My aim is to more precisely define the time span based on a comparison with these known styles.

### **Emily Haven**

#### *A Cross-cultural Study of PTSD*

Faculty Mentor: Bruce Roberts

Post-traumatic stress disorder (PTSD) is an affliction that plagues many people worldwide, especially soldiers. PTSD is just one of many challenges soldiers face when trying to recover and reintegrate into civilian life after serving in the military. This study takes a look at how different cultures around the world have dealt with PTSD in the past and the present. This includes methods used by other cultures to reintegrate soldiers into society after they've participated in military conflicts in order to see if there are any ideas that can be used to help soldiers in the United States better cope with trauma and reintegration.

### **Chelsey Quiring**

#### *Defining the Sandy-Ota Style*

Faculty Mentor: George Holley

Sandy-Ota is a term for pottery displaying Sandy Lake and Oneota traits of cord-marking, punctations and incising. Sandy-Ota has been assumed to date strictly from the Oneota period (1300 to 1700 AD), as it represents an interaction between Sandy Lake people of northern Minnesota and the more southerly Oneota people. However, a recent dating of a pot from central Minnesota before 1300 AD leads to the possibility that the interaction between northern and southern people may have started before the Oneota period. The pre-1300 cultures of southern Minnesota are associated with Cambria and have a different form of incising than Oneota. Through the analysis of vessel shape and decoration, I aim to define Sandy-Ota as a uniquely occurring ceramic style during the Late Prehistoric period in central and southern Minnesota. I will reproduce ceramic artifacts through scientific illustration to properly depict their complexity. Through studying artifacts owned by the Minnesota Historical Society and Minnesota State University Moorhead, I hope to establish Sandy-Ota as a potential cultural style.

### **Carli Hermes**

#### *Understanding the Ranes Mound Complex and Native Monuments of the Great Bend Region*

Faculty Mentor: George Holley

The Bend Region of the Sheyenne River is home to countless prehistoric earthen monuments and unique enclosures. In this culturally significant area, clusters of mounds were built by native peoples as a form of claiming and investing in their land. The most unique of these clusters, the Ranes Complex, is an extensive grouping of conical and linear mounds situated on the southern bluff of the Sheyenne Valley. The mounds were created and used during the Late Prehistoric period (900-1700 AD) and are part of the Okiedan Butte area (Holley 2008). When the site was originally recorded by T. H. Lewis in 1890, a total of 19 mounds were documented. Currently, only a few remain visible. The general pattern of the mounds at the site is still evident although it has been altered by weathering and cultivation. Interpreting the complex's

arrangement in relation to the rest of the area is beneficial to understanding the American Indian's use of the Northeastern Plains.

### **Darcy Smith**

#### *Hair and Religion*

Faculty Mentor: Erik Gooding

The main question that will be examined is "What does hair have to do with religion?" Other questions are: Why do some people cut their hair when they are mourning? Why do others let their hair grow? What are some of the common beliefs about hair? How have people's beliefs about their hair changed over time? Areas covered will be Hopi and other Indigenous people's opinions, thoughts, practices with their hair as it relates to religion. Some topics will be hairstyle, rite of passage, scalping, mourning process and history. Hair can be short, long, or none at all.

### **Danielle Lean**

#### *The Evolution of the Pentagram*

Faculty Mentor: Erik Gooding

The pentagram or pentacle first appeared in an area that expanded from present-day England to Egypt. It was associated with the goddess called Kore, but she had many different names. Her sacred fruit was the apple and when one cuts the apple in half, the seeds create a pentagram. Wiccans, Neopagans and Roma gypsies still use it. Pythagoras used the pentagram to identify his followers. Worshipping Kore continued into 4th-century Egypt and England. It used to represent the first five books of the Torah. For Christians, it has represented Christ's five wounds, Emperor Constantine's seal, on Sir Gawain's shield for the five knightly virtues. It made the switch from good to bad in the 15th and 16th century during the witch trials. Today it is used by Wiccans and other neopagan religions. Satanists use the inverted pentagram as well as the Sigil of Baphomet.

### **Bret Salter**

#### *Language Basics of the Wabanaki Confederacy*

Faculty Mentor: Erik Gooding

The presentation discusses the languages spoken by the Wabanaki, or the "People of the First Light," an Algonquian confederacy within the Northeast Culture Area in Native North

America. The confederacy was comprised of five nations, the Abenaki, Penobscot, Mikmaq, Passamaquoddy and Maliseet. The five nations spoke three dialects of Eastern Algonquian, the Abenaki and Penobscot spoke "Eastern Abenaki," the Maliseet and Passamaquoddy spoke "Maliseet-Passamaquoddy," and the Mikmaq spoke "Mikmaq." This poster will present various similarities and differences between these dialects, unique forms of these languages, and will discuss their current states.

### **Linnea Dahlquist**

#### *19th Century Meskwaki Village Life*

Faculty Mentor: Erik Gooding

This presentation is a reconstruction of 19th-century Meskwaki village life based on ethnohistorical research. The Meskwaki are a Central Algonquian Native American tribe who resided in the 19th-century, primarily in Iowa. The Meskwaki participated in a seasonal round based on subsistence. Spring through fall, they lived in large communal villages with a horticultural focus, while during the winter they lived in small family-based units scattered throughout their territory. Drawing upon historic documents from the 1700s and 1800s, this reconstruction discusses both the cultural and physical components of a typical Meskwaki Village.

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## **ART AND DESIGN**

### **Ceymione Herbert**

#### *Re-Imagining the Role of African Americans and Women in Contemporary Art*

Faculty Mentor: Anna Arnar

My paper focuses on the art works of Renee Cox and Faith Ringgold. I compare how each woman takes on the issues of feminism and how African Americans are visually represented in their art. For example, Faith Ringgold incorporates well-known figures from African American history such as Rosa Parks and Madame C.J. Walker alongside well-known Caucasians like Vincent Van Gogh in her quilts. Renee Cox integrates her own image into historical scenes where African Americans are not commonly featured (such as the Last Supper or the Pieta). Ringgold is an activist, artist, and teacher. Born during the Great Depression, she yearned to combine elements of her culture with her life and her art. Through

her quilt compositions she revisits the fondest memories of her childhood and expresses her political beliefs. She has a broad use of color in her quilts and an array of compelling settings in which to tell her stories. Originally from Jamaica, Cox assumes a more provocative role in the contemporary art world. She frequently uses herself as a model and displays attributes like courage and dominance in efforts to empower women. Moreover, Cox invokes controversy for the sake of challenging sexism and racism. Her alter egos "Yo Mama" (an empowered, typically nude or pregnant mother) and "Raje" (a Wonder Woman-esque character who fights racism) are key elements in this effort. Although distinct in their approaches, I will argue that the two artists share the same end goal: racial equality, gender equality, and recognition.

### **Takara Geck**

#### *Cindy Sherman and Nikki Lee:*

#### *Using the Body as Voice*

Faculty Mentor: Anna Arnar

My presentation will focus on photographers Cindy Sherman and Nikki Lee. In their works, each artist employs her own body to comment on women in society. They utilize makeup, clothing, props and backgrounds to transform themselves into various stereotypes of women. Sherman disguises herself in form of aristocrats, degenerates, generic B-film characters, and figures from history. By using herself instead of models, she shows that women can take on more than one persona; they can be mothers and daughters, executives and hourly workers. Lee also uses herself as model; however, she becomes the personas in her photographs. For her Projects Series, Lee immersed herself in various subcultures of society, and used a point-and-shoot camera to photograph different situations. By doing so, she has shown that one's sense of identity can change, whether consciously or not. My paper will argue that while each artist takes a different approach to exploring identity, they both use the photograph and themselves as subjects of the art work to convey their messages.

### **Stacy Barth**

#### *The Artist's Body as a Tool*

Faculty Mentor: Anna Arnar

My research is devoted to the contemporary artist Janine Antoni. She works in many

media including performance, sculpture and photography. Antoni emphasizes the process of creating art and how the beginning product correlates with the end product. I will examine how she uses her own body as a tool in many of her artworks. For example, she utilizes her mouth, hair, eyelashes and even brain waves to create unique pieces. She also includes ordinary activities such as eating and sleeping into her pieces. Although her work focuses mainly on the body, it also addresses the subject of power and femininity. One of her most famous works is "Lick and Lather," which consists of self-portrait busts made of chocolate and soap. She licks the chocolate busts and lathers the soap busts to reshape them using her body. Antoni experimented with chocolate in another piece titled "Gnaw." For this work, she bites out of two giant cubes, one made of chocolate and the other lard, showing how her mouth and teeth transformed the piece. In yet another work called Loving Care, Antoni used her hair as a paintbrush. She incorporated hair dye as her paint and her hair as the paintbrush. Once again, the artist's body serves as a tool while also cleverly referencing the male heroic gestures of abstract expressionist painter Jackson Pollock. By examining these examples of her work, I will argue that Antoni engages the viewer in an unexpected way through process and material.

### **Caroline Juel**

#### *The Feminist Art Movement:*

#### *The Role of Hannah Wilke*

Faculty Mentor: Anna Arnar

The focus of this paper is the feminist artist, Hannah Wilke (1940-1993). Although, for over 20 years, Wilke produced drawing, printmaking and sculpture, her best known work is in photography. Subjects addressed in her photographs include illness, ideals of beauty, sexuality and nature. In some photographs, she incorporates sculpture into the photography. In others, she documents her mother's battle with cancer, as well as her own battle with the same disease. These are often some of her most moving works. This paper analyzes aspects of her life that have acted as scaffolding and inspiration for the themes and subjects of her work. I will also look at how her work in photography specifically impacted and changed the feminist art culture. For her series, S.O.S. (Scarification Object Series), she had her





audience chew pieces of gum, shape them into small sculptures resembling genitalia, and stick them on her body. The gum sculptures acted as “scars” representing objectification and labeling, which are themes of her work. Minute details in her photographs have significance to the message delivered. To her, gum is “the perfect metaphor for the American woman – chew her up, get what you want out of her, throw her out and pop in a new piece.” In other photographs she stages her body in pre-established environments and becomes part of that environment. The combination of the environment and small details work together to send her intended message.

**Jonathan Reich**

*Suspect Number 1: The Creation and Propagation of Ugly Renaissance Babies*  
Faculty Mentor: Holly Silvers

This document was inspired by the Tumblr blog titled “Ugly Renaissance Babies,” which displays images of infants painted in the Renaissance that can be described as static, stiff, sickly, anatomically awful, or simply ugly. Oddly these babies were painted in tandem with the increased level of realism and anatomical correctness that was characteristic of the Renaissance period. Stranger yet, they remained unchanged while renderings of older humans grew more sophisticated and realistic. Sometimes even within the same painting a malformed Christ child was painted in the arms of an elegant idealized Madonna. This disparity forces one to ask, why are these infants unaffected? Especially when so many are of Christ, the center European spirituality and religion. This document addresses those questions by positing that the conventional use of pattern books by painters, the prevailing views on originality, and religious experience were the primary propagators of these babies. The image-maker’s industry, the use of pattern drawings and their transmission, and the role of the religious patron’s demand for experience inducing imagery are examined to show that there may not only have been reasons for ugly babies but also preferences for them.

**Marissa Van Vleet**

*Finding a Voice: Contemporary Art Created by Homeless and At-Risk Youth for Personal Progress and Social Change*  
Faculty Mentor: Anna Arnar

This paper discusses contemporary art created by at-risk and homeless youth with guidance and training by artists and organizations. This collaborative art goes deeper than creating awareness about social problems. Instead of shedding light on the issue of homelessness, it gives a voice to the youth who are experiencing it. I examine a few projects geared toward guiding children struggling with homelessness to produce art. These projects focus on providing tools to children to be catalysts for social change. One of the projects I highlight is a photography collaboration initiated by photojournalist Jim Hubbard and youth living in homeless shelters in Washington D.C. and Virginia. “Shooting Back” is a photographic documentary about homelessness from the perspective of children experiencing it. When the act of art making moves from the hands of the professional artist to the hands of the child the artwork becomes an avenue to help the child cultivate a voice. The child has the power to reveal who they are and how they see themselves, instead of being a subject in artwork. A similar project investigated is “Critical Exposure.” Multiple non-profit organizations and companies have arisen from the homeless crisis and actively addressed the problem by nurturing creativity within the afflicted population. “Artist and Homeless Collaborative” and “Juxtaposition Arts” are, among others, two of the organizations reviewed.

**Kathryn Jacobson**

*The Influence of Dante on Last Judgment Scenes before the Counter Reformation*  
Faculty Mentor: Holly Silvers

This paper focuses on the relationship between Dante Alighieri’s Divine Comedy and Last Judgment scenes from Italy as they developed before the Counter Reformation’s censorship of the book. The works of Giotto, Giovanni di Paolo, Luca Signorelli and Michelangelo are all considered as they incorporate Dante’s work in various ways. Cross-disciplinary research between the fields of Art History and Literature are important in revealing the way Dante’s audiences might have viewed and understood both the paintings and the literature in the centuries following the Divine Comedy’s publication. Rather than looking directly at illustrations of the Divine Comedy, the examination of Last Judgment scenes by artists

who were influenced by or familiar with Dante’s work, provides a different perspective of how ordinary people viewed and processed images that were normally only available in expensive codices for the elite. Especially enlightening are the presence of classical characters in medieval art and the evolution of nude figures in Last Judgment scenes from being relegated to the damned and then spreading up into the elect after the Divine Comedy was published.

**Michelle Mork**

*The Iconography of Hell: Its Sources and Meaning*  
Faculty Mentor: Holly Silvers

This paper investigates the origins and development of depictions of Hell in Last Judgment scenes from the Renaissance by examining the paintings of Giotto, Rogier Van Der Weyden and Michelangelo, among others. The iconography of Hell can be traced to ancient pictorial traditions found in Egyptian tombs and Mesopotamian demon carvings, contemporary judicial and theatrical practices, and literary sources such as the popular “Christian Visions of Heaven and Hell” and “Dante’s Inferno.” As established motifs and compositional formulas passed chronologically from artist to artist, depictions of the Last Judgment changed as each individual brought his own innovations and meanings to the genre. Initially used by the Catholic Church to combat external heresies, these images developed from being a didactic tool to serving as an outlet for individual artists personal interpretations of the Last Judgment scene.

**Mary Lodu**

*Contemporary Artists of the African Diaspora Exploring the Topic of Cultural Identity and Post-colonialism: Wangechi Mutu and Yinka Shonibare*  
Faculty Mentor: Anna Arnar

Wangechi Mutu and Yinka Shonibare are contemporary artists of the African diaspora with highly disparate styles, yet within their artwork, similar themes are explored. In this paper, I will examine the major subjects of cultural identity and post-colonialism, along with other themes present within their work. Mutu is a Kenyan-born, mixed media artist living in Brooklyn, New York, who creates magical yet grotesque collages, paintings and installations. Her work explores the topic of cultural identity by

challenging representations of the black female body in Western society within a feminist context. Shonibare on the other hand is a Nigerian-British artist who also works with a wide range of media and is well known for his use of African textiles. The headless mannequins that he dresses in handmade Victorian style costumes are the most striking sculptures he has created by far. Shonibare utilizes these textiles in order to challenge issues surrounding post-colonialism in terms of race and class, within the context of globalization. Shonibare's artistic style is polished and enchanting whereas Mutu's is provocative and unearthly, making them ideal for comparison. I will also analyze the aesthetic quality of their work and how this quality shapes their themes.

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## ATHLETIC TRAINING

### Kyle Hart

#### *High Protein Diets - A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

A majority of today's athletes are looking for an extra edge to become bigger, faster and stronger. Disregarding some of the illegal ways to achieve the aforementioned goal, the common choice for athletes often becomes the use of nutritional supplements, specifically protein supplement beverages. Athletes use high-protein diets to build muscle mass via the combination of intense physical exercise routines and/or the use of protein diets and meal replacement shakes. Losing a significant amount of body weight can also become a major factor in the athlete's quest to improve physical stature. When athletes don't truly know what they are putting in their body, or what effects an overabundance of protein can have on body systems (particularly the renal system), harmful effects can take its toll on the body. The purpose of this literature review is to investigate both the positive and negative effects of high protein intake in conjunction with intense physical activity exercise and weight loss. Additionally, it was important to also highlight further recommendations for research in this area of sport science.

### Jered Steen

#### *Chronic Exertional Compartment Syndrome*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

Approximately one-third of lower leg pain complaints are caused by chronic exertional compartment syndrome (CECS) in the athletic population. Interest in CECS arises from misdiagnoses and etiology ambiguity. Acute compartment syndrome is an emergent condition requiring surgical intervention before serious neurovascular (and other) soft tissue damage occurs. Although surgery is an option for CECS, it is not always necessary. The occurrence of a compartment syndrome condition may transpire from a traumatic injury, spontaneously, or from muscle exertion. Conservative treatments versus a surgical fasciotomy are the primary options for treatment. The purpose of this literature review is to highlight the possible pathophysiology of CECS, the diagnosis, the potential treatments, and the various case studies of this condition in the lower leg.

### Sarah Shepersky

#### *Rhabdomyolysis - A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

Rhabdomyolysis is characterized by muscle fiber breakdown. The breakdown of the muscle fibers can lead to myoglobin and enzymes being released via urine excretion. Rhabdomyolysis occurs when the body is pushed beyond its physical performance limits in extreme conditions, such as high humidity and heat. A key sign of rhabdomyolysis is a cascade event that can eventually lead to death if the condition isn't detected early enough. Signs and symptoms for rhabdomyolysis are dark cola-colored urine, bilateral muscle soreness, severe pain with musculoskeletal movement, and swelling in the muscles. Rapid medical treatment is required to prevent kidney failure and includes IV, monitoring of urinary output, mannitol, and loop diuretics. Without immediate medical treatment, serious complications are imminent with rhabdomyolysis, including death. Preventative measures are paramount with regard to avoiding major health complications with rhabdomyolysis;

however, the most important of these is making sure that athletes, athletic trainers, coaches, personal trainers and strength and conditioning coaches are well educated about rhabdomyolysis.

### Garret Miller

#### *The Adonis Complex - A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

The Adonis Complex, or muscle dysmorphic disorder, is a mental health problem that affects males 19-24 years old. The disorder has obsessive-compulsive traits, as well as characteristics of eating disorders. Muscle dysmorphic disorder is a psychological belief by a muscular individual that he (or she) is physically much smaller than their actual body size. Muscle dysmorphic disorder can begin during childhood; children often look up to the muscle-bound heroes in movies and video games. Children can also be bullied into feeling smaller than their actual stature. Known criteria for this condition include an obsession with diet, working out long hours, embarrassed feelings regarding their own body, and feeling inadequate. Negative consequences of muscle dysmorphic disorder include hypertension, cardiac arrhythmia, sleep disturbances, agitation, social phobias, panic disorder, and dysthymic disorder. Implications for athletic trainers include having an awareness of the disorder along with the ability to differentiate between the demands of the sport and the preoccupation of the disorder. It is important for athletic trainers to recognize the problem early because this may be a reversible disorder.

### Stacy Schurr

#### *Kick Up Your Heels & Bare Your Soles: A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

The purpose of this literature review is to examine how athletic trainers analyze running gait in order to comprehend the relationship of structure, function, and lower extremity capabilities, as well as individual limitations. Studying gait patterns and body movement may help athletic trainers prevent injury and enhance performance. While no one is able to calculate an equation for the most economical form of running, there are potential ways to decipher the relationship of



## PRESENTATION LISTINGS

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biomechanical, anthropometric, and kinetic factors to running economy. This literature review examines those relationships, as well as any clear risk factors and how they can potentially lead to running injuries. Additionally, information was reviewed regarding the challenge of barefoot running and some of the proposed benefits of alternative footwear and training.

### **Alexandra Gebeke**

#### *Massage Therapy - A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

The purpose of this literature review is to highlight a variety of aspects associated with therapeutic manual therapy, specifically massage therapy. Massage therapy is defined as the application of manual, soft tissue pressure on human body tissues, and is often categorized with respect to body segments (i.e. crainosacral), specific manual therapy techniques (i.e. deep tissue), or combination therapies (i.e., Thai Yoga or Shiatsu). Effects of manual/massage therapy techniques include muscle relaxation, pain management, increasing local blood and lymphatic circulation, and promotion of adhesion or scar tissue breakdown. Indications for massage therapy include decreased pain perception, increased joint mobility, and muscle cramp relief. Contraindications include deep vein thrombosis, embolisms, malignant cancer conditions, and acute inflammatory conditions.

### **Janey Bulson**

#### *Code Red: Five Hours Away from the Emergency Room - A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

This literature review focuses on the topic of energy drinks and the effects they potentially can have on the human cardiovascular system. Energy drinks are a common beverage used by people ranging from athletes who think it will help improve their sport performance to the average teenager or young adult who believes that extra caffeine is required to sustain a high level of energy throughout a normal/routine day. To date, there are approximately 100 different types of energy drinks available on the market – an industry that has become one of the fastest growing in our society. Consuming these energy drinks can come with many complications, some of which can

be life-threatening. Studies have shown that other countries, such as Germany, have tracked common health issues linked to consuming energy drinks. All of these complications are presented with case studies that have been done on both athletes and adult workers.

### **Tanner Kimber**

#### *Migraine Headaches: A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

This literature review focuses on the topic of migraine headaches, and how they have been disrupting humans long before modern day research or medications were invented. Most people think of a migraine condition simply as a more severe headache, when in reality, it is actually diagnosed as a disease condition or state. Along with the aid of medications, many other extrinsic factors can be noted by the potentially affected individual to decrease the likelihood of someone suffering from migraines. Having four potential stages, migraines affect every individual in a different and unique way. Someone with a long history of suffering from migraines may be able to detect warning signs hours to days before a migraine attack. Although it may seem hard to battle the lengthy list of complications associated with migraine headaches, many athletes are able to manage their signs and symptoms and continue to play at a very high level. The implication for athletic trainers and athletes who suffer from migraines is to assure them that resources are available to assist them in managing the disabling disease state/condition.

### **Hannah Lay**

#### *Sickle Cell Anemia*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

This literature review highlights the topic of Sickle Cell Anemia (SCA), and focuses on how the disease condition is transmitted, who is susceptible to the condition, the signs and symptoms, the diagnosis and the treatment of SCA. A major focus for this literature review concerns the athletes with sickle cell anemia with guidelines, recommendations, and restrictions for what they can and cannot do, and the rationale. This literature review also offers information about the sickle cell trait, a condition

where the person or athlete only carries the abnormal gene in their DNA, but does not display the usual signs and symptoms associated with SCA. Finally, implications are emphasized for the athletic trainer, teammates and family members of those who are affected by SCA.

### **Eric Thompson**

#### *Blood Doping- A Literature Review*

Faculty Mentor: Jay Albrecht  
& Dawn Hammerschmidt

This literature review investigated a variety of blood doping techniques, revealing that there are popular types being used by athletes to gain advantages in sport. Blood doping gives athletes a way to cheat in sport competition without a high risk of being caught. This is done by reinfusion of their own blood called autologous blood doping. There are also two other ways to perform blood doping called homologous and rHuEPO. Blood doping was first discovered in the 1970's when tests were being performed to try and increase VO<sub>2</sub>Max. Shortly thereafter, it was discovered that blood doping was already being used in international competitions. This literature review highlights how each type of blood doping technique works and which athletes have utilized the various techniques for the purposes of gaining an advantage over their competitive counterparts. Finally, information is also provided in this literature review regarding how the world anti-doping agency was able to develop a strategy to detect those athletes who were participating in blood-doping activities.

