Dear 2018 IdeaFest Participants:

Congratulations on the presentation of your work at the 2018 IdeaFest. This event is the University of South Dakota’s premier annual showcase of graduate and undergraduate student research, creative scholarship and academic engagement. As we celebrate with you, we take pride in both the breadth of the graduate and professional programs offered at USD and the liberal arts identity that is at the core of the institution. There is no better representation of all that the University of South Dakota is than the work of its students, guided by faculty mentors, as presented at IdeaFest.

During this event, you and your fellow students, graduate and undergraduate, will present the results of your research, engagement and creative scholarship. Enjoy the opportunity to share your work and ideas, but also take advantage of the opportunity that this event gives you to learn more about the work of your fellow students.

On behalf of the university, thank you for your hard work. I hope you enjoy this year’s festivities!

Sincerely,

James W. Abbott, President
Dear IdeaFest Participants:

It is my pleasure to welcome you to IdeaFest, where we celebrate the creative and academic scholarship of our undergraduate and graduate students! I am humbled by the amazing work our students continue to share with us year after year and excited by what our future holds with such wonderful emerging scholars. On behalf of the IdeaFest Committee, thank you for your commitment to excellence and sharing your talents with all of us.

Best,

Dr. Raimondo Genna
Department of Theatre

Acknowledgements

IdeaFest 2018 would not have been possible without the valuable contributions of many dedicated individuals.

Many thanks to Raimondo Genna (IdeaFest chair), Ranelle Nissen, Mandie Weinandt, Mark Maxon, Kim Albracht, Meghan Hoben, Christian Pollema, Dillion Bryant, Aaron Fleischer, and Edith Reza Martinez, for their commitment and hard work as the 2018 IdeaFest committee.

Ashton Wetherington, Tyler Gutzman, Doug Wagner, Ernest Johnson and the Facilities Management crew, for their help in organizing and setting up the spaces used by IdeaFest.

Angela Heglund and the Aramark Catering staff for helping with the IdeaFest hospitality and reception.

Patty Kasulka, Randil Abeyrathne, Søren Peterson, Virginiya Wilcox, Olivia Siglin, Brett Ries, Natalie Nulle, Nafka Atsemet, Dennis Carlson, Diana Espadas, Ashley Meiners, Anna Andrews, and Betsy Amundson, for their support in many small and large tasks over the past 2 months as part of the Center for Academic and Global Engagement team.

The Office of the Provost, the College of Arts & Sciences, the Beacom School of Business, the Center for Academic & Global Engagement, the Academic and Career Planning Center, the Center for Teaching and Learning, the Graduate School and Division of Continuing & Distance Education, the American Indian Science and Engineering Society, and the Office of Research and Sponsored Programs for their collaboration on programming and support.

And a sincere thank you to the faculty, departments, and deans of USD who continue to support student research activities.

If you are a person with a disability and need special accommodations to fully participate, please contact Disability Services at 605-677-6389, 48 hours before the event.
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2018 IdeaFest Keynote Speaker
Patricia Nez Henderson, M.D., M.P.H
Vice President
The Black Hills Center for American Indian Health
April 5, 11:00 am
Muenster University Center Ballroom

Using Cultural Knowledge and Science to Create Smoke-free Policies for Indian Country

Biography: Dr. Patricia Nez Henderson, a member of the Dine’ (Navajo) tribe, serves as the Vice President for the Black Hills Center for American Indian Health, an American Indian nonprofit health organization located in Rapid City, South Dakota. Dr. Nez Henderson received her Bachelor of Science degree in Biochemistry from the University of Arizona and earned her Doctor of Medicine and Master of Public Health degrees from Yale University. Dr. Nez Henderson is considered one of the leading authorities on tobacco control in American Indian communities. For the past eighteen years, she has collaborated with Tribes and tribal communities in implementing comprehensive tobacco control and prevention programs. Dr. Nez Henderson’s work has led to the Navajo Nation passing commercial tobacco-free policies for government workplaces and ceremonial settings, and increasing excise taxes on tobacco products. In addition, Dr. Nez Henderson has developed, implemented and evaluated numerous American Indian culturally relevant tobacco-related research projects. Dr. Nez Henderson is a panel member of the 2008 update of the Public Health Service Clinical Practice Guideline “Treating Tobacco Use and Dependence,” Federal Drug Administration Tobacco Products Scientific Advisory Committee, and the Human and Health Services Interagency Committee on Smoking and Health. She and her husband, Dr. Jeffrey Henderson, have two beautiful children, Zahlanii and Mato.

Depictions of food and eating in the American popular press have long served as a space for the negotiation of politics, identity, and class. Popular imagery is of particular art historical significance because these pictures were often positioned to both influence public thought and action and to respond to societal change. Through a rigorous analysis of the everyday practices of eating, drinking, and viewing popular imagery, it becomes quite clear that depictions of food and eating in the press fulfilled important social functions and reached a broad range of American viewers in meaningful ways.

The work of American artist George Luks is a compelling example of the expressive potential of food imagery in the press. Luks is well known for his depictions of urban experience in New York City at the turn of the twentieth century. As a prolific illustrator and contributor to popular publications, Luks’s printed imagery exemplifies artists’ use of depictions of food and eating to create public identities based on cultural understandings of food and beverage consumption rooted in social convention and class. An examination of Luks’s illustrations and reproductions of his paintings circulated in the press sheds light not only on Luks, but on the importance of images of food and beverage consumption outside the home in the dissemination of identity and discussion of culinary and cultural change in turn-of-the-century America.

Biography: Lauren Freese is an assistant professor of Art History in the Department of Art at the University of South Dakota. She earned her Ph.D. and M.A. in art history from the University of Iowa and her B.A. in art history from Hamline University in Saint Paul, Minnesota. Her research takes an interdisciplinary approach to the study of art history, utilizing food studies to better understand depictions of food and eating in American art. Her work has appeared in Panorama: Journal of the Association of Historians of American Art and she has delivered papers at the annual meetings of the College Art Association, Southeast College Art Association, and at the Art Institute of Chicago. She has also curated shows for the University of Iowa Museum of Art, including “Boiled, Baked and Brewed: Grains in Art,” recently on view at the Figge Art Museum in Davenport, Iowa. She is currently at work on a book manuscript, A Taste for Images: Depictions of Food and Eating in the American Popular Press.
A Word on Etiquette

Please silence your mobile phones. Be considerate in other ways, too. During the presentations, avoid whispering, crumpling paper or scurrying about from room to room. As you might imagine, that distracts everyone, not the least of all the presenters. We prefer that you stay in the room for all presentations. If a dire need requires your presence elsewhere and you absolutely must leave or enter a room, please do so quietly.

During Q & A, we encourage you to ask questions. Often the best questions are those that find something interesting in the work and ask for an elaboration or clarification, and help the student develop his/her ideas further.

On behalf of the presenters—plus everyone else in the room— we thank you.
Recognition of Student Awards and Grants

The following special characters (*, †, ‡) appear next to some of the names of students who have been awarded grants and are presenting posters or participating in oral presentations:

(*) denotes Graduate Academic and Creative Research Grant recipients

The Graduate School awards Graduate Academic and Creative Research Grants of up to $500 to assist with funding of a research or creative activity project to be conducted on an annual basis. Grants are awarded by the Graduate Council to graduate students who are selected through a competitive process. Applicants are asked explain their project, methods, outcomes, and need for funding. Additionally, applicants must have a research mentor/advisor submit a recommendation on their behalf. Award winners agree to present their progress to date at IdeaFest annually.

Applications are judged on the following criteria:

1. The project will make a unique contribution to the field as evidenced in the description of the purpose, objectives, research questions or artist's statement, methods, and anticipated outcomes/impacts.
2. The student has the academic preparation and practical expertise to conduct the project.
3. The project can be completed according to the proposed timeline.
4. The budget is reasonable and other sources of funding (if any) are identified.
5. The project is of sufficient quality that the results can be presented at a regional or national meeting or other venue, published in a peer-reviewed journal, or result in a product of commercial value.

(†) denotes CURCS Mini-Grant recipients

Student researchers and creative scholars can apply for mini-grants to support their research locally or presentations at national conferences to showcase their work.

(‡) denotes UDiscover recipients

This program is an opportunity for undergraduate students to perform research or creative scholarship over the summer under the guidance of a faculty mentor. Students from all disciplines are invited to apply and, if selected, will receive funding. The 10-week program also includes workshops and lunch meetings to fully integrate students into the world of research. Applications open in March each year.
2018 IdeaFest – Schedule
(session letters are assigned by room; not all rooms are used for every session)

Wednesday, April 4

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<td>1a: Physical Therapy 1</td>
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<td>1b: Interdisciplinary 1: UGR</td>
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<td>1c: Biology 1</td>
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<td>10:00 – 10:50 a.m.</td>
<td>Oral Session 2</td>
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<td>2a: Physical Therapy 2</td>
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<td>2b: Interdisciplinary 2: UGR</td>
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<td>2c: Physics</td>
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<td>2d: Political Science: Pierre Interns</td>
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<td>11:00 – 11:50 a.m.</td>
<td>Oral Session 3</td>
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<td>3a: English: GRAD</td>
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<td>3b: Interdisciplinary 3: UGR</td>
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<td>Undergraduate Research Faculty Workshop</td>
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<td>1:00 – 2:45 p.m.</td>
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<td>5a: Health Sciences</td>
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<td>5b: Interdisciplinary 7: GRAD</td>
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<td>5d: Mock Trial</td>
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<td>4:00 – 5:30 p.m.</td>
<td>Faculty Keynote Address</td>
<td>MUC Ballroom (MUC 225)</td>
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<td>Dr. Lauren Freese</td>
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<td>9:30 – 10:50 a.m.</td>
<td>Oral Session 6</td>
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<td>(6a:) Economics, Finance</td>
<td>MUC 211/211A</td>
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<td>(6b:) Interdisciplinary 8: UGR</td>
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<td>(6c:) Interdisciplinary 9: GRAD</td>
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<td>(6d:) Sustainability Panel</td>
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<td>11:00 a.m. – 1:00 p.m.</td>
<td>Keynote Address and Reception</td>
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<td>Dr. Patricia Nez Henderson</td>
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<td></td>
<td>“Using Cultural Knowledge and Science to Create Smoke-free Policies for Indian Country”</td>
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<td>1:00 – 2:20 p.m.</td>
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<td>(7a:) Chemistry</td>
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<td>(7b:) Interdisciplinary 10: GRAD</td>
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<td>(7c:) Basic Biomedical Science 1</td>
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<td>2:00 – 3:45 p.m.</td>
<td>Poster Session 2</td>
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<td>2:30 - 3:50 p.m.</td>
<td>Oral Session 8 (MUC upstairs)</td>
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<td>(8a:) Basic Biomedical Science 2</td>
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<td>(8b:) Interdisciplinary 11: GRAD</td>
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<td>(8c:) Interdisciplinary 12: UGR</td>
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<td>(8d:) Theatre, Music</td>
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<td>4:00 – 5:20 p.m.</td>
<td>Oral Session 9</td>
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<td>(9a:) Occupational Therapy, Psychology</td>
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<td>(9b:) Interdisciplinary 13: GRAD</td>
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<td>(9c:) Basic Biomedical Science 3</td>
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<td>(9d:) Rural Healthcare Panel</td>
<td>MUC Pit</td>
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## Detailed Schedule of Events at Muenster University Center (MUC)

### Guide to reading program booklet:

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<tr>
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<th>Time period</th>
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<tbody>
<tr>
<td><strong>Session Title</strong></td>
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<td>Presenter, <em>Project title</em> [Student’s Faculty Advisor – academic area of research as reported by the student]</td>
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*Presentations in oral / performance sessions last 10-15 minutes, followed by 5 minutes of Q&A, then change-over.*

### Wednesday Oral Session 1

#### Session 1a: 9:00 – 9:50 a.m.  
**Muenster University Center 211/211A**

**Physical Therapy 1**

- Maggie Loudenslager, Katie Nour, Travis Bolstad, *Physical Performance Measures that Predict Success in Competitive Senior Swimmers* [Becca Jordre: Physical Therapy]
- Jessica R Brave Heart, *Exercise Response to Powwow Dancing in Healthy Adults* [Brandon Ness: Physical Therapy]

#### Session 1b: 9:00 – 9:50 a.m.  
**Muenster University Center 216**

**Interdisciplinary 1: UGR**

- Casey Tester, *An Examination of Inca Child Sacrifice* [Silvana Rosenfeld: Anthropology]
- Alexa Kruse†, *A Comparison of the Retinal Ganglion Cell Distribution Across the Life Stages of the Plains Spadefoot Toad (Spea bombifrons)* [Christopher V. Anderson: Biology]
- Bridget Geerts, *Child Labor in the Developing World* [Mike Allgrunn: Economics]

#### Session 1c: 9:00 – 9:50 a.m.  
**Muenster University Center 216A**

**Biology**

- Brianna Henry*, *Bioaccumulation dynamics and transfer of uranium across metamorphosis in the mayfly Neocloeon triangulifer* [Jeff Wesner: Biology]
- Anna Kase*, *False Map Turtle (Graptemys pseudogeographica) Abundance in a Modified River Habitat, Lake Oahe, South Dakota* [Jacob Kerby: Biology]
- Joseph Madison*, *Microbiome Engineering as a Novel Tool for the Amelioration of Amphibian Chytridiomycosis* [Jacob Kerby: Biology]
Session 1d:  9:00 – 9:50 a.m.  Muenster University Center Pit
AWOL: Rosebud Panel
  Marisa Helm, Megan Feerick, Ellen Roufs, Morghan Byrnes,Brittany Bamberg, Phil Dohn, Jordan Smith, Linze Cowman, Cassie Echols, Andrew Koch, Alternative Week of Learning Spring Break Trip to Rosebud, South Dakota [Kim Albracht: Center for Academic & Global Engagement: AWOL]

Wednesday Oral Session 2

Session 2a:  10:00 – 10:50 a.m.  Muenster University Center 211/211A
Physical Therapy 2
  Zachary Schneider, Anthony Husher, Scott Strand, Comparison of Single Leg Balance to Isometric Ankle and Hip Strength [Hanz Tao: Physical Therapy]
  Tory Nicole Gross, Kyle Vern Behl, Effects of Peripheral Neuropathy on Sensory Interactions for Balance in Children Undergoing Chemotherapy [Patti Berg-Poppe: Physical Therapy]

Session 2b:  10:00 – 10:50 a.m.  Muenster University Center 216
Interdisciplinary 2: UGR
  Kristie Jo Schmidt, Betta Fish Aggression With Varying Acoustic Environments [Andrea Liebl: Biology]
  Allison VanLaecken, Characterization of Dentin Slices and Monitoring their Remineralization by AFM-IR and Nanoindentation [Grigoriy Sereda: Chemistry]
  Alicia Bellefeuille, The Effect of Diabetes Mellitus on Range of Motion and Strength in High-Functioning Senior Athletes [Becca Jordre: Physical Therapy]

Session 2c:  10:00 – 10:50 a.m.  Muenster University Center 216A
Physics
  Sudip Poudel, Low-Mass Dark Matter Search with CDMSlite [Joel Sander: Physics]
  Thomas B Binder, Projected Sensitivity of the SuperCDMS SNOLAB Experiment [Joel Sander: Physics]

Session 2d:  10:00 – 10:50 a.m.  Muenster University Center Pit
Political Science: Pierre Interns
  Catie Dougherty, Samuel Alvine, PJ Freidel, Amber Hulse, Mary Merxbauer, Jacob Selgestad, Chris Junior, Tyler Wenande, USD 'Yotes in Pierre: Interning during the '18 Legislative Session [Eric M. Jepsen: Political Science]
Wednesday Oral Session 3

Session 3a: 11:00 - 11:50 a.m.  Muenster University Center 211/211A
English: GRAD
Kacie M Fodness*, Simon Ferrell, Stephanie Whitlow, Melville’s Beginnings from “the watery part of the world”: A survey of 19th-Century maritime history in the collections of the New Bedford Whaling Museum [Prentiss Clark: English]
Simon Ferrell, Progress, the Property Bubble, and Uneven Development in Tana French’s Dublin Murder Squad Series [Prentiss Clark: English]

Session 3b: 11:00 - 11:50 a.m.  Muenster University Center 216
Interdisciplinary 3: UGR
Hanna Rose Leschisin, End of Life Care Medication Health Literacy in Aging Adult Populations [Barbara Goodman: Biology]
Kouadio Marc-Antoine Niamba†, Color Deficient Vision: Advantages and Applications [Frank Schieber: Psychology]

Session 3c: 11:00 - 11:50 a.m.  Muenster University Center 216A
Interdisciplinary 4: GRAD
Jeffrey Beck, Genetic Determinants of Dizygotic Twinning [Gareth Davies: Basic Biomedical Sciences]
Arjun Chandra Bhowmick, Synthesis and Characterization of Perfluoroalkylated Schiff Base Complexes for Organic Semiconductor Applications [Haouran Sun: Chemistry]

Session 3d: 11:00 – 11:50 a.m.  Muenster University Center Pit Theatre: Cabaret
Rachel Smith, Josie Kasik, Rebecca Schuster, "Life is a Cabaret, Old Chum": Politics and Showbiz Collide [Joe Stollenwerk: Theatre]

Wednesday Oral Session 4

Session 4a: 12:00 - 12:50 p.m.  Muenster University Center 211/211A
Interdisciplinary 5: GRAD
Beth King, Nicole Sikkink, Will Whitlock, Effectiveness of Protective Stepping Intervention to Reduce Fall Risk in Community-Dwelling Older Adults [Angela MacCabe: Physical Therapy]
Brenna Bray*, Uncovering A New Arbiter of Stress-Induced Motivation & Relapse: Corticosterone in the Ventral Hippocampus [Gina Forster: Basic Biomedical Sciences; Center for Brain and Behavior Research (CBBRe)]
Patricia Dombrowski*, True Frenemies: Interactions Between Larvae of the Endangered Hine's Emerald Dragonfly (Somatochlora hineana), and its Temperamental Crayfish Roommate [Daniel Soluk: Biology]

Session 4b: 12:00 - 12:50 p.m. Muenster University Center 216
Interdisciplinary 6: GRAD
Shelby Brunick, Brittany Neagbour, Cooper Hausmann, Analysis of Stress, Coping Strategies and Academic Success in Physical Therapy, Occupational Therapy and Physician Assistant Students: Updated Results [Joy Karges: Physical Therapy]
Kyle Roessler, The Cardiac Sympathetic Afferent Reflex and its Relationship to the Paraventricular Nucleus, Heart, and Veins [Doug Martin: Basic Biomedical Sciences]
Shahaboddin Saeedi*, Antimicrobial Surface Modification of Materials [Grigoriy Sereda: Chemistry]

Session 4c: 12:00 - 12:50 p.m. Muenster University Center 216A
Center for Teaching and Learning Undergraduate Research Faculty Workshop
This workshop will examine the role of undergraduate research and student success, and will feature a panel of faculty who have been highly successful with undergraduate student research. Come learn how this important practice can enhance student learning and satisfaction. This workshop is part of our High Impact Teaching Practices Statement of Achievement track.

Wednesday Oral Session 5

Session 5a: 3:00 - 3:50 p.m. Muenster University Center 211A
Health Sciences
Haley M Baker, The Impact of Epilepsy [Jamie A. Turgeon-Drake: Health Sciences]
Madison Lynn Michels, Cora Ann Ruzika, Erika Nicole Clark, Brook Ashlee Clark, Disabilities PhotoVoice [Jamie Turgeon-Drake: Health Sciences]
Carmelita Samira Shouldis, A Rural, Reservation, Environment Vs. a Non-Rural, Non-Reservation, Environment [Jamie Turgeon-Drake: Health Sciences]

Session 5b: 3:00 - 3:50 p.m. Muenster University Center 216
Interdisciplinary 7: GRAD
Gina Dendinger, Macey Engel, Jordan Mitzel, Two-Point Discrimination Testing: Clinical Testing Methods [Dr. Kory Zimney: Physical Therapy]
Jessica Hoynoski, The Haunting Chronic Pain Disorder: Phantom Limb Pain [Brian Burrell: Basic Biomedical Sciences]
Rayhan Hossain, Modified TiO2 for Doped Semiconductor Hybrid Nanocrystal [James D Hoefelmeyer: Chemistry]

Session 5c: 3:00 - 3:50 p.m. Muenster University Center 216A
English: UGR
Megan Swets, Contentious Content: The Line Between Radical Openness and Sanctioning Disrespect [Prentiss Clark: Writing Center]
Bailey Quanbeck, Megan Swets, Allie Knofczynski, Great Minds Think Together: Forms of Collaboration in the Writing Center [Prentiss Clark: Writing Center]
Allie Knofczynski, Bailey Quanbeck, Megan Swets, *Great Minds Think Together: Forms of Collaboration in the Writing Center* [Prentiss Clark: English]

**Session 5d:** 3:00 – 3:50 p.m.  
**Muenster University Center Pit**

Mock Trial  
Natalie Gronlund, Jessica Allen, Gabby Metzger, Caleb Munce, Chad Weizcorek, Will Himmler, Tuckor Sophomore, Shukri Jama, Hannah Booth, Zach Rodgers, *Mock Trial Demonstration*  
[Sandy McKeown: Mock Trial team]
Wednesday Poster Session 1  1:00 - 2:45 p.m.

Muenster University Center, Main Floor

1: Megan Jorgensen, *The Role of Endocannabinoids in Producing Injury-Induced Sensitization*
   [Brian Burrell - Basic Biomedical Sciences]
2: Ashley Paula Liang, Hongbo Gao, *Skeletal Muscle Secretion of Interleukin-6 is Muscle Type Specific: The Ex Vivo Evidence* [Yifan Li - Basic Biomedical Sciences]
3: Raegan M Nelson, *Characterization of Interferon Expression in Influenza Virus-Infected Human Epithelial and Fibroblast Cells* [Victor Huber - Basic Biomedical Sciences]
4: Riley Terrill Paulsen, *Leech Genome Assembly Project: Workflow and Quality Control* [Brian Burrell - Basic Biomedical Sciences]
5: Nicholas John Pekas, *Computational Analysis of Ligand-Receptor Interactions in Wild-Type and Mutant Erythropoietin Complexes* [Samuel Sathyanesan - Basic Biomedical Sciences]
6: Filip Radev‡†, *CMA-targeting Peptide Pechnology as a Novel Therapeutic Approach to Deplete p62 Levels and Corresponding Pathology* [J. Scott Pattison - Basic Biomedical Sciences]
7: Jackson Shriver‡†, *Nanoparticle Uptake Assay to Demonstrate the Role of Fc Receptor-Mediated Phagocytosis in Influenza Immune Response* [Victor Huber - Basic Biomedical Sciences]
8: Neeraj Kumar Tiwari, *Carbamylated EPO Induced Gene Regulation in Neuronal Cells* [Samuel Sathyanesan - Basic Biomedical Sciences]
9: Matthew Weber, *Adolescent Social Defeat Disrupts Working Memory in Adulthood: Consequences of Reduced Prefrontal Cortex Dopamine* [Mick Watt - Basic Biomedical Sciences]
10: Patrick Wilson‡†, *Contributions of the Influenza Virus Hemagglutinin Globular Head and Stalk Domains to Virus Pathogenesis* [Victor Huber - Basic Biomedical Sciences]
11: Hanming Zhang, *Inhibition of Type 1 Phosphodiesterase Confers Therapeutic Benefit to Proteinopathy-based HFpEF in Mice* [Xuejun Wang - Basic Biomedical Sciences]
12: Malan Moody, *Java Dockerfile UI* [Carol Lushbough - Biomedical Engineering]
13: Yangxi Liu*, *Fabrication of a Novel 3D Scaffold for Bone Tissue Engineering* [Hongli Sun - Biomedical Engineering]
14: Eric Sandhurst*, *Incorporation of Therapeutic Drugs into Hydroxyapatite-modified Microspheres for Local and Controlled Delivery to Improve Tissue Healing and Repair* [Hongli Sun - Biomedical Engineering]
15: Hanna J Sanyour*, *Evaluating Vascular Smooth Muscle Cells Biomechanics during Atherosclerosis* [Zhongkui Hong - Biomedical Engineering]
16: Prerana Sharma*, *Cell Traction Force Generated by Macrophages is Affected by Polarization Status and Polyacrylamide Gel Stiffness* [Etienne Gnimpieba - Biomedical Engineering]
17: Christian Pollema, Erika Clark, *AWOL: New Orleans - Environmental Focus* [Kim Albracht - Center for Academic &Global Engagement: AWOL]
18: Josie M Galles†, Hunter Burns, *USD Alternative Break to Nashville, Tennessee Focusing on Homelessness* [Kim Albracht - Center for Academic &Global Engagement: AWOL]
20: Christina Bushinger, Veronica Sanders, *Giving Back to the City of Minneapolis: Refugee and Women & Children's Services* [Kim Albracht - Center for Academic &Global Engagement: AWOL]
22: Hailey Purves, Lucas Crownover, Calli Hensley, Bridget Fenger, Bridger Irons, Mariah Olson, Krayton Schnepf, Grayson Gruenhagen, Robin Mutsch, Kailyn Mutsch, *Dallas AWOL Health Trip* [Kim Albracht - Center for Academic &Global Engagement: AWOL]
23: Madisyn N Waage, Jamie Anderson, *AWOL Guatemala Service Trip* [Kim Albracht - Center for Academic & Global Engagement: AWOL]
25: Megan Bruns, *The Adsorption of Neurotransmitters in Metal-Organic Supercontainers for Biomedical Applications* [Bess Vlaisavljevich - Chemistry]
26: Ethan Hare, *Speciation of Zirconium and Hafnium Molecular Metal Oxides* [Pere Miro - Chemistry]
30: Tanner Wilson, *Size and Density control of Cuprous Oxide Crystals by Electrochemical Methods* [Chaoyang Jiang - Chemistry]
31: Murtaza Nasir, *Using Machine Learning and Statistical Methods to Predict Material Weaknesses in Internal Controls in Firms* [Srini Ragothaman - Business Analytics]
32: Jared Waltz, *An Analysis of the Impact of the U.S. Dollar's Status as the World Reserve Currency on the Value of the U.S. Dollar Relative to Other Major World Currencies* [David Carr - Economics]
33: Caitlin Garvis, *International Trade Intensity and CO2 Emissions Analysis* [Mike Allgrunn - Economics]
35: Gifty Wheagar, *The Impact of Obesity on Healthcare Cost and Quality* [Mandie Weinandt - Economics]
36: Sarah Barnhardt, Catherine Vietor*Greek Life Affiliation and Social Capital in the Employment Context* [Gabrielle Strouse - School of Education]
37: Jessilynn Bean, Mekko Bearkiller, Brittany Two Elk, Maggie Malathip, *Family Cultures* [Peter Kindle - Social Work]
39: McKayla Marie Foust, Margaret Mary Gell, Marissa Ann Reis, *Measuring Basis on Food Pantry Assistance* [Peter Kindle - Social Work]
40: Mackenzie Gustafson, Benefits of Autism Spectrum Disorder (ASD) Mentor Program at the University of South Dakota [Chris Dallager - Medical Biology]

41: Elizabeth Johnston, Aubrey Houska, Melanie Schneider, Cindy Benitez, Contrasting Views of Individuals Who Are Mentally Ill Compared to Developmental Disability Within the Upper Midwest [Peter Kindle - Social Work]

42: Maria Caroline Letcher, Briana Sargent, Clare Campbell, Tiffany Klug, Makenzie Anthony, Maddison Medbourn, Miles Ludwigs, Stigmatization of Single Motherhood: Rural Attitudes [Peter Kindle - Social Work]


44: Mikaela M Moore, Multiple Sclerosis [Musheera Anis - Health Sciences]

45: Sydney Michelle Smith, Tatum ReAnna Wren, Evelyn Yallah, White Privilege and Immigration [Dr. Peter Kindle - Social Work]

**Muenster University Center, 2nd Floor Balcony**

46: Madeline Schmitt††, Theatre’s Effects on Youth in JDCs [Chaya Gordon-Bland - Theatre]

47: Matthew Miller††, Treading Water: Life in the Day County Flood Era [Prentiss Clark - English]


49: Ethan Jennings, Physiological Adaptions for Predation in Tyrannosaurus Rex [Timothy Heaton - Earth Sciences]

50: Abigail C. Wiebers, Jennifer L. Jorgensen, Using SAFMEDS Instruction Combined with Precision Teaching Measurement as an Alternative Formative Assessment Approach for Building Content Fluency in University Coursework: Three Years of Classwide Data and Samples of Individual Performances [William J. Sweeney - Curriculum & Instruction]


52: Clara Pierskalla, Cira Watson, Stigma Say What?!: Change in Perception Towards Mental Health in College Students from Rural vs. Urban Communities [Gabrielle Strouse, Gabrielle Strouse - Counseling & Psychology in Education]

53: Karissa Jensen, Ashton Moody, Paige Hesselberg, High School Class Size as a Predictor of Freshmen Satisfaction with College Life at USD. [Gabrielle Strouse, Gabrielle Strouse, Gabrielle Strouse - Counseling & Psychology in Education]


55: Adrian Aylor*, The Effect of Participation in Football on Auditory Evoked Electrophysiological Potentials in Middle and High School Students [Teri James Bellis - Communication Sciences & Disorders]

56: Kyle Robert Diveley, Campylobacter jejuni: Harder to Treat, but Easier to Find Thanks to PCR Diagnostics [Kari Potter - Medical Laboratory Science]

57: Kalei Wilson, Madison Kjera, Mitchell Culbertson, Determining Whether Contraceptive Availability or Income Most Directly Decreases Fertility Rates [Daniel Soluk - Biology]

58: Amy West*, Stopover Biology of Grassland Migrant Birds at a Restored Tallgrass Prairie [David Swanson - Biology]

60: Noel Tolvanen, Spencer McAdoo, Dylan Stahly, *DTP3 Vaccination Effects Child Mortality Rates* [Bernie Wone - Biology]
61: Luke Smith†, *Gene Expression and Muscle Performance in Anolis Lizards* [Andrea Liebl - Biology]
62: Brady Skillingsstad, Taylor Gylfe, Myrna Niamba, *Factors Affecting Breast Cancer* [Jeff Wesner - Biology]
63: Emme Lynne Schmidt‡†, *Test of Key Pathways in Protective Bacteria Against a Deadly Fungal Pathogen using Blanchard's Cricket Frogs* [Jake Kerby - Biology]
64: Alyssa M Schild, Alex F McNally, Austin W Keller, *The Effect of Female Education on Child Mortality* [Daniel Soluk - Biology]
65: Rebecca Rolfson, Kasha Shear, *Behavioral Ecology of Aquatic Invertebrates* [Daniel Soluk - Biology]
67: Trevor Pease, *Stage-specific Predation as a Mechanism for Predator Coexistence While Competing for a Single Prey* [Jeff Wesner - Biology]
69: Melanie Magana, Taya Rose DeVine, Hannah Lynn Heckert, *Comparing the Variables Causing Child Mortality in Asia and Africa* [Daniel Soluk - Biology]
70: Annika Diane Lilleberg, Shaina Marie Hunt, Chris Kinsley, Tanner Daniel Hall, *Energy Sources Affect Carbon Dioxide Emissions in the United States* [Jeff Wesner - Biology]
71: Kevin T Krupp, Nathan T Jones, *Anxiolytic Effects of Carbamoylated Erythropoietin (cEPO) During Social Stress* [Cliff Summers - Biology]
72: Anna C Kase*, Hailey N Moodie, Andrew D DeWitt, Dennis Carlson, *Sceloporus Lizard Thermoregulatory and Predator Avoidance Behaviors in the Chiricahua Mountains, Arizona* [Dan Soluk - Biology]
74: Jordan Bosch, Luke Thompson, Kierra Determan, *Examining Possible Contaminants and Their Effects on Stream Biota in Southeastern Arizona* [Daniel Soluk - Biology]
76: Martha M Zere, *Malnutrition within the University* [Rebecca Wolff - Health Sciences]
Thursday Oral Session 6

Session 6a:  9:30-10:50 a.m.  Muenster University Center 211/211A

Economics, Finance
Shinyoung Kim, *Is GPA Affected by Natural Hair Color and Ethnicity?* [Allgrunn Mike: Economics]
Lucas Richard Kobat†, *Win Share Production in the NBA* [Mike Allgrunn: Economics]
Hannah Wich†, *Expected Economic Impact of the 2018 Winter Olympics in South Korea* [Kathryn Birkeland: Economics]
Hyun Woong (Daniel) Chang†, *Multiple Regression Analysis of Professional League of Legends Player Winnings* [Mike Allgrunn: Economics, Decision Sciences & MIS]
Tomas Kamenik, *International Diversification and Performance Prediction in Equity Investing* [Mike Allgrunn: Finance]