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## BIOLOGY

### **Calvin Flander & Olivia Hansen**

#### *Phenotypic Plasticity of the Convict Cichlid: A Predator Induced Morphological Defense*

Faculty Mentor: Shireen Alemadi

Convict cichlids are small freshwater fish from Central America. Like most fishes, larval cichlids have a skeleton made of cartilage that ossifies into bone as they grow and become juveniles. Past research at MSUM has shown that the timing of ossification is earlier for fish from Costa Rica (CR) than for fish from Nicaragua (NI). As is commonly the case in these kinds of comparative studies, we hypothesize that both divergent genes and inducible environmental

effects play a role. The earlier that prey adapt to the prevailing predation climate, the higher their chance of survival. In prior research, eggs of convict cichlid conditioned with an injured conspecific cue employ anti-predator tactics more efficiently than those eggs that were treated with the control, thus increasing their chance for survival. In this experiment, we will test convict cichlid embryos for developmental responses to three test cues: injured conspecific cue (alarm cue) mixed with a novel predator odor, alarm cue, and a control cue (dechlorinated water).

**Abel Tilahun, Alli Fox & Samuel Ameh**  
*Soil Metagenomics Optimization*

Faculty Mentor: Sara Anderson

This project focuses on using metagenomic techniques to unlock the soil microbial diversity in the Fargo-Moorhead area and establish the effect flooding has on the integrity (composition) of these soil communities. To determine, this soil is collected, analyzed and the sequences compared. Possible applications of the results from this study are far-reaching and will include unraveling the effect of flooding on the interactions between the soil microbial community and the local Fargo-Moorhead human population. Preliminary data will be presented from two locations demonstrating the success of the method that displays two microbial communities but, we do not have any Fargo-Moorhead data back at this time.

**Raissa Nkulu Kasongo Wa Nday, Julia Gichimu & Courtney Constantini**

*Optimization of Lab Techniques in DNA Barcoding for Native Bees*

Faculty Mentor: Sara Anderson

Over the past few decades, various species of bee have been under close scrutiny by researchers. This is due to the fact that nature's most important pollinators have been declining rapidly. In order to better understand why this has been happening, researchers have developed a system of identification processes, including DNA barcoding, to track and log various species. Since many species of bee are phenotypically difficult to identify, DNA barcoding has become a widely used system of identification. Although many bees can be identified using this barcoding system, it is estimated that 70 percent of the estimated 20,000-30,000 species of bees

worldwide still do not have an accurate method of identification for them. The focus of our research is to develop and streamline a process for DNA barcoding that will allow identification of lesser-known species of bee. We isolated the DNA from a single leg of each bee collected. From there we used our modified PCR protocol to amplify the barcoding section containing the cytochrome oxidase one gene, which was our targeted gene. To generate barcoding data to compare with published sequences, the PCR products were submitted to a sequencing facility.

**Ashley Eder, Molly Dziekan & Sabrina Boit**

*Molecular Analysis of Two Similar Parasites*

Faculty Mentor: Sara Anderson

Parasitic worms in the class Trematoda require multiple hosts to complete their life cycle. We are studying parasites that use fish-eating birds as a final host, a snail, and then a fish (fathead minnow). A second larval form, called cercariae, emerges from the snail and burrow into the body of a fish. Inside the fish, the larvae encyst as metacercariae where they wait for the fish to be eaten by the bird to complete their life cycle. We are examining two parasitic species. One, commonly referred to as "black spot," form metacercariae covered in melanin that reside within the skin tissue of the minnow and can be seen externally. The second, known as white metacercariae, appears identical in shape and size but lacks melanin coating and encysts within muscle tissue. Are these two forms of metacercariae the same species? To test this question we dissected fathead minnows and collected white and black metacercariae. We have successfully extracted DNA from tissue samples and have begun optimization of protocols to sequence a species-specific genetic variant of the cytochrome c oxidase I gene. The results from the DNA analyses are still being gathered.

**Molly Strong**

*Development of Cell Lines Expressing Na<sup>+</sup>/H<sup>+</sup> Exchanger 1 Mutants for Extracellular-signal Regulating Kinase Phosphorylation*

Faculty Mentor: Mark Wallert

As cancer treatment becomes more targeted at specific regions of a tumor, researchers are looking deeper into the mobility and

development of the tumor and how to contain it. The Sodium hydrogen exchanger isoform 1 (NHE1) is an important protein involved establishing and regulating the pH gradient across the plasma membrane. One of the hallmarks of cancer is uncontrolled cell division resulting in tumors. Cell division requires a series of signaling pathways to be activated in order for proliferation to proceed. A specific pathway of interest is a mitogen activating pathway consisting of extracellular-signaling regulating kinase (ERK) which phosphorylate NHE1 at serine 770 and 771. These sites were removed and mimicked through changing the serine into an alanine and aspartic acid respectively. These engineered DNA sequences will allow us to control which phosphorylation sites are present within the NHE1 DNA sequence. The different mutant NHE1 DNA constructs were genetically inserted into PS120 cells, which are cells that do not express NHE1. Using this new DNA, six mutants allowed us to test for growth and proliferation of cancer cells with and without ERK.

**Alexander Novak**

*Defining interaction interfaces important for the establishment of cell polarity in Drosophila neuroblasts*

Faculty Mentor: Mark Wallert

Asymmetric cell division leads to the differentiation of daughter cells by aligning the mitotic spindle to polarized fate determinant cortical domains during mitosis. In *Drosophila* neuroblasts, cell polarity is established through the Par complex protein Bazooka (Baz aka Par-3) binding to Inscuteable (Insc), while proper mitotic spindle orientation is established through Partner of Inscuteable (Pins) and the G protein, Gai. Loss of any component leads to loss of polarity and subsequent lethality in the developing fly. Although these interactions are fundamentally important, the physical nature of Insc's interactions with its binding partners is poorly understood. To explore this idea further, we asked: What are the interaction interfaces between Insc and its binding partners? We identified and characterized the minimal interaction interface between Insc, Baz, Pins, and Gai by MBP affinity chromatography using different constructs of Insc and assaying for binding of the partners. Our study of Insc has



revealed that Pins/Insc binding is conserved with their mammalian orthologs using a motif within the ankyrin repeat 1-2 region. Baz/Insc binding requires folded Insc ankyrin repeats 2-3 plus one adjacent ankyrin repeat. Gai binds to Insc in a GoLoco-like manner in the ankyrin 3-4 linker. We find that Insc competes with GoLocos for Gai binding. We also find Insc/Gai binding to be nucleotide specific. Using this data we will generate point mutants, which disrupt the individual pathways and look for phenotypes in the developing fly.

**Robyn Oster**

*Using stable isotopes to detect selective feeding behavior of predatory larval midges under different temperature regimes*  
Faculty Mentor: Daniel McEwen

Being near the bottom of the food chain, benthic macroinvertebrates play an important role in driving production in an ecosystem; they are used to determine the integrity of aquatic ecosystems due to their diversity and species-specific responses to environmental conditions. It is no surprise that fish rely heavily on benthic macroinvertebrates as a food source. The quality of nutrients and energy being passed up to fisheries depends on benthic macroinvertebrates that are primarily predatory, though they are also omnivorous because they have an intermediate position in food chains. Understanding how temperature changes affect feeding behaviors may be important under future scenarios of climate change. I want to find out how temperature can influence diet preferences in a group of primarily predatory, though sometimes omnivorous, midges called 'tanytods'. Because warmer temperatures positively correlate with higher metabolic rates, I hypothesize that tanytods cultured in warmer temperatures will preferentially have a carnivorous diet; conversely, tanytods cultured in cooler water will experience a more herbivorous diet because it requires less energy. I will use stable isotopes to determine feeding preferences of predatory larval midges from temperature trials.

**Angela Kooren & Jordana Anderson**  
*Preliminary Genetic Study for Examining Population Dynamics of Painted Turtles (Chrysemys picta) in Three Sloughs of Clay County, MN*  
Faculty Mentor: Sara Anderson

Since 2001, nearly 900 turtles have been live-trapped, marked, and released on three sloughs near Rollag, Minn., to learn about movements, mortality and growth rates, sexual dimorphism, population dynamics, and habitat associations. From the start of this long-term, painted turtle ecology study, a marked decline in turtle numbers has been recorded in addition to higher water depths, less aquatic vegetation, and newly introduced cow grazing and plowing in the area surrounding one slough. During the 2013 field season extending from May 15 to Sept. 15, 61 buccal swabs were collected in order to examine population dynamics more closely with the inclusion of genetic data. Buccal swabs were used because they are the least invasive method for obtaining DNA. The goal of this study is to refine our PCR techniques for processing the DNA from these swabs in order to establish a baseline of genetic diversity across the landscape. Ultimately, we aim to discover if decreased movements and the influence of the changing habitat will change the level of gene flow within and between the sloughs. Additional swabs will be collected in the coming field seasons to see how/if the level of variation/relatedness changes with the future cohorts of turtles.

**Stanislas Ogokeh**  
*A comparative Investigation of PDRP2 and PDRP7 mRNA Expression Using Absolute qPCR*  
Faculty Mentor: Chris Chastain

A key enzyme in C<sub>4</sub> photosynthesis is pyruvate phosphate dikinase (PPDK). PPDK catalyzes the rate limiting reaction of photosynthesis, and is controlled by the regulatory protein PDRP. PDRP has a bi-functional role in regulating PPDK; it is able to phosphorylate and dephosphorylate PPDK's active site. Furthermore, two types of PDRP are expressed in maize; PDRP2 and the newly discovered PDRP7, in which its function is unclear. Therefore the goal of this study was to (i) determine if the gene of the PDRP7 is transcribed, and (ii) if so, how much is it relative to PDRP2. The expression of PDRP2 and PDRP7 transcripts were comparatively assessed using absolute real-time Polymerase Chain Reaction. The mRNA used for this assay was isolated from leaflets of the Zea mays. Based on preliminary results, we have deduced that PDRP2 and PDRP7 were equally expressed.

**Eric Bares & Samantha Stein**  
*The Investigation of the Regulatory Properties of PDRP 2 and PDRP 7 in Relation to PPDK Found in Maize Leaf Tissue*  
Faculty Mentor: Chris Chastain

There are two types of photosynthesis: C<sub>3</sub> and C<sub>4</sub>, the latter being much more efficient. This increase in efficiency allows C<sub>4</sub> crops to have an increase in crop yield by using the same amount of energy as C<sub>3</sub> plants. PPDK is a vital enzyme in the C<sub>4</sub> photosynthesis pathway. It is activated and deactivated by a regulatory enzyme called pyruvate orthophosphate dikinase regulatory protein (PDRP). PDRP has unusual properties which allow it to perform both phosphorylation and dephosphorylation, making it a rare bi-functional enzyme. The goal of our research project is to investigate the biochemical properties of uncharacterized PDRP-7 enzyme found in maize. Several major experimental techniques will be utilized for the purification and analysis of PDRP-7 in maize leaf tissue, including an assay to measure the enzymatic activity and western blots to confirm the desired enzyme is present. Preliminary enzyme assays show that PDRP-7 has a protein phosphorylation activity. Follow-up results will be presented.

**Alejandra Justo, Derek Schwab, Andrew Schmidt, Cassandra Mondshane, Ryan Jedlicka, Hayat Ahmed & Merlinda Yang**  
*Functional Genomics of Chromobacterium Violeaceum Using Random Transposon Mutagenesis*  
Faculty Mentor: Tamara Mans

We proposed to test hypothesized functions of genes in the genome of Chromobacterium violaceum with functional experiments. Currently, genomes are analyzed and functions of genes are hypothesized based on similarities with those already in a database of genes with tested functions. This information is then uploaded to databases before experimental confirmation of the function. We focused on genes whose products are involved in proline biosynthesis and expanded from there to genes involved with other amino acid biosyntheses.

**Shelby Sieverding, Nana Akua Boadu,  
Joshua Miller, Jaden Witt,  
Hermella Alemneh & Alyssa Breitbart**

Endocrine Disruptors in the Red River  
Faculty Mentor: Ellen Brisch

High levels of endocrine disruptors were observed in routine water samples taken downstream of the Fargo Municipal Waste Water Treatment Plant (FMWWTP) on the Red River. Endocrine disruptors can cause cytotoxic effects on organisms living in the water as well as stimulate cell growth. Students at MSUM have been researching this trend by observing fish development in water collected downstream from the FMWWTP. Water is collected in the winter, upstream and downstream of the Municipal Waste Water Treatment Plant. In the lab, fish embryos are placed into three treatments: upstream of the FMWWTP, downstream of the FMWWTP, and control water (dechlorinated water) to detect differences in development. In 2008, Medaka fish that hatched in the downstream treatment hatched more quickly than the fish in the upstream water samples. However, further research was needed to test this hypothesis. In 2009 and 2010, river conditions resulted in unreliable water samples, and in 2011, there were no surviving fish. This year, research was conducted using zebra fish as a model organism to test for change in hatching between the three treatments. This project is in collaboration with a group of students and faculty in Chemistry.

**Jordan Johnson & Ashley Eder**

*Efficiency of Zooplankton in  
Aquaponic Cultures*

Faculty Mentor: Daniel McEwen

An aquaponic culture system involves roots of plants, in this case tomatoes, being held in a container with some sort of porous substrate, like lava rock, which is fully submerged in a water tank with fish and produces waste that contains nutrients that can be taken up by plants for growth. Our main objective is to see if zooplankton can achieve a similar effect. Zooplankton are microscopic animals that feed on algae in the water. Zooplankton are much easier to maintain than fish and have higher rates of metabolism to turn over nutrients more quickly than fish do. Plant cultures will be treated with water (control), fish, and zooplankton. This study will help us understand how different

organisms add to the success of plants in aquaponic cultures.

**Andrew Larson, Nikholai O'Hara  
& Joshua Miller**

*Logging Roads and Poaching in Costa Rica.*

Faculty Mentor: Daniel McEwen

Illegal hunting (poaching) requires hunters to have access to the desired animals and/or plants. Roads provide convenient access, and illegal logging roads provide access deep into protected areas which are managed to conserve biodiversity. These protected areas are often the only place that some endangered species exist, and many only thrive in isolated wilderness areas. The presence of logging roads is most always associated with increased rates of poaching, as roads allow poachers to drive vehicles into habitat that was otherwise only accessible on foot. Both enforcement of poaching laws and closing illegal logging roads should lead to better protection of biodiversity.

**James Kawlewski & Tracy Shervheim**

*The Combined Effects of Pesticides and  
Temperatures on Growth, Development,  
and Survival of Tadpoles*

Faculty Mentor: Daniel McEwen

Metabolic rates are predicted to scale in a predictable way with environmental temperatures. If temperatures are globally increasing, it means frogs, like other ectotherms, will likely be subjected to warmer temperatures and subsequently higher metabolic rates. The rate at which frogs can metabolically process pesticides will subsequently increase; however, we do not know whether anabolic or catabolic processes might be more sensitive to higher temperatures. We have designed an experiment to test the hypothesis that these metabolic rates are asymmetrically influenced by temperature in leopard frog (*Rana pipiens*) tadpoles. We are using a two-factor crossed design with the first factor (pesticides) having four levels (malathion, glyphosate, malathion + glyphosate, and water as a control). These pesticide treatments are crossed with a second factor, temperature, which has three levels: 200, 250, and 300 Celsius. Growth, development and survival will be measured for 12 weeks at three-week intervals. We anticipate at the end of the research we will see lower growth, developmental and survival

rates in pesticide treatments, especially at higher temperatures due to the rate of increase in metabolic activity required to process pesticides.

**Chizoba Adizue & Colin Teichert**

*Effects of Temperature on Snail Growth*

Faculty Mentor: Daniel McEwen

The purpose of our experiment was to determine if there was a positive, negative, or no correlation between size of an organism and the temperature of its habitat. Snails were grown at 10 different temperatures ranging from 80C to 330C, and their lengths were measured using digital calipers. We hypothesize according to metabolic theory that snail size and population density will be higher in colder temperatures. We used non-linear regression to test these hypotheses.

**Andrew Larson, Jessica Lindstrom  
& Nikholai O'Hara**

*Do Ecological Rates in Midges Respond in  
Predictable Ways to Temperature?*

Faculty Mentor: Daniel McEwen

We are studying how temperature influences ecological rates of larval midges, which are the most diverse and productive insect group in Arctic Alaska. Given the Arctic is warming faster than other regions of the world, how temperature impacts their growth, development, and survival may be important. Using aquaria chillers and heaters, we were able to set up a gradient of temperatures ranging from 50C to 300C and assess how that impacts ecological rates of these animals. We tested arctic midge community response by incubating bulk sediments at different temperatures to see which species survived and/or grew. We also used the midge *Chironomus dilutus*, a common laboratory midge, to assess how temperature differentially impacts growth and survival. The Temperature Size Rule (TSR) suggests that development is more sensitive to temperature than is growth, and subsequently insects in colder environments are larger than those in more temperature environments. To test TSR, we used macrophotography to estimate size of animals after treatment. Development was measured as time-to-emergence. We anticipate our findings will lead to direct experiments on the metabolic effects related to temperature.

**Yimeng Li**

*An Inexpensive Method to Determine Bottom Force in a Wave Tank*

Faculty Mentor: Daniel McEwen

Lake waves drive a wide variety of physical processes. We are particularly interested in how bottom dwelling organisms respond to constant disturbance of lake sediments caused by wave action. We have purchased a wave generator that we are using to build an artificial wave tank to study wave impacts on bottom sediments and organisms; however, measuring forces that disturb the bottom from waves is difficult and typically expensive to measure because specialized equipment is necessary. In this experiment, we will try to find out if an inexpensive and easily constructed instrument could be used for measuring wave force in our wave tank. By using a hand-made Underwater Relative Swell Kinetics Instrument (URSKI), which is a subsurface float tethered by a short line.

**Jaime Kallstrom, Ashley Eder, Jamie Naasz, Angela Kooren, Elizabeth Miller & Harrison Pantera**

*Growth Rate Models of Painted Turtles in Clay County, Minnesota*

Faculty Mentor: Donna Stockrahm

In a long-term study (2001-2013), nearly 900 painted turtles (*Chrysemys picta bellii*) have been live-trapped in Clay County, Minn., to study growth rates, survival, population characteristics, and movements. Captured turtles were weighed, sexed, measured, marked by scute notches (and PIT tags starting in 2006), and released on the shoreline of the slough of capture. From 2001-2010, we live-trapped 2 sloughs that were <1 km apart and roughly 3 ha and 6 ha in size. From 2011-2013, a third slough (<0.4 ha) was trapped approximately halfway between the 2 original sloughs where cattle grazing had been excluded and shoreline vegetation was intact. The purpose of this poster is to develop growth models for our captured turtles. Since 2001, we have nearly 4,000 recorded captures. However, for our models, we only used turtles that had been PIT tagged and were caught multiple years. We separated the data set by sex because painted turtles exhibit sexual dimorphism in size, with adult females being larger than adult males. Although we took multiple shell measurements, for our purposes here, we used only use carapace length. Our poster will present several different growth models for painted turtles.

**Ashley Eder**

*A Research Proposal: Effects of Mown Paths on Meadow Vole Movements*

Faculty Mentor: Donna Stockrahm

Meadow voles (*Microtus pennsylvanicus*) prefer open, grassy habitats and use above-ground runways for their movements through vegetative cover. A variety of mice and shrew species also use these habitats, but they are not necessarily tied to runways. If vole runways or their associated vegetative cover are blocked or destroyed by habitat manipulation or other means, vole movements might be curtailed. My experiment is going to test if mown pathways will negatively influence meadow vole movements, essentially serving as a barrier to normal movements. We will live trap small mammals in a grid pattern before and after we insert mowed pathways. To track movements, we will give each individual a unique toe clip number and record distances traveled between recaptures. I will test two hypotheses: that the mown paths will affect vole movements and that the mown paths will have a greater effect on movements of meadow voles than on movements of other small mammal species also using the habitat but not confined to runways. This study will be conducted during summer 2014.

**Jaime Kallstrom, Ashley Eder, Jamie Naasz, Angela Kooren, Elizabeth Miller, Harrison Pantera, Janna Gilbertson, Jordana Anderson, Julia Goroski, Kara Nygaard, Lily Holt, Nikholai O'Hara, Scott Buchholz & Sanjaya Mendis**

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excluded and shoreline vegetation was intact. The purpose of this poster is to develop growth models for our captured turtles. Since 2001, we have nearly 4,000 recorded captures. However, for our models, we only used turtles that had been PIT tagged and were caught multiple years. We separated the data set by sex because painted turtles exhibit sexual dimorphism in size, with adult females being larger than adult males. Although we took multiple shell measurements, for our purposes here, we used only use carapace length. Our poster will present several different growth models for painted turtles.

**Emily Mammenga**

*Familial Odor-Tracking by Larval Fish*

Faculty Mentor: Brian Wisenden

Parental care is unusual in fishes, but common among fishes in the family cichlidae. Convict cichlids form monogamous pair bonds and have biparental care of their free-swimming young for up to six weeks. During this time parents cooperate in the defense of the young against brood predators. If the young are separated from their family, then they must quickly find their way back to avoid being eaten. Here we tested the ability of larval fish to use chemical cues to orient toward their family. Previous research showed that they can orient to chemical cues from their home aquarium, which comprise the odors of the parents, their siblings and the gravel in the tank. In this experiment we showed that they can orient toward the odor of an individual parent. We then showed that they can distinguish between an unrelated parental female blank water control. We also found that young cichlid showed no preference between the odor of their biological mother or the odor of an unrelated parental female.

**Andrew Larson**

*Climate Change and Metabolic Rates*

Faculty Mentor: Daniel McEwen

Rates of global climate change are more pronounced in the Arctic compared to other regions. Recent declines of arctic shorebird populations and nesting success is correlated with the warming trend. We hypothesize that a mismatch may be occurring in when birds arrive to the Arctic and when their food source, primarily flying insects of the family Chironomidae, becomes available. Bird

migration is cued by day length, while insect emergence phenology is cued by temperature. The longest stage in the life cycle of Chironomids is the aquatic larval stage, and like other aquatic macroinvertebrates are poikilothermic, meaning their body temperatures match environmental temperatures. Chironomids are the primary food source of arctic shorebirds. We think that earlier spring thaws and warmer summer temperatures in ponds affect the growth and development rates of the chironomids, altering chironomid size, duration of the life cycle, and timing of emergence for when they are available to birds. Before testing this hypothesis directly, we use *Chironomus dilutus*, a lab-reared model for chironomids, to determine precise relationships between temperature and larval growth and development rates, as well as the effects of temperature on embryonic survival rates. We anticipate our findings will lead to direct experiments in the field of the match-mismatch hypothesis.

**Jamie Naasz, Kara Nygaard, Elizabeth Miller, Kayla Kenney, Ryan Rothstein, Julia Goroski, Janna Gilbertson, Jaime Kallstrom, Ashley Eder & Angela Kooren**  
*Continuing Population Control of Urban Canada Geese in Moorhead, Minnesota*  
Faculty Mentor: Donna Stockrahm

Urban Canada geese (*Branta canadensis*) are becoming too numerous in many places, including the Fargo-Moorhead area. Since 2010, we have monitored nests and oiled eggs on land owned by American Crystal Sugar (ACS) in Moorhead, which has year-round open water in holding ponds and minimal numbers of predators, providing optimal breeding habitat. Between the years of 2010-2013, we quantified goose numbers (March-April), monitored nests (April-May), and oiled (April) all but 1-2 eggs in each nest as part of a long-term management plan to curb goose numbers. Between 2010-2012, the number of nests declined from 123 to 28. However, in 2013, nest numbers jumped to 52. Mean clutch size (5.9, 5.8, 5.1, 5.8) and range (1-12, 3-14, 1-13, 2-10) have remained fairly stable over the 4-year period. Counts of geese decreased since 2010 with maximum counts approaching 440, 250, 300, and 274 for each year, respectively. Comparing nest numbers with numbers of geese on the premises indicate many

of the geese using the habitat are not necessarily nesting there. Concurrently, but separate from our study, any remaining adult geese and/or hatchlings still present on the property by late June of each year were rounded up and removed. The combination of egg oiling and goose removal has reduced goose numbers, but long-term effects are not yet known. Possibly, the vacated habitat on ACS grounds will be repopulated with other resident geese in the Fargo-Moorhead area. Nest monitoring is expected to continue through spring 2014.