Session 6b:  9:30 - 10:50 a.m.  Muenster University Center 216

Interdisciplinary 8: UGR
Christian Daniel Pollema, *Communication Guidelines for Interacting with People with Dementia Experiencing Subjective Realities* [Kathy Magorian: Communication Studies]
Addie Kaster, *Yauyos Quechua: Linguistic Intricacies of an Endangered Language* [Armik Mirzayan: Modern Languages]
Logan Bullard, *Going Native: American Indian Characters and Themes in Revisionists Westerns* [Dave Posthumus: Native American Studies]
Jack Sternburg, *Specificity of Auditory Long-Term Memories is Regulated Through an Epigenetic Mechanism* [Kasia Bieszczad: Psychology, Rutgers University]
Muslim Atiq, Kay Dosch, Ashley Miller, Ramu G. Sudhagoni, *Anatomic Location Predicts Survival in Pancreatic Cancer Patients*, [Public Health]

Session 6c:  9:30 - 10:50 a.m.  Muenster University Center 216A

Interdisciplinary 9: GRAD
Keith BraveHeart*, *Creating Community & Art: A Workshop in Sharing Voices and Screen Printing* [Amber Hansen: Art]
Alison Vogelsang, Ashley Brage, *Readmission Among Children in a Residential Treatment Center* [S Jean Caraway: Clinical Psychology]
Chris Lucido*, *Defining the Contribution of Tumor Innervation to Treatment Resistance* [Paola Vermeer: Basic Biomedical Sciences]
Catherine Beall*, *Woody Vegetation Dynamics on the Niobrara/Lewis and Clark Reservoir Delta* [Mark Dixon: Biology]
Morgan Carnes, *Social Values Regarding Ecosystem Services and Land-use Change in Mitchell, South Dakota* [Meghann Jarchow: Sustainability]
Session 6d: 9:30 – 10:50 a.m.  Muenster University Center Pit
Sustainability Panel

Seth C Kersten, *Walkability Recommendations for Vermillion, South Dakota* [Meghann E Jarchow: Sustainability]


Kaitlin Roberts Roberts, *The Connection Between Consumerism, Happiness, and Sustainability* [Meghann Jarchow: Sustainability]

Jessica Eralia Romero, *Changing Behavior Toward Sustainability and Bike Sharing* [Meghann Jarchow: Sustainability]


Erika Oddy, *Why Bike Share Programs Support Human Health and Sustainability* [Meghann Jarchow: Sustainability]


Jessica Eralia Romero, *Changing Behavior Toward Sustainability and Bike Sharing* [Meghann Jarchow: Sustainability]

Siyu Mao*, *Perfluoroalkylated Conductive Polymers for High Performance Lithium Battery* [Haoran Sun: Chemistry]

Thursday Oral Session 7

Session 7a: 1:00 - 2:20 p.m.  Muenster University Center 211/211A
Chemistry

Roman Sarder, *Functionalization of Mechanically Enforcing Carbon Fibers to Improve their Alignment and Adhesion to Plastics* [Grigoriy Sereda: Chemistry]


Yifeng Huo*, *Synthesis of Gold Nanostars and their Application on Colorimetric Detection of Lead Ions* [Chaoyang Jiang: Chemistry]

Shahzahan Mia, *Quantitative Control of Doping in TiO2 Nanocrystals* [James D. Hoefelmeyer: Chemistry]

Siyu Mao*, *Perfluoroalkylated Conductive Polymers for High Performance Lithium Battery* [Haoran Sun: Chemistry]

Session 7b: 1:00 - 2:20 p.m.  Muenster University Center 216
Interdisciplinary 10: GRAD

Rebecca Sistad*, *Adaptive Metacognition and Alcohol Consequences: The Moderating Role of Maladaptive Metacognition* [Raluca Simons: Clinical Psychology]

Taylor James Bosch, *Changes in Cortical Connectivity Following Tool Use Motor Learning* [Lee Baugh: Basic Biomedical Sciences]

Atia Binte Amin*, *Functional Characterization of a Kalanchee Laxiflora MYB Transcription Factor Putatively Involved in Regulation of the Crassulacean Acid Metabolism (CAM) for Improving Water-deficit Stress Responses in C3 Plants* [Bernie Wone: Biology]

Holly Jean Richard*, *South Dakota Women's History: Experiences along the Big Sioux and Missouri Rivers* [John Dudley: English]
Nicholas Britten, *Addition Property of Algebraic Entropy: Some Noncommutative Cases* [Catalin Georgescu: Mathematics]

**Session 7c: 1:00 - 2:20 p.m.  Muenster University Center 216A**

**Basic Biomedical Science 1**

Katie Grausam, *Targeting Leptomeningeal Dissemination and Tumor Metastasis of Sonic Hedgehog Subgroup Medulloblastomas* [Haotian Zhao: Basic Biomedical Sciences]

Alex Verma, *Lactate Induces the Expression of Immune Checkpoint Inhibitors in HPV+ Head and Neck Positive Squamous Cell Carcinoma* [Keith Miskimins: Basic Biomedical Sciences]

Hannah Wollenzien, *Targeting Notch Signaling Pathway in Bone Cancer* [Jianning Tao: Basic Biomedical Sciences]

Mariah M Hoffman, *Characterization of Stem Cell Populations in Atypical Teratoid Rhabdoid Tumors Using Graph-Based Clustering of Single Cell RNA Sequencing Data* [Etienne Gnimpieba: Biomedical Engineering]

**Thursday Oral Session 8**

**Session 8a: 2:30 - 3:50 p.m.  Muenster University Center 211/211A**

**Basic Biomedical Science 2**

Eric Fogarty, *Modulating Current In Vitro Methodologies to Elicit In Vivo Cellular Identity of Mammalian Renal Collecting Duct Cell Types* [Kamesh Surendran: Basic Biomedical Sciences]

Bethany Freel, *Understanding the Cellular Responses to Cilia Dysfunction in Primary Ciliary Dyskinesia* [Lance Lee: Basic Biomedical Sciences]

Rachel Laufmann, *Characterizing Cytoskeletal Defects in Cholesterol Synthesis Disorders* [Kevin Francis: Basic Biomedical Sciences]

Rhiannon Sears, *Revealing New Members of Innate Immunity Using BioID* [Kyle Roux: Basic Biomedical Sciences]

Nicholas A. Wood, *Protection of Mice from Superinfection by Influenza and Streptococci by Passive Immunity* [Michael Chaussee: Basic Biomedical Sciences]

**Session 8b: 2:30 - 3:50 p.m.  Muenster University Center 216**

**Interdisciplinary 11: GRAD**

Emily Storm*, *Cardiogenic Genome Acetylation: Potential Regulatory Roles for Nucleoporin Proteins in Cardiac Development and Disease* [Randolph Faustino: Basic Biomedical Sciences]

Eric Sazama*, *Determining the Viability of Wolbachia After Horizontal Transfer Through Cannibalism* [Jeff Wesner: Biology]


Cheyenne Marco*, *Water, Water Everywhere: A Writer's Perspective on Water Quality in the Northern Plains* [Paul Formisano: English]

Kristina Neumann, Rachel Noonan, Rebecca Spangler, Katelyn Walsh, *The Effectiveness of The Ready Approach in Improving Occupational Participation in Persons with Dementia* [Ranelle Nissen: Occupational Therapy]
Session 8c:  2:30 - 3:50 p.m.  Muenster University Center 216A
Interdisciplinary 12: UGR
Scott Stallmann, *The Illness of Human Being: Self and Personhood in Medical Anthropology* [David Posthumus: Anthropology]
Megan Street, *Great Faces, Queer Places: A History of Queer Populations in Sioux Falls, South Dakota* [Sara Lampert: Anthropology]
Marisa Helm, *Exploring the Connection Between Muscle Twitch Time and Gait Dynamics in Anolis Lizards* [Christopher Anderson: Biology]
Michaela E. Crouch, *Mathematical Model on Crimean-Congo Hemorrhagic Fever Virus to Determine the Effectiveness of Treatment* [Jose Flores: Mathematics]

Session 8d:  2:30 - 3:50 p.m.  Muenster University Center Ballroom (225)
Theatre, Music
Alexis Tuttle*, *Peggy Seeger's Twist on Tradition* [David Moskowitz: Music]
Lauren Danielle Stacks, *Theatre Beyond Words* [Rai Genna: Theatre]

Thursday Oral Session 9

Session 9a:  4:00 - 5:20 p.m.  Muenster University Center 211/211A
Occupational Therapy, Psychology
Brandon L. Gray*, *Associations between Attentional Biases Maladaptive Personality Traits* [Sara Lowmaster: Clinical Psychology]
Megan E Hilson, Hannah Roberg, *Effects of Peripheral Neuropathy on Sensory Interactions for Fine Motor Skills in Children Undergoing Chemotherapy* [Dr. Shana Cerny: Occupational Therapy]
Mariah Niemeyer, Shaylee Aryn Heinert, Brenda Michelle DeLano, *Understanding Children's Subjective Well-Being* [Barbara Brockevelt, Shana Cerny: Occupational Therapy]
Kami Pearson‡†, *The Role of Oxytocin in Young Adult Attachment Preference* [Harry Freeman: Counseling & Psychology in Education; Basic Biomedical Sciences]

Session 9b:  4:00 - 5:20 p.m.  Muenster University Center 216
Interdisciplinary 13: GRAD
Logan Welker*, *Grandiose and Vulnerable Narcissism: Associations with Sexual Assault Tactics, Rape Myth Acceptance and Alcohol Use* [Raluca Simons: Clinical Psychology]
Casey T Finnicum, *Genetically Informative Designs for the Study of Aging and Lifestyle Associated Biomarkers* [Gareth Davies: Basic Biomedical Sciences]
Samiksha Giri, *Defining Molecular Mechanism Promoting Neointimal Hyperplasia by CSN8 Hypomorphism* [Xuejun Wang: Basic Biomedical Sciences]
Colton Ketelhut, Anna Ruppelt, *Effects of Preoperative Education on Postoperative Outcomes Following Total Hip or Total Knee Arthroplasty* [Angela MacCabe: Physical Therapy]
Heidi Willett, Tim Aune, Alyssa Gee, Tyler Rowland, *Occupational Therapy and Collaborative Low Vision Care in Rural Settings* [Whitney Lucas Molitor: Occupational Therapy]
Session 9c:  4:00 - 5:50 p.m.  Muenster University Center 216A

Basic Biomedical Science 3

Jon J Brudvig, **MARCKS is Necessary for Netrin-DCC Signaling and Corpus Callosum Formation**  [Jill Weimer: Basic Biomedical Sciences]

Aaron Fleischer**, The Influences of Naturally Cycling Sex Steroids on Neural Mechanisms Underlying Fear Conditioning** [Gina Forster: Basic Biomedical Sciences]

Hongbo Gao, **Ubiquitin C-terminal Hydrolase L1 Regulates Oxidative Metabolism in Skeletal Muscles** [Yi-Fan Li: Basic Biomedical Sciences]

Liuqing Yang, **Genetically Modeling PKA-mediated Proteasome Priming in Mice** [Xuejun Wang: Basic Biomedical Sciences]

Jazmine DW Yaeger, **Learning, Motivation, and Fear Contribute to Anxious Responses during Social Stress** [Cliff H Summers: Biology]

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Session 9d:  4:00 – 5:20 p.m.  Muenster University Center Pit

Rural Healthcare Panel

Marley Hanson, Tamee Eloise Livermont, Carter Kerber, Jace Jenson, **Rural South Dakota Healthcare Issues: Isabel, South Dakota** [Matthew Fox: Business Law]

Ward Reesman, Tomas Kamenik, Hannah Trierweiler, Alexander Steinley, **Rural Healthcare Facility Closure: Impact on Rural Communities** [Matthew Fox: Business Law]

Jaedon Foreman, Jack Sternburg, Dylan Fox, **Understanding the End of a Partnership Between the VA and the Community Clinic in Faith, South Dakota** [Matthew Fox: Beacom School of Business]

Tyler Austin Pahl, Kevin Nam, Logan Schiebout, **Healthcare Sustainability in Rural Communities in South Dakota** [Matthew Fox: Honors Program]
Thursday Poster Session 2  2:00 pm - 3:45pm

Muenster University Center, Main Floor

1: Bailey Oettel, The Correlation Between BMI and Rate of Decomposition Seen in Human Cadavers in Grand Junction, Colorado. [Melissa Connor - Anthropology]
2: Logan Christopher Bullard, Incan Metallurgy: The Use of Metal Tools and Weaponry Among the Inca [Silvana Rosenfeld - Anthropology]
3: Dillon Bryant‡†, To Bear Witness: First Generation Narratives [Johntimothy Pizzuto - Art]
4: Austin M. Hahn*, Cognitive Bias Modification for Risky Sex and Alcohol Use [Raluca Simons - Clinical Psychology]
5: Emily K Short*, Creating an Intaglio Print [Cory Knedler - Art]
7: Elle Anderson, Dynamic Regulation of Vesicular Trafficking by Altered Sterol Homeostasis [Kevin Francis - Basic Biomedical Sciences]
8: Chesney Arend, Social Discounting: An Examination of the Neural and Behavioral Performance of Individuals Making Altruistic Decisions About Family Members [Lee Baugh - Basic Biomedical Sciences]
9: Danielle Lee Brown, The Potential for Stress to Produce Both Pro-Nociceptive and Anti-Nociceptive Effects Through Endocannabinoid Mediation [Brian Burrell - Basic Biomedical Sciences]
10: Kaci Clement†, Stress & Drug Relapse: The Effects of Stress on Dopamine Output and Reward Value in Healthy and Amphetamine Withdrawn Brains [Gina Forster - Basic Biomedical Sciences]
11: Rebecca Cordie, Optogenetic Inhibition of Methamphetamine-Seeking in Rats [Lisa McFadden - Basic Biomedical Sciences]
12: Shaydel Davies, Disrupting Cortical Dopamine in Adolescence Alters Reward Seeking and Related Neural Activity in Adulthood [Michael Watt - Basic Biomedical Sciences]
13: Alexandra Dolezal, Analyzing the Relationship among Socioeconomic Factors and Drug Overdose Mortality in the United States [Lisa McFadden - Basic Biomedical Sciences]
14: Eric Thomas Graack, Enhanced D2 Autoreceptor Function in the Adult Medial Prefrontal Cortex Following Adolescent Social Defeat [Michael J. Watt - Basic Biomedical Sciences]
15: Mackenzie Gustafson, Comparison of Chronic Kidney Disease in the United States versus Germany [Becky Wolff - Basic Biomedical Sciences]
16: Alex D Hanson†, The Role of Endocannabinoids during Transfer of Habituation [Brian Burrell - Basic Biomedical Sciences]
17: Dustin Heiden, Glycosylation: The Shield Maiden of Influenza A (H3N2) [Victor Huber - Basic Biomedical Sciences]
18: Brandon Johnson, Method Development for Assessing the Chimera Status of Dizygotic Twins Discordant for Sex [Erik Ehli - Basic Biomedical Sciences]
19: Jescy Carlos Rodriguez, Maria Nicole Potratz, Andrew Candela, Hannah Kelly Diggins, Joey Michael Bader, Ouch! That Could Have Been Avoided: A Content Analysis of Work Place Safety Videos Using Message Sensation Value [Travis Loof - Biological Sciences]
20: Levenae Buggs*, Rathna Garigipati, Independent and Interdependent Self-Construal as Predictors of Help-seeking Attitudes in Rural Communities [Randy Quevillon, Randy Quevillon - Clinical Psychology]
22: Alison Vagelsang, Ashley Brage, Rural vs. Urban: A Factor Associated with a Child's Risk for Admission to a Residential Treatment Center [S Jean Caraway - Clinical Psychology]
23: Spencer M Hackler, Hayley Marie Warren, Life Satisfaction and Substance Use in College Students [Gabrielle Strouse - Counseling & Psychology in Education]
24: Jessica Hofer, Kory Bromley, Gender-related Relationships Between Leisure Time and Physical Activity [Gabrielle Strouse - Counseling & Psychology in Education]
25: Kasandra Girard, Torrian Neeman, The Relationship of Anxiety and Career Indecision in First Generation and Non-First Generation College Students [Gabrielle Strouse - Counseling & Psychology in Education]
26: Shanel Marie Goranowski, Ashmita Ghosh, Parent Beliefs and it’s Relationship to Children’s Skills Using Digital Media [Lisa Newland - Counseling & Psychology in Education]
27: Danielle Hertel, Cyylie Hanson, Arianna Feller, Parental Attitudes Toward Digital Versus Print Media: Exploring Differences in Motivations and Beliefs [Gabrielle Strouse - Counseling & Psychology in Education]
28: Anna K Kuznik, Strengths and Limitations of a Rural College Access Program [Kari Oyen - Counseling & Psychology in Education]
29: Kami Pearson‡‡, Psychological and Biological Indicators of College Students with Alcoholic Parents [Kathleen Brown-Rice - Counseling & Psychology in Education; Basic Biomedical Sciences]
30: Mikayla Leuer, Type II Diabetes Mellitus Prevalence in the United States and Greece [Becky Wolff - Health Sciences]
31: Melisa Miftari, Abbie Marie Johannesen, Chazni Madison Zwaan, Haley Nicole Nettinga, Wednesday Danielle Westerhold, Jessica Lynn Goldsmith, Tayler LaRaye Hoogeveen, Differences in Relationship Values of Offspring From Divorced vs. Intact Families [Peter Kindle - Social Work]
32: Katie Rodig, Telepsychiatry in Rural Populations Case Study [Amy Nelson - Health Sciences]
33: Savannah Walter, Brandi Merritt, Chase Watson, Morgan Engelkes, Medication Administration Error in Hospitals [Carole South-Winter - Health Services Administration]
34: Ethan K Beck, Jessilynn Bean, Caitlin Bolte, Drew Miller, Cami Brenner, Megan Erickson, Wonder-Never Land [Carole South-Winter - Health Services Administration]
35: Mackenzie Hellwig, Danielle Slaughter, Casey Johnson, Quinn Fawcett, Cole Brody, Misdiagnosis of Alzheimer’s: Effective Measures of Lowering the Rate of Misdiagnosis [Carole South-Winter - Health Services Administration]
36: Kacie Nicole Jacobsen, Brianna Marie Sparks, Dasashe Wase Gelaw, Kylie Jeanne Vandry, Jamie Lyn Holscher, Veterans Hospital Opioid Perscriptions [Carole South-Winter - Health Services Administration]
37: Payton Larson, Grant James Wunder, Kyle Jonathan Bergeson, Kaitlyn Erin Ashley, Rachel Marie Orton, Health Care System for "Balow" [Carole South-Winter - Health Services Administration]
38: Kate Liveringhouse, Jeremy Coss, Nathan LaCroix, Connor Larson, Sydney Schad, Mandating Flu Vaccinations for Healthcare Employees [Carole South-Winter - Health Services Administration]
39: Madison Marie Reimer, *Music Therapy in Long-Term Care Facilities* [Jewel Shepherd - Health Services Administration]
41: Dan Wetering, Madison Harrington, Jennifer Walz, Justin Jones, Gfyti Wheagar, Bret Pearson, *The Effect of Socioeconomic Status on Readmission Rates* [Carole South-Winter - Health Services Administration]
42: Cassie Pieschke, *Nonpharmacologic Interventions for Agitation in Patients with Dementia* [Randy Quevillon - Honors Program]
44: Anthony Drazick, *Brain Derived Neurotrophic Factor in Slow and Fast Twitch Muscles* [Yifan Li - Medical Biology]
45: Nehal Adhikari‡†, *Quality Control for the Strength of Carbon Fibers* [Yuhlong Lio - Mathematics]
46: Paul May, *Non-Trivial Centralizers of Diffeomorphisms on the Circle* [Catalin Georgescu - Mathematics]

**Muenster University Center, 2nd Floor Balcony**

47: Alex Kirkvold, Trevor Edwards, Xavier Loose, *Development of a Portable Cryostat for High Purity Germanium Detectors* [Jing Liu - Physics]
48: Kyler Kooi, *Purification of Germanium Crystals by Zone Refining* [Dongming Mei - Physics]
49: Nathan Saunders*, *Sensitivity Improvement of Scintillation Light Detectors by Introducing Novel Light Sensors and Crystal Cooling* [Jing Liu - Physics]
50: Christina Mary Vogel, Sara Sue Napsey, *Rural Brain Drain Project* [Julia Marin Hellwege - Political Science]
51: Aimee Wieczorek‡, *The Relationship Between Hegemonic Masculinity and Aggressive Thoughts* [Bridget Diamond-Welch - Political Science]
52: Harrison Smith, Rachel Krause, *First-Generation College Students: Are They More Academically Motivated?* [Gabrielle Strouse - Psychology]
53: Joshua D Fox, *What Does it Mean to be a Man or a Woman? An Examination of the Social Construction of Gender* [Jae Puckett - Psychology]
54: Logan T Hale*, *Determining Emotion in Real Time from User Speech* [Jan Berkhout - Psychology]
55: McKenna Marie Halverson, Jamarian Dariese Latarence Davis, *Racial Acceptance and Prejudice on the USD Campus and in the Vermillion Community* [Cindy Struckman-Johnson - Psychology]
56: Denis Kozhokar*, *Formulating Predictions of Future Errors Using Classification Analysis of EEG In a Multi-Component Environment* [Doug Peterson - Psychology]
57: William Madsen†, Jose Ramon Dominguez, *Pain Sensitivity and Behavioral Markers of Self-Harm* [X.T. Wang - Psychology]
58: Kouadio Marc-Antoine Niamba†, Sean Callahan, *Exercise, Oxygen Consumption Rates and their Effects on Self-control and Decision Making* [X.T. Wang - Psychology]
59: Shannyn Tate, Whitney Thies, *Survey of Attitudes and Behavior of Facebook Users* [Cindy Struckman-Johnson - Psychology]
60: Kriston Lynn, *Constructing Competing Value Claims of the Upper Missouri River Basin* [Meghann Jarchow - Sustainability]

61: Drew R. Davis*, *Understanding the Effects of the Herbicide Glyphosate on the Microbiome of the False Map Turtle* [Jacob Kerby - Biology]

62: Garrett Adam, *Psychological Health and Academic Progress of College Students Raised by Alcoholic Parents* [Jeff Wesner - Biology]

63: Irene P Aplan, *DNA Extraction From Leather and Drumheads: Developing an Authentication Method* [Hugh Britten - Biology]

64: Madeline M Butterfield‡†, *Surveillance of Ranavirus and Characterization of Gut Bacterial Microbiome in False Map Turtles (Graptemys Pseudogeographica) within the Missouri River in South Dakota* [Jacob Kerby - Biology]

65: Kaitlyn Campbell*, *The Effects of Chemical Stessors Across an Environmental Gradient on Host Susceptibility and Prevalence of Batrachochytrium dendrobatidis (Bd)* [Jacob Kerby - Biology]


67: Pasan Chinthana Fernando*, *A Novel Integrative Approach that uses Protein-protein Interaction Networks and Anatomy Ontology Data to Increase the Candidate Gene Prediction Accuracy* [Erliang Zeng - Biology]


69: Josie M Galles†, *Development of Complemented Serratia Marcescens Knockout Strains and Analysis of Restored Phenotype of Anti-fungal Potential in Vitro* [Jacob Kerby - Biology]

70: Ethan Hare, Rosie Blote, Michaela Ahrenholtz, *Effects of GDP per capita, Healthcare Spending, and Immunizations on Child Mortality Rates* [Jeff Wesner - Biology]

71: Amanda M Hegg*, *Impacts of Invasive Trees on Nesting Success of Breeding Birds in Missouri River Riparian Forests* [David Swanson - Biology]


73: Jensen Holzbauer, Orin Kaufman, Steven Honomichl, *Effects of Human Development and Internet Users Throughout the World* [Bernie Wone - Biology]

74: Kelly Howell, *Sex Ratio Significance in the Cooperative Breeding Chestnut Crowned Babbler* [Andrea Liebl - Biology]

75: Nadeesha Dilrukshi Illeperuma Arachchige Done, *Historical Patterns and Impacts of the 2011 Flood on Redcedar Distribution along the Missouri River* [Mark Dixon - Biology]

76: Abraham Kanz*, *Quantifying Feeding Patterns of Fish and Their Cascading Influences in a Stage-structured Food Web* [Jeff Wesner - Biology]

77: Emma Johnson, *Porn and Visual Culture* [Amber Hansen - Art]
How to Market Your Research & Creative Scholarship

Demonstrates . . .
Time Management
Trustworthiness
Teamwork
Written & Verbal Communication
Leadership
Initiative
Problem Solving
Critical Thinking

On your resume . . .
On your resume, document your research experiences the same way you would describe other campus involvement and work experience. Focus on your accomplishments. Select the skills that are transferable to your career interests and demonstrate the qualifications required for the position.

List this experience with a few short bullets highlighting your achievements. For example:

COLLEGIATE INVOLVEMENT, AWARDS & HONORS
(list other organizations/awards/positions held and duties)

Undergraduate Research – Project Assistant
Missouri River Institute, University of South Dakota, Vermillion, SD August 2012-May 2014
• Assumed the primary responsibility for the technical supervision, fiscal control and reporting of the research project.
• Collaborated with five team members during the course of the research.
• Calculated and managed a $2,000 budget for the research project.
• Successfully investigated the impact of flow regulations on land cover and patch dynamics of the Missouri River floodplain.

OR

Creative Scholarship – Grant winner & Project Director
Council for Undergraduate Research & Creative Scholarship, University of South Dakota, Vermillion, SD. Mini-grant awardee. April 2014.
• Wrote successful mini-grant application ($750) for funding of creative scholarship project
• Developed artistic project based upon performances in the University of South Dakota’s productions of “Next to Normal” and “Seussical”
• Used performative techniques of Arthur Lessac, Michal Chekhov, and Konstantin Stanislavsky
• Worked closely with production team and multiple crews (director, stage manager, costume, lighting, scenic design, sound technicians) to develop and deliver award-winning performance

OR

Undergraduate Research – Research Assistant
Department of History, University of South Dakota, Vermillion, SD. October 2015.
• Researched collections in the South Dakota State Archives about women’s suffrage during the early 1900’s (over 100 hours of primary source analysis)
• Conducted multiple oral history interviews for a research project that were later deposited in the USD Oral History Center for cataloging and use by other researchers
• Nominated by faculty to present research at the USD Student History Conference, a regional meeting featuring a dozen area colleges and universities
• Completed an internship at the WH Over Museum where research results from the women’s suffrage project became the basis for a new museum exhibit

During the Interview . . .
Most interview questions are open-ended and situational in nature. The STAR method may help you better describe your accomplishments during a behavior-based interview. Describe the situation, the task you needed to accomplish, the action you took and the results of your actions.
Tell me about the most significant or creative presentation that you had to complete.

*Situation:* The most significant presentation I have ever had to present was to a class of 50 students at the University.

*Task:* Our team had completed research for the Missouri River Institute on the impact of flow regulation on the future ecological state of the river system, as well as wildlife habitat.

*Action:* We focused on the research and collected information consistently at the site. We then analyzed this data using statistical software and discovered a significant relationship between water flow and wildlife habitat. We then wrote a report on these results and shared it with a Biological conference at the University.

*Result:* The presentation went over very well and was a success. We received positive feedback on the presentation evaluations and we were even asked to present our presentation at a community forum by faculty. Later that semester, it was also published in a peer review journal that showcases Biology students’ research from across the nation.

Tell me about the most complex assignment you have had.

*Situation:* The most complex assignment was when I was the Project Assistant of a research project.

*Task:* My colleagues and I did research for two semesters to complete the project. It consisted of many complex components.

*Action:* I made many critical decisions along the way that would affect the outcome of the research project. I made these decisions by consulting with the other members of the group, seeking out as much information about our options as possible, consulting faculty, and reviewing the literature. I was trusted to maintain research results that were important in my faculty director’s own research agenda.

*Result:* The results of the research were very successful and all of us were happy with the final product. Our research was published in a peer-reviewed journal, for which I was listed as a co-author. We also earned an A on our project and presented it at several local events.

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APPENDIX A: Oral Session Abstracts

Wednesday Oral Session 1
1a: 9:00-9:50 - Muenster University Center 211/211A

Physical Performance Measures that Predict Success in Competitive Senior Swimmers
Maggie Loudenslager, Katie Nour, Travis Bolstad
Physical Therapy
Faculty/Staff Sponsor: Becca Jordre

Background: Swimming has become increasingly popular in the US and has health benefits for participants of all ages. Research on characteristics of successful swimming performance has been disseminated, however studies targeting aging swimmers are limited. Purpose: The purpose of this study was to identify whether physical performance measures (PPMs) of strength and flexibility could predict successful outcomes in senior athlete swimming performances. Methods: Swimmers competing in the National Senior Games (NSG) between 2011 and 2017 completed PPMs of strength (dominant hand grip strength (DHGS) and five times sit to stand (5TSTS)) and flexibility (shoulder flexion ROM) as part of a larger fitness screen. Outcomes from these PPMs were compared to athlete race times. Pearson’s correlations were used to determine any relationship between the PPMs and race times. A stepwise linear regression was applied to each event to determine the best model for predicting success. Results: Superior performance in each PPM correlated with backstroke and freestyle race times (p<.05) while breaststroke times correlated strongly to DHGS (r>-0.60, p<0.0001) and significantly but more weakly to 5TSTS scores (r>0.28, p<.04). Stepwise linear regression models for all backstroke events utilized shoulder ROM and DHGS (R^2>0.40, p<.04). Models for breaststroke events utilized only DHGS (R^2>0.40, p<.01). Models to predict freestyle performance consistently utilized DHGS and 5TSTS together but found no significant predictive value from the variables applied (p>0.13). Discussion: Shoulder flexibility and DHGS appear necessary for superior times in backstroke events while DHGS alone predicts success in breaststroke events. The variables investigated in this study were unable to predict freestyle success though the model pointed primarily to variables of strength as potential predictors. Conclusion: DHGS appears to be the most consistent predictor of success in aging swimmers across all events. Aging swimmers interested in improving their event times may benefit from increased strength training.

Hit Count Volume and Upper Extremity Performance Measures in Division I Volleyball Players over a Competitive Season
Hans Tvedt, Dustin Javers, Allison Thielsen, James Whitcher
Physical Therapy
Faculty/Staff Sponsor: Brandon Ness

Shoulder injuries are common in volleyball athletes. A paucity of research exists regarding hit count volume in volleyball athletes and changes to upper extremity performance measures over a competitive season. Prior research investigated pitch counts and clinical performance measures in certain populations of overhead athletes, but no comparable studies exist for volleyball athletes. The purpose of this study was to investigate shoulder pain, mobility, and strength, along with hit count volume in Division I female volleyball athletes over a competitive season. Five healthy Division I female volleyball athletes completed the testing procedures. Dominant shoulder strength, range of motion (ROM), and pain were recorded at five different points throughout a competitive season. Hit count was
obtained through practice footage and from coaches and athletes during practice sessions. Results: Significant increases in shoulder IR strength were observed. Moderate-large effect sizes were observed in upper extremity pain, shoulder ER (external rotation) ROM, and IR (internal rotation) strength. A large effect size was noted for shoulder IR ROM loss. ER ROM gains were significantly associated with ER strength loss. Conclusion: Upper extremity performance measures varied. After a period of rest, performance did not return to baseline pre-season values. Monitoring the progression of upper extremity performance measures and hit count volume may have implications for injury prevention and program development. Levels of Evidence: Level 3 Clinical Relevance: Results may assist coaches in monitoring the number of hits athletes perform in efforts to decrease the risk of overuse injury and provide insight into upper extremity adaptations in volleyball athletes. This study highlights physical adaptations to the upper extremity that occur during the volleyball season and provides insight into actual and perceived hit counts among this population.

Exercise Response to Powwow Dancing in Healthy Adults
Jessica R Brave Heart
Physical Therapy
Faculty/Staff Sponsor: Brandon Ness

Research Question: What is the exercise response to different types of powwow dances in healthy adults? Methods: Healthy adults performed three different powwow dances (traditional, jingle, and crow hop) in a laboratory setting. Each dance lasted 3 minutes duration, separated by a 5-minute rest period. Participants were familiarized with each dance prior to testing. Rating of perceived exertion (RPE), average heart rate (HRavg), and maximal heart rate (HRmax) were recorded after each dance. Results: Eight participants completed testing procedures. RPE varied according to dance type (mean ± SD; traditional: 2.4 ± 0.9, jingle: 4.0 ± 1.4, crow hop: 5.3 ± 1.8), while no significant differences were observed between dance types for HRavg or HRmax. Conclusions: In healthy adults, powwow dancing produced a favorable exercise response in terms of reaching HR training zone thresholds and may have the potential to promote cardiovascular health.

1b: 9:00-9:50 - Muenster University Center 216

An Examination of Inca Child Sacrifice
Casey Tester
Anthropology
Faculty/Staff Sponsor: Silvana Rosenfeld

Andean child sacrifice has been one of the most intriguing concepts in South American Archaeology. The emotions and willingness of the victims, especially relating to children, is an interesting topic to try and decipher. The Llullaillaco child remains may offer us insight into the possibility that some Andean child sacrificial victims may have known about their situation and fully understood their role. Evidence from hair and tissue samples from the Llullaillaco mummified remains suggest that the oldest child was treated very well in the year leading up to her sacrificial death, despite DNA evidence showing that she was from a more distant land. She ate a very stable and nutritious diet and was in a very healthy state before her death. However, evidence also shows that in the few months prior to the ritual that she was consuming larger amounts of chicha beer and coca leaves and it is suggested this may have been to calm her nerves and anxiety in relation to the upcoming ritual, which may also suggest that she was aware of her situation. The younger children, also sacrificed during the ritual, showed different results during hair and tissue analysis. Their analysis showed that they were given vast amounts of chicha, coca leaves, and other hallucinogens shortly before their deaths. Because of their young age and the lack of evidence showing any kind of nutrition changes in the year leading to their deaths, it is suggested that they were
not aware of their situation and this may have been done in order to make them more compliant and unaware of their situation. Psychological thought is always up for debate, but the evidence in these mummies can help provide us with clues into better understanding the Andean sacrificial victim.

A Comparison of the Retinal Ganglion Cell Distribution Across the Life Stages of the Plains Spadefoot Toad (Spea bombifrons)
Alexa Kruse†
Biology
Faculty/Staff Sponsor: Christopher V. Anderson

Although vision may not be the most important sense for every organism, for many animals, the ability to perceive light is the stimulating sense for a wide range of behaviors. The retinal ganglion cell (RGC) layer of the eye is responsible for transmitting visual information to the brain. RGCs are concentrated in areas where light and visual input are greatest. Therefore, by understanding the RGC distribution and concentration (retinal topography) of a given organism’s retina, conclusions can be drawn about that animal’s behaviors. Few studies on the retinal topography of anurans have been carried out, but of those studies, most adult anurans have a horizontal, naso-temporal arrangement of RGCs known as a visual streak. However, the Plains Spadefoot Toad, Spea bombifrons, has unusual, vertically-oriented, elliptical pupils. This may interfere with a naso-temporal visual streak throughout its lifetime. The number and distribution of RGCs was examined in S. bombifrons. Retinae of tadpoles, metamorphs, and adults were flatmounted and stained with Cresyl Violet Acetate. The concentration of RGCs was measured per mm² throughout predetermined points on the retinae, resulting in compiled topographic maps of the retinas rendered during each major life stage. The concentration of RGCs is approximately 1,150mm² on average in tadpoles, and 2,220 cells per mm² in adults. Ganglion cell density moves from no apparent retinal arrangement in tadpoles to a more defined, dorso-nasal area centralis in adults. The differences in RGC number and distribution allow for further understanding of the anuran eye throughout metamorphosis, and shows that retinal ganglion cell specializations change over the course of S. bombifrons’ life.

Child Labor in the Developing World
Bridget Geerts
Economics
Faculty/Staff Sponsor: Mike Allgrunn

Although media has raised social awareness about child labor, it still remains prevalent throughout the workforce of many countries in the developing world. This study examines the relationship between child labor and the poverty gap of populations of varying sizes. This study will utilize a time series econometric analysis in two ways. The first is to determine the components of the poverty gap. Second, the analysis which will be used to examine the effect of the poverty gap on child labor.
Bioaccumulation dynamics and transfer of uranium across metamorphosis in the mayfly
Neocloeon triangulifer
Brianna Henry*
Biology
Faculty/Staff Sponsor: Jeff Wesner

In 2012, the Department of Interior issued a twenty-year moratorium on uranium (U) mining in federal lands of the Grand Canyon Region, allowing for study of the impacts that this activity has on water and wildlife resources. The Colorado River watershed contains several tributaries that receive U inputs naturally from the land that they drain, making an understanding of the effects of U on aquatic biota crucial to understanding the risk of potentially increased U introduction through mining. Among these aquatic biota, insects play a key role as a link between aquatic and terrestrial ecosystems. They can carry their contaminant history with them as they metamorphose to become adults, transferring exposure risks to terrestrial consumers, but this varies widely by contaminant. In the case of U, Walters et al. showed that most of the U accumulated in blackfly larvae collected along the Colorado River was lost during metamorphosis to the adult stage. However, little is known about the underlying mechanisms governing U bioaccumulation by insect larvae. We used the precepts of a kinetic bioaccumulation model and experimentally parameterize U uptake and elimination rate constants in a model aquatic insect species, the mayfly Neocloeon triangulifer. The model can predict U accumulation and potential risk to consumers in impacted ecosystems. Results showed that mayflies efficiently accumulate U from the aqueous phase, but marginally from diet. Increasing concentrations of U in diet lowered mayfly feeding rates. Nearly 90% of the accumulated U was eliminated within 24 hours. Assessment of the U content in mayflies exposed across several life stages further revealed that that more than 90% of U accumulated by larvae is lost by the adult stage. These results indicate a relatively low risk of U transfer from the Colorado River and its tributaries to insect consumers on land.

False Map Turtle (Graptemys pseudogeographica) Abundance in a Modified River Habitat, Lake Oahe, South Dakota
Anna Kase*
Biology
Faculty/Staff Sponsor: Jacob Kerby

False map turtles (Graptemys pseudogeographica) are aquatic turtles endemic to the Missouri River in South Dakota, and currently listed as a state threatened species. Historically, false map turtles were found throughout the Missouri River and at one time were considered the most abundant turtle species in the northern stretch of the Missouri River in South Dakota that is now known as Lake Oahe. These turtles mainly inhabit complex river habitats that contain an abundance of deadwood for basking, but can also be found in slightly more lentic bodies of water such as oxbow lakes and other aquatic habitats throughout river. Their current scarcity is likely a reflection of the habitat alteration (e.g. river damming) throughout South Dakota. The objective of our project was to determine if false map turtles still inhabit Lake Oahe. During June and July 2017 we conducted surveys from boats driven along the shoreline of Lake Oahe. Baited hoop-net traps were set in areas expected to be suitable for turtles (i.e. sandy or deadwood basking sites). We surveyed 600 miles of shoreline, and found representatives of three of the five turtle species that inhabit the Missouri River, however none of these were false map turtles. In a subsequent trip, 40 miles of the Missouri River directly below the Oahe Dam were surveyed. After surveying one fifteenth of the amount of shoreline we surveyed on Lake Oahe we found representatives of four of the five turtle species that inhabit the Missouri River, and a majority of the turtles observed basking were
false map turtles. This difference in abundance suggests that there is a difference in the turtle population compositions above and below the Oahe Dam, possibly due to differences in habitat quality associated with the damming of the river.

Microbiome Engineering as a Novel Tool for the Amelioration of Amphibian Chytridiomycosis
Joseph Madison*
Biology
Faculty/Staff Sponsor: Jacob Kerby

The manipulation of host-associated microbial communities for the amelioration of disease remains a novel and active area of interest in the context of microbial and disease ecology. Genetic modification of constituent bacterial members of host-associated microbial communities remains important in understanding a variety of host-microbiome-disease system factors. One such system of interest is the amphibian-microbiome-fungal pathogen system. Specifically, the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*) has the ability to infect amphibian skin (chytridiomycosis) thereby disrupting skin respiration and osmotic processes resulting in cardiac arrest and host death. Chytridiomycosis is responsible for global amphibian declines and extinction events worldwide, making mitigation efforts important for global conservation efforts. The ability to modulate amphibian-associated cutaneous microbial communities through genetic manipulation of constituent bacterial species is thought to present a novel method in which to protect susceptible amphibian species from the onset of chytridiomycosis and subsequent mortality. Previous work has isolated and characterized various bacterial species from amphibian skin with a subset of isolates exhibiting both strong antifungal properties and a disproportionate potential for influencing host-associated microbial community structure and function. Specifically, the Gammaproteobacteria *Serratia marcescens* (*Sm*) is a known constituent of the amphibian cutaneous microbiota and has the aforementioned properties of interest. Here, we present work examining the effects of host inoculation with knockout (ΔpigM) and wild-type *Sm* and the resulting effects on the overall microbial community structure. We also present results from post-*Sm* inoculation exposure to *Bd* (1.5x10^6 zoospores/mL) and the resulting mortality data in control, wild-type *Sm*, and knockout *Sm* treatments (n≥7). Effects on host behavior, mass, and *Bd* zoospore load are also presented as a function of the applied treatments and controls. Results from this work have important implications for further studies on the amphibian-microbiome-*Bd* system and will also be broadly applicable in influencing current paradigms vis-à-vis host-associated microbiomes and pathogens of interest.

1d: 9:00-9:50 - Muenster University Center Pit

Alternative Week of Learning Spring Break Trip to Rosebud, South Dakota
Marisa Helm, Megan Feerick, Ellen Roufs, Morghan Byrnes, Brittany Bamberg, Phil Dohn, Jordan Smith, Linze Cowman, Cassie Échols, Andrew Koch
Center for Academic & Global Engagement: AWOL
Faculty/Staff Sponsor: Kim Albracht

The University of South Dakota's Alternative Week of Learning (AWOL) organization provides students with an experience to learn and serve here in our community and outside our state. For spring break 2018, AWOL had a student-led group travel to Rosebud, South Dakota. The alternative break trip was focused on awareness for the issues faced by Native Americans in our own state. Co-leaders created a week filled with service activities including painting and chopping wood, as well as learning opportunities including visiting the Sicangu Heritage Museum and spending time with children. Nightly
discussions of the daily work and activities done by the group was used to help participants reflect on the conditions and issues that people face on the reservation. Participants are encouraged to be open and honest during these discussions, so the group as a whole can learn from various perspectives about our trips focus. During the panel discussion participants will be discussing what they learned and experience while on the Rosebud reservation. As well as how their initial stereotypes and perspectives may or may not have changed. Overall experiences and thoughts will also be discussed. The objective for AWOL trips is to create conscious, active citizens who go above and beyond for social issues faced around the world.

Wednesday Oral Session 2
2a: 10:00-10:50 - Muenster University Center 211/211A

The Effects of Chemotherapy-induced Peripheral Neuropathy on Functional Balance in Children
Katie Schuelke, Elizabeth Waltner
Physical Therapy
Faculty/Staff Sponsor: Patti Berg-Poppe

The purpose of this research was to assess subjects’ levels of neuropathy using the Modified Pediatric Total Neuropathy Score (Ped-mTNS) and establish the relationship between functional balance and chemotherapy-induced peripheral neuropathy. We hypothesized higher levels of neuropathy would correlate with poorer functional balance and a relationship would exist between poorer functional balance and common manifestations of CIPN, such as distal strength deficits and loss of ankle joint range of motion. Subjects included 8 female children; Diagnostic group (DG): 4 children diagnosed with leukemia, lymphoma, or solid tumor and currently receiving/received chemotherapy within 2.5 years. Control Group (CG): 4 children age and gender matched. No between-group differences were found in age or BMI. Children in DG were invited to participate by responding to a letter given by their pediatric oncologist, a flyer posted in a Midwestern United States hospital, or Facebook call for participants. CG children were a sample of convenience. The Star Excursion Balance Test (SEBT), Pediatric Reach Test (PRT), and Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT™-2) were used to measure functional balance. Orthopedic measures taken were: dorsiflexion (DF) strength and talocrural DF/plantar flexion (PF) passive range of motion (PROM). Correlations between CIPN and functional balance (BOT™-2 Balance subtest, PRT-all directions, and SEBT-all directions) were not significant. Whole-sample correlations met significance for DF strength, PRT backward, opposite limb reach directions as well as sum SEBT performance. Between-group analysis found significant differences in Ped-mTNS scores (P=0.018; CIPN mean=2.25; CG mean=0) and DF PROM (P=0.031; CIPN mean=14 degrees; CG mean=31 degrees). Results demonstrated no relationship between CIPN and balance. Balance and DF strength were related. Results are likely attributed to the small sample size. A larger sample may lead to a greater understanding of performance changes.

Comparison of Single Leg Balance to Isometric Ankle and Hip Strength
Zachary Schneider, Anthony Husher, Scott Strand
Physical Therapy
Faculty/Staff Sponsor: Hanz Tao

Ankle sprains commonly affect individuals who participate in sports, hypothesized to be the result of impaired postural and neuromuscular control, and strength deficits. Postural control is a sensorimotor process aimed at maintaining, achieving, or restoring a state of balance during activity. The relationship
between ankle strength, hip strength, postural control, and injury is uncertain. Clinical research has varied and conflicting evidence regarding the interaction of these factors. The aims of this study were to investigate whether there was a correlation between a single leg balance task on stable or unstable conditions and isometric ankle and hip strength. Forty of forty-four adults volunteered to participate in this study. A modified Balance Error Scoring System was utilized to assess postural control. Isometric hip strength and ankle strength were assessed using manual muscle testing positions for gluteus maximus, gluteus medius, ankle inversion, and ankle eversion. Force and the derivative torque were determined using a HHD. A low, negative correlation was found between mBESS and hip extension ($r = -0.35, p < 0.01$). All other correlations between mBESS and strength were negligible. Secondary findings revealed strong, positive correlations between all hip and ankle strength tests. A paired t-test comparing dominant versus non-dominant strength within individuals revealed a significant difference between gluteus maximus ($p = 0.01$) and ankle evertors ($p < 0.01$). Gluteus medius ($p = 0.28$), inversion, ($p = 0.10$), and mBESS score ($p = 0.97$) revealed no significant difference. Our results suggest low to negligible correlation between hip or ankle strength and balance in a healthy population. The results of our study suggest that task specificity is important for assessing balance in clinical populations. Balance performance can be compared to contralateral limb, as our results suggest that there is no effect of limb dominance on static balance in stable or unstable conditions.

Effects of Peripheral Neuropathy on Sensory Interactions for Balance in Children Undergoing Chemotherapy

Tory Nicole Gross, Kyle Vern Behl
Physical Therapy
Faculty/Staff Sponsor: Patti Berg-Poppe

Purpose/Hypothesis: This study explored the effects of peripheral neuropathy (PN) on sensory interactions for balance in a diagnostic group of children undergoing chemotherapy (DG) against a control group (CG). We hypothesized that the DG would demonstrate higher rates of balance impairment. Number of Subjects: 8 female children participated, with 4 in the DG receiving or having received chemotherapy treatment in the last 2.5 years and 4 in the CG matched for age (DG = 6.40 + 1.82 years; CG = 6.29 + 1.38) and gender. Materials/Methods: The pediatric modified Total Neuropathy Score (ped-mTNS) was used to quantify PN severity, if it existed, among subjects. Sway and stability were assessed using the modified Pediatric Clinical Test of Sensory Interaction for Balance (m-CTSIB), testing subjects under a matrix of surface (Firm [Fi] vs. Foam [Fo]) and visual (Eyes Open [EO] vs. Eyes Closed [EC]) conditions. The Limits of Stability (LoS) test assessed shifts in center of mass within base of support. A digitalized platform quantified balance performance. Independent t-tests were used for between-group comparisons. Results: While the DG showed significantly higher levels of PN than the CG ($P = 0.018$), PN in the DG ($M = 2.25, SD = 0.96$) was considered mild. Correlations revealed an indirect relationship between sway and PN under FiEC conditions. The DG performed better under firm conditions, with eyes open and closed (FiEO AP Sway, FiEC AP Sway, FiEO Stability, and FiEC Stability). Conclusions: While showing higher levels of PN than the CG, the DG demonstrated better balance performance under firm surface conditions. Neuropathy in DG subjects was mild, which may in part explain relatively unperceivable between-group differences. These results are preliminary; although our findings contradicted our original hypothesis, we believe that increasing the number of subjects would present a more accurate representation of balance performance in both groups.
This study determined the effect of varying acoustic environments on Betta fish (*Betta splendens*) aggression. Three acoustic environments were studied: a null acoustic environment with no acoustic stimuli, an acoustic environment with Reggae music from a playlist of three songs performed by Bob Marley, and an acoustic environment with Rock music from a playlist of three songs performed by Sleeping with Sirens. The results were widely inconclusive and showed no significant difference between the aggressive striking behaviors of Betta fish exposed to any of the listed acoustic environments. However, there was a significant increase in the number of Betta fish striking behaviors in the final trial in the initial trial, indicating that some form of habituation or conditioning may have skewed the results. Future experiments will be done with longer time intervals to potentially reduce the effects of habituation/conditioning. Female Bettas will also be used to determine if the presence of a female conspecific will induce variations in agonistic behaviors. Research on how various acoustic environments affect Betta fish aggression can provide information regarding the effects on noise pollution on wild fish, the effectiveness of music as a tool for captive animal enrichment, and the execution of models studying the effects music may or may not have on human aggression.

**Characterization of Dentin Slices and Monitoring their Remineralization by AFM-IR and Nanoindentation**

**Allison VanLaecken**  
**Chemistry**  
**Faculty/Staff Sponsor: Grigoriy Sereda**

This research aimed at testing the hypothesis that mineralization of dentin at the nanoscale is guided by both hydroxyapatite and protein components of dentin and depends on the method of mineralization. The concurrent use of the resonance-enhanced atomic force microscopy coupled with infrared probe (AFM-IR) chemical mapping, nano-indentation, and scanning electron microscopy (SEM) provides a detailed insight into the structure of human dentin, as well as to the processes of its partial demineralization and remineralization. Partial demineralization of dentin drastically affects its mechanical properties. After the partial demineralization, dentin slices were remineralized by the MI® toothpaste, Colgate toothpaste ground with hydroxyapatite, and by diffusion of calcium and phosphate ions through the chitosan-phosphate gel. The patterns of the deposited hydroxyapatite on the dentin surface and dentin-derived collagen matrix depend on the method of remineralization and on the nanoscale structure and composition of the dentin surface. The observed trends of the affinity of collagen toward hydroxyapatite provide an insight to the natural processes of bone mineralization guided by its both hydroxyapatite and protein constituents.
The Effect of Diabetes Mellitus on Range of Motion and Strength in High-Functioning Senior Athletes
Alicia Bellefeuille
Physical Therapy
Faculty/Staff Sponsor: Becca Jordre

Background: Diabetes Mellitus (DM) is a systemic disease of increasing prevalence which is known to negatively impact the musculoskeletal system. Individuals with DM have been shown to have lower muscle quality and limited joint mobility. With increasing prevalence of DM, additional research is needed to have a greater understanding of the effects of DM on the musculoskeletal system of older adults and to understand the influence of exercise. Purpose: The purpose of this study is to compare the upper extremity function of older adults who exercise regularly with a history of DM to older adults who exercise regularly without a history of DM. Methods: Subjects were recruited athletes at the National Senior Games. The athletes were asked to self-report any diagnosis of diabetes. Grip strength (GS) and shoulder flexion active range of motion (SF) of each athlete were measured. Statistical Analysis was performed using a General Linear Model with alpha set at < 0.05. Results: SF was significantly lower in athletes with DM than athletes without (F = 9.12, P = .0026). GS in women athletes with DM was significantly lower than women athletes without DM (F = 11.83, P = .0006) while grip strength in men athletes with DM was lower but not significantly lower that men athletes without DM (F = .97, P = .3238). Discussion: All athletes with DM displayed decreased SF while only female athletes with DM displayed decreased GS. Additional research is needed with a larger sample to consider possible reasons for the preservation of GS in males with DM. Conclusion: The addition of regular exercise among the older adult population does not entirely prevent the negative effect of DM on upper extremity strength and range of motion.

2c: 10:00-10:50 - Muenster University Center 216A
Low-Mass Dark Matter Search with CDMSlite
Sudip Poudel
Physics
Faculty/Staff Sponsor: Joel Sander

Multiple observations agree that about 80% of the mass in the Universe is fundamentally different than the baryonic visible matter and is called dark matter. The most popular candidate for dark matter is Weakly Interacting Massive Particles (WIMPs). WIMPs are expected to constitute most of the mass of galaxies including the Milky Way. The WIMP mass is generally unknown but thought to be within the GeV/c2 to TeV/c2 range. Low mass dark matter (<~10 GeV/c2) is challenging to detect because it deposits only a small amount of (keV-scale) energy in a detector. The Cryogenic Dark Matter Search low ionization threshold experiment (CDMSlite) specializes in low mass dark matter searches. The experiment applied a higher voltage bias (~70 V) across a SuperCDMS iZIP germanium detector to internally Luke-amplify the ionization signal, resulting in a 56eVee analysis threshold. New regions of low-mass, WIMP parameter space are excluded for WIMPs with masses between 1.6 and 5.5 GeV/c2.
SuperCDMS SNOLAB: Building the Next-Generation Dark Matter Search Experiment in the Deepest Underground Laboratory in North America

Joseph Mammo
Physics
Faculty/Staff Sponsor: Joel Sander

Dark matter comprises about 80% of the total mass of the Universe. SuperCDMS SNOLAB, a second-generation dark-matter-search experiment is designed to search for low-mass dark-matter particles. The experiment will utilize both germanium and silicon cryogenic detectors to detect energy depositions produced by elastic scattering of dark matter particles off detector nuclei. The detectors are surrounded by shielding to reduce radioactivity-induced backgrounds. The experiment will be installed in SNOLAB, a laboratory 1.24 miles below the Earth's surface in Sudbury, Ontario. I will describe the SuperCDMS SNOLAB experiment and its expected sensitivity to dark matter.

Projected Sensitivity of the SuperCDMS SNOLAB Experiment

Thomas B Binder
Physics
Faculty/Staff Sponsor: Joel Sander

SuperCDMS SNOLAB is the next generation of the SuperCDMS experiment designed to search for low-mass dark matter. The experiment utilizes both germanium and silicon cryogenic detectors that are configured to use either phonon sensors only (high voltage, HV) mode for low-mass dark matter detection or use both phonon and ionization sensors for electromagnetic-background rejection (iZIP) mode. The HV detectors are designed to use phonons to amplify ionization signal to allow sensitivity to sub-GeV dark matter. The iZIP detectors are designed to discriminate between nuclear and electron recoils as well as against surface-events. Through improved background control and detector design, SuperCDMS SNOLAB is expected to be sensitive to spin-independent cross sections as low as approximately $1 \times 10^{-43} \text{ cm}^2$ for a dark matter mass of 1 GeV/c^2.

2d: 10:00-10:50 - Muenster University Center Pit

USD 'Yotes in Pierre: Interning during the '18 Legislative Session

Catie Dougherty, Samuel Alvine, PJ Freidel, Amber Hulse, Mary Merxbauer, Jacob Selgestad, Chris Skunk, Tyler Wenande

Political Science

Faculty/Staff Sponsor: Eric M. Jepsen

This panel discussion will focus on 8 current USD students who have interned during the Spring '18 SD Legislative Session in Pierre. The students interned in the legislature and for lobbying firms and an executive agency. The students interned for the Republican caucuses and the Democratic caucuses. From their vantage points across the two parties and two legislative chambers as well as other offices and positions, the students will answer questions such as: What was it like to intern in Pierre during the session? What makes for a good internship experience? What influence did you have over policy and the politics of certain bills? How has this influenced what you want to do in the rest of your academic career? How has this influenced what you want to do after graduation? If you could change one thing about the policy process in the state capital/Capitol, what would it be? What advice would you give to other students seeking to intern with state government in future years and sessions?
Melville's Beginnings from "the watery part of the world": A survey of 19th-Century maritime history in the collections of the New Bedford Whaling Museum  
Kacie M Fodness*, Simon Ferrell, Stephanie Whitlow  
English  
Faculty/Staff Sponsor: Prentiss Clark

*Moby-Dick* is one of the most recognizable narratives in the American literary tradition. It is a combination of history and fiction— one that is closed and open, at once a systematic catalogue of cetology and a meandering poetics of meaning. One of the things we understand from this novel is that Herman Melville was himself tremendously interested in archival work. His introductory "Extracts" include etymological discussions, passages, letters, and newspaper excerpts that catalogue a brief history of the leviathan in literature. As a part of my initial dissertation research, I will travel to New Bedford, Massachusetts in April 2018 to visit the Grimshaw-Gudewicz Reading Room at the New Bedford Whaling Museum. My research focuses on possibility in Melville's fiction and the ways in which these novels are defined by their resistance to fixity and conclusion. At IdeaFest, I will present preliminary research conducted in preparation for this trip as a part of the "Work in Progress" panel. While I expect to discover far more than my remote research indicates is on site, my time in the archives will consider documents related to *Moby-Dick*, information on Melville's own whaling voyages and his travel journals, other whaling accounts (fiction and non) from 1840-1850, as well texts that Melville "owned or borrowed" during this time. In many ways, collections like the one in New Bedford pick up a project started first by Melville and allow readers access to the nuanced literary and historical edges of his fiction.

Progress, the Property Bubble, and Uneven Development in Tana French's Dublin Murder Squad Series  
Simon Ferrell  
English  
Faculty/Staff Sponsor: Prentiss Clark

This paper examines the structures of violence in Tana French's Dublin Murder Squad series, focusing specifically on *The Likeness* (2008) and *Broken Harbor* (2012); it argues that the novels' violence emerges as a symptom of the convergence of late capitalism and neocolonialism in Ireland and should be read as a critique of these very circumstances. Set during the Celtic Tiger - Ireland's late 20th- and early 21st-century economic boom - and the Republic's ensuing financial crisis, each of French's novels traces a family's tumultuous and mysterious domestic life, which becomes exposed throughout the course of the novels' murder investigations. This paper proposes to interrogate the dark uncertainties of the home, violent crimes, and the police procedural in a modernized Ireland, specifically the social antagonisms, economic conditions, and culture of consumerism that lead to each novel's brutal crimes and grisly murders. Out of these economic and cultural conditions and their constitutive anxieties and acts of violence, this paper will excavate a critique of their engendering circumstances: the Celtic Tiger, its crash, the ensuing global economic crisis, and the antagonisms and contradictions of life under late capitalism and capitalist modernity in 21st-century Ireland.
Asserting firmly, "not for a moment did she believe in God," Clarissa Dalloway, the protagonist of Virginia Woolf's 1925 novel Mrs. Dalloway, instigated a complex discussion on the role of spirituality and the presence of oppressive institutions in a secular post-war England (Woolf 28). In addition to Woolf's secular upbringing, her "gender, sexuality, feminist views, class position, [and] Englishness" all function to separate her relationship and interpretations with religion from other modernists-like James Joyce, T.S. Eliot and Marcel Proust (Smith and Andrés Cuevas 1). However, despite Clarissa's adamant refusal to accept the tenets of orthodox Christianity, she remains an incredibly spiritual character simply "seeking some alternative spiritual sources," as much of the population during the aftermath of World War I, the rise of the secular age, sought (Taylor 302). The distinction for Woolf's work lies in the vast difference between religion defined by spirituality and religion defined by Christianity; Clifford Geertz, in "Religion as a Cultural System" considers religion in terms of "(1) a system of symbols which acts to (2) establish powerful, pervasive, and long-lasting moods and motivations in men by (3) formulating conceptions of a general order of existence" (qtd. in Sherman 725). In this sense, though criticizing Christianity and organized religion as an institution, the musings and existential questioning of Clarissa Dalloway and Septimus Smith, a young soldier in the novel, can aptly be termed religious thought. The discussion of this paradoxical relationship, and Woolf's literary response to secularization and England's postwar government, arises in Mrs. Dalloway through her unique construction of spirituality and the soul, depictions of the institution of Christianity and its similar rendering to other institutions (like science and nationality), as well as the formation of spirituality and the concept of resurrection though the themes of nature and death.

End of Life Care Medication Health Literacy in Aging Adult Populations
Hanna Rose Leschisin
Biology
Faculty/Staff Sponsor: Barbara Goodman

In recent years, an expansion of palliative care and hospice care programs has revolutionized how individuals approach death. The philosophies about these programs focus on patient autonomy, dignity, pain management, and improving quality of life, all which could benefit many individuals at the ends of their lives. To increase proper utilization of these programs, there needs to be a focus on increasing health literacy about end of life. Health Literacy is defined by H. Ishikawa and E. Yano as pertaining to the importance of using health information as a resource to allow greater patient participation in managing and making competent decisions in response to health concerns (2008). People at all stages of life need to be informed about their medical choices for better understanding and decision making through the transitions of life, but it is especially important in helping individuals to approach death. This thesis will focus on the central theme of taking full advantage of end of life care through increasing health literacy. To make a meaningful impact on individuals with low health literacy at end of life, this thesis will focus on a precise application: medication use. Pharmaceutical use is notoriously complicated, but has the potential to help illustrate the philosophies behind the End of Life Care programs and make dramatic improvements on reinforcing patient autonomy. The goal is to increase understanding about the medications prescribed to aging individuals who are enrolled in end of life care programs, which in turn would assist in serving this population in improving health care participation.
and outcomes. Medication use in aging adults enrolled in end of life care is a practical focus to increase health literacy.

**Color Deficient Vision: Advantages and Applications**

**Kouadio Marc-Antoine Niamba‡**  
**Psychology**  
**Faculty/Staff Sponsor: Frank Schieber**

The objective of this study is to analyze potential advantages of color blindness, by comparing color blind vision (CBV) and color normal vision (CNV) in different perceptual tasks. These tasks involve depth perception and detection of camouflage and will be partially evaluated using color correcting glasses, which have never been included in a visual comparative study. Based on previous literature, it is known that CBV participants respond better than CNV participants when tasked to detect camouflage (Morgan, Adam, & Mollon, 1992). Previous literature also suggests that the brightness and contrast of the colors of an object, in relation to its background, can alter the depth perception of CNV participants (Allen & Rubin, 1981). As such, we hypothesize that CBV participants will react faster and/or perform better than their CNV counterparts. Prior to testing, multiple calibrations and chromaticity measurements will occur, using the CRT screen on which the experiment will be performed and a photometer. To evaluate depth perception, participants will do a paired comparison test between two colored images differing from their background, and choose which image appears nearer. To evaluate camouflage detection, participants will be identifying a camouflaged human within a nature scene. The measured variables across all conditions will be the reaction times and response accuracy of the participants. The results of the study should verify that CBV might present few advantages over CNV in some instances, assert of the effectiveness of the color corrective glasses for CBV, and assess the nature of any change caused by the color corrective glasses on CNV.

**3c: 11:00-11:50 - Muenster University Center 216A**

**Comparing Aging Swimmers to other Athletes on Measures of Physical Health and Fitness**  
**Kristen McFarland, Shantel Norman, Jenifer Paul**  
**Physical Therapy**  
**Faculty/Staff Sponsor: Becca Jordre, William Schweinle**

Swimming is a life-long sport embraced by many aging athletes and shown to aid in the maintenance of health with aging. A small body of evidence suggests swimmers may enjoy superior health to other aging athletes. The purpose of this study is to understand the health characteristics of senior athlete (SA) swimmers as compared to SAs who compete in other sports. This observational cohort study utilized data on 2,346 competitive SAs collected from 2011-2017 on National Senior Games (NSG) athletes. A general linear model was used to compare health characteristics between 201 SA swimmers and 2,145 competing in non-swimming events. Health characteristics were collected as part of the Senior Athlete Fitness Exam (SAFE) a tool developed to test the strength, flexibility, cardiovascular health and balance of SAs. SA swimmers exhibited significantly better shoulder range of motion (p < 0.0001) than their SA peers. No difference was seen in measures of balance, fast gait speed, cardiovascular health, lower extremity (LE) strength or LE flexibility. SA swimmers showed lower overall grip strength (p < 0.0001), slower average gait speed (p = 0.0050), and an increased occurrence of osteoporosis (p = 0.0227) compared to non-swimming SAs. Competitive older adult swimmers demonstrate superior shoulder flexibility to other SAs but are otherwise similar to other SAs in many health characteristics. SA swimmers did show inferior performance on a select number of health characteristics most notably the presence of osteoporosis, when compared to their SA peers. These findings suggest the need for aging swimmers to include other modes of sport participation in their regimen that involve strength training.
land-based activity and weight bearing to complement the benefits of their preferred sport and protect their bone health.