**Chase Esslinger, Scott Buchholz & Clarice Wallert**

*In vivo and in vitro interaction of calcineurin B homologous protein isoforms 1 and 2 (CHP1 and CHP2) with the Na<sup>+</sup> - H<sup>+</sup> exchanger isoform 1 (NHE1)*  
Faculty Mentor: Mark Wallert

The Na<sup>+</sup>-H<sup>+</sup> exchanger isoform 1 (NHE1) is a key regulator of cell proliferation, migration and invasion in cells from a variety of solid tumors. The calcineurin B homologous proteins (CHP1 and CHP2) appear to be essential cofactors to support NHE1 function. CHP1 appears to be expressed ubiquitously in healthy tissue, while CHP2 is predominantly expressed in tumor cells. While both CHP isoforms are highly homologous and bind in nearly identical regions on NHE1, each has been identified to have a distinct impact on NHE1 function. In this study we investigate the ability of CHP1 and CHP2 to bind independently and competitively to NHE1. The impact of serum deprivation has been thought to drive CHP2-NHE1 transport and the effect of low serum on CHP1/CHP2 interaction with NHE1 will be assessed. Using recombinant fusion CHP1, CHP2 and NHE1 proteins a reconstituted-96 well plate based assay has been developed to quantitate the binding affinity of each CHP isoform for NHE1. We will also demonstrate the competition binding between CHP1 and CHP2 for NHE1 using this in vitro protein-protein method.

**Fabian Trejo**  
*Physical Therapy*

Faculty Mentor: Shireen Alemadi

The practice of physical therapy can be traced back to the time of Hippocrates and Galenus in 460 B.C. The first professional group of physical therapists was founded by Per Henrik Ling, a

Swedish physical therapist in 1813. He founded the Royal Central Institute of Gymnastics with the purpose for massage, manipulation and exercise. There are many specialties in the field of physical therapy, but the five most common are orthopedic, geriatric, neurological, cardio and pulmonary, and pediatric physical therapy. Each specialty plays an important role in the health management plan of their patients and will be reviewed in detail. The physical therapy employment rate is expected to grow by 36 percent by 2022.

**Sarah Martinson**

*Using Macrophotography to Estimate Dry Mass of Larval Insects*  
Faculty Mentor: Daniel McEwen

The purpose of this research is to find a fast and effective method for estimating dry mass of macroinvertebrates using the midge, *Chironomus dilutus*, as a model, by comparing measured body length, area, perimeter, major and minor axes. Length-mass, as of now, is the most commonly used method for estimating the dry mass of macroinvertebrates. We propose that the best body dimension for estimating the dry mass of macroinvertebrates will be area, based on previously published research. We used a macrophotography and captured pictures of live *Chironomus dilutus* in several different positions to assess how body orientation influenced measurements. We used ImageJ to measure resulting body dimensions. Area was found to be the best approach to estimating dry mass.

**Pantera & Nicholas Berthelsen**

*Mutational analysis of calcineurin B homologous protein isoform 2 (CHP2) binding to the Na<sup>+</sup> - H<sup>+</sup> exchanger isoform 1 (NHE1)*

Brittany Bisnett, Alexander Novak, Harrison  
Faculty Mentor: Mark Wallert

The Na<sup>+</sup>-H<sup>+</sup> exchanger isoform 1 (NHE1) is a transmembrane protein that regulates a range of cellular functions essential for cancer progression including cell adhesion, proliferation and migration. The calcineurin B homologous proteins (CHP1 and CHP2) appear to be essential cofactors to support NHE1 function. The CHP1 and CHP2 binding domain on NHE1 is the same, amino acids 515 to 530. CHP2 is expressed primarily in tumor cells where it binds to NHE1





with a 5-10 fold higher affinity than CHP1. CHP2 expression in tumor cells supports increased invasion and migration. Here we investigate the ability of mutations at several key amino acids in the binding domain (N519, H523, D536) to alter CHP2 binding to NHE1 *in vivo*. Two distinct site directed mutations to NHE1 for each key amino acid have been constructed along with the accompanying stable cell lines expressing NHE1 with these mutations. We will present data evaluating CHP2 binding to NHE1 in these cells using GFP and RFP CHP fusion proteins. We will also evaluate how a change in CHP2 binding alters adhesion, proliferation, and migration in mutant expressing cells as compared to cells expressing wild-type NHE1.

### **Moriah Hovde & Whitney Swanson**

#### *A Comparative Survey of the Impact of NHE1 Phosphorylation on Cell Motility.*

Faculty Mentor: Mark Wallert

The sodium hydrogen exchanger isoform one (NHE1) exchanges an intracellular proton for an extracellular sodium ion playing a key role in directed cell motility. The regulation of NHE1 function is complex, involving multiple protein-protein interactions and several phosphorylation sites. While most of the kinase sites have been identified, the role of each phosphorylation event has not been defined in the context of the other phosphorylation events. There are many challenges involved in gaining a comprehensive understanding of the role of the different phosphorylation events. In part, these challenges come from the fact that data has been collected from multiple cell types being stimulated by a wide array of agonists. Two key phosphorylation sites on NHE1 are RhoA associated kinase (Rock) and ribosomal S-6 kinase (Rsk). We have created cell lines expressing two distinct mutations at each Ser/Thr phosphorylation site. The first mutation changes the Ser/Thr to Ala removing the ability of a kinase to phosphorylate that site. The second changes a Ser/Thr to Asp to mimic the phosphorylation event. To screen the roles of each of these phosphorylation sites, changes cell motility will be determined in cell lines stably expressing each NHE1 mutant. Our goal is to evaluate the relative impact of each phosphorylation site on NHE1 function in a comparative comprehensive manner.

### **Harrison Pantera, Katie Robinson & Elizabeth Miller**

#### *The Three-Wattled Bellbird: A Symbol of Conservation Efforts in Costa Rica*

Faculty Mentor: Brian Wisenden

All living things have a vital role that contributes to life as a whole; whether similar or not, they all form an interconnected web. A term related to this concept is biodiversity, a crucial element to maintain in order to preserve the circle of life. Costa Rica is well known for its highest degree of biodiversity and has many ongoing projects that are in place to conserve and rebuild what has been damaged in the past. The case of the three-wattled bellbird (*Procnias tricarunculata*) is of particular concern, as it requires conservation of multiple habitats to ensure its preservation. It is believed that there are four populations of bellbirds around the world, and one of the largest is found in Monteverde, Costa Rica. Bellbirds utilize two separate habitats: one for breeding and one for post-breeding. Tropical rain shadow forests are areas with diminishing forest fragments and host bellbirds during their post-breeding season; due to the loss of the habitat where they spend one-half of the year, there has been a decline in the bellbird population size. Conservation efforts are being made to restore small fragments that are a second home to bellbirds and to stabilize the bellbird population size.

### **Heather North, Katie Robinson & Avi Oczachowski**

#### *Costa Rican Cichlid and Phenotypic Plasticity*

Faculty Mentor: Brian Wisenden

Cichlid fish have biparental care of their eggs and free-swimming young. Both parents protect the young against predators for 4-6 weeks or until the young have developed the swimming ability to be able to avoid predator attacks. Swimming performance is linked to skeletal ossification (conversion of cartilage to bone), which allows more forceful propulsion. The timing of ossification can be influenced by genetics (population differences) or by environmental factors (chemical alarm cues: indications of predation risk such as chemicals from injured members of their species). Here, we compared the timing of ossification of embryos and larval

exposed to either chemical alarm cues or water (control). We predict that alarm cue will induce early ossification because early ossification controls early ability to escape predators.

### **Molly Kraemer & Vincent Anani**

#### *Proximate Mechanisms of Olfaction in Goldfish: Acquired Recognition of Predator Odor*

Faculty Mentor: Brian Wisenden

Fish have olfactory (sense of smell) receptors at the tip of the nose that detect chemicals in the water. The receptors connect to tracts of axons that transmit information up the snout to the brain. The olfactory tract in goldfish comprises two subtracts: the lateral olfactory tract (LOT) and the medial olfactory tract (MOT), each specializing on different classes of chemical odorants. The MOT carries information about alarm cues (chemicals released from damaged skin) while the LOT carries information about amino acids and polypeptides (food, predator body odor). Fish are not born with the innate ability to associate the chemical cues of a predator with fear; they must learn it. In this study, we will be testing whether the association between unknown predator odor and alarm cue released from shredded skin occurs if either the LOT or MOT is severed. We will use a surgical technique to open the bone plate of an anesthetized goldfish and sever either the MOT or the LOT or neither (sham). Then the hole will be closed and the fish will be allowed to come back to consciousness. We will run a conditioning trial on each fish, delivering both the alarm cue and the predator odor, to see if the fish pick up both signals of the alarm cue and the predator cue, and then run a test cue to see whether the predator odor alone will cause a fear response. This has application in environmental biology and aquaculture.

### **Blair Posusta, Ashley Eder & Sabrina Boit**

#### *Butterfly Diversity in Costa Rica*

Faculty Mentor: Brian Wisenden

Maintaining and promoting biodiversity is a major goal of conservation biology. There are different forms of biodiversity: genetic, species and ecosystem diversity. We will document butterfly diversity in Costa Rica to reveal some of the underlying mechanisms that maintain

butterfly diversity in several different habitat types. In particular, we will look for correlations between wing color patterns and habitat types. Color patterns are selected by prevailing predation pressure and ambient light conditions that exist in each habitat type. We hypothesize that because of the interdependence of butterflies and host plant species, that butterfly species diversity and general color patterns will be habitat-specific. To maintain a diversity of butterfly species a diversity of ecosystem types will be required.

**Janna Gilbertson, Rachel Walsh & Robyn Oster**

*A Use for Methane*

Faculty Mentor: Brian Wisenden

Methane gas has a global warming potential 43 times that of CO<sub>2</sub>. Finding a way to use methane reduces the total impact of emissions. We will be investigating an alternative energy practice at the UGA-Costa Rica. At the stable, the family uses a biodigester that uses liquid manure and urine from cows and pigs to produce methane gas and organic material. The methane gas is used to power for cooking and heating water, and the organic material is used as fertilizer for the pastures and crops.

**Katelyn McMahan**

*Genetic Fingerprinting Used to Determine Paternity in *Poecilia reticulata**

Faculty Mentor: Sara Anderson

Utilizing a variety of molecular biology techniques guppy mate selection will be examined. Using the variable of color choice, it will be determined whether a female guppy prefers a blue or orange male. The paternity of the offspring will be determined using multi-locus microsatellite data as an individually identifiable genetic fingerprint. The DNA was purified from tissue samples and polymerase chain reactions were optimized to amplify the DNA. The final products are in the process of being measured using the Agilent bioanalyzer “DNA on a chip” technology to establish the genetic paternity of each fish. This data will then be statically analyzed and will reveal which color of mate a female guppy prefers.

**Rachel Walsh & Emily Mammenga**

*Skeletal Ossification of Nicaraguan Convict Cichlids*

Faculty Mentor: Brian Wisenden

Natural selection shapes all aspects of animal life, including morphological and behavioral traits. Predation is a major agent of natural selection therefore anti-predator competence is very important. Predation is most intense on early life stages especially in species with large numbers of small young. We are studying the timing of skeletal ossification on lab-reared Nicaraguan convict cichlids, which are small freshwater tropical fish that exhibit bi-parental care of their young. The young, or fry, depend on the protection of their parents as they develop. The skeletal ossification of fry correlates with swimming velocity and acceleration. Timing of skeletal ossification also affects the evolution of parental care behavior. From the understanding of fry development we can learn more about parental protection and evolutionary anti-predator adaptations.

**Molly Dziekan, Sabrina Boit & Ashley Eder**

*Wind Exposure Effecting Parasite Density in Fathead Minnows*

Faculty Mentor: Brian Wisenden

Parasites can have a strong negative effect on the health and reproductive success of their hosts. This puts selection on hosts to detect and avoid areas where risk of parasitism is high. In our study system, trematode parasites infest fish-eating birds such as herons and king fishers. The eggs pass with the bird feces and hatch in the water and infect pond snails. The parasites develop in the snails and then emerge into the water as cercariae where they attack fish. The parasite's life cycle is completed when the fish is eaten by a bird. The purpose of our experiment was to determine whether risk of parasitism is the same for all areas of the shoreline. To carry out our experiment, we used 16 test sites in Shoe Lake – eight sheltered and eight exposed to wind. Lab-reared minnows, free of parasites, were placed in small cages at each site to recruit parasites. After three weeks, the minnows were brought into the lab for dissection to look at the density of five different species of parasites.

Results are still being analyzed. This study will help us understand how biotic and abiotic factors may influence infection rates among fish hosts.

**Amanda Cameron & Colin Larter**

*Positive and Negative Effects of Tourism on the Environment of Costa Rica*

Faculty Mentor: Brian Wisenden

Tourism has introduced a host of positive and negative effects on Costa Rica economically and environmentally. While economically, tourism is currently one of the best ways for Costa Rica to make money, if the country continues down the path of converting biologically diverse areas into resorts, its rich environmental resources will be lost. Costa Rica's tourism industry includes ecotourism as well, rather than just resorts as travel destinations. Ecotourism promotes environmental awareness among travelers. Ecotourism also provides jobs for Costa Ricans that do not directly harm the environment, like logging, for example. Tourists looking to experience the biodiversity Costa Rica has to offer also spend money on other things while in the country, like travel expenses, food, lodging. This increases the incentive to preserve the tropical forests that bring ecotourists in. However, ecotourism is not without its drawbacks. The pollution caused by the travel to get to Costa Rica can be bad enough to cancel out any of the positive effects ecotourism supposedly has, as well as any direct damages tourists may inflict during their stay.

**Katelyn Huber & Paige Meyer**

*Monteverde Cloud Forest Preserve*

Faculty Mentor: Brian Wisenden

Tourism in Costa Rica is a growing business, and Costa Rica has adapted to fit the demands of many tourists and still protect many rain forests. In particular, the Monteverde Cloud Forest Preserve is one of the most visited and largest forest preserves within the country. This preserve was established in 1972 containing 810 acres of land and has now expanded to cover approximately 35,089 acres of land. Today, over 70,000 people visit this forest from around the entire globe, making Monteverde one of the most popular tourist destinations in Costa Rica. This cloud forest has surpassed the revenue of both banana and coffee exports combined. The revenue from this almost self-sustaining forest



is grand enough to stimulate the economy, and many families within the country. Monteverde is a tremendous example of eco-tourism at its prime. During our presentation, we will cover a few various topics on Monteverde and the benefits/disadvantages of this forest preserve.

**Molly Kraemer, Vincent Anani, Frantz Joseph & Dinara Bosch**  
*Olfactory Detection of Dietary Alarm Cues in Goldfish, Carassius Auratus*  
Faculty Mentor: Brian Wisenden

When a predator grasps prey, their teeth damage the skin and release chemicals that are released in no other context. Therefore, these “alarm cues” are a reliable indicator of predation risk. Fish have two pairs of olfactory tracts: the lateral (LOT) and medial (MOT) olfactory tracts that conduct messages from olfactory receptors in the nose to the brain. The LOT is known to mediate feeding responses while the MOT mediates alarm behavior. Prey can detect alarm cues released directly from injured prey, and also from prey that are already inside the digestive tract of a predator by ‘dietary cues’ that eke out of the anus of the predator. It is not known if dietary cues are detected by the same class of olfactory receptors that travel up the MOT. In this study, we will test if goldfish use the MOT or LOT to recognize dietary alarm cues. We will use a surgical technique to open the bone plate of an anesthetized goldfish and ablate the MOT or leave it intact (sham control). We will have a better understanding of how fish process information in their environment.

**Phillip King**  
*Exploration of Write-to-Learn as an Instructional Learning Strategy and Effectiveness in Large Post-Secondary Education.*  
Faculty Mentor: Alison Wallace

Writing-to-learn (WTL) is an instructional learning strategy that centers on the process of the formulation, organization and articulation of ideas as opposed to the final written copy. WTL is an important scientific learning strategy because the model is designed to encourage the development of scientific literacy in secondary and post-secondary science students. The research based on the WTL model has proven effectiveness as a scientific literacy instructional strategy on small

classes but has relatively no data for large post-secondary education classes. We believe that WTL can be incorporated into the large post-secondary educational classes with some adjustments to the previous model while still maintaining the effectiveness and practical aspects. We have incorporated the WTL model into Cell Biology at MSUM to test the effectiveness and practicality of the model on a post-secondary class with 150 plus enrolled students.

**Angela Kooren, Jordana Anderson, Jamie Naasz, Harrison Pantera, Kara Nygaard, Ashley Eder, Julia Goroski, Sanjaya Mendis, Jaime Kallstrom, Scott Buchholz, Elizabeth Miller, Janna Gilbertson, Nikolai O’Hara & Lily Holt**  
*Movements of Painted Turtles between Three Sloughs in Clay County, Minnesota*  
Faculty Mentor: Donna Stockrahm

In a long-term study (2001-2013), nearly 900 painted turtles (*Chrysemys picta bellii*) have been live-trapped in Clay County, Minn., to study growth rates, survival, population characteristics, and movements. Captured turtles were weighed, sexed, measured, marked by scute notches (and PIT tags starting in 2006), and released on the shoreline of the slough of capture. From 2001-2010, we live-trapped 2 sloughs that were under 1 km apart and roughly 3 ha and 6 ha in size. From 2011-2013, a third slough (under 0.4 ha) was trapped approximately halfway between the two original sloughs where cattle grazing had been excluded and shoreline vegetation was intact. The purpose was to determine if marked turtles from the original sloughs, especially the 3-ha slough with surrounding recent cattle grazing and/or plowing were moving into this undisturbed middle slough. From 2011-2013, we had over 600 captures of turtles. Of these, 22 PIT-tagged turtles (13 males, six females and three unknown sex) moved between the three sloughs for a total of 82 captures. For 18 (82 percent) of the turtles, the 6-ha slough had at least one of the captures, and for 21 (95 percent), the middle slough did. Only six (27 percent) turtles were captured at least once in the 3-ha slough with the disturbed surrounding area. In contrast, 17 (77 percent) of the turtles moved back-and-forth between the middle slough and the 6-ha slough where vegetative cover was dense and continuous between the sloughs. The

lack of vegetative cover from the cattle grazing/plowing appears to be a deterrent for turtle dispersal.

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## CHEMISTRY

**Kaila Ornquist & Kshitij Gurung**  
*Preparation of 1-{2-[diphenylboryl]benzyl}-2,2,6,6-tetramethylpiperidine*  
Faculty Mentor: Gary Edvenson

Frustrated Lewis pairs have been shown to be able to activate small molecules such as H<sub>2</sub>. The previously unprepared B-N frustrated Lewis pair, 1-{2-[diphenylboryl]benzyl}-2,2,6,6-tetramethylpiperidine (1), has been calculated to activate H<sub>2</sub> more readily than the known derivative that contains perfluorinated phenyl groups. A modification of the synthesis of that known derivative that involves using diphenylboron chloride instead of bis(pentafluorophenyl)boron chloride leads to the formation of one. Characterization data for one will be reported.

**Jessica Langlais & Susan Bertrand**  
*Reactions of Borohydride and Tetrafluoroborate Ions*  
Faculty Mentor: Gary Edvenson

Tetrabutylammonium tetrafluoroborate and tetrabutylammonium borohydride were reacted in an attempt to prepare fluorinated borohydride anions via exchange reactions. These reactions were performed by melting and stirring the reactants at 1300C in a vacuum. The stoichiometric ratio of the reactants was varied, but the highest yield of a fluorinated boron-containing anion was obtained with a 1:1 ratio. The boron-containing anion reacts readily with THF at room temperature. The <sup>11</sup>B NMR, <sup>19</sup>F NMR, and <sup>1</sup>H NMR spectra for this fluorinated boron-containing anion and the product of its reaction with THF will be reported.

*Does A Stressed Mothers’ Hormones Contribute to the Personality of Their Offspring?*  
**Mikaela Hanson & Hermella Alemneh**  
Faculty Mentor: Shawn Garrett

All animals, including fish, express consistent behavioral types, or personalities. Our research examines some of the characteristics of fish

personality and how it corresponds to circulating hormone levels. In the first part of the study, we investigated fish performance in mazes in correlation to their circulating cortisol levels. Using a maze-based test for fish personality, we identified bold versus shy fish based on their tendency to explore. After testing this, the fish were euthanized and cortisol was extracted from their tissues. The cortisol was measured with an enzyme linked immunosorbent assay (ELISA). In the second part of the study, we examined whether eggs exposed to cortisol levels similar to those circulating in a stressed mother's body affect development and behavioral characteristics of newly hatched zebra fish. To do this, we bred adult fish, placed their eggs in petri dishes and added either water (control) or different levels of hydrocortisone and incubated them in that environment until they hatched. The exploratory tendency of the offspring corresponding to boldness was then tested in the maze.

**Hermella Alemneh, Shelby Sieverding, Jaden Witt, Joshua Miller, Nana Akua Boadu & Alyssa Breitbach**

*Chemical Methods of Detection of Endocrine Disruptor Chemicals (EDCs) in Freshwater*

Faculty Mentor: Shawn Garrett

The topic of our project is the chemical detection and quantitation of endocrine disruptors in the waters upstream and downstream of the wastewater treatment plant effluent on the Red River. According to the Hibberd et al., endocrine disruptors are "of worldwide concern due to their observed effects on the reproductive systems in fish, other wildlife and possibly even human" (Hibberd et al., 2009). The water samples were collected in January by drilling through the ice using water column samplers. Samples were preserved with azide and kept at 40C until concentrated. Since very low levels of EDCs have been demonstrated to cause biological effects, samples required concentration by solid phase extraction (SPE) prior to testing. After developing a method, Gas Chromatography-Mass Spectrometric (GC-MS) was used to identify which EDCs were present in the water samples. Next, Enzyme-linked immunosorbent assays (ELISA) were used to quantify the concentrations of specific EDCs in the samples.

We plan to report on these chemical results for the identification and levels of specific endocrine disruptor species in the Red River samples. The biological testing of these same water samples, using a zebrafish hatch model, was also conducted and those results will be given in another presentation.

**AliReza Rahimi, Andrew Dahl**

*Synthesis of N-Benzyl Pyrazolidinones by Nitrogen Benzoylation*

Faculty Mentor: Craig Jasperse

This research explored the synthesis of N-benzyl pyrazolidinone rings by direct N-benzoylation using benzyl bromide. The procedure was hoped to be superior to an alternative but somewhat problematic procedure involving reductive amination of benzaldehyde. N-H pyrazolidinone was initially prepared in impure form from cinnamic acid and excess hydrazine. Treatment of the N-H product with benzyl bromide in methanol produced the N-benzyl derivative. Times, temperatures and workup procedures were explored. Excess benzyl bromide was found to cause decomposition. Several treatments were explored to remove excess benzyl bromide in an effort to provide optimal yield, product purity and procedural simplicity.

**Constance Anderson**

*Active Chemical Display Cases: Doing Experiments in Public*

Faculty Mentor: Jeffrey Bodwin

Display cases are an opportunity to engage students, faculty, staff and visitors at MSUM in academic programs, such as chemistry. Although static informational displays are valuable for some purposes, they will rarely engage passersby in a substantive way and after a few viewings are ignored. This work is directed toward making display cases that will actively draw the attention of observers and demonstrate a variety of chemical principles through experiments that are actively taking place in public display cases. The chosen experiments have unique safety, kinetic and visual requirements due to being performed in public display cases, but a broad range of chemical concepts can be demonstrated with some relatively simple apparatus. Active chemical displays also serve as a science outreach activity that will encourage observers to think about science in a positive way and

will increase the visibility of the Department of Chemistry & Biochemistry.

**Ariel Gray**

*A Biochemical Analysis of Cucumber Seedlings Grown Using Silt-nutrient Enriched Soil Following a Flood Event*

Faculty Mentor: Andrew Marry

In this study, 10-day-old cucumber seedlings were used to evaluate potential difference in the nutritional value between control soil and soil supplemented with silt deposits recovered from a recent seasonal flooding of the red river in the Fargo-Moorhead area. This study is of great interest as these large river silt deposits, produced by over-land flooding, are known to aid in crop production in the Red River Valley area. However, to date, no studies concerning potential biochemical alterations to plant growth and yield have been carried out. It is our hypothesis that the addition of silt will increase the growth rate and overall health of the cucumber seedlings used in this study. Plant cell walls were isolated and total uronic acid and total methyl ester, total xylose content, and physical analysis of the isolated plant cell wall material were carried out to determine any potential chemical variations to the cell wall. We also determined the total chlorophyll content of the cucumber seedlings and will present all of our findings.