Genetic Determinants of Dizygotic Twinning
Jeffrey Beck
Basic Biomedical Sciences
Basic Biomedical Faculty/Staff Sponsor: Gareth Davies

Spontaneous dizygotic (DZ) twinning occurs in roughly 1-4% of women and has been observed to cluster within families. Physiologically, the underlying mechanism of natural DZ twinning is the release and fertilization of two or more oocytes. Endocrinologically, regulation of ovulation and ovarian folliculogenesis is governed by circulating follicle-stimulating hormone (FSH) and other intra-ovarian factors. Thus, DZ twinning is defined as the concomitant conception and development of two independent zygotes during a single pregnancy. Several maternal factors have been shown to contribute to increased incidence of DZ twinning including increased age, height, body mass index, gravidity, parity, and smoking behavior prior to pregnancy. Taken together, these observations suggest that there exists an underlying genetic component of spontaneous DZ twinning that may be polygenic in nature.

Over the years, scientific efforts to elucidate the genetic origin of DZ twinning have been unsuccessful. However, a recent genome-wide association study (GWAS) meta-analysis, initiated by the Netherlands Twin Register, identified two single nucleotide polymorphisms in genes (near FSHB and within SMAD3) associated with spontaneous DZ twinning and female fertility. Animal studies have indirectly substantiated those findings by demonstrating that SMAD3 is required for the synthesis and regulation of FSH. As a follow up to the discoveries of the investigative twinning GWAS, we have performed whole genome sequencing on six mothers of DZ twins, spanning multiple generations, from a Dutch pedigree with rich history of DZ twinning. With these data, we are working to identify rare genetic variants that may implicate novel pathway regulation concerning ovarian responsiveness to FSH. All in all, these findings would allow for prediction of DZ twinning and for the identification of additional genetic biomarkers related to fertility. Ultimately, the conclusions of this work may help to improve outcomes of multiple gestation pregnancies and the reproductive ability of infertile couples.

Synthesis and Characterization of Perfluoroalkylated Schiff Base Complexes for Organic Semiconductor Applications
Arjun Chandra Bhowmick
Chemistry
Faculty/Staff Sponsor: Haouran Sun

Semiconductors are playing a key role in various electronic and sensory devices. One of the areas of organic semiconductor research is to develop suitable semiconductor materials with low band gap and lamellar π-π stacked solid state structure. In the Centre for Fluorinated Functional Materials we aim to build efficient perfluoroalkyld organic semiconductor materials. Some unique features of these compounds are that one may tune the band gap by suitably introducing perfluoroalkyl group and the superhydrophobicity of the complexes further enhances the stability of the materials in moist environment. Many of these perfluoroalkylated organic compounds form interesting lamellar π-π stacked structure that potentially enhances charge mobility. The $\text{C}_3\text{sp}^3$-$F$...$F$-$\text{C}_3\text{sp}^3$ attractive interaction between perfluoroalkyl chains further stabilize the crystal structures. Dr. Sun et. al. have published perfluoroalkyld organic complexes where π-π stacking distance reduced significantly than HOPG. To reduce the lamellar π-π stacking distance, we are now concentrating to synthesize perfluoroalkylated Schiff Base with large conjugation and its square-planar transition metal complexes. We expect that
the extended conjugation of these Schiff base complexes will favor the decreasing band gap and π-π stacking distances further to get more efficient semiconductor Materials.

3d: 11:00-11:50 - Muenster University Center Pit

"Life is a Cabaret, Old Chum": Politics and Showbiz Collide
Rachel Smith, Josie Kasik, Rebecca Schuster
Theatre
Faculty/Staff Sponsor: Joe Stollenwerk

Cabaret debuted on Broadway fifty years ago and it is still just as relevant today. The musical examines such complex and chilling topics as the rise of nationalism, anti-Semitism, scapegoating, and the complicity of people in empowering the forces of evil. As Margaret Atwood wrote in The Handmaid's Tale, "Nothing changes instantaneously; in a gradually heated bathtub, you'd be boiled to death before you knew it." Another key idea the show explores is what philosopher Hannah Arendt terms "the banality of evil": the idea that evil doesn't always look like a monster, but more often is embodied by everyday people who make the easy or comfortable choice rather than the morally right choice, and that evil can look like our friends, neighbors, and family. And at the same time, Cabaret is an immensely entertaining show, full of memorable songs by Fred Ebb and John Kander and with a sharply written script by Joe Masteroff. This performance presentation will include excerpts of several songs from the show performed by the students playing some of the principal roles in USD's production of Cabaret, which will presented later in April. We will include introductions explaining the context, relevance, and key issues the songs examine and then lead a Q&A with the audience.

Wednesday Oral Session 4

4a: 12:00-12:50 - Muenster University Center 211/211A

Effectiveness of Protective Stepping Intervention to Reduce Fall Risk in Community-Dwelling Older Adults
Beth King, Nicole Sikkink, Will Whitlock
Physical Therapy
Faculty/Staff Sponsor: Angela MacCabe

Impaired balance in older adults can lead to falls. A reduction in fall risk promotes safety and mobility in community-dwelling older adults necessary for independence. Exercise has been shown to be a beneficial intervention to decrease fall risk in older adults. Additionally, protective stepping strategies have been shown to mitigate falls in this population. The purpose of the study was to determine if a group based, 12-week protective stepping program would improve balance and reduce fall risk in community-dwelling older adults. Forty-two community-dwelling older adults participated in a 12-week protective stepping class held at a Midwestern senior living center. Class was led by a facility instructor twice a week for 45 minutes and consisted of multi-directional stepping exercise. The Activities-Specific Balance (ABC) scale, Mini-BESTest, Four Step Square Test (FSST), and Multi-directional Reach Test (MDRT) were administered before and after the program to assess changes in fall risk. Significant improvements were found in the Mini-BESTest 28 scores and 32 scores (p=.000). Additionally, subsections were significant: Mini-BESTest 28 reactive (p =.013), MiniBESTest 32 reactive (p=.021), Mini-BESTest 32 anticipatory (p=.018) and Mini-BESTest sensory (p=.001). No differences were found in Mini-
BESTest dynamic gait \( (p=.067067) \) and Mini-BESTest 28 anticipatory \( (p=.065) \). Significant change was found in the MDRT forward reach \( (p=.048) \) and in the ABC scale \( (p=.011) \). The MDRT backwards reach \( (p=.290) \), right reach \( (p=.300) \), left reach \( (p=.144) \) and FSST scores \( (p=.365) \) showed no significant differences. AA 12-week protective stepping program proves to be an effective way to improve balance in community-dwelling older adults, shown by improvement in the Mini-BESTest and ABC scale. Improvement in the reactive balance subsection of the Mini-BESTest may indicate that class participants have an enhanced ability to use a protective strategy when perturbations are experienced.

**Uncovering A New Arbiter of Stress-Induced Motivation & Relapse: Corticosterone in the Ventral Hippocampus**

Brenna Bray*

Basic Biomedical Sciences; Center for Brain and Behavior Research (CBBRe)

Faculty/Staff Sponsor: Gina Forster

Alterations in stress and dopamine levels can motivate goal-oriented behavior and prompt drug use during periods of withdrawal. For example, amphetamine withdrawal is associated with stress hypersensitivity and lack of motivation that can prompt relapse and may be mediated by altered dopamine reward- and corticosterone stress responses in the brain. In rats, amphetamine withdrawal is associated with enhanced stress-induced corticosterone in the ventral hippocampus (vHipp), which may contribute to stress hypersensitivity in withdrawal. Corticosterone is thought to be excitatory in the vHipp, and the vHipp sends excitatory projections to the nucleus accumbens (NAc) to enhance dopamine output and reward incentive. To directly test whether corticosterone in the vHipp can enhance accumbal dopamine, a stress-relevant concentration of corticosterone was infused into the vHipp and resulting NAc dopamine output was measured with in vivo chronoamperometry. In drug-naïve rats, vHipp corticosterone enhanced accumbal dopamine output, suggesting a mechanism that enables stress to increase the reward value of particular goals, thereby motivating goal-oriented behavior. In amphetamine withdrawal, vHipp corticosterone biphasically reduced NAc dopamine output, suggesting a mechanism that contributes to lack of motivation and relapse in the face of stress during withdrawal. Corticosterone can act on glucocorticoid (GR) or mineralocorticoid (MR) receptors located inside the cell or at the membrane. Our findings suggest that blocking either GRs or MRs results in vHipp corticosterone reducing dopamine output in drug-naïve and amphetamine withdrawn rats. We are currently testing the effects of corticosterone on accumbal dopamine output when only GRs and MRs in the membrane are accessed. Overall, these findings suggest that vHipp corticosterone may help provide motivation in the face of stress (in healthy conditions), but may reduce motivation and contribute to stress-induced relapse during amphetamine withdrawal. NIH R01 DA019921; Graduate Research and Creative Scholarship Award.

**True Frenemies: Interactions Between Larvae of the Endangered Hine's Emerald Dragonfly (Somatochlora hineana), and its Temperamental Crayfish Roommate**

Patricia Dombrowski*

Biology

Faculty/Staff Sponsor: Daniel Soluk

The Hine's emerald dragonfly (HED) is a federally listed endangered species with a complex relationship with the omnivorous devil crayfish (Cambarus diogenes). They use crayfish burrows as refuge during winter and periods of low water, over their 4 to 5 year larval life. To explore how these larvae survive cohabitation with a predator, we analyzed 16 years of data looking for patterns of burrow occupancy. Burrow mesocosm studies were conducted to examine behavioral interactions between HED larvae and crayfish. Field studies indicate that larvae are found in greater numbers in specific burrows,
and exhibit high burrow system fidelity. Mesocosm experiments suggest that low detectability of the HED larvae by the crayfish plays a role and allows coexistence for prolonged periods. The complex dependency of this endangered dragonfly on a predator and competitor, highlights the need for the integration of ongoing ecological and behavioral studies into conservation efforts.

4b: 12:00-12:50 - Muenster University Center 216

Analysis of Stress, Coping Strategies and Academic Success in Physical Therapy, Occupational Therapy and Physician Assistant Students: Updated Results
Shelby Brunick, Brittany Neagbour, Cooper Hausmann
Physical Therapy
Faculty/Staff Sponsor: Joy Karges

Purpose: The purpose of this study was to identify perceived stress, self-reported coping and self-efficacy, perceived social support, and perceived self-esteem in medical, physical therapy (PT), occupational therapy (OT), and physician assistant (PA) students. Specific aims for this research included: 1) examine the levels of stress between disciplines; 2) compare the relationship between stress and academic performance; and 3) examine self-reported stressors and coping strategies. Methods: Enrolled PT, OT, and PA students from a local Midwestern university were invited to participate in this non-experimental study administered via SurveyMonkey. The survey was comprised of demographic questions and included the following scales; Rosenberg Self-Esteem Scale (RSES), Multidimensional Scale of Perceived Social Support (MDSPSS), Coping Self-Efficacy Scales (CSES), and Perceived Stress Scale (PSS). Open-ended questions asked about top stressors and coping strategies in everyday life and academics. Surveys were sent out during orientation, fall and spring semesters starting in fall 2016. IBM SPSS 24.0 was used to analyze data. Results: 68 participants completed the surveys. No significant differences were found in survey scores based on program, year in program, real time, graduation year, gender, and age category. Significant differences were found in MDSPSS Friends Subscale, RSES, and CSES surveys based on GPA categories. R2 values indicated that 24% and 21.5% of the variability in RSES and CSES scores (respectively) was accounted for by self-reported GPA. Top reported stressors included school, exams, and homework, while primary reported coping strategies were exercise, talking to someone, and making lists. Conclusion: Those with the highest GPA category (3.76-4.00) had increased self-esteem and coping strategies compared to those in the remaining GPA categories. The reported R2 indicated that GPA may help predict self-esteem and coping self-efficacy and may be utilized in the future to identify at risk students. The coping strategies used are considered positive or adaptive techniques.

The Cardiac Sympathetic Afferent Reflex and its Relationship to the Paraventricular Nucleus, Heart, and Veins
Kyle Roessler
Basic Biomedical Sciences
Faculty/Staff Sponsor: Doug Martin

In 2013-2014, the cost attributed to cardiovascular disease and stroke in the US was estimated at $330 billion, and is expected to reach $1.1 trillion by 2035. The cardiac sympathetic afferent reflex (CSAR) has been implicated as a contributing factor in the regulation of cardiovascular function and disease. The venous compartment of the heart, which is responsible for controlling cardiac output and blood pressure, is integrated with the CSAR. The specific mechanism of this integration is still unknown. The paraventricular nucleus of the hypothalamus (PVN) is linked to the CSAR and the control of blood pressure. How the PVN modulates CSAR output to the venous compartment through a precise
anatomical substrate and neurotransmitter systems is also unknown. We will test the general hypothesis that the PVN is an integral part of the CSAR, which controls the venous compartment. Our first aim will be to use neuronal tracers to map the afferents from the heart to the PVN, then from the PVN back to the venous compartment. We expect to substantiate that there is an anatomical loop which includes the heart, PVN, and veins. Our second aim will study the functional significance of these connections. We will excite the CSAR at the level of the heart in order to measure neurotransmitter (glutamate and γ-aminobutyric acid) changes in the PVN using microdialysis techniques. We expect this work to corroborate the idea that the PVN is an essential component of the CSAR and involved in control of the venous compartment.

Antimicrobial Surface Modification of Materials
Shahaboddin Saeedi*
Chemistry
Faculty/Staff Sponsor: Grigoriy Sereda

This work, which is comprised of several projects, is an interdisciplinary research between materials science, chemistry, and biomedical engineering/science. The project can help improving overall health of the society. Chondroitin sulfate, which is the main used antibacterial agent in this project, has not been used as such against dental caries or more specifically against colonization and growth of Streptococcus Mutans bacterial species, which is responsible for tooth and oral decay. Also, the effect of chondroitin sulfate on adhesion of calcium carbonate, calcium citrate, and hydroxyapatite to dentin is being investigated. Initial results showed that chondroitin sulfate increased the adhesion of calcium carbonate and hydroxyapatite and they were able to occlude dentin tubules, and, therefore, provide the known effect of treating hypersensitivity of teeth. The remineralization potential of hydroxyapatite particles may also add in the prevention of caries. In addition to dentin, production and modification of antimicrobial (antibacterial/antifungal) cotton fabric and titanium (material for bone implants) through adhesion of antimicrobial agent with the help of linking agents is under investigation. Last but not least, we are investigating mesoporous hydroxyapatite nanoparticles as the potential drug delivery vehicle for iodine and eugenol. All in all, these projects can start a whole revolution in dental/oral science as well as production of antimicrobial clothes.

Wednesday Oral Session 5

5a: 3:00-3:50 - Muenster University Center 211/211A

The Impact of Epilepsy
Haley M Baker
Health Sciences
Faculty/Staff Sponsor: Jamie A. Turgeon-Drake

Photovoice is an example of using a creative medium to present research to depict a health disparity or health condition through the use of images supported by statistical data. This project was designed as a "flipped" classroom learning unit to expose the students to health disparities and or conditions within their undergraduate community. Each student was to pick a disparity in their community or a health condition where there was a lack of awareness and educational information available. The topic that was chosen for this presentation was the health condition of Epilepsy. The presenter has first hand experience with Epilepsy and finds this information and personal account important to share with others. The daily routine of an epileptic along with the medical component of this condition will help
future healthcare professionals with awareness and more knowledge going forward on this condition. The presenter also wanted to bring to light seizure safety and what to do if one encounters someone who is having a seizure. The presenter has seen first hand a person having a seizure in a classroom setting of fifty students, two aides, and one professor and no one knew what to do except for the presenter. Using Photovoice as the mode of education versus traditional lecture and PowerPoint style of learning gives a more contemporary and artistic spin on presenting health education.

Disabilities PhotoVoice
Madison Lynn Michels, Cora Ann Ruzika, Erika Nicole Clark, Brook Ashlee Clark
Health Sciences
Faculty/Staff Sponsor: Jamie Turgeon-Drake

PhotoVoice's vision is for a world in which everybody has the opportunity to represent themselves and tell their own story. PhotoVoice's mission is to build skills within disadvantaged and marginalized communities. To achieve this, we utilize innovative participatory photography and digital storytelling methods. These skills enable individuals to represent themselves and create tools for advocacy and communication. Through this, and through developing partnerships, we deliver positive social change.

In my HSC 380, Health Literacy and Culture Care class, our group's project was to research a marginalized population. We were instructed to give statistical data on our groups: demographics, history, language fluency/communication styles, religion/spirituality/believes, educational attainment, economic, insurance coverage, traditional/native diet, health conditions, and health beliefs, healing practices that impact the health of this population. We were to write a paper and present the information to the class, but we decided to be more creative. We took the parameters of a previous PhotoVoice assignment of a health disparity and use it as a tool to present our information to the students. We wanted to give the disability population the opportunity to represent themselves and tell their own story through photos.

A Rural, Reservation, Environment Vs. a Non-Rural, Non-Reservation, Environment
Carmelita Samira Shouldis
Health Sciences
Faculty/Staff Sponsor: Jamie Turgeon-Drake

To address health inequity within our own state of South Dakota I have created a photovoice that compares and contrasts a rural, reservation environment to a non-rural, non-reservation environment. White River and Vermillion share similar data, yet Vermillion provides immense resources, such as health services, banking options, and healthy food options. The use of "I wish" statements is meant to avoid the research stigma that reservations face and focus attention on my personal perspective of a place where I grew up to a place where I attend college today. In Frank Walns song, "White War," the lyrics help viewers to understand that perspective. With this photovoice I want to share another story about data by using music and pictures. To me, the placement of Native Americans onto a reservation and the meaning behind why it happened (unsustainable and undesirable land), marks health disparities within reservations. Since outside, meaningful commitment, does not last long, I see how my tribe supports our children to leave the reservation, get a career, and come back to positively impact our people. My ultimate goal through the use of photovoice is to acknowledge that the Native American population in South Dakota is more than just health disparities and stereotypes. By sharing a visual to others who are uneducated, I have intended to fill that area of understanding. The reservation holds our culture, ceremonies, language, and many other vital resources and teachings that nurture our spirits and teach us how to be a good relative to all of our relation.
Two-point discrimination (TPD) is a test performed to assess individuals' tactile acuity. Research is currently lacking a single consistent reliable method for TPD testing because the practice of TPD has not been standardized to a point of getting accurate reliable normative values. The purpose of our research is to investigate the inter-rater reliability using the most popularly used methods in the literature and a novel approach. The study will be a one-way repeated measure, cross-sectional pilot study examining the reliability and efficacy of three different methods used in clinic for TPD testing. These methods include the ascending-descending without randomization, descending with randomization, as well as a newly proposed method known as two-point estimation. Thirty five participants (N = 35; female = 25) with an average age of 27.69 (range 19 - 59) were studied. The inter-rater reliability ICC (2,k) for the upper trapezius, hand and foot in each method were as follows: ascending-descending without randomization .722, .650 and .584; descending with randomization .640, .330 and .525; two-point estimation .239, .430 and .739. The inter-rater reliability for TPD for the ascending-descending without randomization for all testing locations is moderately reliable. The inter-rater reliability for TPD for the descending with randomization and two-point estimation methods for all testing locations ranged from poor to moderately reliable.

The Haunting Chronic Pain Disorder: Phantom Limb Pain
Jessica Hoynoski
Basic Biomedical Sciences
Faculty/Staff Sponsor: Brian Burrell

At least 100 million Americans suffer from chronic pain giving chronic pain a higher prevalence rate than cancer, cardiovascular disease, and diabetes combined. Chronic pain is defined as ongoing or recurrent pain that persists past the time of the initial injury and recovery, usually on a time scale of months (Treede et al. Pain. 2015, 156(6): 1003). One especially unusual form of chronic pain is phantom limb disorder. In this condition, the nervous system is sending signals of sensory information and pain from appendages that are no longer there. Risk factors include sex, pain levels pre- and post-amputation, and the location of the amputation. There are currently no medical tests for phantom limb pain and is a condition difficult to treat, which underlines a need for research to understand the physiological mechanisms involved with this complex disorder. What makes this such a challenging condition to understand is that sensory information is being received from a part of the body that is no longer present. This suggests that the nervous system is potentially being reorganized at multiple levels. For example, a peripheral mechanism could cause changes in the activity of the thickened nervous tissue on the residual limb. There can also be changes at the level of the central nervous system that involves the body schema, neuromatrix, and neurosignature; cortical-motor sensory dissociation and reorganization; and spinal cord sensitization.
The TiO2 nanorods play an important role owing to its excellent chemical and physical properties. Researchers hypothesized that Metal-doped semiconductor hybrid nanocrystals are attractive high performance photocatalyst materials due to the potential for fast interfacial electron transfer after the light absorption event that leads to charge separation and redox catalysis. The TiO2 nanorods was synthesized using nonhydrolytic ester elimination reaction between titanium Isopropoxide and oleic acid using Hyeon method since It was easy, simple method and large quantity of TiO2 nanorods can be synthesized. TiO2 nanorods show two absorption peaks in the UV region with high attenuation constant. Most of the semiconductor active under UV region because of high band gap, so we need to engineer the band gap. Then, we attach transition metals on the surface of nanorods. This paper will review the recent research dealing with development of TiO2 used for various applications. The article will focus on the progress of doped TiO2 for an efficient application as a photocatalyst. We intend to synthesize doped-TiO2 saturated with metal ion to engineer the band gap and charge separation. However, charge recombination and charge separation processes are two important competitive process that largely affect the efficiency of the photocatalytic reaction for water splitting. The doping efficiency is determined by three main factors, surface morphology, nanocrystal shape, and surfactants in the growth solution. The doping method proceeds with no change in morphology of the nanocrystal.

5c: 3:00-3:50 - Muenster University Center 216A

Contentious Content: The Line Between Radical Openness and Sanctioning Disrespect
Megan Swets
Writing Center
Faculty/Staff Sponsor: Prentiss Clark

Contentious Content: The Line Between Radical Openness and Sanctioning Disrespect suggests that higher education must build empathy and critical thinking skills; as a component of higher education focused on improving self-expression, the consultants of the Writing Center must encourage writers to engage in reflection about problematic ideas. In a writing center, consultants and writers collaborate to improve writers' confidence and competence. Accordingly, writers and consultants balance control during a session; however, this balance can be difficult to maintain when a writer's work contains problematic ideas. For example, in a recent appointment, I encountered a writer who described that when she became a teacher, she would treat non-white students differently than white students, referencing specific racial stereotypes. During our discussion, we discovered that her intent of addressing the unique needs of diverse students was not translated into her writing, and worked on clarifying her meaning. Not all sessions broach this ground, since many writers come to appointments with specific mechanical concerns, and since many consultants--on the principle of preserving a balance of control--avoid initiating content discussions. I argue that in such situations, rather than ignoring the potential pitfall, consultants should engage with the writer about the controversial content. This interaction should first, aim to discover the writer's intended meaning, then encourage the writer to question both their ideas and how their writing communicates those ideas. Although consultants must carefully consider their own subject positions and writers' right to express their ideas, this engagement should occur to inform the writer of how their writing might be perceived. Even if a consultant is hesitant to challenge a writer's ideas, consultants should ask the writer to consider alternative...
perspectives and (if the consultant knows of any applicable resources) suggest the writer build their understanding of the issue about which they are writing.

Great Minds Think Together: Forms of Collaboration in the Writing Center
Bailey Quanbeck, Megan Swets, Allie Knofczynski
Writing Center
Faculty/Staff Sponsor: Prentiss Clark

The University of South Dakota Writing Center serves hundreds of students, faculty, and staff each semester. Of those who frequent the Writing Center, many are International students who meet with a consultant for an hour each week to have a conversation while refining their English speaking and writing skills. In my academic memoir "Beyond the English Language: Using an ESL Writer's Native Language as a Catalyst for Mutual Growth," I isolate a consultant-writer relationship and propose an approach to ESL (English as a Second Language) instruction that emphasizes the writer's unique perspective by incorporating an ESL writer's native language, culture, and experiences into ESL conversations. For instance, one writer and I listened to a song in Korean during one of our first interactions. This approach achieves collaboration and growth in three integral ways. Initially, incorporating a writer's native language and culture in conversations makes the Writing Center a more comfortable, familiar space for the writer. The pressure to speak "flawless English" diminishes as the writer shares their own expertise. This simultaneously accomplishes a second goal: equalizing power between the writer and the consultant. By making the Writing Center a welcoming space for other languages and cultures, we celebrate ESL writers' knowledge that extends beyond the consultant's familiarity. After all, while writers do practice and develop skills in the Writing Center, consultants can learn from writers, as well. Finally, my proposed approach to ESL conversations encourages consultants to ask genuine questions. Instead of offering narrow questions with "right" answers in mind, consultants who are learning about another language or culture are more likely to express genuine curiosity. In many ways, the Writing Center emphasizes mastery of the English language; we can access new avenues for achieving that goal by embracing ESL writers' native languages and cultures, as well.

Great Minds Think Together: Forms of Collaboration in the Writing Center
Allie Knofczynski, Bailey Quanbeck, Megan Swets
English
Faculty/Staff Sponsor: Prentiss Clark

This presentation will include a reading of "Anybody Can Edit," published in the Dangling Modifier, and will be followed by reflections on the poem's broader implications and significance. "Anybody Can Edit" is a poem reflecting upon three years spent working as a Writing Center consultant, developing a greater understanding of the collaboration required in the writing process. Writers with any amount of experience often believe that writing is a calculated craft, and consultants working in the Writing Center simply serve as editors to pinpoint small spelling and grammatical errors. However, a Writing Center appointment is an in-depth conversation between peers discussing more than what is printed on the page. Not only do consultants help fellow students with questions and concerns, but they also gain greater insight into subjects and perspectives they might not have ever learned otherwise. Despite the importance of writing in all career paths, writing requirements at all levels of education are becoming increasingly limited. Writing is a lifelong skill everyone should practice. It is not equivalent to other courses like math and science that adhere to formula mastery but is instead a visual expression of thought. Without equipping oneself with writing experience and feedback, students cannot reach their full potential in effectively communicating their ideas. "Anybody Can Edit" stands as a testament to writing's role in society and education, suggesting further collaboration to ensure every student possesses the opportunity to grow and improve in one's writing.
People of Vermillion, South Dakota, are you looking for that special someone? That person who will love you forever? That person who would do anything for you? Boy, do we have the app for you. Welcome to Tender, a dating app. where you will be able to swipe right to make these dreams come true. You will hear from one of our users, Dylan Hendricks, who met the love of their life, Carmen Bell-Leon, on this app and is now accused of attempting to murder their spouse Kerry Bell-Leon. Will Dylan be found guilty of attempted murder, or found innocent and allowed to continue swiping right? YOU DECIDE! The USD Mock Trial will present an abbreviated version of the trial of the State of Midlands v Dylan Hendricks. Learn about the trial process and how to get involved with USD Mock Trial.

**Thursday Oral Session 6**

**6a: 9:30-10:50 - Muenster University Center 211-211A**

**Is GPA Affected by Natural Hair Color and Ethnicity?**

**Shinyoung Kim**

**Economics**

**Faculty/Staff Sponsor: Allgrunn Mike**

The purpose of this experiment is to examine the relationships between students' personal characteristics (natural hair color and ethnicity) and their cumulative GPA in an attempt to confront stereotypes. The project uses a multiple regression model to find how students' individual characteristics are associated with cumulative GPA, the dependent variable, holding all independent variables constant. Independent variables that may affect GPA include natural hair color, ethnicity, average amount of hours spent studying per week, average amount of hours spent working per week, frequency of missing classes, gender, and year in college. The regression model will inspect two common discriminatory stereotypes, including that blondes are less smart than brunettes and that Asians are generally smarter than other ethnicities. In addition, statistical hypothesis testing will allow one to measure whether natural hair color and ethnicity have a significant impact on students' cumulative GPA. The primary method of gathering data is through a survey. The sample size is estimated to be 300 undergraduate and graduate students at USD. Hair color is categorized on a spectrum of four hues: blonde, red, brown, and black. There are two possible problems with data collection in this study. One problem is that natural hair color will be subjectively defined because individuals will categorize their own hair color. Another problem with conducting this survey is that there is no guarantee of getting true answers. Assuming that students truthfully answer the questions, the multiple regression model will help to observe the relationships between a student's personal characteristics and cumulative GPA. If successful, the research can contribute to disproving the stereotypes about the effects of natural hair color and ethnicity on GPA.
Win Share Production in the NBA
Lucas Richard Kobat†
Economics
Faculty/Staff Sponsor: Mike Allgrunn

This paper examines win share production of players in the National Basketball Association to determine whether or not said performance levels can be predicted. By analyzing career data, panel data and draft data the research aims to show that analyzing specific variables can aid in the selection of players who will produce more wins relative to players compensated at similar levels. Rookie contracts are also examined, as teams potentially can benefit from advantageous team options, locking in talent for four years. Players who receive these team options operate at lower costs than players who do not, creating a gap between win production and payroll expense. Maximizing this gap has direct implications for NBA front offices because it reduces costs and increases chances of obtaining championships.

Expected Economic Impact of the 2018 Winter Olympics in South Korea
Hannah Wich†
Economics
Faculty/Staff Sponsor: Kathryn Birkeland

This research project focuses on the expected impacts of the 2018 Winter Olympic Games in South Korea. The Winter Olympics is counted as one of the largest sporting events and requires vast expenditures by the host nation. Due to the expenditures, the controversy arises if the costs cannot be offset by the economic growth that result from the games. The research project contains data from former host countries as well as declined applicants of the Winter Olympics, the earliest data goes back until 1983. The data set is split in different time periods that allow a before and after comparison of the Real GDP per capita (US $). To answer my research question, I am using a panel data set to estimate the increase in Real GDP per capita caused by hosting the Winter Olympics. Results show that previous countries, for example the Russian Federation that hosted the Winter Olympic Games in 2014, experienced an increased in Real GDP per capita, so I expect a positive impact on South Korea’s Real GDP per capita. This research can be extended and could focus on the different economic status of a country, whether the country is considered as developed, emerging or advanced.

Multiple Regression Analysis of Professional League of Legends Player Winnings
Hyun Woong (Daniel) Chang†
Economics, Decision Sciences & MIS
Faculty/Staff Sponsor: Mike Allgrunn

With the rising popularity of video games, the economics of e-sports is becoming increasingly important. The purpose of this research is to investigate game play factors that influence professional League of Legends players’ earnings from premier tournaments. Multiple linear regression analysis on the data shows that higher kill-death ratio and larger champion pools lead to higher player earnings. Although there are statistically significant differences in player earnings between regions, the differences could be attributed to difference in prize pools. The analysis also shows that Korean players may perform worse outside of Korea. The effects of creep score per minute and kill participation on players' earnings are not clear. This research contributes to increased understanding of the economic consequences of gameplay decisions.
International Diversification and Performance Prediction in Equity Investing  
Tomas Kamenik  
Finance  
Faculty/Staff Sponsor: Mike Allgrunn

The undergraduate honors thesis is focusing on several aspects of international investing in the equity space. The research showed that foreign exchange risk is significant, especially in times of higher volatility, in most countries and should be an important consideration for investors. The correlation across markets around the world have seen a steady increase over time, with a peak during the Great Recession. The increase in correlation makes investors to look beyond developed markets, shifting focus to smaller emerging markets. Lastly, the prediction of daily performance proved to be a difficult task, especially for smaller markets.