**Bibek Rai**

*Optimizing the Formation of N-H Pyrazolidinone Rings Using Hydrazine*

Faculty Mentor: Craig Jasperse

N-H Pyrazolidinone rings can be formed by reacting cinnamic acid and hydrazine using heat followed by hot-vacuum conditions. But the straight vacuum process includes some difficulties, such as decomposition of products and the retention of unreacted reactant hydrazine, which interferes in the follow up N-benzoylation reaction when benzaldehyde is used. The purpose of the research is to improve the efficiency by manipulating the variables of the straight vacuum process. How hot should the temperature be? How long should the vacuum be applied? How much hydrazine should be used? A convenient NMR assay for residual hydrazine was developed.



**Hermella Alemneh, Shelby Sieverding,  
Jaden Witt, Joshua Miller, Nana Akua  
Boadu & Alyssa Breitbach**

*Development of GC-MS Methods for  
Detection of Endocrine Disruptor Chemicals  
in Freshwater*

Faculty Mentor: P Asoka Marasinghe

Chemicals thought to disrupt or act like hormones released into water may be harmful to organisms including humans. The main purpose of this project was to develop a technique to detect the common EDCs in water samples. Because previous studies have shown EDCs can elicit effects on organisms at extremely low levels, solid-phase extraction (SPE) was used to concentrate the water samples before Gas Chromatography-Mass Spectrometry (GC-MS) analysis. Standard solutions of the compounds 17 $\beta$ -estradiol, 17 $\beta$ -ethynylestradiol, 4-nonylphenol, and bisphenol A were employed to optimize the GC parameters for the separation and identification of the named analytes. After pre-concentration of water samples, the screening of the water samples for the endocrines of interest was done by GC-MS using the GC parameters optimized for the standards. The identifications of EDCs in the water samples were further confirmed by matching spectral library entries to the MS spectra of the analytes. Results of sensitivity levels for detection of 17 $\beta$ -estradiol, 17 $\beta$ -ethynylestradiol, 4-nonylphenol, and bisphenol A by GC-MS will be presented. The results of GC-MS analysis of concentrated Red River water and enzyme-linked immunosorbent assay and biological assay results of testing the same samples will be reported in other presentations.

**Joseph Rumreich**

*A Simple Method to Estimate the  
Molecular Volumes of Small Organic  
Molecules by Infrared Spectroscopy*

Faculty Mentor: P Asoka Marasinghe

The IR spectra of solutes in solution obtained with a pure solvent as the background would have negative peaks at frequencies where solvent absorbs IR radiation. The intensity of such negative peaks are proportional to the total solvent volume displaced by the solute molecules and therefore to the molecular volume of the dissolved solute. A correlation plot between the intensity of the negative peaks vs. theoretically

calculated molecular volumes of the solutes was generated with a correlation coefficient of 0.9680. The correlation plot was employed to predict the theoretical volume of some model compounds. The predicted molecular volumes using the observed negative peaks of the solvent generated from solutions of small model molecules from the correlation plot was within 95 percent of the theoretically calculated molecular volumes.

**Akinyemi Adegbenle & Bryan Masaki**  
*Effects of Salicylic Acid on Plant  
Immune System Enzymes and Cell Wall  
Polysaccharides*

Faculty Mentor: Andrew Marry

Plants have inducible defense mechanisms against pathogens, which can be characterized at the molecular and biochemical level. Recognition of pathogen initiates a hypersensitive response (HR), which causes cell death at the infection site and restricts pathogenesis by nutritional deprivation. One of the mechanisms of the plant defense is a systemic acquired resistance (SAR), which provides a long-lasting protection from pathogens. SAR in plants can be compared to hormonal immune system in humans. SAR signal travels through the phloem to the upper part of the plant, where the pathogen is not present. Salicylic acid (SA) is an endogenous signal for SAR, but the mechanism of SA induction of SAR varies among species of plants. The goal of this research project is to investigate possible biochemical alterations associated with salicylic acid application on diphenol oxidase, peroxidases, and cell wall polysaccharides in cucumber seedlings. Peroxidases and diphenol oxidases are important candidates of study in this process as they play important immunoregulatory functions. Any alterations in enzyme activity of peroxidases and diphenol oxidases were determined using Michaelis-Menten V<sub>max</sub> analyses. Any induced polysaccharide alterations in the cell wall were measured using uronic acid assay, uronosyl-methyl ester assay, and Fourier Transform Infrared (FTIR) spectroscopy.

**Kaitlan Jensen**

*Synthesis of N-H Pyrazolidinone Rings and  
N-Benzyl Pyrazolidinones*

Faculty Mentor: Craig Jasperse

This research attempted various workups to optimize the synthesis of N-H pyrazolidinone

rings. The model experiment used cinnamic acid and excess hydrazine under thermal and then hot vacuum conditions. Initial efforts used aqueous workup to remove unreacted hydrazine, but product yields were seriously reduced. Redissolving the product in methanol and then reconcentrating it by vacuum heating provided more promising results, with high product yields and minimal residual hydrazine. Treatment of the product with benzaldehyde and then sodium borohydride produced the N-benzyl pyrazolidinone derivative. Best yields for the desired N-benzyl derivative using 0.9 equivalents of benzaldehyde.

**Alyssa Anderson & Danielle Anderson**  
*Effects of Floodplain Silt on Plant Cell  
Biochemistry*

Faculty Mentor: Andrew Marry

Research is to investigate if there is an effect on plant cell walls when plants are grown in soil mixed with floodplain silt. Principle techniques utilized include soil pH methods and various sugar assays. The plant used for the experiments are cucumbers, *Cucumis sativus*, which is a model system in the study of plant vascular biology and is a valuable resource in studying the evolution and function of the plant vascular system. Floodplains are crucial to plant growth world-wide, and are highly enriched with nutrients, containing 100 or more times as many species as normal river ecosystems. Plant health is largely dependent on the content of the soil, so with increased nutrient content, plants should be more healthy, therefore possibly chemically altered. Plant cell walls are formed with three layers, first being the lamella which has the primary cell wall within it, and if maximum plant size is reached, secondary cell walls form between the plasma membrane and primary wall. The cell wall consists of cellulose, pectin, and hemicellulose, with cellulose being a straight-chained carbohydrate that gives the plant cell strength.

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## COMMUNICATION STUDIES

### Emily Bublitz

*Move It and Lose It: Can Reframing Exercise Increase One's Intentions to Work Out?*

Faculty Mentor: Jason Anderson

Many studies have investigated the effects of mentally reframing the time that is required for an exercise program in order to increase a person's willingness to try a certain exercise regime. The proposed research seeks to investigate if individuals who are reframed and view exercise in smaller time increments (such as minutes per day vs. hours per week) will report greater intentions to exercise than those who view exercise in larger time increments. College undergraduates will be given reframed information to study the effects of temporal framing on exercise intentions. If supported, these results will help reframe exercise duration and increase a person's willingness to try a workout program, which may lead to a healthier lifestyle.

### Margaret Casey & Megan Schroeder

*#GETOFFYOURPHONE*

Faculty Mentor: Jason Anderson

There are a limited number of studies that have investigated the correlation between cell phone use and intimate relationships. As cell phone use increases in today's society, the correlation of these factors becomes more apparent. Through this research study, we address the connection of four concepts; relational maintenance behaviors, relationship satisfaction, communication competency and cell phone use. With methods of self-report and observational data we address the association of cell phones and intimate relationships.

### Sarah Freeman

*Computer Science and Information Systems Grandmaster Computing: A Historical Look at Chess Playing Artificial Intelligence*

Faculty Mentor: Andrew Chen

#### Oral Presentation

A chess-playing artificial intelligence (AI) was first proposed in the late 1940s to early 1950s. In 1996 and 1997, it became a reality when

Deep Blue beat the world champion chess player, Gary Kasparov. Chess is defined as a game of "perfect information," because both players are aware of the entire state of the game world at all times: just by looking at the board, you can see which pieces are alive and where they are located. All of the chess-playing AIs have some basic things in common, such as data representation, move generation, search techniques and evaluation. Based on the problems involved in solving a "perfect information" type of game, AIs are not expected to take over the world within our lifetimes.

### Muhammed Saho

*Quick Mobile Apps with HTML5*

Faculty Mentor: Andrew Chen

The last decade has seen a wealth of consumer electronics that emphasize their extensibility through third-party applications, otherwise known as apps. Cell Phones, TVs, cars, and even refrigerators now support apps. This provides a special challenge to software developers who want users to engage with their apps on all these different devices. Hyper Text Markup Language 5 (HTML5) aims to unify them by allowing developers to write code once, and deploy to all desired devices. Although the technology is still quite young, HTML5 is the most viable cross-platform software development framework of the near future. This presentation will demonstrate some of the tools available today.

### Michael Hurtig

*An Overview and Demonstration of a Mobile Inventory System*

Faculty Mentor: Andrew Chen

This project aims to demonstrate the design process and implementation of a mobile inventory system. This system will emulate an inventory system such as what might be found in a retail store, with the ability to scan a barcode and perform an item look up, as well as the ability to create or edit any entry for any item. This application will also allow the user of the inventory software to tag a targeted item with attributes such as price, weight, location, etc. This application will store the information in an SQL-related database located on the host device, with the implementation allowing for the development of the ability to connect with and utilize a remote database. This project is targeted

at Google's Android mobile operating system, most commonly deployed on smartphones and digital tablets.

### Kody Olmstead

*Ant Colony Optimization Algorithms*

Faculty Mentor: Andrew Chen

Whether it be a network of computers or a network of planes traveling around the world, all networks need can be optimized. To optimize networks, the shortest path from one node to another needs to be found. The natural world offers one solution to find the shortest path. Ant colony optimization algorithms mimic ant colony behavior for finding food and returning to the nest in the most efficient way possible. They do this by use of pheromones to mark a path for other ants in the colony to follow. The most used path will be the most attractive to the ants. This report is to enhance the understanding of Ant Colony Optimization (ACO). ACO algorithms are a category of swarm intelligence algorithms. I will look at different algorithms developed over the past few decades and what has been changed and improved. I will also explain the benefits and future purposes of utilization of ACO algorithms. By studying the ants, we can use their techniques to optimize our own forms of networking.

### Joseph Dlugos, Graduate Student

*Counseling & Student Affairs*

*Policy Violation Recidivism*

Faculty Mentor: David Paul

Policies, rules and guidelines are great caution markers and ethical checkpoints for the world's future leaders who are attending college. When institutional policy is violated or student misconduct takes place at a higher education institution, sanctions are imposed. Sanctions can surface as either active or passive. Active would be identified as a monetary fine or a reflection paper, while passive would be a formal warning or a deferred consequence. Taking the time to study which method of sanctioning has the greatest chance of reducing recidivism, or repeat offenses, is beneficial to students and institutions alike. I used pre-existing, non-identifiable judicial data from similar institutions to compare recidivism rates amongst low-level policy offenses. In the end, recidivism rates were comparable, and both sanctioning styles proved effective.

**Dana Strand, Graduate Student**

*Service Learning Course Designed for Students in an Alternative School*

Faculty Mentor: Lisa Karch

The course curriculum is designed to be a stand-alone service learning course at an alternative school. The course is modeled after Clark Copper's service learning course at Phoenix High School in Lawrenceville, Ga. Students will receive one semester credit for this course. They will need to complete 60 hours of volunteer service and attend 10 classroom meetings. During the classroom meetings, students will discuss their successes and struggles in a group counseling environment. In addition, students will need to create and present a photo essay presentation. The course design is sensitive to the fluid population and attendance issues present in an alternative school. The primary goal is to help at-risk teenagers create meaningful relationships within their community through service.

**Allen Irish, Graduate Student**

*Student Bullying: The Continuation Into College Years*

Faculty Mentor: Lisa Karch

The issue of bullying is highly researched in primary and secondary educational settings and is increasing in regards to bullying in the workplace. The purpose of this research is to fill this gap and examine the level of bullying that occurs during the college years. I am investigating the amount of bullying that occurs on the MSUM and North Dakota State University campuses and see if there is a relationship between being bullied in high school and college. College freshman and sophomores at MSUM and NDSU were asked to complete an online survey to obtain the results. Participants were asked about characteristics of bullying (hurtful words, obscene gestures, physical altercations, and social isolation/exclusion), rather than being directly asked if they had been a bully or a victim. A total of 702 students participated in the survey. Thus far in the analysis, the results have indicated that bullying does occur on both college campuses where individuals have been identified as bullies victims, and bully/victims. The data is presently being examined to determine if there is a connection between high school and college occurrences of bullying.

**Christen Bergeron, Graduate Student**

*Assessing the Need and Desire to Obtain Geriatric Counseling Services within a Residential Facility*

Faculty Mentor: David Paul

The purpose of this study is to examine the perceived need and desire for older adults (65 and older) to utilize counseling services at residential facility Touchmark at Harwood Groves in Fargo for older adults if the opportunity were available on a regular basis. This study identifies the prevalence of depression among older adults, stigmas associated with receiving counseling services, probable outcomes of utilizing counseling services, and a brief description of the Geriatric Depression Scale (GDS), which is utilized as the survey instrument. This spring 2014, all 200 residents residing in assisted and independent living units of Touchmark at Harwood Groves will be invited to participate in a demographic and survey instrument measuring need and desire to utilize counseling services. Participants must sign informed consent prior to receiving survey instrument and will be provided a debriefing of results upon request. The researcher will assure confidentiality will be maintained throughout the survey, and results will be compiled as a whole with no identifying information about participants.

**Anna Kaiser, Graduate Student**

*S.E.L.F. (Succeeding Every Day and Living Freely) Educational Process Group Instruction Manual*

Faculty Mentor: David Paul

There are many advantages when it comes to supportive counseling groups, especially for the undeclared freshman population, as most are entering college in a vulnerable state of mind. A supportive counseling group offers an exceptional freedom of speech as a safe and trusted environment is created. Group counseling is unique, as the group members openly provide feedback aiding in an increased sense of self and perception expansion. Due to the lack of supportive counseling groups at MSUM, a manual will be designed that will encompass health, motivation, college knowledge and career outlook. The S.E.L.F. group will focus on freshman undeclared students enrolling in their first semester at MSUM. The group will aim to develop a better sense of self, enhance wisdom

of life purpose and meaning, increase university engagement, establish peer supports, and create an academic pathway to an appropriate career choice. Lessons will focus on: readiness for change, interpersonal and intrapersonal relationships, family dynamics, personality assessment, learning style and studying tips, career decision making, problem solving and life evaluation, managing stress and coping skills, and career development. The S.E.L.F. group will provide students the opportunity to explore academic and career options, but most importantly, their authentic self.

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## CRIMINAL JUSTICE

**Sarah Weisser**

*Depression: Society's Problem*

Faculty Mentor: Susan Humphers-Ginther

Depression costs society more than \$43 billion a year, of which \$17 billion is the cost of job absenteeism alone. It knows no gender or age but affects everyone. About one in five women develop depression at some point in life. In America alone, more than 6 million men have depression each year. Women are nearly twice as likely as men to have depression. Major Depressive Disorder is the leading cause of disability in the U.S. for ages 15 to 44. It affects approximately 14.8 million American adults, or about 6.7 percent of the U.S. population age 18 and older in a given year. The different types of depression varies from one extreme to another. Why are women more depressed than men? What are our social factors that affect men more than women? Even with all the new technology and medicines that are at the doctors disposal, there is still no cure for this mental illness. There are medications that treat these chronic illnesses, But with these medications come some uncomfortable side effects. Society in the past years have looked down on mental illness. In the recent years it has been more accepted, but we have a long way to go.

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## ECONOMICS

**Kofi Boadu**

*Will the economic gap between developing and developed countries narrow?*

Faculty Mentor: Tonya Hansen

Gross domestic product (GDP) per capita is a recognized measure for comparing the standard of living between different nations or monitoring conditions in an individual nation over time. Comparisons of 2012 GDP per capita of the United States (\$48,360) and African nations such as Nigeria (\$1,555) and Kenya (\$862) reveal that widespread differences remain. Ghana, often called the gateway to Africa, displays some success in closing this gap with a higher 2012 GDP per capita value of \$1,605. The historical growth paths of developed and developing countries reveal the challenges that developing countries like Ghana face in traveling the road from poverty to prosperity. Based on economic development literature, this research considers whether and to what extent globalization characteristics, foreign direct investment levels, and literacy rates impact the gap between developing and developed countries. Results of this country-level study can inform domestic firms, foreign firms, and international policymakers interested in making economic-advancing decisions in developing nations.

#### **You Wang**

##### *An Economic Analysis of Housing Market Instability and Affordability in China*

Faculty Mentor: Tonya Hansen

Housing market instability in China has prompted fear of a price bubble and a related housing market affordability crisis since 2000. Applying an intertemporal optimization model proposed by Aizenman and Marion (1991), this research quantifies instability in the Chinese housing market. Although the Chinese government established numerous real estate policies to ensure the stability of the housing market, the regression analyses indicate that housing policies had no significant impact on the stabilization of the Chinese housing market. Alternatively, macroeconomic factors, such as the growth rates of gross domestic product and the money supply, respectively, are identified as significant explanatory variables to the instability of housing prices. The ratio of median house price relative to median annual household income, known as the Median Multiple, measures changes in housing affordability. Using data from the National Bureau of Statistics of China, this research computes the Median Multiple for major cities in China and provides

an alternative means of investigating the abnormal housing price situation in China.

#### **Jesse Leyk**

##### *Do Transportation Costs Impact International Trade Flows of U.S. Agricultural Commodities?*

Faculty Mentor: Tonya Hansen

International trade accounts for more than 56 percent of world GDP (World Bank, 2010). Furthermore, increasingly integrated nations exemplify widespread interest in the relationship between transportation costs and trade flows. In this climate, the deceleration of annual international trade growth to 2 percent in 2010 elevates the profile of the gravity model. Using assumptions of this model and data from the United Nations and World Bank, this research measures the relationship between a nation's transportation costs and its imports of U.S. agricultural commodities. Regression analysis results signify whether or not international trade patterns align with economic theory and offer insights to policymakers and logistical service providers.

#### **Dennis Freborg**

##### *The Costs and Benefits of Elderly Care*

Faculty Mentor: Tonya Hansen

The average monthly cost for assisted living in the U.S. is approximately \$3,300 US (Glenworth, 2012). Elderly individuals purchase care using private savings, insurance, public subsidies, or some combination of these funding sources. This research considers the costs of different levels of elderly care among individuals paying for care with private funds. Consumers in this market and those making decisions on their behalf often face an information deficit regarding what level of care is needed, along with the costs and benefits of alternate levels of care. Consumers may also transition from one level of care to another as physical and mental health needs change, further complicating decision making in this market. This research includes a review of economic literature and development of a case study of facilities in Fargo-Moorhead. Research findings may enhance competition in the elderly care market as consumers are better informed in relation to alternative care options.

#### **Ching Yu Lam**

##### *Fertility Considerations in Singapore: An Economic Perspective*

Faculty Mentor: Tonya Hansen

The four East Asian Tigers (Singapore, Hong Kong, Taiwan and South Korea) exhibited noticeable macroeconomic growth between 1960 and 1990. Unity among these countries is likewise seen in the declining fertility rates of women within these countries. New Family Economics identifies educational attainment, female labor force participation, and preferences toward smaller family size as explanations for the fertility decline in western countries. However, recent research reveals that housing price changes may be an additional explanation of the fertility decline observed among East Asian countries. This paper examines the relationship between housing prices and fertility rates in Singapore by comparing the substitution and income effects associated with fertility decisions. Results of this research will inform individuals making policy decisions in response to the demographic changes occurring among the East Asian Tigers.

#### **Zebulon Hallman**

##### *The Economics of Online Games: Blurring the Lines of Reality*

Faculty Mentor: Tonya Hansen

The popularity of online games is visible in the millions of people whose online avatars interact in virtual worlds and the industry's 2007 estimated worth of \$18.82 billion. Boundaries between real and virtual worlds are increasingly blurred as creators, distributors and even players of online games continue to identify alternative ways of generating real profits from virtual goods and services. This research considers how the popularity of online games impacts markets in which people exchange virtual goods and services for real money. Using features of alternative gaming structures and behavior patterns of gamers, this research employs economic theory to describe the appearance of the online gaming industry in the future.

#### **Jed Eix**

##### *The Economics of Being Human*

Faculty Mentor: Tonya Hansen

The relationship between the abstract definition of economics and its use in our daily lives





# PRESENTATION LISTINGS

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is unclear. This study draws upon literature from diverse schools of thought to investigate the culture, psychology, and physiology of economics. This approach encompasses the use of existential and postmodern philosophy, behavioral psychology, and new developments in economic thought and social theory, including semi-autobiographical literature and storytelling. In response to the question, "Why, as a human, do anything at all?" this research considers the role of economics and what it means to be an economist in-place with the empirical reality of being in the world.

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## EDUCATION

### **Nathaniel Lundin**

*One-to-One Schools: Personal Computing and Educational Success*

Faculty Mentor: Sheila Marquardt

Education and technology have always gone hand-in-hand. Filmstrips, overhead projectors and TV/VCR carts have given way to digital projectors, computers and the Internet. Most recently, schools are shifting to "one-to-one" models, meaning that each student is equipped with a tablet or iPad on which they do their daily work. Schools have stated different goals for one-to-one programs, including: preparing students for an increasingly technological world, college preparedness, and "green" practices. This project seeks to present information about the conditions upon which one-to-one works best, and understand the connection between academic success and technology in the classroom.

### **Derek Davis, Graduate Student**

*Shared Governance Among Faculty Senate and Student Senate*

Faculty Mentor: Julie Swaggert

Every college and university has a student senate, as well as a faculty senate. Depending on the organizational structures of the faculty senate and the student senate, communication and collaboration between faculty senate and student senate occur. Most communication and collaboration happen when student senators speak with faculty members from that student's academic department. This is done on an individual basis and is where the communication

and collaboration typically ends. In research conducted using surveys and observations at Valley City State University (VCSU) and MSUM, it shows that student senators only communicate with faculty senate on an individual basis to get updates on their respective academic departments. Student senate and faculty senate can work together using a variety of means, including regularly scheduled meetings and volunteering together in the community.

### **Kelsey Hennessy, Graduate Student**

*Service Learning with Special Olympics*

Faculty Mentor: Michael Coquyt

Service learning is becoming a popular avenue to provide students with real-life experience by collaborating with local community service providers. Service learning is an opportunity for students to unite hands-on service experience with their academic curriculum. Within this project, students from PE 372 - Basketball Coaching partnered with Special Olympics of Moorhead to volunteer their basketball knowledge and coaching skills to the community athletes. Reflections from the volunteer students will show if there is a relationship connecting service opportunity with course material.

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## ENGLISH

### **Danya Adair**

*The Art of Storytelling: Publishing Methods and Their Merits*

Faculty Mentor: Sharon Scapple

In this digital age, methods of storytelling are as numerous as they are varied, and publishing has evolved to adapt to the trends of the times. The advent of e-books has given aspiring authors an innovative new way of getting their work to a wider audience and increased the availability of books to less populated areas of the globe. Interactive media on netbooks and tablets have the potential to reinvent educational resources and create more immersive approaches to storytelling for the next generation of readers. The more "old fashioned" business of printmaking and publishing is far from obsolete, however. There can be arguments made for and against both electronic and paper publishing techniques, but it's important to realize that the medium in which a story is communicated

has the power to alter its message or overall meaning. I intend to demonstrate this idea by utilizing the methods and techniques learned in MSUM English courses on how to craft, edit, and hand-bind a collection of my own work.

### **Taija Noel**

*The Neo-platonic Ladder: Mirth to Melancholy*

Faculty Mentor: Stephen Hamrick

Milton's *L'Allegro*, and *Il Penseroso* symbolize the psychological binary Milton lived by. They encapsulate his Neo-platonic philosophy by first validating the physical pleasures of the body, simplicity, and a level of blissful ignorance in *L'Allegro*. In *Il Penseroso*, they focus on the joys of the mind, nobility in the sacrifice of scholarly pursuits, and the elevation of the suffering poet. In tandem with Neo-Platonism, Milton ends with a far more convincing argument for the merits of melancholy. Enjoyment is important, but is a tool for revitalization and social agency in order to concentrate on the higher calling of the mind. Milton's poems characterize melancholy and intellectual happiness as the superior state of being.

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## FILM STUDIES

### **Kayla Duffney**

*The Art of Adaptation: Baz Luhrmann*

Faculty Mentor: Anthony Adah

Adaptation is neither new nor rare in film. It is the inclination of the human imagination or desire to transform a story from one medium or one genre to another. Baz Luhrmann is one of many artists that takes an existing piece of work and makes it his own. By doing so, he creates discernible patterns, or themes within his films, such as those in his *Red Curtain Trilogy*. The trilogy consists of "Strictly Ballroom" (1992), William Shakespeare's "Romeo and Juliet" (1996) and "Moulin Rouge" (2001), all of which explore opera's themes of bohemian creativity, youth, idealism and love. In each case, Luhrmann utilizes a highly stylized medium to drive the narrative: dance in "Strictly Ballroom," Shakespearean language in "Romeo and Juliet," and popular song in "Moulin Rouge." Throughout this presentation, I draw on

diverse theories of adaptation to examine Baz Luhrmann's approach to adapting different arts, novels, opera, theater and recontextualizing them to film.

**Kayla Duffney, Kylie Herland & Kaeun Ko**  
*Evil or Ill?*

Faculty Mentor: Anthony Adah

Experimental filmmaking is an artistic practice that allows filmmakers to portray a new version of reality. Our experimental film, "Evil or Ill," is an analysis of one woman's mental state in which she drowned all five of her children in a bathtub. Based on true events that took place in 2001, this experimental narrative takes a closer look into the mind of Andrea Yates by exploring what made her commit these heinous crimes. Was she an evil mother or an ill person? Using filmmaker and theorist Maya Deren's approach through montage editing, we capture the series of juxtaposed images that correlate our ideas about the matter. Through these dream-like sequences, we take the audience through an abrupt and sometimes frightening look at Yate's mental state and speculated inner thoughts that impacted her decision in the process and planning of murdering her children in order to save them. This tragedy opens our minds to the psychoanalysis of a confused mother struggling with the conflict between her conscious and unconsciousness that materialize in the form of mental and emotional disturbances, who sought to only help her family. Our hope is to let the audience decide, was she Evil or Ill?

**Joseph Koesterman**

*Artful Vengeance: Finding Onryou in Japanese Art Cinema*

Faculty Mentor: Anthony Adah

In the tradition of Japanese horror stories, the onryou, or avenging spirit, has played an important role since their very beginning. In recent Japanese Cinema, the avenging spirit has made a very strong appearance, creating a subgenre of films that have been imitated, and even remade in American Cinema. While a great deal of scholarship has been done to identify this subgenre's role in expressing anxieties over Japan's changing family structures, little work has been done advocating this work as a new extension of Japan's Art Cinema tradition. The aim of this paper, therefore, is to use examples from the films "Nakata Hideo" and "Shimizu

Takashi" to demonstrate the onryou movie's place in art cinema, and argue that the art cinema stylistics contributes to the genre's international appeal.

**Holly Leftridge**

*East Meets West: The Disparity Between Tradition and Westernization in Japanese Cinema*

Faculty Mentor: Anthony Adah

Japanese animated films often present their viewers with a world created by mixing contemporary Western themes and filmic styles with Japanese traditions and folklore. These films signify the disparity between Japanese traditions and the influx of Western influence in modern-day Japan. The characters portrayed in these films are often placed in situations where they are forced to engage with both the external and internal tensions created by these socio-cultural disparities before either rejecting one of the influences or coming to terms with their convergence. I will examine how these two worlds combine within the context of very recent Japanese animation.

**Zachariah Anderson**

*Barbara Stanwyck: Film Actress and Author*

Faculty Mentor: Anthony Adah

The field of film studies has put forth numerous conflicting theories about film authorship, yet despite their disagreements, available theories share one feature: there is little room for discussions of women in the context of authorship. This paper explores the limitations, and even inherent sexism, of existing theories such as auteurism (omitting women by excluding non-directors) and post-structuralism (marginalizing women by narrowing studies to their representations within the text). By analyzing Barbara Stanwyck's career, this paper will expose the adverse effects of this discrimination on the world of film criticism, as well as provide tools for expanding the studies of authorship to include many more undervalued artists. To accomplish this task, I graft studies of freelance acting and fan discourse (Emily S. Carman, 2008) and the analysis of acting technique (Johannes Riis, 2009) to the concept of collective authorship (Paul Sellors, 2007). I argue that it is immediately apparent, when concepts of independent stardom and technique are explored in Stanwyck's films, she holds an

important role as film author. In conclusion, this paper will challenge the exclusionary status quo by offering alternative tools for recognizing, analyzing and elevating the historically dismissed contributions of female collaborative authors like Barbara Stanwyck.

**Zachary Suckerman**

*A Study of Israeli Films About War*

Faculty Mentor: Anthony Adah

The purpose of this paper is to examine the war film genre in Israeli films. I demonstrate some of the similarities that past filmmakers and theorists have studied about Israeli film pertaining to war. Some of the films that I specifically discuss include, "Wasted" (2006) and the films of the 1960s Bourekas genre. When beginning my research on Israeli film, I found many articles on how war has affected Israeli film. Drawing inspiration from the essay, "Orientalism as Alterity in Israeli Cinema," I examine cinematic techniques used in Israeli films to portray orientalism while highlighting the need to have both honor and national pride in the past.

**Ariel Tobolaski**

*Women in Chinese Cinema*

Faculty Mentor: Anthony Adah

The purpose of this presentation is to compare the role of women in Fourth and Fifth Generation Chinese Cinema. Drawing from four films over the two periods, I trace the history of women in the Chinese film industry. The presentation will explore shifts in gender roles over these two periods. Women have become more empowered in all aspects of Chinese life, especially during and after the upheavals of the 1990s. This presentation explains how representations of women have evolved before and after Tiananmen Square demonstrations.

**Joseph Koesterman**

*Dead Together: The Work of George A. Romero*

Faculty Mentor: Anthony Adah

Though it is often difficult for people to take a zombie movie, or its director, seriously, one director that stands apart in the zombie genre is George A. Romero. While some criticize his work as a mere exploitation of society's insatiable draw to the genre, he is still often considered one



of the best at what he does. Part of the reason for that is his consistency of style and thematic elements that find its way into his films. The aim of this paper is to demonstrate this consistency through several of his works to hopefully pay respect to an often mocked, yet often replicated director.

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## GEOSCIENCE

### **Lindsey Anderson**

*Chemical Activity of Nickel in Silicate Melts*  
Faculty Mentor: Russell Colson

As a molten substance begins to cool and solidify within a magma chamber, elements partition between the liquid state of the melt and crystalline phases. Because the crystals have a different composition from the melt, the composition of the remaining melt changes. This process is the key process in planetary evolution. To better understand this process, we have been conducting experiments to measure the chemical activity of Nickel (Ni) in high temperature silicate melts. There were two main parts to our study. The first main part was a series of experiments to measure the chemical activity of Nickel Oxide (NiO) within a silicate melt. In these experiments, we measured how different valence states of Iron (Fe), varying degrees of polymerization (or the amount of Silica and Oxygen present), or varying temperatures will affect Ni activity, which will control how Ni will partition. Our experimental method for this part involved equilibrating the silicate melt in the presence of platinum wire, using the metallic Ni in the wire as a standard. Our second main part involved imposing a voltage to the sample, and using the currents to measure the activity of Ni<sup>2+</sup> and O<sup>2-</sup> separately and the effects of network-forming cations on those activities. By better understanding the chemical activity of present elements, we can form a better understanding of how magma will evolve over time, which in turn can lead to understanding the history of rock over time and the stories it tells.

### **Monique Parisien**

*Ancient Marine Environment of the Florena Shale*  
Faculty Mentor: Leonard, Karl

The Permian Florena Shale Member lies in eastern Kansas near the center of the Council Grove Group and in the middle section of the Beattie Limestone. It is overlain by the Cottonwood Limestone Member and underlain by the Morrill Limestone Member. The presence of shoals formed in an ancient midcontinent sea created a restricted marine basin explaining the absence of a typical transgression-regression pattern. Bulk samples of the Florena Shale were collected from an outcrop south of Manhattan, Kan., and were later processed in the lab to recover both macrofossils and microfossils. The Council Grove Group, composed of a moderately diverse group of fauna contains brachiopods, Foraminifera, ostracodes, conodonts, holothurians sclerites, charophytes, and fish teeth and scales. In looking at the diversity of the fossil assemblages present in the Florena, it became evident that regression patterns directly affected the diversity of these assemblages. From this, gradual shifting of marine environments is revealed to be present in the Florena Shale. Also present was a decreasing abundance and variety of fossils from bottom to top with the upper part only containing a few fish teeth. Shifting was shown by each dominant species of the assemblages having been present in different strata of the Florena with varying diversities. The brachiopod fauna of the lower part of the Florena Shale consists of species adapted for life on a muddy substrate. Their presence stabilized the muddy bottom and resulted in an increase in diversity in this fossil assemblage.

### **Jonathan Sands, Nicholas Anderson, Donovan Donarski & Christopher Benjamin**

*Sequence Stratigraphy of the Tyler Formation (Lower Pennsylvanian/Morrowan) in the Williston Basin, North Dakota*  
Faculty Mentor: Karl Leonard

We are doing a detailed stratigraphic correlation of the Tyler Formation of the Williston Basin within Western North Dakota. We are looking at core samples taken from many different counties within the Williston Basin and are now stored at the William Laird Core Library at the University of North Dakota in Grand Forks. The purpose of analyzing these cores is to understand how

they existed both spatially and temporally. Our goal is to correlate core samples from the center of the Williston Basin to the edge of the basin, by doing this we can notice where different sequences begin to pinch out. The objective is to put together a stratigraphic framework that will aid in the future studies of fossil distribution as well as the paleoecology of the Tyler Formation. A greater understanding of the Tyler Formation can also help us improve the economic development potential of the resources within the formation. By doing this detailed stratigraphy, we are preparing ourselves to be better professional geologists in the area of field work.

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## HISTORY

### **Jacob Clauson**

*Civil War Medicine*  
Faculty Mentor: Annette Morrow

The focus of my presentation looks at the evolution of medicine during the Civil War. By looking at how battlefield medicine was used, and the changes that were made in the years preceding the Civil War, one can come to understand how these advances saved many lives during the war. The presentation follows the story of the First Minnesota Regiment through the Battle of Gettysburg and considers the various injuries they would have sustained. It then delves into the wounds that soldiers would have most likely suffered and each of the procedures that would have been performed on the various soldiers from the First Minnesota Regiment to mend those injuries.

### **Maureen Hukill**

*Power and Politics: Yuan Shikai's (1859-1916) Role in the 1898 Reform*  
Faculty Mentor: Henry Chan

Yuan Shikai was not only a key figure in the dissolution of the Qing Empire, but he also played a crucial role in the abortive 1898 reform. Emperor Guangxu, influenced by reformers like Kang Youwei and Liang Qichao, proposed many educational reforms, as well as plans for modernizing both the Qing government and army during 1898. These reforms, while

promising to strengthen China and perhaps undo the effects of the unequal treaties, also threatened the established Manchu order, often represented by the Empress Dowager Cixi and her subordinates. In the conflict between conservatives and reformers, Yuan Shikai was important because of the military power he had gained through his role in the modernization of the army. This presentation examines not only the political layout of the 1898 abortive reform, but also reviews Yuan Shikai's personal view of the reform, his position and interest in 1898 that led him to his decision of siding with the conservative Manchu order.

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## INTERNATIONAL STUDIES

### Eldana Temesgen

*Explaining the Causes of Corruption through Exploring Elements of Culture*  
Faculty Mentor: Andrew Conteh

Corruption is an epidemic that has plagued many countries but is most common in third-world or less economically developed countries. In an effort to eradicate this issue, one must ask what the underlying causes are for corruption. There have been countless theories behind its causes. I am investigating the role that culture plays in explaining corruption. The values, norms and traditions that create the foundations of a society can be very influential in helping understand how corruption takes place and why it has remained so prominent, especially in areas that are less developed. Through exploring this uncharted idea and reasoning behind corruption, it will bring us one step closer in eradicating corruption.

### Tran Pham

*Money Laundering*  
Faculty Mentor: Andrew Conteh

Globalization brings many benefits for mankind, but it also exacerbates evils. One of the unfortunate consequences of globalization is it makes money laundering easier. Therefore, it encourages other illegal activities. Dirty money can also come from weapons smuggling, prostitution and prohibited goods purchases, such as alcohol, tobacco, etc. In addition, it comes from the corruption, bribery of national leaders and local officials, embezzlement of

public officials, or by taking advantage of their positions. Money laundering is not a new phenomenon. According to many Chinese traders, money laundering initially existed over three thousand years ago with the purpose of avoiding the tax court. Overall, this activity has exploded with globalization and caused many serious consequences for the economy as well as society, particularly in the developing or transition countries. In developing countries, the corruption of money laundering is the most serious problem. In contrast, the western countries consider dirty money laundering related to terrorism, which is the most concerned issue recently. This presentation is devoted to discussing the role of money laundering in the context of terrorism and counter terrorism.

### Sarah Kaml

*History of Australian Migration*  
Faculty Mentor: Andrew Conteh

Historically, Australia was a solution for Britain's prison overflow. It grew to become a striving civilization, popular to immigrants around the world. In order to govern the flow of migration, Australia had created and enforced the White Australia Policy, where only immigrants of European descent were allowed into the country. Once the policy was lifted, the flow of migration picked up, and the country has one of the highest standards of living today. This presentation will analyze how migration has had an enormous effect on Australia throughout history. It also examines certain factors, such as the economics and culture.

### Vanya Keswani

*Contributions of Women in Building Democracy*  
Faculty Mentor: Andrew Conteh

If we look through a historian's eyes, women's access to democratic power and right to vote has been quite recent. In fact, history is full of instances and long periods when laws were heavily biased against women; ironically it's still the same in certain nations. All good things start with courage. Likewise, feminist movements in developed countries brought new hope for women. Gradually they started to assert their

right for equality and ascended from "weaker sex" to "fairer sex." Women's journey from the kitchen cabinet to the Parliament Cabinet has been very long and arduous, though today we can proudly boast of much-needed gender equality in many, if not all, places across the world. The real wave of feminism began in the 1960s and significantly undermined legal and social barriers, which made women the "second sex," economically and legally subordinate in all spheres of life. Look at the scenario today: scores of nations and states are governed by women, unthinkable a half century ago. This presentation is devoted to reviewing and assessing women's contributions in building democracy.

### Adam Lyon, Richa Neupane & Noor Alomran

*International Students Integration and Cultural Competency in Minnesota State Universities*  
Faculty Mentor: Karen Branden

Minnesota State University Moorhead currently has 505 international students. There is a distinction between international students and diverse American students. However, lack of knowledge regarding both groups has brought about instances where these students go through humiliation, segregation, etc. This research will look at these three groups of students and look for solutions that will help increase their cultural competencies. To do this, other state universities of Minnesota will be put into consideration for comparison. Likewise, different literature in this subject will be consulted and findings will be presented at the conference accordingly.

### Jordan Pinneke

*The Violation of Human Rights with the Privatization of Water*  
Faculty Mentor: Andrew Conteh

With the issue of human rights coming into the global spectrum, it is important to analyze what rights all people are entitled to. A newly declared human right by the United Nations is the right to water. This is being jeopardized daily with the privatization of fresh water sources for transnational corporation use. Since these transnationals are denying locals fresh, inexpensive water, they are therefore violating a basic human right and should be persecuted for



their actions. This presentation takes an in-depth look into the examples of current water rights violations and what needs to be done to ensure that every person on Earth is entitled to such a basic human necessity as water.

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## MARKETING

### **Dakota Aberle, Bailey Holzbauer & Tara Andresen**

#### *Hitting the Target*

Faculty Mentor: Ruth Lumb

A marketing plan enables a business owner to understand the target market for a business/product as well as the firm's competitive position in the market. This presentation provides an overview of the research required to prepare an effective marketing plan for a client who is the owner of a start-up custom clothing business. The presentation describes how this business can profile its target market, determine tactics to reach the target market, and differentiate itself from the competition by researching geographic, demographic, psychographic and behavioral trends. Effective research strategies for acquiring information about the marketing mix (product, place, price and distribution) variables and the SWOT analysis are presented.

### **Jayasankha Perera**

#### 'Strategic Marketing Research' Through the Use of a Simulation

Faculty Mentor: Ruth Lumb

Through the use of a simulation, this presentation demonstrates how marketing research is conducted in a firm. The simulation is based on a large international electronics firm entering the microcomputer business. It has formed a new PC Marketing Division to pursue this business opportunity. In order to succeed in a fast-paced market where customers are demanding and the competition is attempting to take away business, marketing research must be undertaken. I will show how research enables marketers to analyze a situation, plan a strategy to improve it, and then execute that strategy into the future while facing uncertainty from the outside environment. The interplay among marketing, manufacturing, logistics, human resources, finance, accounting and team management is stressed. The simulation

provides a "real-world" example of trade-offs and potential outcomes of various decisions. A goal of this learning experience was to make decisions in ways that would be most profitable for the firm. The requirements included market opportunity analysis, brand development, advertising, pricing, sales force management and profitability analysis.

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## MASS COMMUNICATIONS

### **Noor Alomran & Rebecca DeGeest**

#### *Mass Media Stereotypes: Media and War*

Faculty Mentor: C Strand

Many stereotypes have occurred in the media throughout the 21st century. The purpose of this project and study is to show the true viewpoint of media by showing the current stereotypes (i.e. women in the Muslim/Arab world being oppressed, coverage in the war in Iraq and the controversial images displayed from media). The problem with media in Western culture is the lack of truth, understanding and open-mindedness toward other cultures. The project will include interviews of journalists; Muslim/Arab/Eastern individuals, professors/researchers and we will use current relevant documents, like books, documentary movies, video clips, etc. Our goal is to inform and enhance people's ideas and viewpoints on mass media stereotypes and how people portray individuals from other countries and cultures. This project and information is significant for the future of building relationships with those of other cultures. Example: "When seeing a Muslim woman walking down the street, don't think that she was oppressed."

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## MATH EDUCATION

### **Ashley Borchardt & Monica Maus**

#### *Integrating Technology into the Mathematics Classroom*

Faculty Mentor: Timothy Harms

Technology has revolutionized the way people go about their everyday life. The same can be said about the way people learn. Although many schools and teachers around the globe have begun to incorporate technology into their

classrooms, mathematics classrooms often lack this 21st-century amenity. Throughout this project, we have experimented with numerous ways a mathematics teacher could potentially utilize various forms of technology in his/her classroom. In this demonstration, we will be focusing on a set of robots that can be used to demonstrate and explore a variety of mathematics topics that range from Algebra I to Precalculus. In particular, we will concentrate on a single robot, ArmBot. We will utilize ArmBot to explore angles and their relation to the unit circle and Cartesian and polar coordinate systems. The use of technology in a classroom often makes a traditional lesson far more engaging and relatable for the students. Technology allows teachers, especially mathematics teachers, to keep their students interested in the material and thinking about the various real-world applications they could potentially be involved in.

### **Holly Sullivan**

#### *Forecasting Deaths Using Time Series Analysis*

Faculty Mentor: Ellen Fagerstrom

Accidental death is quite common in the United States, but I wanted to figure out just how common it was and how it may have any patterns, whether it is the demographics, time, temperature, location, etc. Looking further into data based off these traits and graphing them, I hypothesized that there may be one or more factors that play a part in accidental deaths in the U.S. I will present my analysis to prove whether accidental deaths in the U.S. are nonstationary or stationary. My goal in this project is to find an appropriate probability model to represent the data on deaths and estimate its parameters. Once I have reached this step, I then can use the model to make inferences about predictable factors.

### **Megan Sanford**

#### *Swim/Dive Meet Scoring Analysis*

Faculty Mentor: Ellen Fagerstrom

At a swim and dive meet, deductions can be made about individual winners for each race, but there is some abstraction from those places to the final team scores. The goal for this project is based on swimming and diving meet scoring and the comparison between original and true team scoring, as well as college and high school

swimming and diving scores. To model this comparison, I have compared the outcome of several dual and invitational meets from the Northern Sun Intercollegiate Conference (NSIC) teams and from North Dakota High School teams. There will be four cases associated with this model. Case 1 represents NSIC dual meets, Case 2 represents NSIC invitational meets, Case 3 represents North Dakota High School dual meets, and Case 4 represents North Dakota High School invitational meets.

### **Samantha Notch**

#### *Bezout's Theorem and Its Applications*

Faculty Mentor: Damiano Fulghesu

Bezout's Theorem states that if two polynomials do not share a common factor, then the number of intersection points they have is no more than the product of their degrees. These intersections can be distinct or have multiplicity depending on if there are any tangency conditions. Classical techniques to determine the intersection points of two polynomials are methods from linear algebra. Various systems of polynomials with different degrees will be considered to show examples of how curves can intersect and what properties they hold. The sketch of the proof will also be given to verify the results of Bezout's Theorem.

### **Ajaya Shrestha**

#### *Best Game to Play: Call of Duty: Black Ops or Assassin's Creed Black Flag*

Faculty Mentor: Ellen Fagerstrom

"Call of Duty: Black Ops" and "Assassin's Creed IV: Black Flag" are considered to be top games to play. "Call of Duty: Black Ops" is a first-person shooter video game. "Assassin's Creed IV: Black Flag" is a historical, action-adventure, open world video game developed by Ubisoft Montreal and published by Ubisoft. They both are the most successful selling games, especially "Call of Duty: Black Ops" as it broke the record of selling 5.6 million copies in a week. Very similar is Assassin's Creed IV: Black Flag. I chose to find out which of these most successful games people would best enjoy to play and share. My assumption is, since "Call of Duty: Black Ops" was the most successful game to be sold, I would say that it is the best game to play, enjoy and share. However, let's see with a mathematical solution whether my assumption is considered to be agreeable or not.

### **Jacob Moe**

#### *Cost Analysis of Home Car Repair*

Faculty Mentor: Ellen Fagerstrom

During the summer, saving up money to invest in a new car is often a thought in the mind of a college student. The only problem is that affording a brand new car is out of the budget, so settling for a used car is the only choice. After searching through the market, and days of painstaking research, the most desirable car is found and purchased. The new owner can't wait to drive away, but there is just one catch: it is in need of a couple repairs before it can hit the open road. An examination needs to be performed on the costs of these repairs at a dealership versus doing them in a home garage. Will less money and more time be spent wrenching in a home garage, or will more hard earned money and less time be better spent at the dealership?

### **Jacob Moe & Megan Sanford**

#### *Accuracy of Fitness Tracking Device*

Faculty Mentor: Ellen Fagerstrom

Technology has advanced from the primitive step counters that keep track of walking motions using a simple clicking mechanism. Today, devices are available that can monitor steps, distance, exercise, sleep habits, calorie burn, and many other lifestyle statistics. But how accurate are these devices? Does the device account for stride distance per step, or is it simply a one-size fits all algorithm to determine the number of steps taken? This project will analyze the accuracy of the measurements taken by a personal fitness tracking device against the actual measurements. Measurements that will be studied: steps taken, distance walked, and sleep monitoring/disturbances.