6b: 9:30-10:50 - Muenster University Center 216

Communication Guidelines for Interacting with People with Dementia Experiencing Subjective Realities  
Christian Daniel Pollema  
Communication Studies  
Faculty/Staff Sponsor: Kathy Magorian

47.5 million individuals are affected by dementia worldwide as of 2016, making it one of the major health challenges of our time. Referring to a wide array of symptoms and causal diseases, dementia is ultimately recognized as the deterioration of brain tissue leading to neurological deficits that impede on one's everyday life. Given the variability of dementia's presentation, caring for those affected is an incredibly individualized process. With reduced cognitive and language capacities, effectively communicating with people with dementia can be challenging. However, it is recognized as one of the single most important aspects of quality of care. Current literature emphasizes the importance of reducing speech complexity, monitoring environmental stimulus, and maintaining a respect for each individual's personhood in establishing effective communication bridges. This study focuses on how these connections are made in people with dementia who are experiencing subjective realities, including misperceptions, delusions, and hallucinations. How is it that caregivers are able to effectively communicate with people whose contextual understanding of their surroundings differ from their own? Through fourteen semi-structured interviews, the findings of this study indicate that while the variability of dementia prohibits the establishment of any determinate rules, providers are able to utilize a set of guidelines for these situations. By engaging with their subjective realities and maintaining an attitude of patience and respect for each individual, caregivers are more effectively able to build communicative relationships with people with dementia and assure a better quality of life.

Yauyos Quechua: Linguistic Intricacies of an Endangered Language  
Addie Kaster  
Modern Languages  
Faculty/Staff Sponsor: Armik Mirzayan

Classified as critically endangered, Yauyos Quechua, a Peruvian indigenous language from the Andes Mountains, is spoken in the world today by scarcely 450 people. Paired with a lack of new language learners and an aging population of current speakers, Yauyos Quechua faces the distinct possibility of becoming a dormant language. It is this threat of language dormancy, and in other words, an imminent extinction, that raises the following question: What does the Quechua Language family stand to lose
should Yauyos Quechua cease to exist? It is in an exploration of the unique linguistics details of Yauyos Quechua where we find the answer to this question. In addition to intriguing variation within dialects, Yauyos Quechua displays a mix of unique characteristics normally found on what are thought to be distinct branches of the Quechua Language family tree which, along with the location of the region in which the language is spoken, supports the notion of Yauyos Quechua as a boundary language. In fact, this mix of traits could even lead one to the idea of Yauyos Quechua as a "missing link" in the grand web that is the Quechua Language family. In other words, it is in the linguistic intricacies of Yauyos Quechua where we find important clues for deeper interconnections between the two major branches of the Quechua language family. Thus, as a consequence of looming language dormancy, it is these unique connections that are critically endangered today.

**Going Native: American Indian Characters and Themes in Revisionists Westerns**

Logan Bullard  
Native American Studies  
Faculty/Staff Sponsor: Dave Posthumus

Focusing primarily on film I intend to explore the origins, progression, and current state of American Indian themes used by characters, particularly non-Indian men in Revisionist Westerns and the phenomena of "Going Native" in relation to views about race, gender, and Native Sovereignty of American Indians in American and Canadian Cinema. While this trope does have a large number of examples of men appropriating Native culture, it should be duly that some of the earliest films in the genre, such as Broken Arrow made non-Indian men, at least appear, Native by virtue of marrying an Indian woman. All the while fully ignoring the existence of metis people in Native culture, unless portrayed negatively. My analysis will also include the history and themes of women adopting Native culture. In my presentation I shall prepare film analyses of many major motion pictures examining both the critical receptions of the actors in the film and the purported "Nativeness" seen on screen, such as the very inaccurate Sun Dance in "Man Called Horse", documenting particular advances and trends such as Anti-War or Environmentalists themes in the trope. Finally commenting on the current status of the trope which is widely concerned with putting Native actors, or at least actors who claim Native heritage, and exploring what it means to be Native in the 21st century, according to Hollywood. Films that shall be examined include: Broken Arrow (1950), The Searchers (1956),Hombre (1967),100 Rifles (1969),Little Big Man (1970),A Man Called Horse (1970),Billy Jack (1971),Jeremiah Johnson (1972),The Outlaw Josey Wales (1976),Dances with Wolves (1990),Clearcut (1991),The Last of the Mohicans (1992),Thunderheart (1992),Frozen River (2008),The Revenant (2015) Hell or High Water (2016)

**Specificity of Auditory Long-Term Memories is Regulated Through an Epigenetic Mechanism**

Jack Sternburg  
Psychology, Rutgers University  
Faculty/Staff Sponsor: Kasia Bieszczad

The primary auditory cortex (A1) represents sounds by frequency. As a result of auditory associative memory formation, the A1 undergoes neuroplastic changes, devoting more cortical area to the conditioned stimulus (CS) frequency, and these changes are proportional to the memory strength. Memory and neuroplasticity require gene transcription regulation, and one way to accomplish this is through the epigenetic mechanism of histone acetylation. When the histone deacetyltransferase 3 (HDAC3) is inhibited during consolidation of a frequency-reward conditioning long-term-memories (LTM), rodents have a better CS memory and the neuroplasticity of the A1 area corresponding to the frequency of the CS is enhanced. These results suggest HDAC3 plays a role in the control of specificity of the LTM. To test this, rats were trained on the two-tone discrimination task (2TD), an associative
learning task in which one tone (CS+) is rewarded after a bar press (BP) and the other is not (CS-). For the first 3 days, directly after conditioning, the rats received the HDAC3 inhibitor, RGFP966. The rats were conditioned on 2TD up to criteria (90% accuracy). This test found that HDAC3i treated rats reached criteria faster than controls. Afterwards, the rats were tested with the stimulus generalization test (SGT), a test in which the rats are exposed to a range of frequencies (3.6 kHz - 16 kHz), including the CS+ and CS- and the rats BP but under extinction conditions. Based on the bar pressing, control rats appear to only discriminate between "higher" and "lower" frequencies while the HDAC3i rats appeared to distinguish the CS+ and CS-. These results support HDAC3’s role in controlling the specificity of LTM{s. Current research aims to identify the genes affected by HDAC3 and the neuroplasticity occurring during the initial few days of 2TD conditioning. Understanding the mechanisms of LTM will influence most areas of neuroscience.

**Anatomic Location Predicts Survival in Pancreatic Cancer Patients**

Muslim Atiq, Kay Dosch, Ashley Miller, Ramu G. Sudhagoni

Public Health

Faculty/Staff Sponsor:

Pancreatic cancer is the fourth leading cause of cancer related mortality in the United States. This study was performed to describe the epidemiology of pancreatic cancer in South Dakota. Methods: Data was collected using the South Dakota Cancer Registry. All cases of pancreatic cancer reported to this registry between Jan 1st 2005 and December 31st 2014 were included. Demographic and cancer specific variables were collected and analyzed using SAS 9.1.4 software. Results: 1064 cases of pancreatic cancer were reported. Mean age was 71 years. Most patients were greater than 60 years of age (n=828; 77.28%). There were 536 males (50.4%) and 528 females (49.6%). Most patients were Caucasians (n=1020; 95.9%). Crude incidence of pancreatic cancer was 11.34 and 15.24 per 100,000 of population in 2005 and 2014 respectively. Most cases originated from Minnehaha County (n=210; 19.7%). Almost half of these patients had distant metastasis at the time of presentation (n=536; 50.4%). Median survival was 5 months. Median survival for patient under the age of 60 years was 9.5 months as opposed to median survival for patients 60 years or older 3.9 months. Median survival for females was 4.7 months as compare to males 5.4 months. A total of 499 tumors were located in the head of pancreas; whereas 244 were located in the body or tail of the pancreas. Median survival of patients with tumors located in head of the pancreas was 6.23 months as compared to 4.47 months for patients with tumors located in the body or tail of the pancreas (p value= 0.006). Conclusion: Patients with tumors located in head of pancreas have better survival than those with tumors located in body or tail of pancreas. Further studies need to focus on factors associated with the aggressive nature of this disease.

6c: 9:30-10:50 - Muenster University Center 216A

**Creating Community & Art: A Workshop in Sharing Voices and Screen Printing**

Keith BraveHeart*

Art

Faculty/Staff Sponsor: Amber Hansen

Graduate Research and Creative Scholarship Grant awardee, Keith BraveHeart presents research about community-based arts practices and the potential for the development of critical thought across multi-disciplinary fields. BraveHeart, a MFA student at the College of Fine Arts, is using his award to support the facilitation of a planned series of participatory art-making workshops relying on community engagement and inclusivity through a method of story-circles. The story-circle approach is a method shared from Arlene Goldbard (author of New Creative Community: The Art of Cultural Development). The story-circle creates a journey into a theme, and this method of inclusivity and acknowledgement of
voice is often understood in the growing community-based arts field as deriving from an indigenous background. BraveHeart utilizes Goldbard as primary resource in the opportunity to analyze the impact of community-based art projects and artist-led initiatives. The research presented focuses on the relationship between art and community, and introduces BraveHeart's workshop project as an opportunity for community-based art at USD to give example of shaping positive experiences and promoting community-based arts initiatives as alternative methods for success. In conjunction with a USD CFA graduate seminar course, BraveHeart is engaging with his research and project vision to welcome participation within the diverse USD community. "Creating Community & Art: A Workshop in Sharing Voices and Screen Printing," provides participants with the opportunity to engage with the Fine Arts and learn technical skill through art-making, specifically working with silk screen printmaking. Built upon the artistic concepts of signification and perspective, BraveHeart's workshop explores the significance of the American bison as symbol and gathers community voice to aid the creation of installation artworks that will emerge across the state of South Dakota as part of an on-going series of community arts projects speaking to moments and memories of shared space.

Readmission Among Children in a Residential Treatment Center
Alison Vogelsang, Ashley Brage
Clinical Psychology
Faculty/Staff Sponsor: S Jean Caraway

There are an increasing number of children with emotional difficulties being referred to residential treatment centers (RTCs) while few studies have examined treatment outcomes for these children. Specifically, one common treatment outcome for children in RTCs include readmission to a residential treatment center (RTC) at some point after their initial discharge. Estimates indicate that 59% of children will be placed in some out-of-home placement within three years following initial RTC discharge. Generally, children are readmitted due to behavioral or conduct difficulties, school difficulties, parental drug use, or a combination of reasons. Overall, these children are prone to experiencing multiple out-of-home placements over time and there is very little research exploring ways to identify children at highest risk for being readmitted. The proposed presentation will discuss common characteristics among children admitted to a RTC multiple times. Although some research studies have explored general characteristics describing children in RTCs and/or general treatment gains among children in RTCs, very little research has explored ways in which RTCs can identify children at greatest risk for future RTC readmission. Improving RTC's ability to recognize children at highest risk for readmission may allow for development of efficacious intervention strategies. The proposed presentation will discuss preliminary data obtained from a master's thesis project at a Midwest RTC for children.

Defining the Contribution of Tumor Innervation to Treatment Resistance
Chris Lucido*
Basic Biomedical Sciences
Faculty/Staff Sponsor: Paola Vermeer

Though clinical management of primary human papillomavirus-associated head and neck squamous cell carcinoma (HPV[+] HNSCC) is relatively successful, at least 1 in 4 patients treated with standard of care therapy (chemoradiation therapy; CRT) will experience disease progression, which carries an exceedingly poor prognosis. Recent studies have identified that nerves infiltrate tumors, and the extent to which a tumor is innervated is inversely associated with patient outcome, identifying tumor-infiltrating nerves as potential contributors to disease progression. Further work has identified that tumor cells actively recruit nerves, indicating that innervation may confer some evolutionary advantage to tumors. Previously, our laboratory has generated and characterized a murine model of HPV(+) HNSCC
(mEERL) that faithfully recapitulates the clinical course of the disease. Upon overexpression of the axonal guidance molecule, EphrinB1 (mEERL EphrinB1), this model grows densely innervated tumors. In contrast, when EphrinB1 is deleted via CRISPR/Cas9 technology (mEERL EphrinB1-null), innervation is abrogated. Preliminary data show that densely innervated mEERL EphrinB1 tumors grow much faster and are much more resistant to CRT than their less innervated counterparts. Moreover, the enhanced growth and treatment resistance of mEERL EphrinB1 tumors cannot be explained by differences in in vitro proliferation rate or in vitro treatment response, suggesting that factors acquired in the in vivo environment, such as nerves, are critical to this aggressive phenotype. Immunohistochemical analysis has identified TRPV1-positive sensory nerves as the subtype of nerve responsible for tumor innervation in this model and in human HNSCC patients. Interestingly, sensory nerves can modulate local and systemic immune responses through a neural-immune circuit. Importantly, our laboratory and others have shown the anti-tumor immune response to be essential in achieving long-term cures in HPV(+) HNSCC. Thus, our overall hypothesis is that sensory tumor innervation negatively regulates anti-tumor immunity, leading to enhanced tumor growth and treatment resistance in HPV(+) HNSCC.

Woody Vegetation Dynamics on the Niobrara/Lewis and Clark Reservoir Delta
Catherine Beall*
Biology
Faculty/Staff Sponsor: Mark Dixon

Damming has negatively impacted riparian ecosystems along the Missouri River, reducing channel dynamism, sediment transport, and regeneration of dominant riparian tree species (Populus deltoides and Salix spp.) over the last six decades. However, regeneration opportunities may be provided where geomorphically-active tributaries discharge sediments into reservoir slackwaters, forming novel delta habitats. In a 2015 BioScience article, Volke et al. suggested that reservoir deltas may provide conditions conducive to recruitment of riparian trees, including cottonwood, which are limited elsewhere on the regulated river system. One such delta occurs at the confluence of the Niobrara River with the Missouri River above Lewis and Clark Reservoir in southeast South Dakota and northeast Nebraska. We are investigating patterns of riparian tree regeneration on this delta through vegetation sampling, dendrochronology, and analysis of historical aerial photography. We sampled 30 plots across 17 woody vegetation patches stratified by region within the ~30 km delta in summer 2017. Within each plot, we took cores or slabs from a few representative trees to determine approximate establishment dates. Our initial results suggest a pattern of primarily recent regeneration (i.e., last 5-15 years), spread throughout the delta. This occurrence of regeneration throughout the delta was an unexpected result, as we initially expected tree regeneration to be concentrated within the older sections of the delta. Understanding woody vegetation dynamics within river-reservoir deltas may be vital for managing riparian and riverine habitats, as well as forecasting long-term effects on the riverine landscapes and reservoir storage capacity.

Social Values Regarding Ecosystem Services and Land-use Change in Mitchell, South Dakota
Morgan Carnes
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

Abstract: The landscape provides benefits to humans, and land-use decisions are made based on constantly evolving human needs. These landscape benefits are known as ecosystem services: resources provided by the land for human benefit. The decisions that drive land-use changes and preferences in ecosystem services come from a variety of sources and must consider environmental, economic, and social factors. Behind all of these factors is a set of social values, obtained either through societal or familial influence, which guide our thoughts and opinions regarding land-use. In the summer of 2017,
ten interviews were conducted with stakeholders in Mitchell, SD, an area which has experienced a significant change from native grassland to row crops over the last twenty years. Interviews focused on values, attitudes, and beliefs of the stakeholders interviewed regarding land-use and land-use change. From these interviews, eleven major value themes emerged as major contributors to land-use opinions and ecosystem services valuation. Preliminary research results revealed the following themes: Small-town community, investment in community, land for farming, conservation, education, nostalgia, small farms/family farms, tourism, new jobs/businesses, land as economic value, and hunting. These themes, also known as values typologies, will be used as part of a larger project which will assess social values as they relate to ecosystem services and land-use throughout the Upper Missouri River Basin.

6d: 9:30-10:50 - Muenster University Center Pit

Walkability Recommendations for Vermillion, South Dakota
Seth C Kersten
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

The purpose of this paper is to: (1) underline the issues with CO2 emissions and their effects on cities; (2) Identify the critical causes of urban sprawl; (3) Describe desirable urban planning aspects (4) Evaluate government funding and policies; (5) Give recommendations to Vermillion City Planners. Approach: Through researching the major environmental factors that contribute to climate change I elude to why it is necessary for city planners to take action. My research uses economics, science, surveys, and other research studies to enhance the knowledge around sustainable growth. Findings: (1) Motorized transportation contributes large quantities of carbon dioxide to the atmosphere, in-turn raising global surface temperatures. (2) pedestrians have preferences on the transportation networks they use. (3) 20-minute neighborhoods are the optimal urban development structure. (4) States receive a financial allocation from the federal government to fund walkable networks within their states. Value: My research findings show that many United States cities have benefited from smart urban planning. Benefits include economic, health, and social acquisitions. Because Vermillion has potential to expand and become a more diverse community, smart urban planning will improve the well-being of its residents.

Implementation of Sustainable Solid Waste Reduction Policies
Erin Wetzstein
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

For my presentation I am going to discuss solid waste reduction policies that cities have undertaken to manage waste in more sustainable ways. Many factors such as, higher standards of living and consumerism, have created a larger amount of waste generated over the past decade, and with limited land availability, pressure has been placed on authorities to create and enforce waste reduction policies. Three policies that have been implemented in various ways across the United States have been: zero waste targets, plastic bag bans, and pay-as-you-throw programs. One approach larger cities in the United States, such as San Francisco, have taken is to move away from traditional methods of waste disposal and to transition to a zero waste system. A zero waste system sets the goal of sending nothing to the landfill or incinerator, but to simply reduce waste by reusing, recycling, or remanufacturing waste resources. Another way that cities and states have looked at to reduce waste is to regulate the use of single-use plastic bags. Plastic bags have a variety of negative impacts on the environment, so regulations including mandatory recycling programs, taxes and fees, and bag bans have been implemented to reduce the number of bags used. The final way cities have implemented policies to
reduce waste is through pay-as-you-throw (PAYT) programs. PAYT programs incentivize customers to reduce the amount of waste they put out for collection, by making those who put out more waste have to pay more. Vermillion could potentially introduce PAYT programs to encourage waste reduction. Overall, all of these waste reduction policies in addition to education campaigns have been effective in reducing the amount of waste, benefiting the environment, and reducing costs for cities.

The Connection Between Consumerism, Happiness, and Sustainability
Kaitlin Roberts Roberts
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

Kaitlin Roberts The Connection Between Consumerism, Happiness, and Sustainability For the IdeaFest oral presentation, I will speak about what happiness is and how it can lead to over-consumption. Combatting over consumption helps move a society towards being more sustainable. I focus on how mindfulness and gratitude ideals can help society move towards less consumption and better sustainable goals. The objective of this paper is twofold. First I will review literature on the relationship between increased material consumption and short-term and long-term happiness in Americans. Second, I will evaluate the role of gratitude and mindfulness in fostering both short-term and long-term happiness. My research found that perceived happiness does not correlate with increased income and material goods. Thus, why such ideas as mindfulness and gratitude are great tools for living happier lives while also breaking down over consumption in society. Mindfulness is being aware and conscious of your decisions and how they affect you and make you feel. Gratitude is being thankful for what you have. When you are thankful for what you have, you are less likely to want something else. Together mindfulness and gratitude help people realize that they already have all they need, and what they own is valuable. When a value is placed on things, there is no need to go out and buy better or more things. This oral presentation will gauge how valuable such attributes such as gratitude and mindfulness are in moving towards a more sustainable society.

Changing Behavior Toward Sustainability and Bike Sharing
Jessica Eralia Romero
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

Changing the behavior of populations is a challenge to any movement toward sustainability. Change comes from educating the target population and making alternate behaviors convenient, attractive, and normal. This means that people do things when they have an incentive that is both bigger than personal cost and easily accessible. In the context of bicycle sharing programs, an effective strategy for the program to encourage behavior change is to state a straightforward and precise purpose as a guide, then to take strides to make and maintain the changes. Stakeholders in changing behavior of populations toward sustainability and bikeability must be concerned with a long list of factors, like city infrastructure, helmet laws, and the individual receptiveness of their community. The specific information that should be portrayed to the public are the benefits of participating in bicycle sharing, like the safety, health, and monetary benefits. The best way to motivate communities to use bicycle sharing is through creating an infrastructure with a connected network of bicycle paths without pedestrians or vehicle interference, but this is costly and difficult. If a particular behavior is effectively communicated, made easily accessible, attractive, and normal in communities, it is quite likely to be adopted. Maintaining these adopted changed is aided by ensuring that the bicycle stations are efficiently balanced, consistently advertised, and staying relevant in communities.
Environmental Impacts of Municipal Waste Disposal
Lilly Sencenbaugh
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

The rapidly increasing human population and affluence of the population has caused there to be a large increase in the amount of municipal waste produced. Municipal waste is managed in different ways in different places to different environmental impacts. Landfills are the most commonly used type of waste disposal for municipal waste. Landfills are accepted as the best waste disposal option, but can still cause soil and water pollution. However, with improving technology and increased concerns for the environment and energy costs, many places have attempted to implement new monitoring and education systems to reduce the environmental impacts of landfills, from within the landfill itself. Another commonly used method for waste disposal is incineration, which when done with modern technology, can be even better for the environment than landfills. Problems arise with incineration in larger cities where facilities may not be able to keep up with the waste disposal demand. Incineration facilities working in conjunction with a landfill facility is a viable option for many locations as much of the waste is incinerated, preventing some pollution, and in the instance of the incineration facility not having enough space for waste, the excess waste can be diverted to the landfill. One solution to reducing the amount of municipal waste is to increase the amounts of materials that are recycled. This would require cities to form recycling facilities if they do not already have one, or potentially expanding upon a facility they already have. Other solutions look more closely at issues coming from the specific disposal techniques, including capturing and using methane coming from waste to create natural gas power. Overall, the world faces many problems with municipal waste disposal, but many places are working diligently to find solutions to the myriad of problems.

Why Bike Share Programs Support Human Health and Sustainability
Erika Oddy
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

The Yote Bike Share was launched in April of 2017. Despite the ongoing fine-tuning of management-related details, the program has achieved widespread success and popularity among USD students and is backed by community support. The goal of a bike share program is to provide an alternative, active transportation method. Desired outcomes include reduced vehicle emissions, decreased parking lot congestion, and the improved health and well-being of community members. This oral presentation will evaluate the relationship between human health and bike share programs. The World Health Organization defines human health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Physical activity is an evidence-based preventative and/or management strategy for diseases of modernity, such as cardiovascular disease-the leading cause of death in the U.S., cancer, diabetes, hypertension, and depression. Studies demonstrate that physical activities such as biking also have the potential to reduce health-adverse stress and even improve academic performance. Finally, bike share programs are a practical means of providing economic benefits for local communities; eliminating disparities in income, access to transportation, and recreational opportunities; and protecting the environment to ensure the health of future generations. Various studies have found marked differences between men and women in terms of physical activity: men tend to be more active than women, and each sex has distinct motivators, including social recognition and competition for men and weight management and appearance for women. Recognizing these differences may provide insights into how to best engage members of each sex in taking an active role in his/her own health. The existing research provides compelling support for programs such as the
Yote Bike Share, the continuation of which promises a range of benefits for the USD student body and potentially the community at large.

**A Review of Assessment Methods for Solid Waste Management**

*Zahra Ghodsi Zadeh*

*Sustainability*

*Faculty/Staff Sponsor: Meghann Jarchow*

The main goals of sustainable waste management are to protect human health and the environment; conserve resources such as energy, materials, and space; and to prevent exporting waste related problems into the future. Waste management practices must be socially acceptable, economically affordable, technically applicable, and environmentally effective. In order to achieve the goals, integrated strategies consisting of a multitude of connected processes (collection, transportation, treatment, recycling, and disposal) have been applied by decision makers. This has always been a challenge for managers to choose the most cost-effective method to reach a sustainable waste management. During the past decades, several assessment methods have been developed to evaluate waste management systems. Using assessment methods, waste management systems mostly have been modified or supplemented. Life cycle assessment (LCA) is the more commonly used method for identification and assessment of environmental impacts of waste management. The aim of this study is to review waste management studies and categorize and summarize frequently used assessment methods for solid waste management. This review would provide information for decision makers in Vermillion, SD to develop a sustainable waste management system. According to University of South Dakota (USD) waste and recycling study, the largest share of waste is compostable materials (43%) and approximately 20 percent of produced waste is recyclable. Almost 37% of the generated waste is going to landfill. During the past years, there have been several efforts to enhance the waste management system by improving the recycling program.

**The Environmental Benefit of a City Bike Share Program**

*Daniel Greblunas*

*Sustainability*

*Faculty/Staff Sponsor: Meghann Jarchow*

Cities in this day and age are creating new environmentally friendly practices that lower the stress we are putting onto the environment. One huge contributor to this stress is the use of non-renewable fuels in motorized vehicles. Using renewable transportation can solve this problem. The overall message in this talk will explain the environmental benefits to implementing a bike share program. Creating a bike share program will decrease the automobile traffic in cities. The main environmental benefit that this will help is the reduction of emissions through motor vehicle transportation. Toxic gasses being emitted into the atmosphere induces global warming. Global warming has many negative effects on the earth and its inhabitants; therefore, any possible reduction that we can help is essential for the environment. The second purpose of this talk will explain the dangers of global warming and how implementing a bike share program into cities can lessen a cities environmental impact. Doing this will hopefully keep our global temperature rise below 2°C or even 1.5°C. Controlling the emissions by implementing a bike share program will also reduce environmental hazards like acid rain and air pollution. Although creating a bike share program may seem like a very small solution on a large-scale problem, it can get the public to make a lifestyle change. A global lifestyle change is the ultimate solution to reducing emissions. A bike share program will benefit the environment and increase the incentive to make a lifestyle change for the environment.
Carbon fibers are important graphitic materials for their unique physical properties such as metallic conductivity, low density, tunable morphology, high strength, mechanical and electrochemical stability as well as compatibility for functionalization of surface with organochemical modification. The functionalization of carbon fiber reinforced composites is dependent on the properties of fiber matrix interfacial adhesion and the improvement of interfacial properties in carbon fiber were extensively studied by introducing water-soluble derivative of graphene, graphene oxide and linker molecules that were dispersed in the fiber sizing onto the surface of individual carbon fibers. My project involved synthesis of different linker molecules for pre-functionalization of graphene and using those pre-functionalized graphene, functionalization of carbon fibers and characterization them. The linker molecules used for functionalization of graphene are maleic anhydride (MA), maleimide (MI), N,N’-hexane-1,6-diylbis(maleimide) and N-hexadecylmaleimide(HDMI). The pre-functionalized graphene used for further functionalization of both pyrolyzed and nonpyrolyzed carbon fibers in different solvent systems and characterize them by scanning electron microscopy(SEM). Till now in our study, we find bismaleimide functionalized graphene in hexane, water and dichloromethane(DCM) solution coat nonpyrolyzed carbon fibers better than HDMI functionalized graphene. My next step is to synthesize some other linker molecules to functionalize graphene and use them for further functionalization of commercial carbon fibers to improve their alignment and adhesion to plastics in a mild, cheap, fast and simple functionalization of large scale carbon fibers.

Analysis of amino acids is crucial to protein structure elucidation. Amino acids are non-volatile and are amenable to separation by liquid chromatography (LC). However, amino acids are not detectable with sensitive detectors typically used in liquid chromatography including absorbance, fluorescence or electrochemical detectors. Derivatization of amino acids using suitable reagents enhances the separation and detection of amino acids using liquid chromatography. Sanger used 2, 4-dinitrofluorobenzene (DNFB) to derivatize amino acids for the structure determination of insulin for which he received the Nobel Prize in 1958. The DNFB makes amino acids suitable for absorbance detection. However, little has been done in terms of liquid chromatography with electrochemical detection (LC-EC) of the DNFB derivatized amino acids. Reduction of aromatic nitro groups has been known for many years but there are disagreements as to the reduction pathway and products. Since aromatic nitro compounds are electrochemically active, electrochemical investigation of nitrobenzene (NB) is essential to determine the reduction pathway. Cyclic voltammetry (CV), rotating disk electrode (RDE) and rotating ring disk electrode (RRDE) experiments have been done on the NB to determine that NB is reduced into phenylhydroxylamine (PHA) by addition of four electrons and four protons and the reduced PHA can be reversibly oxidized into nitrosobenzene removal of two electrons and two protons transfer. For the electrochemical detection of DNFB derivatized amino acids, reduction and oxidation potentials of nitro group must be known. Therefore, electrochemical investigation has been done on N-methyl-2,4-
dinitroaniline (mimic DNFB derivatized aminoacid) in solutions of varying pH. Electrochemical detection of the nitro groups will be appropriate for dual electrode detection of DNFB labeled amino acids on which we can observe the reduction on an upstream electrode and corresponding oxidation of the reduction product on the downstream electrode.

**Synthesis of Gold Nanostars and their Application on Colorimetric Detection of Lead Ions**

Yifeng Huo*
Chemistry
Faculty/Staff Sponsor: Chaoyang Jiang

Gold nanostars are a type of spherical gold nanomaterials with sharp branches on the surface. This morphology provides unique plasmonic properties including unique plasmonic bands and tunable plasmonic peaks. Typically, the morphology evolution of gold nanostars in colloidal solutions will result in the changes of their colors. Thus, the colloidal gold nanostars could be used as colorimetric sensors for detecting various molecules and ions, such as lead(II) ions. Recently, spherical gold nanoparticles have been applied to the colorimetric detection of lead ions based on an etching effect on gold nanoparticles. However, there are few reports on applying gold nanostars for lead detection. In this work, we first synthesized the colloidal gold nanostars with different sizes and shapes. The surface of gold nanostars were then modified with various ligands to provide both colloidal stabilities and detection sensitivities toward lead ions. The morphology and plasmonic properties of gold nanostars were characterized by scanning electron microscopy (SEM) and ultraviolet-visible (UV-vis) spectroscopy. We have demonstrated that the abilities of colloidal gold nanostars in colorimetric detection of lead ions could reach a part-per-billion (ppb) level. The mechanism of such high sensitivity is currently under investigation using UV-vis spectroscopy and dynamic light scattering (DLS). With further optimization, it is expected that gold nanostars with unique branches can sensitively detect lead ions in a timely and accurate manner.

**Quantitative Control of Doping in TiO2 Nanocrystals**

Shahzahan Mia
Chemistry
Faculty/Staff Sponsor: James D. Hoefelmeyer

Doping is a powerful and effective way to alter the electronic, magnetic, and optical properties of a semiconductor, however the precise control of the dopant concentration in semiconductor nanocrystals is a major challenge. Previously, our group demonstrated full control of surface loading of first row transition metals on TiO2 nanostructure. Herein is described a method to 'push' the surface metals into the TiO2 framework. The diffusion of metal ions from the surface to the interior of the nanocrystal is limited by two factors, the solubility limit of the dopant in the host lattice and the concentration of metal ions on the nanocrystal surface. Below the solubility limit of dopant ion in the semiconductor, the redistribution of metal ions into the nanocrystal (versus desorption into solution) proceeds at a linear ratio of ~30% with our current method. Post-synthetic treatments ensure full removal of surface adsorbed metal ions. The doping method proceeds with no change in morphology of the nanocrystal. Cobalt-doped TiO2 nanorods with low dopant concentrations are both UV and visible light active for dye degradation. Photocatalytic water splitting study with synthesized cobalt-doped TiO2 nanocrystals shows consistency with theoretical calculation. The synthesized samples were also used to prepare thin films for conductivity measurement for diverse applications.
Perfluoroalkylated Conductive Polymers for High Performance Lithium Battery

Siyu Mao*
Chemistry
Faculty/Staff Sponsor: Haoran Sun

Designing and fabricating high capacity Li batteries have attracted significant attention for past few decades in both academic and commercial fields. However, traditional inorganic cathodic materials are limited by their low specific capacity due to their fabrication process, for example, 170 mAh/g for LiFePO4. In contrast, perfluoroalkylated organic polymeric materials offer a unique alternative solution in comparison to their inorganic counterparts. The high capacity of these types of perfluoroalkylated organic cathodic materials are due to several reasons including 1) the high conductivity when polymerized to eliminate the usage of inactive conducting additives and mechanical binders and 2) the high energy storage sites containing perfluoroalkylated side chains (-CxFy) on the aromatic system that are capable of undergoing reductive-defluorination to generate the current during discharge process. In this talk, different types of perfluoroalkylated conducting polymers will be introduced and their electrochemical behavior will be discussed. In addition, the potential of using these types of perfluoroalkylated conducting polymers as cathodic materials in Li batteries will be demonstrated.