### **Shrijana Gurung**

#### *A Walk on Campus*

Faculty Mentor: Ellen Fagerstrom

MSU Moorhead has a lot of visitors every now and then who are here in order to check the campus site and facilities provided to the students, faculty and staff. We have Dragon Ambassadors who guide these visitors to different buildings on campus. The Ambassadors tend to show places such as residential office, dining places, some buildings with classes and some

interactive places as well. In this paper, our first goal would be modelling a path on campus that will enable the mentors, visitors or anyone else to visit all the important buildings, possibly once following a certain path.

### **Pengyu Qian**

#### *When Will the U.S. Stock Market Stabilize?*

Faculty Mentor: Erdenebaatar Chadraa

Nowadays, with the high development of the economy, the price of stock is fluctuating more than ever. Many people are wondering what the stabilization point of the U.S. stock market is. In this presentation, we will show a built generalized autoregressive conditional heteroskedasticity (GARCH) function in a financial time series that exhibits time-varying volatility clustering, and the application part of the GARCH model. We used the Dow Jones Industrial Average for our research object and tried to find the relationship between date and daily price trend. This result may have some answers in order to predict when the U.S. stock market will stabilize.

### **Josiah Reiswig & Samuel Erickson**

#### *Aphid Sequences*

Faculty Mentor: Adam Goyt

The Fibonacci sequence is a well-known sequence in mathematics. This sequence was created in attempt to count the number of rabbits that could hypothetically reproduce each month with some given assumptions about the rate at which the mother rabbit reproduces and some additional restrictions. Aphids are insects that have very complex breeding patterns. Some Aphid species reproduce asexually and can have their spawn reproducing before they are born. Assuming that aphids live forever, we wish to know the number of aphids alive after a given number of time periods. We find and give a proof of a recursive relation for this generalized Fibonacci sequence. We use this relation to find a generating function. We also consider when the aphids are mortal.

### **Brittney Bunn & Youngshin Lee**

#### *Khan Academy: Free Education?*

*It is about time!*

Faculty Mentor: Geok Ng

For this presentation, we will be introducing the Khan Academy. This organization is known



for providing free educational resources online and has been helping students since 2006. In our presentation, we will discuss how the Khan Academy began and what it has been providing for students and educators. To illustrate how impactful this organization is on the classroom environment, we will show how this program has been successful in multiple school districts. We will demonstrate how this website operates and what it offers to the public. At the end of our presentation, we will discuss how this program gives a glimpse into the future of the educational system.

**Brittney Bunn & Youngshin Lee**

*Experience the Magic of Tangrams*

Faculty Mentor: Carol Okigbo

Our presentation will focus on tangrams, their origin and how they can be used. The purpose of our presentation is to show the various activities that can be done with tangrams and how it can help to develop critical thinking and problem solving skills. The presentation will involve several demonstrations of multiple arrangements that can be made with these manipulatives. The participants will also be engaged in some hands on, as they will be required to try to create some figures with the tangrams. Overall, the presentation will allow the audience and participants to leave with a better understanding of what tangrams are and how they can be used.

**Iwnetim Abate**

*Algebraicity of Limit Cycles*

Faculty Mentor: Damiano Fulghesu

We study a particular kind of differential polynomial systems. We show that this system has, at most, one limit cycle, and that when it exists, it can be explicitly found. We focus on systems of equation which have one limit cycle and check whether they are algebraic. This is achieved by expressing the system in polar coordinates and solving a Bernoulli equation. Finally, we study particular case involving polynomials of degree 3 and 4.

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## MUSIC

**Travis Bauer**

*Chopin Nocturne*

Faculty Mentor: Laurie Blunsom

In 1812, pianist John Field (1782-1837) created the Nocturne, establishing one of the most versatile and popular musical genres of the 19th century. Field's nocturne was free in form and content, focusing on mood and atmosphere and creating a tender, dreamlike flow of melody that evoked the emotion of sadness and solace. Frederic Chopin (1810-1849) was enamored by Field's idea and took up the new genre, expanding it to create his own unique version of the nocturne. Ultimately, it was Chopin who popularized the nocturne and made it an important part of concert repertoires for pianists. In this presentation, I will discuss the invention of the nocturne and the innovations that Chopin brought to it. I will focus on the significant impact Chopin had on the genre and how the new approach applied to his own nocturnes. I will examine his writing style and how it created tension and drama. Finally, I will demonstrate how his writing brought a different rhythmic profile and structure to the Nocturne.

**Stephanie Knapper**

*Dvorak's Cello Concerto in B minor*

Faculty Mentor: Laurie Blunsom

Antonin Dvorak (1842-1904) was a Czech composer who wrote many masterpieces for string instruments. His "Cello Concerto in B minor" (1895) is considered among the finest of all cello concertos. From its first performance in 1896 through to the 21st century, this cello concerto has maintained tremendous popularity among performers and audiences. In this presentation, I discuss the importance of Dvorak's cello concerto to the history of his oeuvre and the repertoire. I will describe the progression of his ideas about the instrument and his inspiration for writing the work. I will also explain some of Dvorak's particular approaches to the instrument and the genre. Finally, I will consider some of the reasons this work continues to be studied, performed and enjoyed today.

**Matthew Seidel**

*The Electric Guitar and Blues Music*

Faculty Mentor: Laurie Blunsom

For over 100 years, the blues have influenced American music styles ranging from folk to pop to rock and jazz. Over its long history, dating back to its origin in the early 19th century,

the blues have revealed and demonstrated its flexibility in adapting to new trends and integrating new approaches. The introduction of the electric guitar to the blues offered exciting new possibilities that look forward and backward in the blues style. In this presentation, I will discuss the blues and some of the particular characteristics of the genre, including the attributes of vocal blues. I will then explain how electric instruments, specifically the electric guitar, began to be used in playing the blues in the 1930s and 1940s in such a manner that embellished the style. I will also describe the connections between the electric guitar and vocal blues, as well as what components are added to the blues by the means of amplification. Finally, I will examine the use of electric guitar to play the blues and the ways in which it adds significant possibilities and interesting layers to the framework of traditional blues.

**Alex Thammavongsa**

*Into the Mind of Robert Schumann*

Faculty Mentor: Laurie Blunsom

Robert Schumann was a leading German composer of the Romantic era. He was an important music critic who also devoted as much of his life to literature as he did to music. He is notorious for having suffered from mental illnesses, including depression, suicidal tendencies and bipolar disorder. In addition to several other aspects of Schumann's life his mental illness undoubtedly had an effect on his compositions. In this presentation, I will describe Robert Schumann's mental illnesses and explain how his early work, *Carnaval* op. 9, is a window into Schumann's mental state and a sign of the impending illness he would suffer later in life. *Carnaval* is a set of short character pieces, each portraying a different character or idea. In creating the work, Schumann demonstrated his facility with representing varying moods and perspectives. I contend that some of these pieces point toward instability in the composer's mental state. In order to demonstrate this idea, I will examine selected individual pieces to demonstrate how these specific examples, and the work as a whole, relate to schuman's struggles with mental illness.

**Peter Lonquist**

*New Beauty in New Music*

Faculty Mentor: Laurie Blunsom

The motivation for my composition of the piece “Why not White” was to answer a question in my mind about whether beauty in music was possible while furthering musical composition practices or if the sensation was tied to music practices of the past – specifically western harmonic practices of the 19th Century. Through composing, speaking with others, and researching various interviews and historical texts about music, I found/furthered techniques that are virtually nonexistent in music as far as I am aware. These techniques, being expressed through “Why not White,” give others and myself a sensation of beauty. In this presentation, I will discuss the idea of beauty in music and contemporary compositional practices. I will demonstrate some of my ideas as manifested in “Why not White,” focusing on the techniques I have used to compose the piece.

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## PERSONAL DEVELOPMENT

### Logan Schrader

*Introversion in Effective Leadership*

Faculty Mentor: Diane Wolter

Extroverts are often perceived to be stronger leaders than introverts, but this is often not the case. This study investigates several leaders on campus who identify as introverts and explores their effectiveness as leaders.

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## PHILOSOPHY

### Jessica Hillesheim

*Moral Obligation and Charity*

Faculty Mentor: Marilea Bramer

We live in a time in which many people are struggling to meet the basic necessities of life. Because of this struggle, the topic of charity has been brought to the forefront of our concerns. The purpose of this presentation is to express the concern of charity as a moral obligation to citizens at large, both geographically distant and on a local scale. Morally speaking, this means we must pay special attention to the welfare of those geographically distant, and in dire need of assistance, instead of simply focusing our attention on those in need who are geographically close to us. I will be contrasting Kantian and Utilitarian ideas on the subject,

and I conclude that both will favor a form of developmental aid above traditional charity methods. This conclusion is required by the Kantian idea of Justice and Mill's Greatest Happiness Principle.

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## PHYSICS

### Iwnetim Abate

*Fabrication of Counter Electrodes for Microprobe Impedance Measurement*

Faculty Mentor: Ananda Shastri

A major obstacle to the study of fundamental properties of candidate materials for solid oxide fuel cell (SOFC) cathodes is the morphological complexity of the electrode-electrolyte interface. This complexity prevents a true determination of the catalytic mechanisms. Using well-defined electrode geometries, it is possible to quantify the relative density of two-phase boundary sites to three-phase boundary sites, and so by varying the pattern used to generate the electrode geometry we can determine the primary pathway. Toward this goal, we first made porous composite cathodes of  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-x}(\text{BSCF}) + \text{Ag}$  or  $\text{SrCo}_{0.9}\text{Nb}_{0.1}\text{O}_{3-x}(\text{SCN}) + \text{Ag}$  for impedance measurements of well-defined microelectrode SOFCs. Porosity, friability, adhesion to the substrate's surface, thermal stability and electrochemical properties of the porous films were investigated by optical microscopy and AC impedance spectroscopy (ACIS). Next, we studied whether a chemical reaction occurs between the high-performance cathode material, SCN, and the most conventional electrolyte material,  $\text{Y}_{0.16}\text{Zr}_{0.84}\text{O}_{1.92}$  (YSZ). The conditions that favor the reaction are also determined using X-ray diffraction (XRD).

### Tyler Lane

*Measuring the Dipole Moment of a Human Heart*

Faculty Mentor: Ananda Shastri

A student built electrocardiogram (ECG) monitoring system was used to measure the QRS complex of a human heart and compare it to measured data to accepted values. A normal QRS complex duration of the frontal plane is 0.06s - 0.10s [Frank G. Yanowitz, MD]. Fundamental concepts of electrostatics and electrodynamics

were used to determine the dipole moment of a human heart and plot it against time. Each participant will hold an electrode in each hand while their heartbeat is recorded. At least 10 participants will be asked to participate and measure their heartbeats. Results will be presented.

### Iwnetim Abate

*Characterization of Materials for Proton-based Fuel Cells*

Faculty Mentor: Ananda Shastri

Developing efficient, sustainable and economic alternative energy systems is currently of great political, technical and scientific interest. Hydrogen-oxygen fuel cells are a possible solution for applications requiring a portable energy source. Central to proton-based fuel cell operation is the proton exchange membrane (PEM), which simultaneously provides electronic insulation between the fuel cell's anode and cathode and allows proton conduction. Recently discovered candidate materials under consideration as proton conductors for PEM are alkali thio-hydroxogermanate system,  $(\text{MS})_x\text{Ge}(\text{OH})_{4-x}\cdot y\text{H}_2\text{O}$ , where  $\text{M}=\text{Na}, \text{K}, \text{Rb}, \text{Cs}$ , and  $x=1, 2, 3, 4$ . In this study, the correlation between conductivity, the type of alkali metal, and the amount of proton inside the system was examined in solid state. Nuclear magnetic resonance spectroscopy was used to study the hydrogen local environment and mobility. Results will be presented.

### James Diem, Connor Cease & Zachary Deschene

*Electrocardiogram*

Faculty Mentor: Ananda Shastri

In this experiment the goal was to determine the effect on the heart of varying orientations the human body was in. Using an oscilloscope and a lab constructed electrocardiogram (ECG) monitoring system attached to the wrists of a human subject (who volunteered during the class period), changes in both the rate and the amplitude of the signals obtained from the heart were then observed as the person was rotated through 225 degrees. As the body was rotated, it was observed that as the beats per minute increased, the amplitude (V) decreased. As the subject went from a standing position to a lying position, the beats per minute decreased and the





amplitude increased. Orientation of the body had a significant effect on the behavior of the heart.

**Connor Stotts**

*Studying the Performance of Solid State NMR Heater System*

Faculty Mentor: Ananda Shastri

In solid state nuclear magnetic resonance (NMR), it is often necessary to change the temperature of the sample under study. An apparatus was designed to serve as a general purpose temperature control system for a solid state NMR spectrometer. The goal of this project was to evaluate the performance and determine the maximum temperature achievable in the sample chamber. The heating apparatus was constructed from copper tubing, coated with Sauereisen ceramic heater cement, wrapped with 226 cm of 26 gauge nickel/chromium (60-40 percent) heater wire (2.679 ohms/ft), and coated with ceramic heater cement. The performance results will be presented.

**Loza Tadesse**

*Signal Enhancement in the Electrocardiogram and the Study of Cardiac Activity Changes in Response to Stress in Zebra Fish*

Faculty Mentor: Ananda Shastri

In the last decade the zebra fish has become a major model organism for various cardiovascular researches. ECG reading is one of the vital mechanisms that is utilized to assess changes in their cardiac activity. The purpose of this research to enhance the in-house ECG machine to develop a less invasive mechanism to study cardiac response in stressed zebra fish. Filters were added to the current ECG equipment in order to reduce the noise level and enhance the required signal. Several trials on human subjects were made by placing the electrodes on the right and left palm of the hand. While working with the fish, the electrode probes were placed in a small container filled with water for the fish to swim in. The first recording was taken with the fish swimming inside. A second recording was taken without the fish. The resulting signals were computed to isolate the signals from the fish ECG results. In addition, the use of a faraday cage was attempted, where by the fish inside the container was placed in a metal box. The research is still in progress, and so far it

was found that the addition of filters further enhanced the required signals. Furthermore, various factors that influence the process were identified. To mention some, the motion of the water, the presence of an investigator and the type of container.

**Daniel Houk**

*Acoustic Analog to Quantum Mechanical Systems*

Faculty Mentor: Ananda Shastri

Quantum physics is the analysis of the wave-like behavior of particles. Laboratory activities that illustrate quantum behavior can be complicated and expensive. Are there analogs in acoustic systems that could illustrate important quantum mechanical systems? An acoustic apparatus was created to show the similarities in wave functions of sound waves and quantum mechanical waves. A system was set up to model an infinite square well containing a delta potential. The system contained two closed pipes and a series of foil sheets. A standing wave pattern was created within the pipes using a speaker. The similarities between the acoustic and quantum mechanical systems were explored and results will be presented.

**Meredith McLinn**

*Source Extraction for Astronomical Images*

Faculty Mentor: Juan Cabanela

Source extraction is the process of automatically finding sources of light in an image of the night sky and is essential in determining the amount of light coming from each source. A python script is being written to perform a simple source extraction on a variety of starfields, and to output a term estimating the likelihood of that light source being a star.

**Benjamin LeMay & Casey Keller**

*Mass to Charge Ratio of an Electron*

Faculty Mentor: Ananda Shastri

The goal of this experiment was to determine the charge to mass ratio for an electron by manipulating a beam of electrons produced by an electron gun using a Helmholtz coil with a varying magnetic field. The strength of the magnetic field was adjusted by changing the current supplied to a Helmholtz coil, which varied the radius of the electron beam's path in the uniform magnetic field. The voltage that

accelerates the beam of electrons was adjusted so the beam would strike the same location prior to changing the current. Using the relationship between kinetic energy and magnetic field in the system the  $e/m$  ratio was determined. Results will be presented.

**Abel Tilahun**

*Making a Difference in the Future of Middle School Kids with STEM*

Faculty Mentor: Juan Cabanela

The internship I did in the summer of 2013 was SEEK (Summer Engineering Experience for Kids), a program of NSBE (National Society of Black Engineers). The program has a mission to increase elementary school students' aptitude in math and science and their interest in pursuing STEM career fields, by having them engage in interactive, team-based engineering projects. I had a mentor position in the program at two sites, New Orleans, La. (June 10-28, 2013), and In Washington D.C. (July 13-August 02) where I taught about a "steel can rover engineering toy" to fifth-grade students and a "Solar car engineering toy" to eighth-grade students, respectively. I explained the basics of energy conversion processes and the realistic applications of science in a way the students could understand and get inspired to pursue STEM in their future times. I received a letter of appreciation for my accomplishment in the program.

**Nathan Walker, Wyatt Davis & Kyle Salk**

*Speed of Light in a Coaxial Cable*

Faculty Mentor: Ananda Shastri

The speed of an electromagnetic wave in a coaxial cable is often stated as  $2/3$  the speed of light in a vacuum. In this experiment, the actual value of the electromagnetic wave speed was determined by reflecting the signal in a known, increasing length of coaxial cable. The time interval between the original signal and the reflected signal was used as the time it takes for the signal to travel twice the length of the coaxial cable. With the knowledge of the time interval and distance the signal traveled, the velocity of the wave was calculated. Results will be discussed.

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**Laura Herzog & Michael Meraz**

*Photoelectric Effect*

Faculty Mentor: Ananda Shastri

When photons hit a metallic plate the photons, also known as light, will transfer energy to the electrons in the metal. If enough energy is transferred to the electrons, they will be ejected from the metal in a process called the photoelectric effect. An experiment was conducted to determine Planck's constant using an EP-07 precision photoelectric effect device to determine the stopping potential caused by the freed electrons. It is possible to solve for Planck's constant using monochromatic light sources with known wavelengths. The relationship between the stopping potential the inverse of the wavelengths was plotted on a graph, and using the slope, the charge of an electron, and the speed of light, Planck's constant was computed and compared to the accepted value. The experiments result of  $(5.18 \pm .11) \times 10^{-34}$  was consistently below the accepted value of  $6.63 \times 10^{-34}$ .

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**POLITICAL SCIENCE**

**Bibek Rai**

*Final Stages of the Sri Lankan War: A Journey to Unanswered Accountability*

Faculty Mentor: Andrew Conteh

Many serious violations of international humanitarian and human rights law occurred during the recent wars in the former Yugoslavia, Rwanda, Sierra Leone, Cambodia and Liberia. Tribunals and special courts were established to provide universal jurisdiction to the helpless victims in the response to the atrocities. Significant violations occurred during the "Sri Lankan Civil War," which was fought between the government and Liberation Tigers of Tamil Ealam (LTTE). LTTE, formed in 1975 and based in the northern and eastern Sri Lanka, was led by Vellupillai Prabhakaran and demanded a separate state called Tamil Ealam. The government launched a massive military offensive in the LTTE and held territories in January 2008, which came to an end with the surrendering of LTTE in May 2009. There are claims of war crimes and atrocities committed by both sides during the final stage of the Civil War in 2009. The panel appointed by the Secretary-General of UN submitted a report after analyzing information from various sources, their allegations,

characterizing the credible sources, and appraising them legally.

**Richa Neupane**

*Types of Foreign Aid and Its Use in Recipient Countries*

Faculty Mentor: Philip Baumann

This is a literature review of the dynamics of foreign aid. Nepal is the least-developed country that gets significant amount of foreign aid from the rest of the world. But it has a long way to go in its development. Although foreign aid distributed in the world today is little, this paper aims to understand what kind of aid and their administration best fits a developing nation like Nepal. In the process, the paper looks at what kind of aid is available, the different goals of countries that provide foreign aid, and the role of the governments in disbursing the aid. The paper will review the delivery system in Nepal and make appropriate recommendation and conclusions.

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**PSYCHOLOGY**

**Adam Boles, Graduate Student**

*Selecting and Using Educational Apps as Intervention Tools*

Faculty Mentor: Lisa Stewart

Apps for iPads, iPods or other devices hold great promise as educational tools, but selecting a good app can be overwhelming. Technology allows us to do things easier, faster and more individualized. Selecting and using educational apps as intervention tools starts off with first knowing when and how to use the apps. Selected apps should be evidence-based, matched to the students' needs and typically used to enhance other Tier 2 or supplemental interventions. Progress monitoring should also be done to track the students' performance and make decisions about the intervention. This summary of innovative practices covers the different ways to use apps, highlights some of the more popular apps used in schools and provides a rubric to help select apps for educational and behavioral interventions. The presenter also will have an iPad available to demonstrate selected apps.

**Samantha Kallberg**

*Appearance-related Social Norms: How the Thin Ideal Impacts Opposite Sex Perceptions of Attractiveness*

Faculty Mentor: Rochelle Bergstrom

Many studies have investigated the effects of media exposure on women's body image. No published research examines if images of thin women accompanied by men have the same impact as images of thin women alone. Furthermore, no published research examines if media exposure can not only influence women's perception of self, but also influence women's perception of what others find attractive. A sample of 186 female college students was collected. Participants viewed print advertisements from one of three conditions: cars (control), women only, and women and men together. Consistent with the hypothesis, we found that women who viewed images of thin women alone perceived that men found a significantly larger body shape more attractive than women who viewed images depicting both sexes together. Contrary to predicted however, women in the control condition perceived that other women found a significantly smaller body size more attractive than women who viewed images of women only. The findings from this research will extend the knowledge about media's effect on women's body image and will potentially provide support for the notion that perceived attractiveness norms are impacted by media imagery.

**Katherine Johanson & Madhuri Tiwari**

*Competing Sound and Spelling Information Produce Memory Blocks in Word Fragment Completion*

Faculty Mentor: Christine Malone

The present study investigates automatic activation accounts of encoding and retrieval in word fragment completion tasks over a delayed period. Three spelling and sound overlap conditions were presented auditorily on the study list: 1) Initial Overlap (IN) of study and target; 2) Ending Overlap (EN) of study and target; and 3) Unrelated control words (UN). Significantly fewer correct target completions occurred on the fragment task for both IN and EN overlap relative to the unrelated controls. This inhibition pattern is indicative of the memory blocking



effect (MBE), which is thought to occur due to automatic activation of spelling information at retrieval. This study extends MBE to cross-modal study-test situations. Implications for encoding and retrieval processes are discussed.

**Hayley Hilfer, Beth Anderson & Kelsey Ihringer**

*The Role of Attachment in Facial Emotion Scanning Patterns of Infant-mother Dyads*  
Faculty Mentor: Elizabeth Nawrot

The ability to read emotional expression is essential to establishing and maintaining relationships. Several studies have investigated a connection between attachment style and the ability to interpret emotion on faces. This study has currently collected data on 14 mother-infant dyads to examine a possible relationship between attachment styles and the ability to interpret facial expressions of emotion. Infants ages five-to seven-months-old and their mothers viewed facial expressions (anger, sadness, happiness and neutral) while their gaze was recorded using infra-red eye tracking. The mothers' parental and romantic attachment styles were calculated using two surveys. It is predicted that dyads with insecure attachment styles will show a different pattern of face scanning compared to dyads with secure attachment styles. In particular, insecure attachment may be related to an avoidant style of gaze to negative or threatening facial expressions. These results may have important implications for the study of attachment, especially the emotional development of infants.

**Ryan Hamilton & Timothy Fode**

*The Right Person for the Job: The Influence of Resume Position on Hiring Decisions*  
Faculty Mentor: Gary Nickell

Recent research suggests that mental metaphors have the power to influence our cognitions, emotions and perceptions. In many cultures the "right" side is associated with positive or good attributes while the "left" side is associated with negative or bad attributes (Casasanto & Chrysikou, 2011). However, Casasanto (2009) found that people tend to prefer a product or person presented on their dominant side. Since approximately 90 percent of the world is right handed, this often results in an overall bias for the right side. The purpose of the present study was to investigate whether left/right placement

influences the evaluation of job applicants. Right-handed participants were asked to read the qualifications of two resumes (presented on the left and right) for five different job openings. It is hypothesized that right-handed participants will be more likely to recommend hiring applicants whose resumes are presented on their right.

**Jesse Hennen, Graduate Student**  
*Effects of Child Directed Interaction on Disruptive Behavior*

Faculty Mentor: Olivia Melroe

The project explored the effects of Child Directed Interaction (CDI) intervention with a boy who had displayed disruptive off-task behavior and failure to follow teacher directions. It was hypothesized that these behaviors stemmed from the inability of the child to self-regulate. CDI is an intervention method designed to facilitate the development of self-regulation in children. The treatment included daily one-on-one sessions with a trained adult facilitator followed by observations of the targeted behaviors.