Adaptive Metacognition and Alcohol Consequences: The Moderating Role of Maladaptive Metacognition

Rebecca Sistad*
Clinical Psychology
Faculty/Staff Sponsor: Raluca Simons

Metacognitions (MC) are executive functioning processes. Adaptive MC are positive, flexible thoughts and beliefs (Beer & Moneta, 2012) and maladaptive MC are ineffective beliefs that generate psychological distress (Wells & Matthews 1994). Both maladaptive and adaptive MC have been associated with an array of coping strategies (Beer & Moneta, 2012). Maladaptive MC have also been linked to alcohol and nicotine dependence (Monta, 2011; Spada & Wells, 2009) and depression (Papageorgiou & Wells, 2003). However, the relations between adaptive MC, maladaptive MC, and alcohol outcomes have yet to be delineated. The current study aims to address this gap in the literature by examining the associations between alcohol use, problems, and adaptive and maladaptive MC while controlling for gender First, it is hypothesized maladaptive MC will predict increased alcohol use and problems and adaptive MC will predict decreased use and problems. Secondly, it is hypothesized adaptive and maladaptive MC will interact (i.e., moderate) to predict alcohol problems, while controlling for gender and use. Multiple regression was used to test the proposed relationships in Stata 14 (StataCorp, 2015). Maladaptive (b=6.69, p<.001) and adaptive MC (b=-2.53, p=.04) were both significant predictors of alcohol-related problems, controlling for gender (b=2.74, p=.02) and use (b=0.67, p<.001), full model F(4, 340) = 48.89, p<.001, R2=0.37. The interaction between adaptive and maladaptive MC significantly predicted problems (b=5.04, p=.02), F(5, 333) = 40.56, p<.001, R2=0.38. Adaptive MC inversely predicted problems when maladaptive MC was low. Thus, adaptive MC is a protective factor for problems, but only when maladaptive MC is low. The results speak to the importance of adaptive and maladaptive MC in the risk for alcohol consequences. Moreover, this study provides support for treating substance use with Metacognitive Therapy through enhancing attentional control skills and modifying metacognitive beliefs (Wells & Mathew, 1994; Wells, 2009).
Changes in Cortical Connectivity Following Tool Use Motor Learning
Taylor James Bosch
Basic Biomedical Sciences
Faculty/Staff Sponsor: Lee Baugh

Tool use is seen throughout the animal kingdom. However, only humans possess an advanced technological culture that revolves around using and manufacturing tools. One potential explanation for humanity's advanced tool using capabilities is that humans possess a unique neurobiological system that facilitates experience-independent tool use, a claim which is supported through examinations of human and non-human primate brain activation during tool use action observation. In humans, the left anterior supramarginal gyrus (aSMG) is consistently active during tool use action observation, whereas non-human primates do not display activation in their homologous brain region. However, whether the aSMG facilitates rapid tool use motor learning is still unknown. In order to further elucidate the role of the aSMG during tool use motor learning, we recruited individuals with little prior experience using chopsticks and trained them over the course of four weeks to use chopsticks to perform a challenging sensorimotor task. Before and after training, we obtained functional magnetic resonance imaging (fMRI) measurements while participants observed the same action that they performed during training. Our results demonstrate that activation of the aSMG is unaffected by behavioral training. In addition, connectivity between the aSMG and the left anterior intraparietal sulcus (aIPS) - a brain region involved in planning grasping actions - is affected by behavioral training. Before training, activation of the aSMG precedes activation of the aIPS, whereas after training the direction of connectivity is reversed. These findings suggest that the aSMG is able to send signals to the aIPS so that an unfamiliar tool can be grasped in a manner that maximizes its efficiency for performing a particular action. In this way, the aSMG may facilitate rapid tool use motor learning and the presence of this brain region may explain why humans more readily use and manufacture tools compared to other tool using species.

Functional Characterization of a Kalanchoe Laxiflora MYB Transcription Factor Putatively Involved in Regulation of the Crassulacean Acid Metabolism (CAM) for Improving Water-deficit Stress Responses in C3 Plants
Atia Binte Amin*
Biology
Faculty/Staff Sponsor: Bernie Wone

Plants that are naturally water-use efficient have a specialized type of photosynthetic adaptation called Crassulacean Acid Metabolism (CAM). Previous research has identified several putative transcription factors that are thought to regulate the CAM pathway in the obligate CAM plant Kalanchoe laxiflora. One such transcription factor is the myeloblastosis (MYB) transcription factor, which was highly expressed during CAM induction in older leaf pairs in Kalanchoe laxiflora. Here, we ectopically overexpressed the KlMYB transcription factor in the C3 plant Arabidopsis thaliana to determine the gene's role under water-deficit conditions and if it has potential to increase water-use efficiency in a C3 plant. First generation (i.e., T1) of positive transgenic plants on antibiotic selection plates have been grown in soil and water-use efficiency of the T2 generation plants will be measured after water-deficit treatment analysis. The outcome will be discussed in the context of water-use efficiency or drought tolerance of those plants carrying the transgene in comparison to the wild type plants. The results are expected to provide new perspectives into the CAM pathway with broad relevance to gene regulation in CAM plants and this knowledge can feed back into exploring the KlMYB transcription factor in crop plants to increase drought tolerance responses.
"South Dakota Women's History: Experiences along the Big Sioux and Missouri Rivers" explores women's past relationship with the Missouri and Big Sioux Rivers. The Missouri River and the Big Sioux River and their respective watershed areas were explored, named, manipulated, and polluted, evidenced both in American literary history and daily life, by mainly men. With an in-depth, interdisciplinary study of women's history of these rivers, this project demonstrates that including women's voices and values, metaphors and meanings, styles and systems that declare distinction of place are vital to these river's histories as well as solving today's river issues. What do women's writings reveal about the interdependence of women's daily experiences and the natural environment in which they live? What is revealed about the lives of Native Americans and other minority populations along these rivers? In what ways might women's writings about their life along or experiences with the rivers reflect, influence, or change our current attitudes about and relationship with water? In what ways might women's stories influence our contemporary attitudes, actions, and policies regarding the rivers? Through original research at the South Dakota State Historical Society's State Archives (to be conducted in May with USD Graduate Research Grant) and other women's written accounts of river life, this project reveals interesting tales of the Missouri River and Big Sioux River unique to South Dakota women. Uncovering women's experiences of the Missouri River and the Big Sioux River will help foster place-consciousness and environmental activism for South Dakotans. As well, considering women's experiences will better shape our theories/ethics for biocentricity, ecological sensibility, and ecological multiculturality.

Addition Property of Algebraic Entropy: Some Noncommutative Cases
Nicholas Britten
Mathematics
Faculty/Staff Sponsor: Catalin Georgescu

Entropy is a broad concept that, loosely speaking, is intended to measure the disorder of a system. In this thesis we will investigate the properties of algebraic entropy, that is entropy defined on endomorphisms of groups. We will denote the algebraic entropy of an endomorphism $\phi$ by $h_{\text{alg}}(\phi)$. We will be particularly interested in the addition theorem, which has only been proven for abelian groups. The addition theorem states that for $G$ a group with $H \subseteq G$ such that $\phi(H)$ $H$ we have that $h_{\text{alg}}(\phi) = h_{\text{alg}}(\phi|_H) + h_{\text{alg}}(\phi^*)$, where $\phi^*$ is the endomorphism of $G/H$ induced by $\phi$. The main goal of this thesis is to extend the addition theorem to some nonabelian cases. We first present some concrete examples of the computation of algebraic entropy. We then show that the addition theorem will hold in general provided $H = \ker(\phi)$. Finally we present the main result of this thesis, that the addition theorem holds for any finite index normal subgroup of an arbitrary group $G$. That is for $G$ any group with $H \subseteq G$ such that $\phi(H)$ $H$ and $|G:H| < w$ we have that $h_{\text{alg}}(\phi) = h_{\text{alg}}(\phi|_H) + h_{\text{alg}}(\phi^*)$, where $h_{\text{alg}}(\phi^*)$ is the endomorphism of $G/H$ induced by $\phi$. 
Medulloblastoma (MB) is the most common malignant pediatric brain tumor that can disseminate into the leptomeningeal space surrounding the brain and spinal cord. Patients typically undergo surgical resection of the tumor followed by chemotherapy and radiation that lead to a high 5-year survival rate; however, this aggressive treatment often leads to long-term cognitive deficits. It is well established that tumorigenesis is triggered by mutations of multiple genes. Likewise, tumor metastasis involves dysregulation of multiple signaling pathways. It is imperative, therefore, to understand how various pro-oncogenic events cooperate in tumor dissemination to improve upon the toxicity of current treatment. The transcription factor Atonal Homolog 1 (ATOH1) not only plays an essential role in normal cerebellar development, dysregulated expression is part of the gene signature for the Sonic Hedgehog (SHH) subgroup of MB in humans. We generated several transgenic mouse lines with conditional ATOH1 expression, which were bred to mice with constitutive SHH signaling through knockout of the Patched receptor (Ptch1+/-). Approximately 30% of Ptch1+/- mice develop MBs; however, Ptch1+/- mice with Atoh1 transgene expression all develop highly penetrant MBs with extensive leptomeningeal metastasis. We have tested several therapeutics on these mice. Treatments lead to a significant decrease in disseminated tumor cells and metastasis along the spinal cord, along with a significant decrease in proliferating tumor cells. To examine specific target genes of ATOH1 that may play a role in dissemination of tumor cells, we have used chromatin immunoprecipitation (ChIP) with high throughput sequencing (ChIP-seq) in combination with RNA-seq. We are currently validating potential targets of ATOH1, including important factors of epigenetic regulation, as well as growth factors within the microenvironment that may aid in attracting tumor cells to a metastatic niche. Overall, our studies reveal an important role for ATOH1 in MB metastasis, while the efficiency of targeted therapy for metastatic MBs demonstrate the utility of this animal model for understanding mechanisms of metastasis and evaluating potential therapeutics.

Lactate Induces the Expression of Immune Checkpoint Inhibitors in HPV+ Head and Neck Positive Squamous Cell Carcinoma
Alex Verma
Basic Biomedical Sciences
Faculty/Staff Sponsor: Keith Miskimins

The human papillomavirus is responsible for 60-72% of oropharyngeal cancers (Ritprajak and Azuma, 2015). These cancers lie in close proximity to delicate structures in the head and neck and have significant risks involved with surgical resection. Previous work by the Miskimins lab has demonstrated that an intact immune system is necessary for tumor clearance and animal survival. Furthermore, we have demonstrated that the biguanide drug metformin reduces tumor clearance and animal survival only in immunocompetent animals, despite strong anti-tumor activity in vitro. Due to metformin's innate ability to increase tumor lactate production, we believe that lactate directly inhibits the anti-tumor immune response. Lactate is known to inhibit immune activity, usually by directly impairing active T cells (Fischer et al., 2007). Lactate has also been shown to affect gene expression in somatic and cancer cells by activating the surface protein GPR81/HCAR1 (Wagner et al., 2015). Therefore, we sought to determine if lactate could improve tumor immune evasion by altering expression of immune checkpoint co-inhibitors. Immunohistochemistry staining showed that metformin-treated tumors express higher
levels of the immune checkpoint co-inhibitor PD-L1 at the cell surface. The expression of PDL1 and PDL2 and the co-activator molecule CD80 were assessed by qPCR and flow cytometry. It was shown that lactate, but not lactic acid, increased transcription of PDL1, PDL2, and CD80 when added to media. This phenomenon was observed in the HPV positive HNSCC lines SCC90 and SCC47, but not in the HPV negative lines SCC1 or SCC90 or the HPV positive HeLa line. To assess the role of GPR81, MEER cells were incubated with pertussis toxin (PTX), a known GPR81 inhibitor. PTX treatment did not prevent the lactate-induced increase in PD-L1, suggesting that lactate induces PD-L1 via other means. Together, these findings indicate that lactate can act as a paracrine or autocrine signal to induce immune resistance in MEER cells.

Targeting Notch Signaling Pathway in Bone Cancer
Hannah Wollenzien
Basic Biomedical Sciences
Faculty/Staff Sponsor: Jianning Tao

Osteosarcoma is the most common type of bone cancer that primarily affects children and young adults. The genetic cause is unknown but signaling pathways such as Notch have been implicated. The Notch pathway is vital to cellular communication, playing a role in cell fate and stem cell renewal and differentiation. Recent studies in cancer have shown gain of Notch function (or Notch activation) promotes cell proliferation, tumor growth, and angiogenesis. Currently, there are several promising clinical trials for Notch inhibitors as cancer therapeutics but none are in the context of human osteosarcoma. To identify novel Notch-pathway-regulated genes, we performed a sleeping beauty forward genetic screen study in a genetically engineered mouse model with Notch activation in bone cells. We found that abnormal bone phenotypes have been rescued in those mice, implicating that inhibition of Notch pathway occurs through a novel Notch-regulated gene(s). We hope those novel genes can serve as therapeutic targets in treating osteosarcoma patients. A second project aimed to explore effect of blocking Notch pathway in osteosarcoma cells via a dominant-negative mutant variant of human Mastermind-like 1 (dnMAML). A stable osteosarcoma primary cell line, named T29HW1, was established after screening 35 single cell clones. In the presence of Doxycycline, these cells express dnMAML-BioID2 fusion protein and luciferase, evident by Immunofluorescent staining, western blot analysis or bioluminescence imaging. In addition, we found evidence of a higher level of activities of tyrosine kinases in those tumor cells. This prompted us to the study effects of a tyrosine kinase inhibitor Gleevec (or Imatinib) in osteosarcoma cells. Using wound closure and transwell assays, we found that Imatinib significantly reduced cell proliferation, invasion and migration in vitro. Moreover, T29HW1 cells injected in to nude mice rapidly formed tumors in vivo, which will provide a platform to test new drugs.

Characterization of Stem Cell Populations in Atypical Teratoid Rhabdoid Tumors Using Graph-Based Clustering of Single Cell RNA Sequencing Data
Mariah M Hoffman
Biomedical Engineering
Faculty/Staff Sponsor: Etienne Gnimpieba

Atypical teratoid rhabdoid tumors (ATRT) are rare and aggressive central nervous system tumors that predominantly occur in children under the age of 3. Independently reported research suggests that malignant rhabdoid tumors share certain characteristics with embryonic stem cells and may arise from these stem-like cells. In more extensively studied cancers, cancer stem cells have been associated with resistance to chemotherapy and radiation therapy. Identifying and characterizing the stem cell
population in ATRT is therefore a critical step in identifying small molecule drug targets for the selective elimination of this population. In this study, we have used single cell RNA sequencing to examine the subpopulations within a 3D cell culture model of ATRT. Subpopulations were determined based on both discrete, graph-based clustering and hierarchical clustering. One of the discrete clusters identified was shown to overexpress stem cell markers including SOX family genes, ALDH family genes, and PROM1 relative to the remaining cells. Cells from this discrete cluster were also grouped together at one end of the pseudotemporal timeline of the independently run hierarchical clustering. Protein-drug and protein-protein interaction networks suggest that histone deacetylase inhibitors (HDACi) may alter the expression of genes that are differentially expressed in the stem cell population including SOX2, KLF4, and NANOG, which are implicated in stem cell development and differentiation.

8a: 2:30-3:50 - Muenster University Center 211/211A

Modulating Current In Vitro Methodologies to Elicit In Vivo Cellular Identity of Mammalian Renal Collecting Duct Cell Types

Eric Fogarty
Basic Biomedical Sciences
Faculty/Staff Sponsor: Kamesh Surendran

The mammalian collecting duct is comprised of two primary cell types, principal cell and intercalated cells 1 (Chen et al, 2017). The principal cell population is responsible for water homeostasis through various water channels such as AQP2, AQP4, and membrane receptors such as AVPR2 and compose the majority of the renal collecting duct 2 (Li et al, 2017). Intercalated cells express ion channels to regulate ion homeostasis through proteins such as AE1, ATP6v1B1, and CAII 3 (Roy et al, 2015) but only exist in certain regions of the renal system in significant numbers. Current cell culturing systems cannot accurately model the mammalian system in part due to the inability to culture intercalated cells outside of the organ, thus all current system rely on either immature renal cell lines or mature principal cell lines. We are attempting to modulate current methodologies to acclimate cells to either become intercalated cells or express intercalated cell markers in significant quantities. In light of this, we utilized 3d modeling via collagen matrixes in an attempt to better model the actual conditions of the renal system. The renal tubule system is uniquely compromised of a single cell layer tightly compact to produce an apical-basolateral distinction forming a barrier between the lumen and blood within the renal system, and this can be further mimicked through collagen matrix support. A wild type (untransfected) cell line will also be co-cultured with a genetically modified cell line that expresses dominant negative MAML protein. In theory, the genetically modified cell would have the principal cell identity suppressed and co-culturing would allow the two cell types to co-exist side by side.

Understanding the Cellular Responses to Cilia Dysfunction in Primary Ciliary Dyskinesia

Bethany Freel
Basic Biomedical Sciences
Faculty/Staff Sponsor: Lance Lee

Primary ciliary dyskinesia (PCD) is a genetic disorder of motile cilia dysfunction. Motile cilia aid in the movement of fluids in various tissues throughout the body. Motile cilia are present on the multiciliated epithelial cells that line the respiratory tract, ependymal cells in the brain, and fallopian tubes. Disorders associated with PCD include chronic respiratory infections, recurrent ear infections, infertility, situs inversus, and hydrocephalus. Mutations in over 40 genes are responsible for PCD. Cellular responses to cilia dysfunction in mutant mouse lines can be studied through the culture of mouse tracheal epithelial cells (MTECs). MTECs are cultured by integrating air-liquid interface conditions several days after
isolating the cells from the mice. The air-liquid interface allows for the recreation of the tracheal environment in a cell culture model and allows the cells to differentiate into multiciliated cells. To study cellular responses in MTECs from PCD mice, we isolated RNA and conducted qRT-PCR to analyze expression of genes associated with a variety of cellular functions. We are also crossing the mutant mice to a mouse line that endogenously expresses GFP under the FOXJ1 promoter, which is found exclusively in ciliated cells, to enable isolation of a pure population of multiciliated cells. We first piloted flow sorting of GFP+ cells from the transgenic mice, which allowed us to obtain a pure population of multiciliated cells for RNA isolation. The goal is to perform downstream whole transcriptome analysis of cells from PCD mutant mice to identify the full spectrum of cellular responses to cilia dysfunction.

Characterizing Cytoskeletal Defects in Cholesterol Synthesis Disorders
Rachel Laufmann
Basic Biomedical Sciences
Faculty/Staff Sponsor: Kevin Francis

Smith-Lemli-Opitz Syndrome (SLOS) is caused by mutations in 7-Dehydrocholesterol reductase (DHCR7), leading to both a decrease in cholesterol synthesis and an accumulation of the cholesterol precursor 7-dehydrocholesterol (NORD). Patients exhibit a wide range of potential phenotypes, such as slow growth, microcephaly, cleft pallet, heart defects, cognitive defects, and fused and/or extra digits (NORD). Preliminary data from our collaborators has suggested that inhibiting cholesterol synthesis can lead to decreased cell stiffness and altered actin organization. Over the course of my second rotation as a first year graduate student, I investigated the actin organization of control and SLOS patient-derived fibroblasts under cholesterol deplete conditions. We hypothesized that inhibiting cholesterol synthesis in control fibroblasts with the DHCR7 inhibitor AY9944 and growing them along SLOS fibroblasts in delipidated media may demonstrate more uniform actin stress fiber orientation compared to controls. Using confocal imaging and MatLab image analysis, we analyzed the actin orientation of SLOS fibroblasts compared to controls grown in normal growth medium and no inhibitors. Our initial findings suggest that altered cholesterol homeostasis can lead to more uniform alignment of actin stress fibers. In addition to investigating changes in SLOS cytoskeletal rearrangement, I also worked to establish neuronal progenitor cells (NPCs) from control and patient induced pluripotent stem cells (iPSCs) to study the effects of altered sterol synthesis on neurodevelopment.

Revealing New Members of Innate Immunity Using BioID
Rhiannon Sears
Basic Biomedical Sciences
Faculty/Staff Sponsor: Kyle Roux

The innate immune system is responsible for a host's immediate reaction to an invading pathogen. Host recognition of molecular patterns cause signal cascades that activate effector molecules. Cytosolic DNA is one of these recognized patterns. Barrier-to-autointegration factor (BAF) protein is known to bind DNA, including cytosolic DNA. The Roux Lab is currently assessing if BAF has a role in the innate immune response alongside evaluating known DNA sensing pathways. Cyclic GMP-AMP Synthase (cGAS) is a protein which binds cytosolic DNA as well and causes a signal cascade that results in type I interferon release. To assess other constituents cGAS interacts with during this DNA sensing period, BioID2 was fused to the C-terminal of the cGAS protein and expressed in HeLa cell models. Inflammasomes, present in professional immune cells, are also capable of recognizing and binding cytosolic DNA via the AIM2 protein, causing the release of cytokines. All inflammasomes have the
structural protein apoptosis-associated spec-like protein containing a CARD (ASC). To evaluate the constituents that interact with ASC, and therefore inflammasomes, BioID2 was fused to the C-terminal of the ASC protein and expressed in a professional immune cell model. Using the BioID2 fusion proteins, we hope to identify new members of the innate immune response.

Protection of Mice from Superinfection by Influenza and Streptococci by Passive Immunity
Nicholas A. Wood
Basic Biomedical Sciences
Faculty/Staff Sponsor: Michael Chaussee

Bacterial superinfections (bacterial infections that occur following influenza virus infection) significantly increase influenza-related deaths, as occurred 100 years ago during the 1918 influenza pandemic. *Streptococcus pyogenes*, (the Group A Streptococcus; GAS), is one bacterial species that causes lower respiratory tract complications following influenza A virus (IAV) infection. Current therapeutic options for IAV include vaccines and anti-viral drugs, while GAS treatment relies on antibiotics; nevertheless, the lethality of IAV-GAS superinfections remains high. In a 2009 report, 7 of 10 Californians with a laboratory confirmed IAV-GAS superinfection died despite at least 6 receiving antibiotics and anti-virals. Therefore, we sought to determine the efficacy of using passive immunotherapy to treat IAV-GAS superinfections and decrease mortality. In our model of superinfection, mice were inoculated with a sub-lethal dose of IAV, followed seven days later by inoculation with a sub-lethal dose of GAS. The synergy of infections results in 100% of mice reaching endpoint criteria. In an effort to decrease mortality, we treated mice 6 hours prior to GAS inoculation with purified rabbit IgG antibodies specific to the GAS virulence factor Streptolysin-O (SLO). Given that SLO is a surface associated protein, we reasoned that the binding of IgG to the GAS surface might lead to opsonization and phagocytosis by macrophages. Treatment with antibodies specific to SLO decreased mortality by 25% compared to untreated controls. To determine if the anti-SLO antibodies could promote killing of GAS *ex vivo*, we incubated GAS with SLO antibodies or not and incubated the bacteria in whole mouse blood. Compared to controls, antibody treatment significantly reduced GAS viability. Taken together, our data from the mouse model and blood exposure suggest that antibody treatment can decrease mortality associated with IAV superinfection. Current studies seek to optimize protection and to uncover the molecular basis contributing to increased mortality during superinfection.

8b: 2:30-3:50 - Muenster University Center 216

Cardiogenic Genome Acetylation: Potential Regulatory Roles for Nucleoporin Proteins in Cardiac Development and Disease
Emily Storm*
Basic Biomedical Sciences
Faculty/Staff Sponsor: Randolph Faustino

Atrial fibrillation, referred to as Afib or AF, belongs to a subset of arrhythmogenic cardiac diseases characterized by irregular beating of the upper chamber(s) of the heart. Among novel gene candidates that may lead to Afib is a nucleoporin called Nup155 that has been clinically associated with heart disease. Our central hypothesis is that Nup155 interacts with chromatin via Hdac4, serving as an epigenomic regulator of gene expression and cardiac development. Our first sub-hypothesis is that mutations in Nup155 disrupt interactions with Hdac4 that affect genomic acetylation, and may be one mechanism associated with the development of cardiac dysfunction and arrhythmia. We will use
ChIPseq to identify regions of Nup155 and Hdac4 chromatin occupation in genomes of wild type and mutant Nup155 cell lines, to gain insight into the potential role of Nup155 in regulating Hdac4 chromatin interactions. Our second sub-hypothesis is that changes in chromatin architecture in pluripotent wild type and heterozygous Nup155 mutants leads to transcriptome differences that arise as a result of changes in the underlying epigenomic substrate which will be assessed using RNAseq analysis. Finally, our third sub-hypothesis is that other protein-protein interactions of Nup155 and/or Hdac4 may influence cardiogenesis. To investigate this, we will use BioID to identify other Nup155 and Hdac4 protein-protein interactions in embryonic stem cells and stem cell-derived cardiomyocytes. Furthermore, BioID in wild type and mutant Nup155 cell lines will identify binding partners that may be lost or gained with mutation of Nup155. Understanding this potential Nup155-regulated mechanism of Afib will reveal a novel mechanism of epigenomic regulation underlying heart disease that will have broader implications for nucleoporins as developmental regulators.

Determining the Viability of Wolbachia After Horizontal Transfer Through Cannibalism

Eric Sazama*
Biology
Faculty/Staff Sponsor: Jeff Wesner

Wolbachia are common endosymbionts that act as reproductive manipulators in a majority of insect species. Statistical analysis of the infection rates among species found that 52% (95% CrIs: 44%-60%) of species are infected. As a reproductive manipulator, Wolbachia is primarily inherited vertically through an infected mother. However, the presence of Wolbachia among different lineages suggests that Wolbachia move across lineages through horizontal transfer. Most studies investigating horizontal transfer of Wolbachia have focused on parasitoid wasps such as Nasonia spp., and Trichogramma spp. due to their ability to infect new hosts inadvertently when injecting their own offspring. A few studies have investigated the potential for horizontal transfer to occur through predation and cannibalism, but those studies have yielded conflicting results. Additionally, none of those studies address the viability of the bacteria to induce reproductive effects after infection. In this study, we found that Wolbachia can transfer from an infected individual to an uninfected individual via cannibalism, albeit rarely. We also used the reproductive effect of cytoplasmic incompatibility to demonstrate the viability of the bacteria after transfer. For this experiment, uninfected beetles were fed a consistent diet of infected eggs. After a month of feeding, these beetles were mated with infected males to test viability of any horizontally transferred bacteria. The results indicate that one individual out of 20 acquired an infection and produced offspring. These offspring were tested and did not show any sign of infection, suggesting that Wolbachia transferred to a new individual, but did not pass on to the next generation.

Adult Learners: The Single Greatest Resource You May Be Missing on Your Campus

Jared Cook
Educational Adminstration
Faculty/Staff Sponsor: Karen Card

With traditional student enrollment declining from 2009 to 2014, institutions of higher education have been scrambling to bring prospective students to their universities (National Center for Education Statistics, 2016). Between increased amenities, new buildings, and continual decreases in state funding, institutions of higher education have seen a dramatic rise in the cost not just to maintain services but to continue along a path of providing appealing services to maintain traditional enrollment, giving rise to increases in tuition to help subsidize this cost (U.S. News, 2017, p. 1). As the general public voices skepticism about higher education cost and worth, employers are also speaking up. In a 2015 study, 58% of employers said "improvements are needed to prepare students for success in entry-level positions" (Association of American Colleges & Universities, 2015, p. 1). The same study found that 91% of

Water, Water Everywhere: A Writer's Perspective on Water Quality in the Northern Plains
Cheyenne Marco*
English
Faculty/Staff Sponsor: Paul Formisano

In the Northern Plains, surrounded as we are by lakes and rivers and blasted by blizzards and rainstorms, the abundance of water often obscures its preciousness. Few people know the intricate relationship they hold with ground water and the water cycle, and even fewer care. Recent water challenges, such as the Flint Water Crisis and the Gulf of Mexico's dead zone, reveal that our disregard for the resource can have devastating consequences. The narratives surrounding water and the water quality issues of the Northern Plains are unique and worthy of analysis. This presentation will explore and meditate on the complex perceptions and dynamics of water in South Dakota and Minnesota. As part of the University of South Dakota Graduate School's generous Graduate Research and Creative Scholarship Grant, observations have been collected and compiled into a creative nonfiction project that shares anecdotal accounts of the region's relationship with water. This presentation will begin with a preface on the history and development of the area's lakes and rivers, an overview of the distinctive threats posed to local surface water, a synopsis of the purpose of the nonfiction project, and a preview of further research plans. Following this introduction, a brief selection of the creative writing project will be read. The aim of this presentation is to raise awareness and foster discussion about water quality issues. Upon conclusion, the audience is invited to ask questions regarding the research and/or the writing process.

The Effectiveness of The Ready Approach in Improving Occupational Participation in Persons with Dementia
Kristina Neumann, Rachel Noonan, Rebecca Spangler, Katelyn Walsh
Occupational Therapy
Faculty/Staff Sponsor: Ranelle Nissen

The purpose of this research was to evaluate the effectiveness of The Ready Approach in improving occupational participation by decreasing the behavioral and psychological symptoms associated with dementia (BPSD). The Ready Approach is a sensory-based intervention used to provide persons with the sensory input the brain needs in order to reduce BPSD. Pre-assessment data were gathered to determine eligibility to participate in the study and to develop a sensory flow of the day for each participant (n=6). Facility staff implemented the Ready Approach. The data collected were shared with the researchers for data analysis purposes. A single group repeated measures within-subjects design was utilized to determine the effectiveness of the Ready Approach on reducing BPSD and improving occupational participation. Assessments were administered at baseline, week 5, and week 12, which measured occupational performance, types and frequency of BPSD, and caregiver distress. Results were compared within subjects for the Neuropsychiatric Inventory questionnaire (NPI) and the Modified Barthel Index
(MBI). Comparison of the repeated measures was performed using Friedman's test showing no significant changes in caregiver distress \((x^2(2) = 5.00, p = 0.082)\), symptom severity \((x^2(2) = 1.40, p = 0.497)\), or performance of activities of daily living \((x^2(2) = 2.80, p = 0.247)\). Comparison between baseline and week 12 for number of behaviors was performed using Wilcoxon test showing a statistically significant change \((Z = -2.201, p = 0.028)\). There was some missing data and accuracy of intervention implementation was not guaranteed. While no significant results were found for change in occupational performance and symptoms severity, decrease in caregiver distress approached significance and the number of behaviors decreased significantly. These encouraging results warrant further research. Future research should utilize larger sample sizes and identify means for full adherence of the intervention.

8c: 2:30-3:50 - Muenster University Center 216A

The Illness of Human Being: Self and Personhood in Medical Anthropology
Scott Stallmann
Anthropology
Faculty/Staff Sponsor: David Posthumus

This project, entitled "The Illness of Human Being", explores the concepts of identity and personhood through the lens of medical and religious anthropology. It draws upon ethnographic data concerning mental illness and its physical symptoms as collected in Taiwan by medical anthropologist Arthur Kleinman. Kleinman questions the relationship between Taiwanese perceptions of mental health and resultant Taiwanese definitions of health. Considered here are the anthropological distinctions between anatomical manifestations of sickness (labelled "disease") and the associated cultural significances (called "illness"). The project especially considers how illness and disease influence each other in the individual's experience of sickness. This process complicates popular and professional understandings of wellness and healing held by patients and practitioners of the biomedical model. The biomedical model is problematized to display how culture influences the conclusions that people draw about their physical health, and thus how culture affects the type and quality of illnesses that people experience. The illness-disease binary later is repurposed as a kind of metaphor to question how individual and discrete phenomenal experiences influence personal definitions of the human Self. The primary hypothesis of the project argues that received cultural definitions of health influence how individuals sort their phenomenal experiences into a unified whole, which is identified as the person or Self. Essentially, this project reimagines the personal Self as an experience to be lived, rather than a thing to be inhabited, and investigates how this processual experience can differ from individual to individual based on cultural values and concepts of health.

Great Faces, Queer Places: A History of Queer Populations in Sioux Falls, South Dakota
Megan Street
Anthropology
Faculty/Staff Sponsor: Sara Lampert

Rural queer populations, especially those in the Midwest, are often ignored by scholarship despite unique challenges they may face. Previous research in queer studies has typically focused on metropolitan areas, such as New York City and San Francisco. Stigma towards gender and sexual minorities is more prominent in rural areas than in urban ones. Within the broader American queer community, the lives of people residing in rural regions are often romanticized or ignored altogether. The experiences, struggles, and accomplishments of queer Siouxlanders are largely unrecorded. As Sioux Falls rapidly expands into one of the fastest-growing and most diverse urban centers in the United States, the local queer population has experienced a recent growth in both support and opposition. This
thesis will explore questions of identity and personal liberties at the crossroads of the American heartland. The academic theories of queer ruralism and metronormativity - ignoring rural populations in favor of studying urban ones - will be applied to South Dakota. Anonymous interviews, historical documents, and GIS maps will be compiled into one report that will represent the past experiences and future aspirations of a long-overlooked minority community.