**Hannah Korcuska, Graduate Student**  
*Self-monitoring: Increasing Eye Gaze through a Behavioral Intervention*

Faculty Mentor: Lisa Stewart

The purpose of this project was to explore the effects of a self-monitoring intervention on eye gaze or the visually checking in behavior of a 13-year-old male student with ASD. Individuals with ASD often display deficits in skills such as joint attention and attending behavior that affect their performance in the classroom, social interactions and verbal and nonverbal communication (American Psychological Association, 2013). A trained paraeducator taught the student the target behavior, visually checking in, as well as how to self-monitor the target behavior. Intervention included using a visual prompt to promote eye gaze and self-monitoring during his special education math class. He was also observed during his math class to record whether or not the target behavior was performed. Weekly observation data was collected over an 11-week period. The results indicated an increase in visually checking in behavior using the self-monitoring intervention based on variability, level and effect size. After the implementation of the intervention, the variability of his behavior decreased, and

the level of his visually checked-in behavior increased. The student's mean baseline behavior was 62 percent of the intervals, and the mean during the intervention phase was 81 percent. The percentage of nonoverlapping data for this intervention was 67 percent, which constitutes a medium effect size. These results were consistent with previous research on the use of self-monitoring for students with ASD and indicate self-monitoring can be used successfully if implemented using best practices.

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## SCIENCE EDUCATION

**Victoria Honetschlager**

*5E Inquiry in the Physics Classroom*  
Faculty Mentor: Richard Lahti

5E inquiry is a learning method based on the constructivist view of learning, in which students construct their own knowledge through interaction with material. Students attain greater concept understanding through posing questions and investigating phenomena. This presentation will incorporate 5E inquiry and constructivist learning methods by delivering an introductory unit lesson on circuits. During the presentation, attendees will be led through the 5E instructional model as it would be presented to a classroom.

**Isaac Skalsky**

*The Correlation of Science Fair to the Achievement Level of Students in Minnesota Public Schools Taking the Science Minnesota Comprehensive Assessment*  
Faculty Mentor: Richard Lahti

Minnesota Comprehensive Assessments (MCAs) are mandatory exams for MN schools to administer. This study looks at the correlation between school participation in science fair and their MCA Science score. It also takes into account variables such as school poverty level, geographic region and school size. The data was compiled by utilizing public testing and school information records and by administering a survey to MN public schools. Results will be presented and discussed.

**Brent Vandal**

*5E Inquiry Lesson*  
Faculty Mentor: Richard Lahti

The 5E instructional model is based on the constructivist view of learning. Constructivism embraces the idea that learners construct knowledge for themselves, both individually and socially. The 5E model provides instruction that places students at the center of their learning experiences, encourages them to explore and construct their own understanding of scientific concepts and relates those understandings to other concepts and to the world in which we live. The E's in the 5E instructional model (engage, explore, explain, elaborate/extend and evaluate) stand for specific phases within the learning cycle that start with a hook, and then has students explore a concept and construct their own learning before moving on to formal theory and application. This method of instruction, though gaining popularity, is disparate from instruction found in a traditional classroom. This presentation will serve as a model of 5E instruction following the constructivist view. The lesson itself would be taught as part of an ecology unit in a high school biology classroom.

### **Phillip King**

#### *Exploration of the 5E Model in Population Ecology*

Faculty Mentor: Richard Lahti

The 5E model is an inquiry based instructional model that involves five steps. The five steps, elicit, explore, explain, elaborate and evaluate, are used to address student preconceptions about the world. The preconceptions are addressed by developing student competence in inquiry, factual knowledge and organization of knowledge for retrieval and application. The 5E model is important because it helps students take control of their own learning by defining goals and relevant uses for the knowledge they have learned. The 5E lesson can be tricky to master for both teacher and student alike. For teachers, it is challenging to design a 5E lesson plan because the learning is based on the direction of student thought that needs to be anticipated. For students, it is a challenging lesson because it demands critical thinking and investigation into a topic with minimal instruction in opposition to most traditional lesson plans. This presentation will explore a lesson using the 5E model in population ecology to show practical application of this model.

### **Ryan Schmit**

#### *Completing and Analyzing a High School Biology Lesson*

Faculty Mentor: Richard Lahti

The five parts of the 5E lesson plan format include engagement, exploration, explanation, elaboration and evaluation. When done correctly, there is greater retention of information by the students, which is the primary goal of the 5E format.

### **Alexandra Bondy**

#### *A 5E Approach to Teaching Energy Transfer Between Trophic Levels*

Faculty Mentor: Richard Lahti

This project is a lesson plan that employs the 5E Instructional Method to guide students, and in this case audience members, to explore and understand the biological concept of energy transfer between trophic levels. The objective of the presentation will be to model the instructional method, while also demonstrate its educational advantages. The 5E Instructional Method is an effective educational strategy that allows students to use their existing knowledge to confront new knowledge and create new understandings of scientific concepts. This confrontation occurs through teacher-guided and, more importantly, student-led phases of: engagement, exploration, explanation, elaboration and evaluation. The overall role of the teacher during a 5E lesson is to create a safe environment and activity that motivates students and allows them the freedom to explore the concept in their own way. The role of the student during a true 5E lesson is to investigate, think critically, ask questions, design experiments, and communicate their conclusions. The major emphasis in the 5E Method and its major advantage is that students go beyond active learning and engage in scientific inquiry.

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## **SOCIOLOGY**

### **Clare Palmer**

#### *50 Shades of Pop Culture's Betrayal: A Critique of the Portrayal of BDSM in Popular Culture.*

Faculty Mentor: Karen Branden

"Fifty Shades of Grey" has received an enormous amount of attention and criticism. It has been shunned for depicting taboo sexual practices, chastised for its negative portrayal of such interests, and praised for opening discussions about alternative sexual behaviors. Investigating themes in approximately 30 books, movies and television shows, I analyze portrayals of bondage, discipline, domination-submission, and sadism-masochism. These portrayals provide individualistic, shame-based explanations for BDSM encounters that fall into at least one of four models I have found: the trauma model, the self-degradation model, the predatory model and the fantasy model. The trauma model uses some form of trauma, often in childhood, to explain an interest in BDSM. The self-degradation model involves the character belittling, demonizing, or demeaning his or her interest in BDSM. In the evil/predatory model, the BDSM practitioner is depicted as a predator, a rapist, or evil. Within the fantasy model, a world different from our own is created in which BDSM is acceptable or normal behavior. Locked into a worldview that considers BDSM as a family of deviations that require accounts, popular novels, movies, and television shows perpetuate stigmas that attach to BDSM. They do not open spaces for considering BDSM as desirable, healthy, or acceptable sexual behavior. Through the use of these models and existing research and literature, I explore the history of BDSM and the negative attitudes toward it, the inaccuracies of the portrayal of BDSM in popular culture, and the possible effects of the continuation of the stigma.

### **Sonu Rajopadhyay**

#### *Abortion*

Faculty Mentor: Susan Humphers-Ginther

Abortion is the process to end the pregnancy. It is also called "termination of pregnancy." It uses medicine and surgery to remove embryo and placenta from the uterus. The pregnancy is removed from the womb, either by taking pills which is called medical abortion. There are highly controversial issue. Women between the ages of 15 and 19 account for about 19 percent of all abortions, women 20 to 24 to account for another 33 percent, and about 25 percent of abortions are obtained by women who are 30 or older. Older teenagers and young adults have the highest abortion rates, while women younger



than 15 and older than 35 have the lowest. Women for having an abortion underscore their understanding of the responsibilities of parenthood and family life. Fifty-one percent of women who have abortions had used a contraceptive method in the month they got pregnant. According to British Pregnancy Advisory Service, Abortion is legal up to 24 weeks of pregnancy as long as two doctors agree under the terms of 1967 Abortion Act. Abortion is safe, complications are rare. However, procedures do have risks. To support abortion, females are more supportive than males, according to the research from crosstabs.

### Taylor Hanson

#### *Government Spending on Addiction*

Faculty Mentor: Susan Humphers-Ginther

Addiction is a major problem facing Americans today. From food and sex to alcohol and drugs, people of all power and status are afflicted by addiction. The U.S. government is reported to be spending half a trillion dollars in addiction rehab, but overall prevention needs to become a major focus. With more attention on future addicts we can prevent them from going down the same paths of destruction. Also, those already afflicted need more readily available treatments and by looking at each problem individually we can better understand that problem and solve it.

### Dave Lee

#### *Alcohol Consumption by Age and Race*

Faculty Mentor: Susan Humphers-Ginther

The nation's youth have always participated more in alcohol consumption, which can cause an increased risk for heart disease, cancer, depression and high blood pressure. While moderate consumption may not cause a massive increase in these risks, young adults, particularly college students, tend to consume high amounts of alcohol, which can be detrimental to their health. Why do young adults participate in more alcohol consumption than their older counterparts? Also, why do white adults drink more than any other race? Young adults (18-24) have a higher percentage of alcohol consumption per year than other age categories according to the General Social Survey. Young white adults may drink more than other age groups because of the independence they receive by going to college. With the increased chance of health problems due

to alcohol consumption, something needs to be done to help reduce people's use of alcohol for their overall well-being.

### Jessica Boonstra

#### *Affording the Elderly*

Faculty Mentor: Susan Humphers-Ginther

Americans want to trust their health care system, especially after paying into social security throughout their lives. Most American citizens are unaware of the actual amount their elderly years will cost and the amount of care that is needed in old age. It seems that many people are unaware of what the actual cost of getting old is. In the data collected from the General Social Survey, it is apparent that most people believe it is the government's responsibility to financially provide for the elderly. However, they do not realize that if something is not done to change how the money is provided, funds will soon run out, leaving hard-working people who have paid into social security and medicare all their lives left without benefits when the time comes for them to receive them. This problem needs to be openly exposed to the citizens of this country so that people can start preparing themselves for their elderly years by looking at what amount of money needs to be saved for health-care costs, nursing home care and general retirement lifestyle choices. The truth of this issue is frustrating and harsh, but it can no longer be ignored.

### Brianna Thompson

#### *Under Pressure: Stress and Its Effects on the Body*

Faculty Mentor: Susan Humphers-Ginther

At some point in life, everyone experiences some form of stress. While small amounts may be beneficial, excessive stress can be quite harmful to one's physical and mental health, often leading to more severe health problems and illness. According to the General Social Survey, most Americans report suffering from moderate to high levels of stress on a frequent basis; attributing most of this stress to work and economic sources. Often overlooked as just a "normal part of life," stress is becoming a growing epidemic. It not only contributes to higher rates of illness on an individual basis, but can also lead to problems for students and in the workplace by causing lower productivity,

absenteeism and increased health insurance costs. In order to avoid these negative consequences, preventative measures need to be taken to ease and positively manage stress levels in these environments.

### Joseph Vaske

#### *How Sex, Age and Religion Shape Attitudes Towards Birth Control*

Faculty Mentor: Susan Humphers-Ginther

Birth control is something that is common worldwide. Almost everyone, at some point of time in his or her life, practices some form of birth control. Each individual has to make a decision regarding what method she or he wants to use or not use (abstinence is another form of birth control). How people come to these decisions are shaped by a variety of factors, including sex, age and religion. All three of these have conscious and unconscious influences regarding people's attitudes towards birth control. By further examining these factors one hopes that it will shed light on what forms of birth control people choose and why. This is very relevant to the health and well-being of a society as STDs and STIs are serious issues that affect millions of people. This information could further be used to develop new ways to distribute information about practicing birth control, as well as helping to understand why STDs, STIs and unwanted pregnancies are higher and lower among certain groups of people.

### Pamela DeTienne

#### *Diagnosing and Treating Lung Disease*

Faculty Mentor: Susan Humphers-Ginther

Chronic Obstructive Pulmonary Disease (COPD) is a lung disease that can be caused due to tobacco use, second-hand smoke, chronic asthma, inhalation of indoor pollution and genetic factors. It is the fourth leading cause of death in the United States and will rise to the third leading cause of death by 2020. It affects at least 16 million Americans and is increasing. It is a disease that is easy to diagnose with a pulmonary function test (PFT), but the tests are usually not ordered until the disease is in its late stages. The biggest hurdle with this disease is many do not want to quit smoking, so they do not tell their physician the truth about their smoking history and their shortness of breath until it is in the late stages of the disease

and little can be done for them. When COPD is diagnosed in the late stages, an increase in hospitalizations, infections and other bodily system failures are seen, as well as an increase in cost to the hospital. If patients are tested at the first symptom or risk factor for COPD, many of costs and illness could be prevented. Quality of life could also be improved with early detection. There are many inhaled medications for COPD but one must be tested to find the correct treatment. A majority of lung disease and health costs could be eliminated by the simple solution of quitting the act of smoking tobacco. Prevention is the key to decreasing this disease.

**Brian Lobitz**

*ProSuicide*

Faculty Mentor: Susan Humphers-Ginther

An analysis of the issue of suicide will be presented.

**Ashley Ramirez**

*Racial Impacts on Quality of Health*

Faculty Mentor: Susan Humphers-Ginther

Despite numerous sociological advances in racial disparity, it is quite apparent that races fully exist, especially when examining the differences in health statuses across groups of whites, blacks and minorities. Though medicine has advanced tremendously in the last 50 years and has become much more accessible, cross studies continuously show that blacks and minorities are showing higher rates of poor health than that of their white counterparts according to the General Social Survey. Why is that? If society, medicine and accessibility has truly advanced than these discrepancies amongst races should not exist or the differences should be minimal. These issues need to be addressed. If we are to believe that racism no longer exists, that America is an “equal opportunity” country, that we have made wonderful medical advances and have effectively provided Americans with equal medical accessibility, then we need to demand a difference in numbers. We must demand better health for everyone without race being a factor.

**Jennifer Knecht**

*Seeking Common Ground: A Content Analysis of the Abortion Debate on Pro-Con.org*

Faculty Mentor: Lee Vigilant

In the past two years, the number of abortion laws introduced in state legislatures across the United States has increased at a rapid pace. A content analysis was conducted on responses to the question “Should Abortion Be Legal?” at the website ProCon.org to see what commonalities exist, if any, between the two groups and between members of the same group. The results showed that anti-abortion commenters used more personal and emotive language in responding to the question, while pro-choice commenters used language that was more distancing and objective. Consistent with previous research on the demographics and likely educational attainment of the two sides, less complex language usage was more common among those opposed to abortion as was religious sentiment, while pro-choice respondents had more complex language usage and, more often, correctly used grammar and punctuation. Abortion is an emotional issue for people on both sides of the debate, and both pro- and anti-abortion commenters are highly invested in the issue. The source of emotional response was often tied to the respondents’ belief in the personhood, or lack thereof, of the fetus and to personal identification of the respondent with the fetus. As a result of the sharp differences between the two groups and the extreme polarization of their views, any compromise between the two sides is unlikely.

**Jennifer Wiseman**

*Access to Mental Health Care as it Relates to Socioeconomic Status*

Faculty Mentor: Susan Humphers-Ginther

Mental disorders have a far-reaching and diverse effect on both the individual and family and, ultimately, their community and society as a whole. Although mental disorders are now recognized as a legitimate illness by the medical community and treatment/therapy is now covered by many insurance companies, access to mental health care is limited. Most people in the United States with mental disorders either remain untreated or receive inadequate care. According to the General Social Survey, the majority of those who are unable or find it difficult to get mental health care are those of lower socioeconomic status. More specifically, women, children and those in minority groups report greater difficulty getting mental health care. The association between low income or

low socioeconomic status and mental illness has been well established, and rates of mental illness among the poor are high. Therefore, access for these individuals becomes a major concern, particularly when the rate of poverty in the United States is on the rise.

**Keren Mabisi**

*Government Response Towards Mental Health and Schizophrenia in the United States.*

Faculty Mentor: Susan Humphers-Ginther

Mental health in the U.S. is an issue that keeps popping up, just by looking around the streets. A number of homeless people have some form of mental illness, and a higher percentage of these have schizophrenia. Traditionally, mental health has been addressed for centuries in considerably barbaric ways to try and understand the brain functions that are associated with mental health. This is an issue that many are ashamed of and even scared to address. The recent school shootings have been associated with some kind of mental disorder, but nothing has been done to curb this issue adequately. How else shall we understand and hopefully avoid such issues if proper guidelines and support for those who need it are not enforced or implemented? Should the government be held responsible for providing the necessary support, or should this be left on the shoulders of the family and the individual? Is the slow response from the government due to the perceptions that the public has towards mental health? Through research of several sources, a comparative study with other nation’s responses to mental health and results from the General Social Survey, I will conclude that the government needs to take a center role in addressing the issue of mental health in the country.

**Tawnisha Warren & Charles Pederson,**  
*White Earth Community and Tribal College Boarding Schools on the White Earth Reservation*

Faculty Mentor: Karen Branden

Most people are virtually unaware of the assimilation that happened to the Native American people on the White Earth Reservation. Boarding schools were set up to “Kill the Indian, save the Man” because the government wanted



to take away Native American culture and turn it into a European culture. The government did this by placing Native American children in Boarding schools where they were forced to forget their own traditional ways of living. They did this by cutting their hair and burning their clothing; they were made to forget their name and language; if the children did not listen they were punished, beaten and sometimes killed. What people do not understand is that, from these devastating events that happened, people living on the reservation are still suffering with historical trauma. According to Dr. Maria Yellowhorse Braveheart (2000), "Historical trauma is cumulative emotional and psychological wounding over the lifespan and across generations, emanating from massive group trauma. Native Americans have, for over 500 years, endured physical, emotional, social and spiritual genocide from European and American colonialist policy."

**Kari Pederson, Jody Anderson & Kris LaFriniere,**

**White Earth Community and Tribal College**  
*The Benefits of Eating Fresh: Organic Vegetables for Elders*

Faculty Mentor: Karen Branden

Organic, fresh vegetables are loaded with nutrients; they can help with anti-aging in the elderly population. Eating well as an elder may reduce the risk of heart disease, stroke, type 2 diabetes, bone loss, some kinds of cancer and anemia. These healthy habits can help with constipation. If you already have one or more of these chronic diseases, eating well and being physically active may help you better manage them. Healthy eating may also help you reduce high blood pressure, lower high cholesterol and manage diabetes. Five servings a day of vegetables can also give you spectacular protection against cancer and heart disease. Eating well gives you the nutrients needed to keep your muscles, bones, organs and other parts of your body healthy throughout your life. These nutrients include vitamins, minerals, protein, carbohydrates, fats and water.

**Pam Aspinwall, Michael Thorpe & Alicia Avila**

*The White Earth Treaty of 1867, the Migration to White Earth, and the Nelson Act of 1889: How did these events affect the lives, culture and resources of the Ojibwa people?*

Faculty Mentor: David DeGoat

Our intent is to educate the viewer on certain aspects of White Earth Reservation history by looking at the White Earth Treaty of 1867 and the Nelson Act of 1889. The White Earth Reservation land base was huge, a resource-rich land. The White Earth Treaty was designed to concentrate the Ojibwe of Minnesota to one location, encourage individual landownership and turn the Indian into a farmer. Who was the target population? How were they affected? It was termed a "social experiment." Was it a success? And if not, why not? The Nelson Act of 1889 was a White Earth-specific act of Congress, outlining the process of cession and relinquishment of tribal land. Its intent was to remove all of the Chippewa to White Earth and transform native life into an agrarian society. This soon became a land and lumber grab, resulting in an impoverishment nation, stripping the people of its rich resources and strong, healthy culture. How did the Nelson Act facilitate the loss of White Earth Land and its rich resources? Who benefited from the sales of Chippewa land and resources? We will offer a glimpse into the unique U.S.-White Earth Ojibwe history.

**Caleb Buttenhoff**

*Alcohol and Its Relation to Confidence in the Private Sector*

Faculty Mentor: Susan Humphers-Ginther

The common association between confidence in job security and the amount of alcohol consumed regularly is a negative correlation. That is, when the respondent's confidence increases, the amount of alcohol decreases, and the same reversed. Thus the hypothesis follows as such; the data set being used consists of the opinion of the statement "Job security is good" and the amount of alcohol consumed by said respondent and their corresponding ages placed into three categories. This would either ensure the urban legend that those who associate poor job security with alcoholism is correct, in which the target audience for prevention and rehabilitation are obvious, or it would dispel

the myth and further research may be needed to determine what other causes correlate with alcohol abuse. In either case, dispelling commonplace rumors, influencing policy makers, or increasing awareness of target groups who may be more likely to be influenced by excessive alcohol consumption are the main goals.

**Jordan Pepple**

*Undergraduate Drinking and Academic Performance*

Faculty Mentor: Deborah White

The purpose of the College Alcohol Study (2001), conducted by Henry Wechsler from Harvard School of Public Health, is to determine key factors associated with alcohol abuse. Specifically, the focus of this paper is on undergraduate drinking and academic performance. However, the study also examines unprotected sex, fraternities and sorority influences, access to and cost of alcohol, campus policies, etc. The study population consisted of full-time undergraduate students enrolled in four-year colleges or universities in the United States. The random sample was conducted using probability proportionate to size sampling. The sample size consists of 10,904 students from 119 schools in the United States. The data was collected by mail questionnaire. The general findings concluded from analyzing the study include: males participating in binge drinking more frequently than their female counterpart; students who drink have a lower grade point average than students who abstain from drinking; freshmen will binge drink at higher rates than will upper classmen; and the last finding is undergraduate students who drink on a regular basis do not view themselves as having an alcohol abuse problem.

**McKenzie Benson**

*Alcohol Affects Health*

Faculty Mentor: Susan Humphers-Ginther

The topics of alcohol and health related issues come together and form a multitude of problems and issues globally. Alcohol causes a number of health-related issues. Health effects from drinking start at the age of addiction. In my research, I have gathered statistics of linking race, specific age groups and amount of alcohol consumption weekly, monthly and annually, provided by the General Social Survey. I want to discuss information with how many different

...races and age groups have health issues relating to alcohol. I want to show some awareness about how even taking in one glass to one bottle per day or per week can affect one's health in more ways than one. We need the power elites of this world to understand that people who are addicted to alcohol do have health issues relating to alcohol abuse, and they should seek attention to find the base reason of why these addicts are having issues in today's society. The power elites that can do something about these issues do not understand the extent of how bad it can get for an individual being dependent on this substance.

**Katherine Johanson**

*Effects of Religion and Spirituality on Perceptions of Suicide*

Faculty Mentor: Susan Humphers-Ginther

Through many ways, suicide significantly impacts the lives and well-being of individuals, families and communities. The factors influencing one's decision to commit suicide are complex and interwoven, yet certain life circumstances or social conditions may predict the probability of suicide among different groups of people (i.e. those suffering from depression, victims of bullying, etc.). An important factor influencing perceptions of suicide is religious or spiritual affiliation; because religious groups are enormously popular within the United States and throughout the world, such groups have the power to significantly impact individuals' stances on moral controversies like suicide. Thus, it is imperative that more research be conducted focusing on the influence of religiosity on perceptions of the social acceptability of suicide. Utilizing data from the General Social Survey, it is hypothesized that individuals considering themselves both religious and spiritual will view suicide as unacceptable, whereas individuals who do not consider themselves religious or spiritual will view suicide as acceptable. By conducting further research within this area, the social understanding of these interacting forces can be enhanced and applied to studies of social condition comparison, psychological treatment and community-based mental health centers.

**Cassandra Smith**

*Confirming the Genetic Aspect of Mental Illness in Health Care*

Faculty Mentor: Susan Humphers-Ginther

Within the health community, mental illness can be debated to occur by nature or nurture. Focusing on the nature aspect of mental illness can help to better understand mental illness and how to diagnose it. By understanding what factors to look for in an individual who is prone to mental illness can help to improve the needed treatment that the individual seeks for him or herself. Treatment is only possible by recognizing the symptoms of mental illness as soon as possible. According to the General Social Survey, feelings of mental illness occurred earlier in life, and severity of mental illness did not occur until mid-life. This is why understanding how nature can contribute to possible mental illness is important to prevent the illness from becoming more severe. Hopefully, this will help individual's futures because people in healthcare will be able to better understand mental illness and take preventative steps in order to make mental illness a livable condition.