Exploring the Connection Between Muscle Twitch Time and Gait Dynamics in Anolis Lizards
Marisa Helm
Biology
Faculty/Staff Sponsor: Christopher Anderson

Muscles are the motors that power animal movement. Therefore, an organism’s locomotor performance and stride dynamics would be expected to exhibit key relationships with various muscle properties. Prior research has shown that differences in stride duration and muscle twitch time within a single species are correlated across changes in body temperature and body size. In this study, I sought to further examine these correlations between muscle contractile properties and locomotor performance across five species of Anolis lizards. In doing so, I sought to determine whether the correlation between stride duration and muscle twitch time extends beyond intraspecific comparisons. Biplanar high-speed videography was employed to capture sprint trials in five Anolis species. From these videos, I quantified stride duration and locomotor performance. In vitro muscle contractile experiments were conducted to quantify muscle twitch times and other muscle contractile properties. Preliminary analyses comparing two species show that variation in stride dynamics between species is correlated with variation in muscle twitch time, similar to findings among individuals within a single species. This suggests that muscle twitch times may have an impact on locomotor performance by imposing a limit on stride frequencies. The mechanistic findings of this work can thus be applied broadly to a wide range of organisms, including human movement and performance.

Mathematical Model on Crimean-Congo Hemorrhagic Fever Virus to Determine the Effectiveness of Treatment
Michaella E. Crouch
Mathematics
Faculty/Staff Sponsor: Jose Flores

Mathematical models are effective tools that allow multiple disciplines to describe the real world and predict outcomes. With the human population growing at an exponential rate and increased human to human contact create a need to be able to predict likely outbreaks in order to be prepared both at home and as a community. The math models that study the dynamics of infectious diseases are based on three main categories, SIS, SIR, SIER; with S standing for the population of susceptible, I for the population infected, E for the population latent, and R for the population removed/recovered. The three different models give us a foundation for the general transmission rate of diseases, with different parameters added when needed. Crimean Congo hemorrhagic fever (CCHF) virus is a widespread tick-borne disease. CCHF is transmitted to humans through ticks, which bite either humans directly or through of livestock or other humans, which if infected tissues or bodies fluids which come in contact with another can also lead to transmission. This puts health care workers and immediate family members of the infected at a high risk if the patient is not known to be carrying CCHF, which could possibly lead to hospital outbreaks if proper medical procedures are not taken. There is currently no vaccine for CCHF, making it critical that we understand the potential risk that CCHF poses to human populations. Through a math model of CCHF we can gain a better understanding of the risk CCHF poses and gain more information about its transmission rate in order to prepare for a potential outbreak by examining how the transmission rate and other factors, such as treatment, which can help plan and prevent future epidemics.
The folksinging career of Peggy Seeger (b. 1935) has often been overshadowed by the extreme range of talent of those near to her, including parents Charles and Ruth Crawford and brother Pete Seeger. Her upbringing in America's "first family of folk" readily prepared her for an early career as a singer and instrumentalist in the United States and Great Britain, where she then became involved with Ewan MacColl and a variety of influential projects, including musical arrangements for the BBC Radio Ballads. In 1971, Seeger wrote her first feminist-leaning song, "I'm Gonna Be an Engineer," which describes the struggle of a woman pursuing a career and navigating through life in a male-dominated field. This song quickly became popular and proved to be a defining moment of her career, as the use of a critical feminist approach became a trademark to her style. More than 200 original songs followed, covering topics of contraception and abortion rights, violence against women, marriage, and housework with the use of humor, satire, and hard-hitting truths. In addition to these works, Seeger leads songwriting workshops which critically examine the roles and portrayals of women in traditional folk songs and aims to remedy this skewed perception of women in new works in the traditional Anglo-American style. This paper shows that Peggy Seeger aims to more accurately represent and include women and their experiences in the great tradition of American folksong through her feminist-inspired songs and workshops.

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There are times in all our lives when words fail us. In what forms can we communicate if our verbal skills are not enough? For my honors thesis, I explored how the application of the Moment Work technique can bring a new perspective to the content of a play and create a collaboration of arts by exploring new forms for material for the stage. Moment Work was created by the Tectonic Theatre Project and is a creative method free from reliance on spoken or written text. By applying this technique to my direction of USD's Student Theatre Cooperative's production of Hush Little Celia Don't Say a Word, I investigated if and how the method the Tectonic Theatre Project used to mount The Laramie Project could be effectively applied to a pre-existing script. Brown describes the Moment Work language of elements by explaining that every aspect of theatre that contributes to the completed aesthetic, such as light and color and shape, is considered an "element." Along with my stage manager and seven-person cast, I studied the Moment Work language of theatrical elements and witnessed firsthand how it functions as a catalyst to discover new forms to effectively express difficult content. Because of how it breaks down each piece of an event on stage for analysis, Moment Work equips us as artists with a way to strip away every aspect that weakens our intended message and replace it with a more effective choice, thus creating of a far more potent product. With Moment Work as our foundation, in my thesis, we explored the dramatic power of theatre beyond words and mounted a one of a kind production.
Thursday Oral Session 9

9a: 4:00-5:20 - Muenster University Center 211/211A

Associations between Attentional Biases Maladaptive Personality Traits

Brandon L. Gray*
Clinical Psychology

Faculty/Staff Sponsor: Sara Lowmaster

Emotion plays a pivotal role in individual health. Current approaches to psychopathology argue that disturbances in emotion represent common transdiagnostic impairments. However, these impairments occur in phenomenologically distinct ways, perhaps due to affective processes that underlie maladaptive experiences. Maladaptive forms of anxiety share a common arousal dimension and demonstrate biases towards arousing stimuli while maladaptive forms of depression are characterized by a dimension of negative valence and demonstrate biases towards negatively-valanced information. Thus, individual differences in attentional biases towards arousal- or valence-based stimuli may differentiate these experiences. The current study aimed to examine the associations between individual differences in attention and the trait levels of anxiety and depression. We hypothesize that reaction times (RTs) in arousal cue conditions during an attention task will be positively associated with trait anxiety and RTs in valence cue conditions will be positively associated with trait depression. Data collection is currently ongoing. Participants will include undergraduate students recruited from a Midwestern university. Participants will complete the State-Trait Personality Inventory and a modified version of the Attention Network Task (ANT). The study's hypotheses will be examined using hierarchical regression analyses. Trait depression will be entered as a covariate in the model examining the association between arousal-based RTs and trait anxiety and trait anxiety as a covariate in the model examining the association between valence-based RTs and trait depression. Verbal ability will be entered as a covariate in both models. The value of these models will be determined based on the statistical significance in prediction as well as the significance of change in variance of the final step in each model.

Efficacy of High-performance Vision Training on Improving Reaction Time of Collegiate Softball Athletes: A Randomized Trial

Ashley Athmann, Molly Boell, Angela Kaiser, Ashley Musch, Logan Willhite
Occupational Therapy

Faculty/Staff Sponsor: Diana R. Feldhacker and Whitney Lucas Molitor

Purpose: To determine the efficacy of the Dynavision in comparison to traditional vision training on improving the reaction time of collegiate softball athletes. Methods: The study was completed using a two-arm, randomized controlled trial, mixed within- and between-group design. Participants were randomized to Group A or Group B. Group A participated in Dynavision training and Group B participated in vision training exercises. Data was gathered over 10 weeks. During week one, participants completed pretesting with visual assessments and Dynavision Modes A and D to obtain baseline data. During weeks two and three, participants completed 10 minutes of Dynavision Modes A and B two times a week. Group-specific intervention sessions began at week four. Each participant received 10-15 minutes of intervention, two times a week, for six weeks. The final week consisted of post testing using the assessments completed at pretesting. Results: Results show that both groups had a significant decrease in reaction time. For Mode A testing, Group A displayed a 18% decrease in reaction time (M .78 to .65 seconds) while Group B had a 10% decrease in reaction time (M .81 to .73 seconds) between pre and post testing. At two month follow up, these values maintained. For Mode D testing, Group A had a 14% decrease in reaction time (M .42 to .36 seconds) while Group B displayed a 12%
decrease in reaction time (M .42 to .37 seconds). At two month follow up, Group A maintained a 14% reduction (M=.36) while Group B improved to M= .36. Conclusion: Results display that high-performance vision training is effective in improving the reaction time of collegiate softball athletes. This suggests that both Dynavision and alternative visual training methods can be effective intervention methods in enhancing the visual skills of athletes, but the Dynavision may be a more effective tool.

Effects of Peripheral Neuropathy on Sensory Interactions for Fine Motor Skills in Children Undergoing Chemotherapy
Megan E Hilson, Hannah Roberg
Occupational Therapy
Faculty/Staff Sponsor: Shana Cerny

Chemotherapy-induced peripheral neuropathy (CIPN) is a common side effect in pediatric cancer survivors. The debilitating symptomatology associated with this condition may persist years after receiving chemotherapy treatment and may affect children’s fine motor skills and functional capabilities. Purpose: The purpose of this study was to examine the effects of peripheral neuropathy on fine motor skills and daily functioning in children treated with chemotherapy against a control group. Participants: 8 female children participated, with 4 in the diagnostic group (DG) receiving or having received chemotherapy treatment in the last 2.5 years and 4 in the control group (CG). Participants were matched for age (DG = 6.40 ± 1.82 years; CG = 6.29 ± 1.38) and gender. Methods: The pediatric modified-Total Neuropathy Scale (ped-mTNS) was used to measure the extent of sensory, motor, and autonomic CIPN symptoms. Manual dexterity was assessed using the Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT™-2) and the Nine-Hole Peg Test. The effect of CIPN on function was assessed using a descriptive parent questionnaire. Results: While the DG showed significantly higher levels of PN than the CG (P=.018), PN in the DG (M=2.25, SD=0.96) was considered mild. Correlations between PN and functional dexterity (BOT-2 fine motor precision, fine motor integration, manual dexterity, and upper limb coordination; 9-hole peg test) were not significant. Conclusion: Though demonstrating significantly higher levels of peripheral neuropathy symptomology, the DG performance on measures of fine motor control, strength, and dexterity was insignificant when compared to the CG. We believe that increasing the number of subjects will present a more accurate representation of fine motor performance in both groups.

Understanding Children's Subjective Well-Being
Mariah Niemeyer, Shaylee Aryn Heinert, Brenda Michelle DeLano
Occupational Therapy
Faculty/Staff Sponsor: Barbara Brockevelt, Shana Cerny

Background: Subjective well-being (SWB) is a multifaceted and complex concept. It encompasses many aspects of an individual’s life, including, but not limited to, perceptions of physical and emotional health, interpersonal relationships, and life satisfaction. Previous research has focused on children’s well-being through parental perspectives, however, it is indicated that parental reports of their child’s well-being may not adequately reflect the child’s perception of his/her own SWB. It has been found that children are capable of understanding their own SWB and should be considered equal participants in research involving themselves. Although many factors contribute to well-being, it has been established that engagement in occupations has a positive impact to one’s overall health and well-being. Purpose: The aim of this qualitative study was to gain an understanding of the occupations children engage in and how engagement in these occupations contribute to a child’s experience of well-being. Sample: Fifteen children, aged eight to thirteen-years-old, residing in the rural Midwest. Methods: Interviews were conducted using a modified version of the Multinational Qualitative Interview Protocol and the Paediatric Activity Card Sort. Qualitative data were coded using grounded theory methodology.
Interviews were transcribed and thematic analysis was conducted utilizing open coding, axial coding, and selective coding. Results: The narrative data explain how occupational engagement contributes to children’s wellbeing through 1) meaningful relationships, 2) identity formation, and 3) safety and dependability. Additionally, codes evolved which identified material objects and access to resources as precursors to meaningful occupational engagement. Conclusions: The results of this study support the significance of meaningful activity in children’s subjective well-being and expand our understanding of an ecological model of children’s subjective well-being.

The Role of Oxytocin in Young Adult Attachment Preference
Kami Pearson‡†
Counseling & Psychology in Education; Basic Biomedical Sciences
Faculty/Staff Sponsor: Harry Freeman

Previous research has shown that attachment transfer from parental figures to romantic partners normally occurs during young adulthood. However, it is unclear if oxytocin facilitates this change. Oxytocin (OT) is a neuropeptide produced in the hypothalamus that plays a role in a variety of biological processes but is classically known for its effects in sexual reproduction and intimacy. More recently, studies have shown the role oxytocin plays in social networks. For instance, oxytocin has been shown to increase an individual's readiness to recall and socially share event-related emotions. This willingness to share one's emotions facilitates bonding among individuals. In addition, recent research regarding oxytocin's role in episodic memory recall has been conducted. However, these studies have produced inconsistent results. Some studies demonstrate that oxytocin may have amnesic effects, while others show that recall is increased. The current study seeks to determine if individual's ability to recall and share emotional, episodic memories related to attachment figures within their social network changes after the administration of intranasal oxytocin (IN-OT) spray when compared to placebo. In addition, the current study seeks to determine if individual's perceptions of closeness to their attachment figures is altered after the administration of IN-OT spray when compared to placebo. Given the findings from animal studies that demonstrate oxytocin's modulating effects on monogamous sexual relationships, we hypothesize that the changes outlined above will be more pronounced in romantic relationships when compared to other relationship types. This study will provide important information about whether oxytocin plays a role in the transfer of primary attachment from a parent to a romantic partner. This question is particularly meaningful to emerging adulthood, a time when relationships are rapidly changing positions in attachment networks.

9b: 4:00-5:20 - Muenster University Center 216

Grandiose and Vulnerable Narcissism: Associations with Sexual Assault Tactics, Rape Myth Acceptance and Alcohol Use
Logan Welker*
Clinical Psychology
Faculty/Staff Sponsor: Raluca Simons

Sexual assault is prevalent on college campuses, with as many as 20-25% of college aged women likely to experience a completed or attempted rape (Fisher, Cullen & Turner, 2000). Research that attempts to better understand sexual assault tactics among perpetrators is imperative in order to better inform prevention and intervention strategies. Personality variables such as narcissism have been well studied in relation to perpetration. Vulnerable narcissism is related to perpetration via drugs and alcohol and with rape perpetration (Mouilso & Calhoun, 2016) while traits more consistent with grandiose narcissism like entitlement and exploitativeness are related to emotional manipulation and deception, exploitation of the
intoxicated, and force (Blinkhorn, Lyons & Almond, 2015). This suggests that vulnerable narcissists tend to use tactics that require fewer interpersonal skills while grandiose narcissists are more comfortable utilizing their social ability to perpetrate assault. The current study, like no study to date, will look at differential effect sizes of both grandiose and vulnerable narcissism in predicting specific perpetration tactics. We expect that grandiose narcissists will use more direct social tactics while vulnerable narcissists will resort to more forceful methods of manipulation. Alcohol use is hypothesized to moderate the relationship between narcissism and assault tactic while rape myth acceptance is hypothesized to moderate and mediate this relationship. Participants in this study will be 500 males between the ages of 18 and 25. This sample size will provide an appropriate amount of power for the proposed model. The hypotheses will be tested in Stata 15 (StataCorp, 2016) and MPlus (Muthen & Muthen, 2018) using path modeling. The findings of this study have important relevance for prevention and intervention by better identifying young adults at risk of perpetrating sexual assault and by increasing understanding of the tactics they might use.

**Genetically Informative Designs for the Study of Aging and Lifestyle Associated Biomarkers**

**Casey T Finicum**

**Basic Biomedical Sciences**

**Faculty/Staff Sponsor: Gareth Davies**

Within this project we have employed multiple genetically informative study designs in order to investigate genetic and environmental influences on a number of aging and lifestyle associated phenotypes. The first study utilizes blood and buccal derived DNA samples collected simultaneously in order to investigate telomere repeat mass (TRM) in both tissue types. Samples were collected from the Netherlands twin register (N=1892, MZ=1044, DZ=775), and thus allowed exploration into the heritability of TRM in both tissue types as well as the suitability of buccal derived DNA for TRM measurement. Buccal TRM measurements showed a significant correlation with both blood derived TRM measurements (R=0.39, p<0.01, R=0.36, p<0.01). Sex and age effects were observed within all tissue types as is the norm within blood-derived DNA. The buccal, blood-1, and blood-2 measurements generated heritability estimates of 23.3%, 47.6% and 22.2%, respectively. The second aspect of this work is focused on using multiple genetically informative study designs to understand the relationship between the gut microbiota and the host genomic profile as well as how the gut microbiota relates to lifestyle associated disease states such as obesity and metabolic syndrome. The four-corners design (extremes of genetic risk for body mass index (BMI) and of observed BMI (N=50) and the BMI discordant MZ twin pair design (N=30) were used in order to delineate the role of host genetics and the gut microbiota in the development of obesity. Our results highlight a negative association between BMI and alpha diversity of the gut microbiota. The low genetic risk / high BMI group of individuals had a lower gut microbiota alpha diversity when compared to the other three groups. We also identified 9 operational taxonomic units (OTUs) observed to be associated with either a leaner or heavier phenotype, with enrichment for OTUs classified as Ruminococcaceae and Oxalobacteraceae.

**Defining Molecular Mechanism Promoting Neointimal Hyperplasia by CSN8 Hypomorphism**

**Samiksha GiriGiri**

**Basic Biomedical Sciences**

**Faculty/Staff Sponsor: Xuejun Wang**

Neointimal hyperplasia is a pathological process where vascular smooth muscle cells (VSMC) proliferate and migrate into the innermost layer of the vessel wall, thereby narrowing the vascular lumen. This is a common process triggered by various vascular injuries such as stenting or surgical repair. The ubiquitin Proteasome System (UPS) is a mechanism for protein catabolism which through concerted action of series of enzymes, ubiquitin-activating enzyme (E1), ubiquitin-conjugating enzyme
(E2), and ubiquitin ligases (E3), marks the protein for proteasome degradation. Cullin RING Ligase (CRLs), are activated by neddylation. The COP9 signalosome (CSN) deneddylates CRLs and disrupts UPS. The CSN is a heteromeric complex consisting of eight protein subunits (CSN1-CSN8) among which CSN8 was reported to play an important role in maintaining the G1 phase of the cell cycle. Reduced expression of CSN8 impaired CSN-mediated deneddylation but accelerated the cell cycle rate. On the other hand, conditional ablation of CSN8 caused massive cardiomyocyte necrosis in mice. Ligation of common carotid artery (CCA) induces vascular injury and triggers neointimal hyperplasia in mice. Previous research in our lab had shown that CCA ligation triggered more severe neointimal thickening in CSN8 hypomorphic mice than in the littermate control mice (unpublished data), suggesting that downregulation of CSN8 promotes the neointimal formation in response to injury. My tentative thesis project will explore the mechanisms underlying this phenomenon. My initial focus will be on determining whether VSMC proliferation rate is enhanced by downregulation CSN8 in vivo and in vitro and whether the observed phenomenon is SMC autonomous. For the latter, a SMC CSN8 conditional knockout mouse model will also be used to study the role of CSN in hyperplasia. If enhanced VSMC proliferation is confirmed I will then assess the UPS-mediated turnover of related cell cycle regulators.

**Effects of Preoperative Education on Postoperative Outcomes Following Total Hip or Total Knee Arthroplasty**

Colton Ketelhut, Anna Ruppelt

Physical Therapy

Faculty/Staff Sponsor: Angela MacCabe

Total joint replacement is a common surgical intervention to relieve pain, improve function, and correct deformities.1 Although the research remains inconclusive regarding the post-operative benefits of preoperative patient education, positive outcomes have been associated with patient's satisfaction, expectations, preoperative anxiety, and a decreased length of hospital stay (LOS).2-6 Purpose: The researchers hypothesize that attending Total Joint Journey (TJJ) pre-operative education class will result in a positive effect on patients' post-operative satisfaction, expectations, length of stay, anxiety, and overall function. Methods: A retrospective chart review compared the effects of preoperative education. After applying inclusion and exclusion criteria, 59 subjects were included. Participants completed the Oxford Hip Scale or Oxford Knee Score, the Hip Dysfunction Osteoarthritis Outcome Score Jr. (HOOS Jr.) or Knee Injury Osteoarthritis Outcome Score Jr. (KOOS Jr.), the Hospital for Special Surgery Knee Replacement Expectation Survey (HES), the Six Item Short Form of Spielberger State Trait Anxiety Inventory (STAI), and the Short Physical Performance Battery (SPPB). Patient satisfaction, expectation, anxiety, and function were determined. Results: Paired t-tests calculated a significant difference between the pre- and post-test of the HOOS Jr. (p=.016), Oxford Knee (p=.000), KOOS Jr. (p=.000), STAI (p=.000), SPPB balance (p=.010), SPPB gait speed (p=.021), SPPB chair stands (p=.007), and SPPB total (p=.001). The pre- and post-data for the Oxford Hip score (p=.114) and the HES (p=.939) were not significant. The change score on each outcome measure were not significant based upon TJJ attendance (Oxford Knee Scale: p=.703, KOOS Jr.: p=.673, STAI: p=.073, HES: p=.920, SPPB Balance: p=.751, SPPB Gait Speed: p=.448, SPPB Chair Stands: p=.592, SPPB Total: p=.373, LOS: p=.368). Discussion/Conclusion: The data showed no significant results that supported the researchers' hypothesis. TJJ attendance did not result in a significant change in postoperative patient satisfaction, expectations, anxiety, self-reported and overall function, nor length of stay.
The purpose of this study was to identify the knowledge, use, and perceived value of an interprofessional, collaborative, approach among occupational therapists providing low vision services. Researchers examined differences in service delivery among occupational therapists in rural and urban areas in order to determine utilization and feasibility of providing interprofessional interventions for clients with low vision. The study utilized a non-experimental cross-sectional design through dissemination of an online survey (Portney & Watkins, 2015). The cross-sectional survey design was determined to be the most appropriate for this study because it is an efficient method to enhance understanding and draw conclusions at a single point in time. Initial results of the survey were gathered from 12 occupational therapy practitioners, representing all regions of the U.S. Respondents were from rural (n=3), midsized (n=4), and urban (n=6) locations using defined demographic information located in the survey. Additional results to be presented during presentation. Current results indicate practitioners from urban areas are more likely to collaborate with ophthalmologists (p= .019) and orientation & mobility specialists (p=.046). No respondents reported collaborating with physical therapists. Those working in rural areas were more likely to report barriers regarding uncertainty in how to access other professionals. Despite all respondents reporting collaboration with other professionals, 91.7% reported limited time as a barrier to collaboration. Methods of collaboration occurred via phone (76.9%), e-mail (61.5%), and face-to-face interactions (38.5%). Finally, while respondents reported they agreed their clients would benefit from additional collaboration (M=1.3, SD = .49), they agreed less regarding the need to learn more about professionals with whom to collaborate (M=1.5, SD = .79).

Discussion: All study participants reported collaboration with other professionals when treating clients with low vision despite noted barriers. Collaboration due to the complexity of client's needs is critical among this population.

Axons of the corpus callosum (CC), the white matter tract that connects the left and right hemispheres of the brain, receive instruction from a number of chemoattractant and chemorepulsant cues during their initial navigation towards and across the midline. While it has long been known that the CC is malformed in the absence of Myristoylated alanine-rich C-kinase substrate (MARCKS), evidence for a direct role of MARCKS in axon navigation has been lacking. Here, we show that MARCKS is necessary for netrin-1 (NTN1) signaling through the DCC receptor, which is critical for axon guidance decisions. Marcks null (Marcks−/−) neurons fail to respond to exogenous NTN1 and are deficient in markers of DCC activation. Without MARCKS, the subcellular distributions of two critical mediators of NTN1-DCC signaling, the tyrosine kinases PTK2 and SRC, are disrupted. Together, this work establishes a novel role for MARCKS in axon dynamics and highlights the necessity of MARCKS as an organizer of DCC signaling at the membrane.
The Influences of Naturally Cycling Sex Steroids on Neural Mechanisms Underlying Fear Conditioning
Aaron Fleischer†‡
Faculty/Staff Sponsor: Gina Forster

Women experience PTSD symptoms more greatly and for longer periods of time than men, but rat literature suggests the opposite: male rats condition to fearful contexts more greatly than female rats. However, it must be acknowledged that less than 2% of neuroscience studies focusing on memory and learning utilize female subjects, and those that do often utilize ovariectomy to limit the influences of fluctuating sex steroids, namely progesterone (P4) and estradiol (E2). Therefore, more studies are necessary for the understanding of learning and memory in naturally-cycling animal models. The current study aimed to develop a better understanding of the molecular mechanisms underlying differences in fear learning between the sexes. Footshock and freezing in context were used as measures of contextual fear conditioning. Male rats conditioned better than females at two different phases of their estrus cycles, namely the proestrus phase and the diestrus phase, which are characterized by their differences in P4 and E2. This study examined the learning-associated proteins, Brain-Derived Neurotropic Factor (BDNF) and NMDA receptor subunits, in the hippocampus and amygdala, two regions critical for fear conditioning, as potential mechanisms underlying these learning differences. Previous literature suggests that expressions of these critical proteins are affected by E2 and/or P4 levels. Immunohistochemistry showed that males had significantly greater subfield-specific expressions of BDNF in the hippocampus and the amygdala than diestrus females. Proestrus females did not differ in BDNF expressions in the hippocampus or amygdala when compared to either their male or diestrus counterparts. There were no differences noted in NMDA receptor subunit expressions between the sexes. These results suggest naturally cycling E2 and P4 and the lack thereof produce differential expressions of BDNF but not NMDA subunits, which may promote long-term potentiation in males more than diestrus females, thereby allowing greater fear acquisition.

Ubiquitin C-terminal Hydrolase L1 Regulates Oxidative Metabolism in Skeletal Muscles
Hongbo Gao
Basic Biomedical Sciences
Faculty/Staff Sponsor: Yi-Fan Li

Ubiquitin C-terminal hydrolase L1 (UCHL1) is predominantly expressed in neurons, and accounts for 1-3% of total brain protein concentration. UCHL1 is believed to serve as a deubiquitinase to maintain ubiquitin pool in nervous system, and mutation of UCHL1 is implicated in the development of neurodegenerative diseases. However, the role of UCHL1 in skeletal muscles is still unknown. This study was to detect if UCHL1 is expressed in skeletal muscles, and if so, what is the functional role of UCHL1 in skeletal muscle. We used C2C12 mouse myoblasts as our in vitro model, and UCHL1 skeletal muscle specific knockout mice as in vivo model. UCHL1 was detectable in C2C12 cells, and the protein level of UCHL1 was gradually downregulated during cell differentiation. Knockdown UCHL1 expression accelerated cell differentiation, suggesting UCHL1 inhibits myoblast differentiation. UCHL1 was not ubiquitously expressed in all C2C12 cells, rather UCHL1 was detectable in subgroup of cells but not in others. Similarly, in mouse muscles, UCHL1 was selectively expressed in type I and IIa muscle fibers but not in type IIb ones. Given that type I and IIa fibers rely on oxidative metabolism and type IIb prefers to glycolytic metabolism to provide ATP, UCHL1 could be involved in the regulation of energy metabolism. Histochemical staining showed abnormal morphology of skeletal muscles with UCHL1 specific knockout. Meanwhile, type I and IIa fibers in gastrocnemius possessed reduction in oxidative capability, as well as enhancement in glycogen storage. Furthermore, the elevation of insulin receptor substrate 1 and AKT abundances were present in UCHL1 knockout muscles, suggesting the aberrant accumulation of glycogen in oxidative fibers may be caused by abnormal enhancement of
insulin-mediated glycogenesis in oxidative fibers. Taken together, our data suggest that UCHL1 is involved in the regulation of oxidative metabolism in type I and IIa muscle fibers.

**Genetically Modeling PKA-mediated Proteasome Priming in Mice**

Liuqing Yang  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Xuejun Wang

The ubiquitin-proteasome system (UPS) plays a major role in the degradation of misfolded proteins in all eukaryotic cells. Proteasome functional insufficiency is implicated in various cardiac diseases, making proteasome a promising target for therapeutic purpose. Emerging evidence indicates that proteasome activity in the cell is rigorously regulated. A study using cell cultures showed that protein kinase A (PKA) positively regulates proteasome function through directly phosphorylating Serine14 of Psmd11, a non-ATPase of the 19S proteasome. Previous studies from our lab have demonstrated protein kinase G (PKG)-mediated proteasome priming and its protection against proteinopathy in cardiomyocytes. More recent work from our lab suggested that phosphodiesterase1 (PDE1) inhibition facilitates UPS-mediated protein degradation through duo-stimulation of PKA and PKG, and effectively attenuates heart failure with preserved ejection fraction in the mice with cardiac proteinopathy. To confirm PKA-mediated proteasome priming in intact animals and to aid further investigation into the physiological and pathophysiological significance of this regulation, our lab has recently utilized CRSPR/Cas9 gene editing to generate two mouse lines in which Psmd11 is mutated by replacing Ser14 by Ala (Psmd11-S14A) for blocking PKA-mediated phosphorylation or by Asp (Psmd11-S14D) for mimicking this phosphorylation. My thesis project will include tentatively 3 main specific aims. Aim 1 will test whether PKA-mediated proteasome priming is blocked and mimicked respectively. I will take advantage of a UPS reporter (GFPdgn) mouse model and monitor proteasomal peptidase activities in various tissues at baseline and after pharmacological PKA activation. Aim 2 will determine the phenotype of both mouse models at baseline, by characterizing general health and cardiac morphology and function. Aim 3 will test the contribution of PKA-mediated proteasome priming to the beneficial effect of PDE1 inhibition on treating proteinopathy. Transgenic CryAB<sup>R120G</sup> will be introduced into the genetically modified or wild-type mice and the therapeutic effects of PDE1 inhibition will be compared.

**Learning, Motivation, and Fear Contribute to Anxious Responses during Social Stress**

Jazmine DW Yaeger  
Biology  
Faculty/Staff Sponsor: Cliff H Summers

The exact relationship between motivated, learned, and fear responses remains highly elusive despite the dynamic interconnected nature of each component during a stressful situation. The hypothalamic-generated orexins (OrxA and OrxB) are important for the modulation of drive, decision-making, and arousal. These neuropeptides are modified in concert with neurotrophins, like brain-derived neurotrophic factor (BDNF), during episodes of social stress. While changes in BDNF are linked to fear learning and the phenotypic expression of anxious and depressive behaviors, a parallel role may be associated with erythropoietin (EPo). The Stress Alternatives Model (SAM) is a modified social defeat paradigm, in which a smaller mouse is provided an opportunity to escape from a larger aggressive mouse or remain submissively in the arena. Throughout four days of SAM interaction, a mouse must execute decision-making in a fear-provoking environment. As such, the SAM incorporates aspects of motivational states with learning in stressful situations. We demonstrated the anxiolytic (Escape) and anxiogenic (Stay) phenotypes derived from the SAM can be partially manipulated through prior exposure to the escape route. Furthermore, animals expressing the Escape phenotype, regardless of escape experience, displayed a resilient response to the Social Interaction/Preference (SIP) Test.
Targeting whole brain orexin 2 receptors (Orx$_2$) with the antagonist MK-1064 reversed escape behavior by 50% in the SAM and diminished resilient responses in the SIP Test. Alternatively, the Orx$_2$ agonist [Ala$^{11}$,D-Leu$^{15}$]-Orexin B increased resilient expression in non-escaping mice. Treatment with intracerebroventricular (icv) infusions of carbamoylated EPo (cEpo) reversed 30% of anxiogenic responses (Stay to Escape) in the SAM arena. In addition, cEpo promoted nearly 100% resiliency, regardless of phenotype, in the SIP Test. Together, these results demonstrate the expression of anxious behaviors requires modulation of learning, motivation, and fear. While each plays a unique role during anxiogenic responses, all contribute to the formation of anxious phenotypes.

9d: 4:00-5:20 - Muenster University Center Pit
Rural South Dakota Healthcare Issues: Isabel, South Dakota
Marley Hanson, Tamee Eloise Livermont, Carter Kerber, Jace Jenson
Business Law
Faculty/Staff Sponsor: Matthew Fox

Rural South Dakota towns face many hardships, one of the most important being access to quality, affordable healthcare. In Isabel, South Dakota, the Department of Veterans Affairs (VA) had an agreement with the Horizon Community Health Clinic, to provide healthcare to Veterans in this area. The VA decided to rid of this agreement in 2016. Through interviews with healthcare officials, community members, and other individuals involved in this process, we have been able to get a closer look at why rural communities face healthcare hardships and the effects of losing healthcare facilities in these communities.