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**SPANISH**

**Alexis Vollmer**

*Los de ropa almidonada, el golden boy, and the drug trade: An Analysis of the Linguistic Register of Midas in Delirio*

Faculty Mentor: Cecilia Mafla-Bustamante

The award-winning novel, *Delirio* (Delirium) by Laura Restrepo, is based on the violent city of Bogota, Colombia, during the time in which Pablo Escobar was at his height as an international drug lord. Although Restrepo creates a wide spectrum of intriguing characters, including Agustina, the principle character that has fallen into a "delirium," one of the most intriguing characters of this story is the character of Midas McAlister. Midas is not only the ex-lover of Agustina, but is also directly involved with Escobar as a large source of the funds used in his money laundering schemes. I will analyze the character of Midas, focusing on his use of colloquial vocabulary, slang and the strong influence of English words in an effort to understand his journey from the lower class of Bogota to the higher socio-economic "new money" class, as well as his societal and cultural inability to gain entrance into the "old money" upper class where the generational elite reside. The linguistic analysis will shed light on

his engagement and dialogue with individuals from various socio-economic classes and the social implications that come along with these interactions.

*Bilingualism and Music in Relation to Brain Development*

**Eric Bares**

Faculty Mentor: Benjamin Smith

There are an increasing number of studies on the brain in relation to academic performance. While there is still much studying to be done, there are a number of factors which seem to be linked to higher cognitive ability. Two of these factors are the ability to speak a second language and the ability to play a musical instrument. This presentation will examine the fundamental basics of how the brain functions at the level of neurons in learning a second language and/or mastering a musical instrument. Since the age at which these skills are acquired is critical to further mastery of the tasks, I will also address the cognitive functioning tests among various age groups that further link bilingualism and musical ability with higher academic performance.

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**SPEECH AND LANGUAGE PATHOLOGY**

**Arica Flach, Graduate Student**

*Certified Nursing Assistants' Knowledge of Swallowing Disorders in Assistance to Speech-Language Pathologists*

Faculty Mentor: Richard Adler

Certified nursing assistants (CNAs) are the primary care providers for patients on their caseload and play a crucial role in the identification of swallowing difficulties. Not only do CNAs work with patients on a day-to-day basis but are often responsible for assisting them with feeding and positioning during mealtimes. The purpose of this study was to determine the knowledge that CNAs working in assisted living and long-term care facilities in North Dakota had regarding swallowing disorders in assistance to speech-language pathologists (SLPs). This study utilized quantitative and qualitative questions in the form of a survey. Executive directors and administrators from the assisted living and long-





term care facilities were sent the survey and asked to distribute the survey to the CNAs via email. Each participant was provided with an electronic survey that included questions regarding level of comfort when working with individuals on modified diets, knowledge related to signs and symptoms of aspiration, knowledge of diet textures and liquid levels, and precautionary procedures implemented when aspiration is suspected. The data collected will help speech-language pathologists and other medical professionals (e.g., nurses, administrators) to determine if more focus is needed in the area of swallowing disorders, specifically for CNAs working in assisted living and long-term care facilities. Information obtained from the surveys was used to develop a handout to be used as a reference for CNAs to review when they have questions/concerns about residents on their caseload who have swallowing disorders.

### **Kelsey Dybdal, Graduate Student**

*Public School Speech Pathologists Use of Evidence Base Practice in the Selection of Assessments and Treatment Techniques for Students with Childhood Apraxia of Speech*  
Faculty Mentor: Richard Adler

Childhood Apraxia of Speech (CAS) is a disorder that is not well understood in the medical field, although, children with speech motor planning difficulties are being diagnosed more often with CAS by qualified Speech-Language Pathologists (SLPs). This study investigated the choices public school SLPs make in regard to assessment and treatment techniques when working with students with CAS. Data was collected using quantitative and qualitative questions in the form of a survey. Special Education Directors from public schools in Minnesota and North Dakota were sent the survey and asked to distribute it to their SLPs via email. Each participant was provided with an electronic survey that included questions regarding experience(s), assessment, treatment and evidence base practice when working with a student with CAS. Information obtained from the surveys will be used to inform SLPs about using evidence base practice when determining an assessment or treatment technique for a student with CAS.

### **Nicole Hallin, Graduate Student**

*Teachers' Perceptions and Importance of Vocal Health*  
Faculty Mentor: Richard Adler

It is estimated that 5-10 percent of the United States' workforce consists of "heavy occupational voice users" (Titze, Lemke, & Montequin, 1997). Many professional voice users are at risk for experiencing complications during excessive vocal use. One group of professionals at risk for vocal complications is teachers. When reporting the prevalence of voice disorders during their lifetime, teachers report nearly 30 percent more voice disorders when compared to non-teachers (Roy, Merrill, Thibeault, Parsa, Gray, & Smith, 2004b). In general, teachers may be subjected to consistent behaviors that can be viewed as vocally abusive, such as constant voice use, speaking over background noise and vocal projection (Ng, Bailey, & Lippert, 2005). Respectively, teachers may be challenged to maintain the health of their voices. The purpose of this study was to assess teachers' perceptions and knowledge of vocal health and measure their importance ratings of various vocal health aspects. Results indicated the majority of participants possessed basic knowledge of vocal health, but they are not fully aware of vocal health. Results also indicated that teachers might not fully recognize or understand the importance of various aspects of vocal health. These findings highlight the need for speech-language pathologists (SLPs) and education programs to increase teacher education and knowledge of the voice and vocal health. Data obtained from surveys used in this study can assist SLPs in developing educational programs and measures to enhance vocal awareness to ultimately decrease the incidence of voice disorders in this at-risk population.

### **Elizabeth Wright, Graduate Student**

*The Effectiveness of Literacy Intervention Following the Embedded-Explicit Therapy Model*  
Faculty Mentor: Kris Vossler

Literacy skills are essential for a child to have a successful educational career. However, due to the variety of skills necessary for full development of literacy, even children who may not qualify for special education services in a school can fall behind. This deficit often

compounds and leads to widespread difficulties in school throughout life. The purpose of this case study was to determine if a modified version of the embedded-explicit approach to literacy instruction and intervention results in improvement of literacy-related skills. The participant in this case-study was a 9-year-old female. At the beginning of the previous school year, she had been placed on an IEP for reading difficulties. A time-series design was used in this study to examine the effect of literacy intervention following the embedded-explicit therapy model. In order to determine the effectiveness of this treatment, the participant's silent reading and listening comprehension, word recognition and phonological processing were measured during pre- and post-treatment assessment. Intervention followed the embedded-explicit model and was centered around guided reading activities and increasing phonological awareness. Results of the study did not show the expected progress on pre- and post-treatment measures, so further research on the topic is needed.

### **Aubrey Vesledahl, Graduate Student**

*Teachers' Ability to Recognize Fluency Disorders Among Students*  
Faculty Mentor: Richard Adler

Teachers are a main referral source for school speech-language pathologists (SLPs) concerning students with speech and language disorders; however, communication disorders that may be under-identified by teachers due to a lack of awareness are fluency disorders. To date, there is little research investigating whether teachers feel competent in their ability to identify fluency disorders. The purpose of this study was to determine whether elementary teachers have the knowledge and skills to recognize fluency disorders among students. Seventy-one teachers served as participants in this study, which involved completing an online survey. Results indicated the majority of participants were not required to take coursework in communication disorders while obtaining their education degree. In addition, there were discrepancies among the

definition or explanation of fluency disorders. These findings highlight the need for SLPs and education programs to be more proactive at increasing teachers' knowledge of fluency and communication disorders.

**Michelle Kraling, Graduate Student**

*Telepractice: Current State of the Art*

Faculty Mentor: Richard Adler

Telepractice in the field of speech-language pathology is rapidly gaining interest nationwide as a reliable alternative to traditional delivery methods. As telepractice becomes more prevalent, a need for technology and equipment that will ensure client confidentiality and protection in the delivery of telepractice services becomes evident. The purpose of this study was to examine the current state of the art in telepractice and determine what regulations are in place to ensure these technologies adhere to the ASHA code of ethics and are HIPAA compliant. State licensure boards, members from the American Speech-Language-Hearing Association (ASHA) special interest groups (SIG) for issues in higher education (SIG 10) and telepractice (SIG 18), and clinic directors within university settings across 10 states were surveyed to obtain data for the study.

**Gretta Hjelseth, Graduate Student**

*Clinical Supervisors' Role in the Use of Telepractice*

Faculty Mentor: Richard Adler

The American Speech-Language-Hearing Association (ASHA) adopted the term telepractice as "the application of telecommunication technology to the delivery of speech language pathology and audiology professional services at a distance by linking clinician to client/patient or clinician to clinician for assessment, intervention, and/or consultation" (ASHA, 2013, para. 1). This study examined (1) how many university clinics located in the Midwest use telepractice as a service delivery method and (2) what disorders are assessed or treated in this manner. Data was gathered through an online survey tool that was sent to certified speech-language pathologists in Iowa, Minnesota, Nebraska, North Dakota, South Dakota and Wisconsin. The participants were clinical supervisors and were employed in the universities that have a master's degree

program. The results reveal that ASHA should provide information about telepractice that includes the credentials necessary for using telepractice, the type of equipment the setting can use to deliver services, the types of treatment disorders that can be treated via telepractice, and each state's law regarding telepractice.

**Jessica Dewald, Graduate Student**

*Speech-Language Pathologists' Experiences When Managing Caseloads With Dementia-Based Communication Disorders*

Faculty Mentor: Nancy Paul

The purpose of this qualitative research study was to gain an understanding of speech-language-pathologists' experiences in serving individuals with dementia-based communication disorders. The researcher facilitated a focus group with four SLPs. The interview questions were open-ended questions related to management of a caseload consisting of clients with dementia-related communication problems. Results of the study revealed a variety of themes, including referral sources, confidence in assessment, reduced confidence in treatment, general treatment barriers, varied success with specific interventions, facilitating factors in assessment and treatment, and rationale for dismissal. A discussion of the themes was included, as well as suggestions for future research on the experiences of SLPs managing caseloads with dementia-based communication disorders.

**Erin Jore, Graduate Student**

*Speech Language Pathologists' Knowledge & Skills in the Provision of Services Related to Auditory Training*

Faculty Mentor: Kris Vossler

The purpose of this study was to determine what formal training Speech Language Pathologists (SLPs) have with aural (re)habilitation, specifically auditory training. Intervention is needed promptly for children to catch up to their peers in developing phonological processes before it has a negative effect on other aspects of language. Young et al. (2002) found that children with early language and reading impairments displayed greater academic difficulties later in life. This research may be used as a resource for SLPs who provide auditory training. A quantitative study utilizing surveys was used to seek a thorough understanding of formal training used by SLPs who provide auditory training.

**Aubrie Patchen, Graduate Student**

*Current Evidence-Based Practice for Assessment and Treatment of Right Hemisphere Damage*

Faculty Mentor: Richard Adler

The purpose of this study was to determine what the current literature says is the evidence base for assessing and treating Right Hemisphere Disorder (RHD). This study also sought to learn if a Speech-Language Pathologist (SLP) had a client to be evaluated and treated and if the SLP used assessment and treatment protocols selected at high levels of evidence based on ASHA's Evidence Based Principles. SLPs employed in skilled nursing facilities, assisted living facilities and hospitals in the states of Minnesota, North Dakota and South Dakota were surveyed. This study implemented a mixed-methods methodology and obtained both quantitative and qualitative information via the surveys. The surveys were then analyzed for the variables under investigation and stored in a locked filing cabinet in the principal investigator's office. Results of the study showed that the current evidence available on RHD is limited. The results also showed that various assessment and treatment protocols were being used, the majority of which were not specific to RHD. A discussion of the results was also included, as well as suggestions for future research on the topic of RHD.

**Sarah Roozen, Graduate Student**

*The Effects of Drawing for Communication for an Individual with Aphasia*

Faculty Mentor: Nancy Paul

The purpose of this study was to examine the effectiveness of the Communicative Drawing Program's 10-step process developed by Nancy Helm-Estabrooks and Albert (2004) for augmenting the participant's communication modalities through improved drawing abilities. This is a published method of treatment, meant to enhance drawing abilities in individuals with aphasia in order to use drawing as an alternative or augmentative mode of communication (Helm-Estabrooks & Albert, 2004). The participant was an 82-year-old male diagnosed with severe Broca's Aphasia and Apraxia of speech due to a left cerebral vascular accident in 2010. Pre-test and post-test data was analyzed to determine



if the individual's efficiency and accuracy of his drawings increased and if the frequency in which he used drawings increased. Accuracy improved; however, efficiency did not improve after the completion of the Communicative Drawing Program. This may have been an acceptable tradeoff for improved communicative exchange because drawing more effectively took more time.

**Emily Kunstleben, Graduate Student**  
*The Role of School-based SLP's in Literacy Intervention*

Faculty Mentor: Kris Vossler

The purpose of this study was to explain the role school-based speech-language pathologist (SLP) have in literacy intervention. This project used a survey design. The survey developed by the researchers, consisting of 15 questions, was sent to the members of the American Speech-Language Hearing Sciences Association ASHA) special interest group Language Learning and Education (SIG 01) and the special interest group School Based Issues (SIG 16). A link to the survey (available through LimeSurvey) was posted on the discussion boards for the two ASHA SIGs. Results from the study concluded that SLPs provide direct intervention to student on their caseloads. In addition, SLPs reported demographic information, education, age of students, team members involved in intervention, and location of intervention.

**Karley Sykora, Graduate Student**  
*Technology-based Home Remediation Program for Acquired Dysgraphia: A Clinical Study*

Faculty Mentor: Nancy Paul

The study was a single-subject design that investigated whether a technology-based home program would improve written language abilities on a customized assessment battery. The participant was a 65-year-old female participant with acquired dysgraphia, severe Broca's aphasia and apraxia of speech due to a left hemisphere cerebrovascular accident (CVA). At the time of the study, she was seven years post-onset; she was considered at a chronic stage of recovery. The pre-test and post-test assessment consisted of functional writing tasks and standardized subtests from the Boston Diagnostic Aphasia Examination (BDAE) (Goodglass, Kaplan, &

Barresi, 2000) and Psycholinguistic Assessment of Language Processing in Aphasia (PALPA) (Kay, Coltheart, & Lesser, 1992). The home program was implemented through the use of an iPad application, TalkPath Writing, using a qwerty-keyboard format to both copy and independently generate the name of a pictured stimulus. Speed, accuracy and navigational skills were markedly improved from pre-test to post-test; however, scores of subtests of copying words remained stable. The results of this study suggested that a technology-based home remediation program was beneficial in the treatment of acquired dysgraphia for the given participant. The results of this study suggested the positive impact of a technology-based home program on the treatment of acquired dysgraphia, specifically the grapheme level of written language production.

**Maria Lendobeja, Graduate Student**  
*Preparing for Life: Inside the College Transition for Students with Asperger's Disorder*

Faculty Mentor: Kris Vossler

The transition from high school to college life can be very difficult for individuals diagnosed with Asperger's Disorder. When these students transition to college, they often leave behind educational support and structure. The purpose of this qualitative study was to examine the social and academic experiences of these students. The research question addressed in the study was: "How do students diagnosed with Asperger's Disorder view their transition from high school to college life?" The subjects within this qualitative study were identified as undergraduate college students diagnosed with Asperger's Disorder who attend a state university in northwestern Minnesota. One-on-one interviews with four subjects were used for data collection. The content of these four interviews centered on the changes in academic expectations and the development of relationships with family, peers and professors. Results of this study indicated that many difficulties exist for students with Asperger's Disorder when transitioning into the college setting. In relation to speech-language pathology, significant deficits in conversation skills and social relationships were identified. After analyzing the data, eleven codes, four categories and four themes emerged, leading to one final assertion: The transition from

high school to college life for students with Asperger's Disorder presents difficulties in social interactions, academics and independence. With the proper support, however, it has the potential to be a successful and highly beneficial transition in the student's life.

**Alyssa Halley, Graduate Student**  
*Experiences When Interacting with a Communication Partner with Parkinson's Disease*

Faculty Mentor: Nancy Paul

This research project explored the experiences when interacting with communication partners with Parkinson's disease (PD). Members of a PD support group were invited to participate in the study. The snowball effect occurred through word-of-mouth to invite participants. The qualitative research design included one-on-one interviews in which open-ended questions were asked regarding the effect of communication changes of an individual with PD for the communication partner. A qualitative thematic analysis was completed to identify pertinent themes. Results provided seven major themes of the shared experiences that the participants discussed. This study aimed to provide knowledge to the field of speech-language pathology regarding experiences when communicating with a person with PD.

*Animal-assisted Therapy in Speech-Language Therapy Interventions: A Systematic Review*

**Elizabeth Plankers, Graduate Student**  
Faculty Mentor: Nancy Paul

This study was conducted by systematically reviewing available research that incorporated animal-assisted therapy (AAT) into speech-language sessions for clients with an array of disorders (e.g., dementia, autism and aphasia) and therapy objectives. This study evaluated the effects of AAT on therapy outcomes and assessed the strength of the research designs using an evidence-based hierarchy. Results have been compiled into a table indicating the level of evidence base located. A narrative of the results was also provided to further describe each study. Findings of this systematic review indicated that evidence base for AAT and Speech-Language Pathology (SLP) was available, but further research conducted at a higher level of evidence would be beneficial.

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**Mackenzie Schorn, Graduate Student**

*Applying Crystallized & Fluid Intelligence Theory to Activities That May Promote Optimal Aging of Communication*

Faculty Mentor: Nancy Paul

This was a non-experimental research project that entailed the analysis of games and activities that fit into crystallized intelligence (Gc), fluid intelligence (Gf) or both. Task analysis determined if Gc, Gf, or both were utilized in each activity. A literature review was completed to locate available evidence related to the activities' effect on cognition. This current study is a continuation of a previous systematic review completed by the second author of this study and a previous graduate student researcher (Nordby, 2013), in which the researcher assessed six brain training tools across several parameters including addressing crystallized or fluid mechanics and published evidence on the tools. The current study analyzed the following games and activities: Dual N-back, Scrabble, Blokus, Skip-bo, Sudoku puzzles and crossword puzzles. Based upon the analytical findings of the task parameters for each game and activity and located research that supported the theoretical analyses, recommendation of such products would be valuable to clients taking part in cognitive rehabilitation therapy or as preventative measures for aging. The application of the theory for task analysis will provide consumers and SLPs with pertinent information on activities that may promote healthy cognition in normal aging.

**Lauren Rud**

*Aided Language Stimulation*

Faculty Mentor: Kris Vossler

This Honors Apprentice Scholarship project is based on a therapy technique called Aided Language Stimulation (ALgS) in the field of Speech-Language Pathology. It is a two-year study to see if this technique is successful in therapy sessions with nonverbal clients who use Augmentative and Alternative Communication (AAC) devices. I have put together an educational video describing how to use this method and how the clients showed positive progress over a five-week period at the MSUM Speech-Language-Hearing Clinic.

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**SUSTAINABILITY****Jennifer Glenski**

*The Evolving Role of The City*

Faculty Mentor: Joseph Herbst

Over half of the world population lives in urban areas, and that percentage is expected to continue to rise. Cities are looking for sustainable ways to function and grow, in order to thrive as more people move into urban areas. In order for cities to develop sustainable ways to carry out their role in society, we must examine what that role is and how it is changing as the world becomes increasingly urbanized. This research focuses on the evolving role of the city and society's views on the city, from the times of ancient Rome to today. In ancient Rome, the primary role of the city was to protect people from nature, but it has since evolved, in response to other societal needs, in modern and post-modern cities.

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**THEATRE ARTS**

**Anne Brown, Christopher Pitner, Elliott Heerman, Erika Rosenkranz, Jamaica Meyer, Katharine Aarness, Laurel Schuessler, Michael Johnson, William Schnase, Elliott Heerman & Gojen Rajkumar**

*The Kennedy Center American College Theater Festival: The Audition Process*

Faculty Mentor: Craig Ellingson

An audition is a sample performance by an actor, singer, musician, dancer or other performing artist. It is used in the casting process to demonstrate the level and range of a performer's talent and functions as a job interview for the performing arts. MSUM students will showcase audition packages created for the Kennedy Center American College Theatre Festival and the Irene Ryan Acting Competition.

**Hiu Tung Chan**

*The Cultural Heritage of China*

– *Beijing Opera*

Faculty Mentor: David Wheeler

I am an international student from Hong Kong. Studying Theatre Arts at MSUM is harder than

I thought it would be. However, I've had many chances in class to exchange my home theatre culture to my fellow classmates and professors here. I want more students at MSUM to know about the Cultural Heritage of China, Beijing Opera. I am going to do an informative speech on the topic. I will do basic research on the Internet using credible resources and the help from my advisor. I hope my presentation can give audiences a better general idea of Beijing Opera. I am sure I will be benefited in this project as I will know more about Beijing Opera than I did before the presentation. Also, I hope local students will get a chance to know the other side of China by coming to my presentation.

**Maggie Olson**

*Stones, Streams, and Strings: Metaphors in Sarah Ruhl's Eurydice*

Faculty Mentor: David Wheeler

Sarah Ruhl's play "Eurydice" is a retelling of the Greek myth of Orpheus and Eurydice. Ruhl expands on the myth's original theme of loss to examine ways of dealing with grief. Stones are used to symbolize a hardened, numbed approach. Streams symbolize washing away memory. Strings symbolize remaining emotionally tied to lost loved ones. This presentation will examine how each of these metaphors function both in the text and on the stage.

**Maggie Olson**

*Jekyll and Hyde: Classic Literature Adapted for the Stage*

Faculty Mentor: Laura Fasick

This presentation will examine two stage adaptations of Robert Louis Stevenson's "The Strange Case of Dr. Jekyll and Mr. Hyde." The musical, "Jekyll and Hyde," by Frank Wildhorn and Leslie Bricusse, and the play, "Jekyll and Hyde," by Jeffrey Hatcher, vary considerably from Stevenson's novella and from each other. We will look at the theatrical conventions of each genre that influence these adaptations, as well as the ways in which these adaptations provide new perspectives on Stevenson's classic story.



## PRESENTATION LISTINGS

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### **Michael Johnson, Elliott Heerman & Gojen Rajkumar**

*Devised Theatre Project: Chalk*

Faculty Mentor: Craig Ellingson

Devised theatre (also called collaborative creation, particularly in the United States) is a form of theatre where the script originates not from a writer or writers, but from collaborative, usually improvisatory, work by a group of people. Devising isn't an aesthetic; it's a process. This process of creating new work includes multiple aesthetics, production value spectrums and performance styles. Come experience this unique form of theatre with chalk, an original devised piece of theatre.

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## WOMEN'S STUDIES

### **Sara Rundlett**

*The Medicalization of America's Youth*

Faculty Mentor: Claudia Murphy

Children on medication for mental health issues is nothing new in America. As a common avenue for the treatment of mental illness or disorders, it is often one of first routes of treatment and one of the most readily available. Led by the dramatic increase of diagnoses in childhood Bipolar Disorder, nearly 50 percent of which are later proven incorrect, the number of children prescribed anti-psychotic medications is now over 942,000. *The Medicalization of America's Youth* attempts to take a critical look at how and why this has occurred. Data was collected through a number of different avenues: peer-reviewed journal articles, a meta analysis, the Food and Drug Administration, the Diagnostics and Statistical Manual published by the American Psychological Association and other publications, such as the New York Times and PBS Frontline. Considering the severe side effects, record pharmaceutical sales, and law suits that have prompted a federal investigation, the misdiagnosis and medicalization of childrens' mental health deserves some critical analysis. With evidence showing significant improvements, based on varying types of psycho-educational therapeutic treatments, this presentation argues that medicalization should be the last resort, not the first.

Notes.....