Rural Healthcare Facility Closure: Impact on Rural Communities
Ward Reesman, Tomas Kamenik, Hannah Trierweiler, Alexander Steinley
Business Law
Faculty/Staff Sponsor: Matthew Fox

Rural areas in the United States, including South Dakota, are facing the problem of frequent health facility closure. This leads to less accessible healthcare for the population, including veterans, living in rural areas. In addition, medical facility closures cause some of the best paying jobs in these rural communities to relocate, which might lead to further population decline. This research focuses on the closure of Holy Infant Hospital in Hoven, SD and its consequences on the community there. Finally, the research should determine whether the community could have prevented the closure of hospital, or taken a different action to minimize the negative consequences of closure. The research is part of UHON 390 - Grand Challenges honors seminar.

Understanding the End of a Partnership Between the VA and the Community Clinic in Faith, South Dakota
Jaedon Foreman, Jack Sternburg, Dylan Fox
Beacom School of Business
Faculty/Staff Sponsor: Matthew Fox

Healthcare facilities often struggle in rural areas. Recently, the United States Department of Veteran's Affairs (VA) partnership with the community health clinic in Faith, South Dakota has been discontinued and our group was tasked to look into the issue. To investigate, we have planned to interview several people with unique perspectives regarding the situation. So far, we have talked to the county commissioners office, who directed us towards other sources. Next we had a discussion with Sanford Vermillion Medical Center. They stressed the importance for rural communities to have facilities they
can actually maintain. Later we had a class-wide interview with the VA Black Hills Health Care System. They said that the contract system was too limiting and instead, switched to the CHOICE program. To ease veterans into the change, the VA met with each of the roughly 100 to coordinate a new way to get healthcare. Many now get medical care through telemedicine. In the future, we hope to interview people from the community clinic in Faith and the city government. When these interviews are completed, we will understand the situation involving in the VA activity in these areas and we would be in a better position to start improving the city.

**Healthcare Sustainability in Rural Communities in South Dakota**

Tyler Austin Pahl, Kevin Nam, Logan Schiebout

Honors Program

Faculty/Staff Sponsor: Matthew Fox

Within South Dakota, specifically within rural communities as a whole, healthcare (whether that be the overall service or facilities) has become an important issue. For a rural community, the rural healthcare is a problem that underlies both the demographic shift and the rapid decline of many rural communities within the United States. This particular project is part of a larger research project which aims to both evaluate and diagnose the extent of how prevalent the problem is within the state of South Dakota. Through subject interviews and multiple trend analysis, this project aims to create an accurate depiction of the underlying community issue, and pose possible solutions that rural communities can take to mitigate the damage. The focus on this particular project revolves around the town of Faulkton, which recently built a new healthcare facility for the community. This project discusses the overall sustainability and the economic trend that might impact the overall longevity of the facilities, and ultimately the town as a whole. With rapid changes on what effective healthcare truly is, the project attempts to forecast the best way possible for small rural towns to live within their means. With healthcare as a service becoming more technological and flexible, the project concludes that the current rural demand for traditional medical facilities are unsustainable, if not dangerous. Especially as the trend seems to point in the direction that small, rural hospitals are becoming obsolete while larger facilities in larger towns are becoming the new trend. Without the adaptation of the new healthcare system, rural communities will see further declines of their communities.

**Appendix B: Poster Session Abstracts**

**Wednesday Poster Session #1**

**Poster 1**

The Role of Endocannabinoids in Producing Injury-Induced Sensitization

Megan Jorgensen

Basic Biomedical Sciences

Faculty/Staff Sponsor: Brian Burrell

It is estimated that 52% of patients treated in a primary care setting have a diagnosis of chronic pain. These patients have limited treatment options, each with questionable efficacy, which has led to an interest in developing cannabinoid-based analgesics. Endocannabinoids are traditionally thought to have an analgesic effect, however, it has been shown that endocannabinoids can depress nociceptive signaling and enhance non-nociceptive signaling. Therefore, endocannabinoids have the potential to contribute to non-nociceptive sensitization after an injury. Using Hirudo verbana (the medicinal leech), a model of injury-induced sensitization was developed in which a reproducible puncture injury was delivered to the posterior sucker of Hirudo. Injury-induced changes in the non-nociceptive threshold of Hirudo were
determined through testing with Von Frey Filaments and changes in the response to nociceptive stimuli were tested by measuring the latency to withdraw to a nociceptive thermal stimuli (Hargreaves apparatus). To test the potential role of endocannabinoids in mediating injury-induced sensitization, animals were injected with tetrahydrodipistatin (THL), which inhibits the synthesis of the endocannabinoid transmitter 2-arachidonoylglycerol (2-AG). Following injury, we did observe a significant decrease in the non-nociceptive response threshold (consistent with non-nociceptive sensitization) and a significant decrease in the response latency to nociceptive stimulation (consistent with nociceptive sensitization). Injection of 100µM THL did decrease non-nociceptive sensitization, but also resulted in a significant decrease in the non-nociceptive threshold in the non-injured group, suggesting that THL is having a sensitizing effect on its own. Injection of 50µM THL resulted in a decrease in non-nociceptive sensitization in the injured animals without having a negative impact on the non-nociceptive threshold of the non-injured group.

**Poster 2**

Skeletal Muscle Secretion of Interleukin-6 is Muscle Type Specific: The Ex Vivo Evidence

Ashley Paula Liang, Hongbo Gao
Basic Biomedical Sciences
Faculty/Staff Sponsor: Yifan Li

Emerging evidence indicates that skeletal muscles secrete various peptides and proteins, termed myokines, to regulate tissue function and metabolism in an autocrine, paracrine, or endocrine manner. Interleukin-6 (IL-6) is a well-known myokine that is involved in skeletal muscle performance, muscle injury and regeneration, and metabolism. However, mechanisms by which skeletal muscles express and secrete IL-6 remain to be fully understood. Objective: establish an ex vivo incubation setting to compare IL-6 secretion in two different types of skeletal muscles. Soleus and extender digitorum longus (EDL) muscles were isolated from anesthetized mice. Washed twice with Krebs solution, muscles were incubated in 200 ul of fresh oxygenated Krebs solution with or without a secretion stimulant. Following 90 minutes incubation, the solution and muscle were collected. IL-6 level in the solution was measured using Western blot. Results and discussion: IL-6 protein level was significantly increased in the soleus incubation solution containing the stimulant as compared with the control. In contrast, IL-6 protein level was nearly undetectable in the EDL incubation solution either with or without the stimulant. Soleus muscle is predominantly composed of slow twitch oxidative fibers whereas EDL is a typical fast twitch glycolytic muscle. Our result indicates that skeletal muscle secretion of IL-6 is muscle type specific, suggesting that muscle derived IL-6 may be involved in specific function and metabolism.

**Poster 3**

Characterization of Interferon Expression in Influenza Virus-Infected Human Epithelial and Fibroblast Cells

Raegan M Nelson
Basic Biomedical Sciences
Faculty/Staff Sponsor: Victor Huber

Bacterial superinfection (BSI) continues to be the leading cause of influenza-related deaths every year. Using mouse models, research has shown that the well-used lab strain of influenza, PR8 (H1N1), causes a lethal BSI while the TX98 (H3N2) swine isolate yields survival after a BSI. In addition, we have previously shown that when the influenza virus nonstructural-1 (NS1) gene in PR8 is truncated, the lethal BSI phenotype is lost in mice. The NS1 gene expressed by influenza viruses contributes to virus evasion of the host immune response through inhibition of the type I interferon (IFN) system. The IFN response is made up of signals released by the immune system in response to viral infection, and it is composed of a family of IFN proteins. Expression of IFN-beta and IFN-alpha correlate with BSI
susceptibility in mice and our lab is interested in the contribution of these cytokines toward BSI in humans. Since we know influenza NS1 protein and host IFN signaling both contribute to BSI outcomes, our lab plans to elucidate the protective interactions behind viral NS1 protein and host antiviral immune responses. To accomplish this, we are characterizing the full interferon response in human cell lines (A549 and HAP1) after infection with PR8, TX98, or Truncated PR8. Using one-step qRT-PCR, RNA expression of IFN is being measured in these infected cell lines. The supernatant collected from infected cells will be used to measure the expression of IFN at the protein level. The differences observed will allow us to identify host cell targets for future experimentation. Characterizing the mechanism of protection seen in the TX98 and Truncated PR8 flu isolates can lead to potential antiviral and antibacterial therapy against BSI, with the ultimate goal of helping to save thousands of lives every year.

Poster 4
Leech Genome Assembly Project: Workflow and Quality Control
Riley Terrill Paulsen
Basic Biomedical Sciences
Faculty/Staff Sponsor: Brian Burrell

Endocannabinoids are a class of lipid neurotransmitters involved in the regulation of nociception. Due to their hydrophobic nature, lipid transmitters are synthesized upon demand and released by postsynaptic cells to function as retrograde messengers. The medicinal leech, Hirudo verbana, provides an excellent system to study endocannabinoid-induced synaptic plasticity and its connection to nociception-stimulated learning because of the intrinsic accessibility and conserved arrangement of its neurons for electrophysiological and molecular manipulation. However, one barrier to the development of molecular assays for analyzing the regulatory functions of enzymes in endocannabinoid metabolism pathways is the lack of a reliable Hirudo genome. Genomic DNA from Hirudo was sequenced with Illumina HiSeq 2500. The sequence data was inspected for quality control and Illumina TruSeq Long-Reads were assembled by Illumina BaseSpace and TruSpades analysis software. These long reads were then assembled using two primary assembler programs - Velvet and Spades. This work provides a comparison of the de novo genome assemblies, in addition to the workflow. Our results support that the TruSpades algorithm for long read assembly is better suited for to process the TruSeq Long-Reads. Also given are BLAST results for the genome against sequences collected from our laboratory. These results will be integrated into a larger pipeline to compile and interpret the existing biological data sets surrounding endocannabinoid and nociception research to aid in predictive statistics through machine learning and systems biology.

Poster 5
Computational Analysis of Ligand-Receptor Interactions in Wild-Type and Mutant Erythropoietin Complexes
Nicholas John Pekas
Basic Biomedical Sciences
Faculty/Staff Sponsor: Samuel Sathyanesan

Erythropoietin (EPO), a pleiotropic cytokine, binds to its receptor (EPOR) in bone marrow and activates signaling cascades that result in the proliferation of erythrocytes. A recently discovered naturally-occurring EPO mutation at the R150 residue (R→Q) at Active Site 1 (AS1) has been shown to attenuate its canonical signaling pathway, eliminating its erythropoietic effects and bearing symptomology similar to Diamond-Blackfan Anemia. This, coupled with EPO's potential neurotrophic and neuroprotective effects, has caused an increased interest in the mechanism behind the EPO-EPOR complex. We employed a computational structural biology analysis and molecular dynamics simulations to determine the key interaction differences between the naturally occurring R150Q mutant and the wild type form of
EPO. Both were also compared to another variant mutated at the same position, R150E, which is known to have low bioactivity. The simulations showed significant ligand-receptor interaction changes at position 150 for all variants, and those changes were used to propose an underlying mechanism of the bioactivity changes of the EPO-EPOR complex.

Poster 6
CMA-targeting Peptide Technology as a Novel Therapeutic Approach to Deplete p62 Levels and Corresponding Pathology
Filip Radev††
Basic Biomedical Sciences
Faculty/Staff Sponsor: J. Scott Pattison

Protein aggregate formation due to protein misfolding is a primary cause of many diseases. The main focus of our project is on p62 protein which is known to be increased by several types of cell stress and pathological signaling pathways leading to protein aggregation and disease. Prior research by the Pattison lab shows that p62 plays an essential role in tumor necrosis factor-alpha (TNFα)-NF-κB signaling pathway, protein aggregation, and cardiomyocyte pathology. In this pathway, NF-κB functions as a transcription factor that responds to harmful cell stimuli that is induced by TNFα. TNF-α is induced by stresses like sepsis, and has been shown to cause cardiac hypertrophy and heart failure. Previous studies by the Patterson lab show that gene silencing or knockout of p62 attenuates cardiomyocyte pathology caused by expression of CryABR120G, an αB-crystallin R120G mutant protein which causes desmin-related cardiomyopathy and heart failure. The same concept can be applied to alleviate TNFα induced stressors through p62 knockout. Our lab has also been working on a new technology called Chaperone-Mediated Autophagy (CMA)-targeting peptides, specifically designed to bind to a protein and target it for degradation to the lysosome by CMA. The goal of this project is to test the ability of CMA-targeting peptides to deplete p62 protein levels. Results: We added increasing doses of recombinant CMA-targeting peptides targeted to deplete p62 protein in cultured rat neonatal cardiomyocytes. Immunoblots confirmed that the HA-tagged CMA-targeting peptide entered into the cardiomyocytes. Similarly, immunoblots showed that treatment with a p62-targeting peptide for 48 hours successfully knocked down p62 protein levels in a dose-dependent manner. A cytotoxicity assay showed that increasing doses of p62-targeting peptides did not induce toxicity. Conclusion: These data show that CMA-targeting peptides can successfully target p62 protein for depletion in cardiomyocytes, but additional studies are needed to show reduced pathology.

Poster 7
Nanoparticle Uptake Assay to Demonstrate the Role of Fc Receptor-Mediated Phagocytosis in Influenza Immune Response
Jackson Shriver††
Basic Biomedical Sciences
Faculty/Staff Sponsor: Victor Huber

Influenza is a virus that annually kills up to 500,000 people worldwide. Vaccination can significantly minimize the severity of an influenza virus infection, but these vaccines are not 100% effective at preventing and eliminating infections. The target of vaccine-induced immunity is the hemagglutinin (HA) protein expressed by the virus, and antibodies that bind to the HA protein and can either neutralize the virus or increase clearance through opsonophagocytosis. Since virus neutralization requires high levels of antibodies, which may wane between vaccination and infection, antibodies that enhance opsonophagocytosis are critical for maintaining anti-influenza immunity later during the season. Previous work in the Huber lab has shown that Fc receptors contribute to the clearance of influenza viruses after vaccination, but the exact mechanism remains undefined. We have developed the
hypothesis that certain Fc receptor genes have a more significant impact on clearance of Influenza virus. To test this, we have designed an uptake assay using silica nanoparticles that simulate virus-associated opsonophagocytosis in macrophage cells. These pseudo virions were synthesized from silica nanoparticles and dyed with a fluorescent label. Hemagglutinin protein from various strains of influenza were then attached to the nanoparticles. Using antibodies, uptake of nanoparticles was monitored using fluorescent microscopy and flow cytometry. Future directions involve further optimization the assay, comparison of monoclonal antibodies and polyclonal antibodies, and using cell lines that have had Fc receptor genes inhibited to determine host genes that contribute to opsonophagocytosis.

Poster 8
Carbamylated EPO Induced Gene Regulation in Neuronal Cells
Neeraj Kumar Tiwari
Basic Biomedical Sciences
Faculty/Staff Sponsor: Samuel Sathyanesan

Erythropoietin (EPO), is a cytokine molecule which is best-known for its role in erythropoiesis. It is also being clinically tested for the treatment of neuropsychiatric illnesses due to its neurotrophic and neuroprotective effects. A major limitation of EPO is that long-term administration stimulates excessive red blood cell production and increased blood viscosity. A chemical modification of EPO, carbamoylated erythropoietin (CEPO), exhibits the angiogenic and neurogenic functions of EPO but does not stimulate erythropoiesis. The molecular mechanisms involved in the behavioral effects of EPO and CEPO are still not known. To study CEPO induced gene expression in neuronal cells we used PC-12 cells as the neuronal cell line. For this study, we treated PC-12 cells with CEPO for 3 hours and then conducted a genome-wide microarray study. To examine the functional significance of the gene expression profile from the microarray analysis we employed a bioinformatics software package called Ingenuity pathway analysis (IPA). This revealed activation of signaling cascades for neurogenesis such as NGF, CREB and Neurotrophin signaling and signaling cascades for long-term potentiation such as synaptic long-term potentiation signaling. Some of the upregulated genes from these pathways are CAMK2D, EGR1, FOS, GRIN1, KIF1B, NOTCH1. CEPO treatment can induce expression of genes and signaling mechanisms that have roles in neurogenesis and memory formation and thus makes the case for further development of CEPO as a candidate molecule for the treatment of psychiatric disorders.

Poster 9
Adolescent Social Defeat Disrupts Working Memory in Adulthood: Consequences of Reduced Prefrontal Cortex Dopamine
Matthew Weber
Basic Biomedical Sciences
Faculty/Staff Sponsor: Mick Watt

Teenage bullying is associated with greater prevalence of adult psychiatric disorders characterized by impaired executive function, particularly working memory. This suggests disrupted development of the medial prefrontal cortex (mPFC) dopamine system, as working memory is reliant on optimal dopamine release and D1 receptor activation in the mPFC. Male rats exposed to adolescent social defeat (model of teenage bullying) show deficits in adult working memory, which we hypothesize results directly from a previously observed mPFC dopamine hypofunction. To test this, we determined the effect of brief restraint on subsequent working memory, as this manipulation is known to evoke acute mPFC dopamine release. Adolescent rats underwent daily social defeat from postnatal day (P)35-39, while age-matched controls were exposed to novel environments in the absence of social aggression. In early adulthood (P56+), working memory was assessed using a novel object recognition task, with half of the subjects experiencing acute restraint immediately prior to behavioral testing. As expected, previously defeated
non-restrained rats displayed impaired working memory compared to non-restrained controls. In line with previous research, working memory in controls was impaired by acute restraint stress. However, the defeat-induced working memory impairment was reversed by restraint, suggesting that this acute stressor sufficiently increased mPFC dopamine to restore performance to control levels. This implies a direct relationship between cognitive deficits and the mPFC dopamine hypofunction induced by adolescent defeat. To confirm this, we directly activated mPFC dopamine D1 receptors pharmacologically, which restored working memory in defeated rats. In addition, we will block mPFC dopamine D1 receptors, which should prevent both the improvement in performance caused by restraint in previously defeated rats and the restraint-induced working memory deficits in controls. Together, these findings provide mechanistic understanding of how adolescent stress exposure can have a negative impact on cognition in later life.

**Poster 10**

**Contributions of the Influenza Virus Hemagglutinin Globular Head and Stalk Domains to Virus Pathogenesis**

Patrick Wilson‡†

Basic Biomedical Sciences

Faculty/Staff Sponsor: Victor Huber

Influenza is a pathogenic virus that exploits its host, often leading to serious illness or even death. The influenza virus is made up of eight RNA segments, one of which encodes the protein hemagglutinin (HA). HA resides on the surface of the influenza virus, and interacts with host cells to initiate an infection. HA is characterized by its two distinct domains, the globular head and the stalk region. The globular head is responsible for recognition and binding to host cells, while the stalk controls the intracellular fusion of the virion, which is required to initiate infection. Previous experiments revealed differences in pathogenicity between two distinct influenza A viruses, known as PR8 and TX98. PR8 and TX98 successfully infect MDCK cells, but PR8 infection is greatly reduced in SD-PJEC (South Dakota porcine jejunum epithelium cells). Contradictorily, PR8 results in a 0% survival rate in a virus:bacteria superinfection model, while TX98 results in 80% survival (Weeks-Gorospe et al., 2012). We have shown that the HA contributes to the differences between these two viral strains, but the contribution of the globular head and stalk remain undefined. We hypothesize that these domains of the HA protein make individual contributions to the pathogenesis observed in SD-PJEC cells and mice. Two reciprocal HA constructs have been created to define the individual contributions of the globular head and the stalk to the differences in infectivity for PR8 and TX98. An eight plasmid reverse genetics system is currently being employed to rescue infectious viruses containing the constructed chimeric HAs. Additionally, protein analyses are being performed to detect the expression of chimeric HA in cells. Understanding the specific role for HA in pathogenicity will allow us to determine whether future vaccines and therapeutics should target the HA globular head or the stalk.

**Poster 11**

**Inhibition of Type 1 Phosphodiesterse Confers Therapeutic Benefit to Proteinopathy-based HFpEF in Mice**

Hanming Zhang

Basic Biomedical Sciences

Faculty/Staff Sponsor: Xuejun Wang

Heart Failure with preserved Ejection Fraction (HFpEF) has overtaken Heart Failure with reduced Ejection Fraction (HFrEF) and represents more than 50% of heart failure cases, yet no pharmacological therapy with mortality benefits has been identified. Targeted clearance of misfolded proteins by the ubiquitin-proteasome system (UPS) plays a pivotal role in protein quality control. UPS function
insufficiency contributes to HF genesis, making UPS priming a potential therapeutic strategy for treatment of HF. Previously we reported that protein kinase G (PKG) positively regulates cardiac UPS functioning while others showed protein kinase A (PKA) stimulates the proteasome. Thus, we hypothesize that simultaneous activation of PKG and PKA improves cardiac UPS function and thereby benefits HF treatment. We found that myocardial protein and mRNA levels of phosphodiesterase 1 (PDE1), a major cardiac PDE that degrades both PKG and PKA, were markedly elevated in CryABR120G transgenic (tg) mice which are a classic model of cardiac proteinopathy with HFpEF as the major manifestation of its cardiac dysfunction. To test whether PDE1 inhibition primes cardiac UPS and thereby ameliorates cardiac proteotoxicity, we performed cell cultures and mouse in vivo experiments taking advantage of a proven surrogate UPS substrate (GFPdgn) and a bona fide misfolded protein (CryABR120G), which demonstrates that pharmacological PDE1 inhibition significantly improves cardiac UPS performance and enhances degradation of misfolded proteins. We then treated CryABR120G tg mice with PDE1 inhibitor LSN2790158 (3mg/kg/day x 28 days) or vehicle control via osmotic mini-pumps, starting at 4 months of age when HFpEF has clearly developed in the tg mice as reflected by significant decreases in left ventricular (LV) end-diastolic volume, stroke volume, and cardiac output and increases in end-diastolic LV posterior wall thickness along with unchanged EF (>50%), compared to littermate non-tg mice. Echocardiography revealed that the PDE1 inhibitor treatment resulted in striking improvement of HFpEF. And Kaplan-Meier survival analysis shows a significant delay of premature death in the PDE1 inhibition group vs. vehicle-treated group. Additionally, PDE1 inhibition group showed significant reduction of NP-40 insoluble but SDS soluble fractions of CryAB that represent a misfolded species of CryAB degraded by the proteasome, suggesting that the cardioprotective effect of PDE1 inhibition is, at least in part, due to enhanced removal of misfolded proteins. Our data provide compelling evidence for the first time that PDE1 inhibition shall be explored as a new therapeutic strategy for HFpEF and heart disease with increased proteotoxic stress.

Poster 12
Java Dockerfile UI
Malan Moody
Biomedical Engineering
Faculty/Staff Sponsor: Carol Lushbough

When researchers locate an analytic tool that will help them analyze their data, the next big hurdle is getting that tool and its dependent libraries installed on a local computer. This project, the Java Dockerfile UI, simplifies this process by helping to automate the creation of Docker Images. It can be used to create and edit Dockerfiles, which are text files containing the instructions to build Docker Images. This keeps the analytic tool and all of its dependencies in one platform independent container, allowing it to run on any machine with Docker installed, regardless of the host system's settings. As an example, the system is demonstrated using the Bowtie 2 analytic tool, a program used for DNA sequence alignment and analysis. This analytic tool can be very difficult to install due to its platform dependencies. The Java Dockerfile UI is used to create a Dockerfile for Bowtie2 which includes all required installation commands. This Dockerfile can then be used to build a Docker Image, containing the Bowtie 2 tool and its dependencies. The Dockerfile and Dockerfile Image are platform independent and can be easily installed on any machine that runs Docker.
Poster 13

Fabrication of a Novel 3D Scaffold for Bone Tissue Engineering

Yangxi Liu*

Biomedical Engineering

Faculty/Staff Sponsor: Hongli Sun

Bone structure is a simple construction containing collagen, hydroxyapatite, proteins, and water. Inorganic compound, hydroxyapatite, provide strength and rigidity, while collagen, organic element, offer tension. Large critical-sized bone defects present a major clinical challenge because it is unable to be healed by the natural process. The inability to restore bone without healthy bone tissue and formation is a main area of focus because when defect size is greater than the healing ability of the osteogenic tissues, fibrous connective tissues begin to dominate the bone defect area. Current treatment of large bone defects utilizes bone graft surgery; however, limitations such as inflammation and donor site morbidity arise. Therefore, the research goal of this project is to develop novel bio-mimetic nano-fibrous 3D hydroxyapatite-gelatin scaffold with immobilized small molecule for concentrated drug delivery in order to minimize initial drug loss and maintain sustained localized release to modify osteogenesis and inflammation, while eliminating potential dangerous side effects and achieve beneficial therapeutic impact.

Poster 14

Incorporation of Therapeutic Drugs into Hydroxyapatite-modified Microspheres for Local and Controlled Delivery to Improve Tissue Healing and Repair

Eric Sandhurst*

Biomedical Engineering

Faculty/Staff Sponsor: Hongli Sun

Bone tissue engineering strategies seek to address the challenges affecting the repair and healing of critical-sized defects through the development of scaffolds to deliver exogenous stem cells, therapeutic drugs and growth factors to the wound site. Certain growth factors and drugs have been studied for their use in tissue regeneration and wound repair, specifically for promoting cell proliferation and differentiation, as well as deposition of proteins that make up the extracellular matrix. However, there exist clinical challenges to effectively delivering these molecules directly to the wound site in a controlled manner. To address this challenge we have developed an injectable biodegradable material composed of biocompatible materials. During this project, the surface of multifunctional porous (poly) lactic-co-glycolic acid (PLGA) microspheres were functionalized with crystals of the inorganic bone mineral, hydroxyapatite (HA), during a two-phase nucleation and deposition method. First the porous PLGA microspheres were immersed in a simulated body fluid (SBF) solution for 6, 12 and 24 hours during which a model dye, Rhodamine B, was entrapped within small nucleation crystals on the surface. During the second phase, the nucleated microspheres were immersed in a calcium-phosphate SBF for 12 and 24 hour time points. Mature HA crystals were formed and different concentrations of drugs were entrapped within the crystal matrix. The release kinetics of drugs from HA functionalized microspheres were measured by placing them in phosphate buffered saline at physiological conditions for 28 days. The results show that the dye and drugs entrapped within each phase of the crystal matrix of HA were released in a more controlled manner than those which had been physically adsorbed onto the microsphere surface. This project demonstrates that drugs can be entrapped and released from HA functionalized PLGA microspheres and represents an exciting new method for delivering growth factors directly to bone wounds.
Cardiovascular diseases (CVD) has been the primary grim reaper, mainly atherosclerosis. Phenotypic shifting, alteration in cell adhesion, and migration toward inflammatory site of blood vessel walls are all critical contributions of vascular smooth muscle cells (VSMC) towards the progression of atherosclerosis. Moreover, deciphering disease pathophysiology has been a major dilemma and proven to be complicated. Research has ever since aimed to join several disciplines to mimic live-cell observation and reveal better cellular biomechanical insight. Detachment of VSMCs from neighboring cells/extracellular matrix (ECM) (α5β1 integrin and n-cadherin) and migration toward the intimal inflammatory site (plaque) highlights the progression of atherosclerosis. The atomic force microscope (AFM) is considered as a powerful tool to investigate the real time behavior of living cells. In this project we aimed to use the AFM to measure forces exerted by VSMCs on both neighboring VSMCs and their ECM. Freshly isolated VSMCs from an atherosclerotic disease mouse model, B6.129P2-Apoetm1Unc/J (Apoetm1Unc, ApoE) and compared their adhesion forces to those of wild type (WT) cells. In addition, we monitored the change in migration capacity of VSMCs as a function of varying 2D collagen-I coated gel substrate stiffness in real time. Our results showed that N-cadherin and α5β1 integrin-fibronectin adhesion forces were altered for ApoE VSMCs compared to WT VSMCs. Moreover, this was accompanied with a drop in stiffness. Real time VSMCs migration, illustrated the change in migration capacity on a stiffness tunable 2D collagen-I coated polyacrylamide (PA) gel. VSMCs from ApoE mice, were able to migrate to a further distance and had a larger displacement compared to WT VSMCs. This discrepancy in migration was enhanced as the gel substrate became stiffer. In conclusion, our results provide evidence of changes in VSMCs biomechanics during atherosclerosis. Probing these changes could enable a better understanding of disease pathophysiology and ultimately refine treatment.

Poster 16
Cell Traction Force Generated by Macrophages is Affected by Polarization Status and Polyacrylamide Gel Stiffness
Prerana Sharma*
Biomedical Engineering
Faculty/Staff Sponsor: Etienne Gnimpieba

Statement of Purpose: Macrophages are primary immune cells that play a vital role in immune response to injury and disease. Cellular cues polarize macrophages to M1 and M2 states. By nature, M1 macrophages clear out cellular debris, dead cells, and foreign body particles; while M2 macrophages direct tissue repair and wound healing processes. Macrophages generate traction forces while migrating to their target site. Defining the mechanism of macrophage migration is crucial to understand the development of diseases such as cancer, and rheumatoid arthritis. In this study, we investigated the motility and traction forces generated by macrophages and its phenotypes on varying stiffness of polyacrylamide gels. Methods: SC monocytes were seeded on ligand-coated Polyacrylamide gel with various elasticity. Fluorescent beads that serve as fiducial markers were incorporated into the gels by embedding the beads throughout the gel. Cells were imaged for 2-4 h and a fluorescent image and a phase contrast image was taken at each time point. The images were then analyzed using a customized computational framework based on LIBTRC package. Results and Conclusion: We were able to
fabricate polyacrylamide gels with different stiffnesses within the tissue range (2.3 KPa-8.6 KPa). SC monocytes were used to study the behavior of macrophage phenotypes on their underlying substrate. Macrophages were successfully differentiated into M1 and M2 phenotypes. Beads incorporated onto the gel served as a fiducial marker.

**Poster 17**

AWOL: New Orleans - Environmental Focus  
Christian Pollema, Erika Clark  
Center for Academic & Global Engagement: AWOL  
Faculty/Staff Sponsor: Kim Albracht

Louisiana's wetlands are receding at an average rate of one football-field-sized piece of land per hour, making it one of the largest environmental crises America is facing today. Not only are these ecosystems important for ecological purposes, bolstering some of the highest species abundance in America, but they are also extremely vital to the people of the state. Louisiana's swamps and marshes drive the state's economy through fishing in addition to providing protection from incoming storm surges. Over winter break, USD AWOL sent eleven students to New Orleans, Louisiana to work alongside Common Ground Relief's efforts combatting this rapid land loss. While there, these volunteers worked a collective thirty-five hours potting tree saplings, removing invasive species, and planting nearly 900 new trees around the city. In addition to Common Ground, the group volunteered with the Lake Pontchartrain Basin Foundation, the Montegut Tribal Center, and the Bayou Sauvage Wildlife Refuge. In addition to their service, the students stayed in the lower ninth ward, where they were able to hear the stories of community members that were heavily affected by Hurricane Katrina, and witness that the devastating impacts of the storm are still present nearly thirteen years later. Through this service-learning experience, these students were shown the importance of preserving our nation's ecosystems, and their undeniable connections to our everyday, societal life.

**Poster 18**

USD Alternative Break to Nashville, Tennessee Focusing on Homelessness  
Josie M Galles†, Hunter Burns  
Center for Academic & Global Engagement: AWOL  
Faculty/Staff Sponsor: Kim Albracht

Many students from the University of South Dakota participated on an alternative break trip to Nashville, TN for a full week focusing on urban poverty and homelessness. According to the latest study, released May 2017, 13.8 percent of Middle Tennessee residents are food insecure, meaning they have limited or uncertain access to enough food to maintain a healthy lifestyle. This is above the 13.4 percent national average. In Nashville, the participants worked with many organizations including Open Table Nashville, The Little Pantry that Could, Nashville Rescue Mission, Oasis Youth Shelter, and Second Harvest. Throughout the week, service-learning was emphasized because the goal is to be able to answer what, why and how questions. It is one thing to be able to offer physical service, but another to understand fully why it is a social issue in the first place. Each organization the students worked with gave a new and different perspective towards homelessness, food insecurity, or poverty in general. The organizations had established unique methods on overcoming the homelessness challenges in Nashville. A couple organizations believed that handing out as much food as possible to as many people was the best way. In contrast, other organizations believed getting to know the homeless on a deeper and personal level was a better method. Overall, the experience was significant and eye-opening. By the end of the trip, participants were able to gather all ideas and thoughts and think of ways to incorporate them into their own communities back home.
Poster 19
AWOL Chicago 2017-2018: Issues Facing the Previously Incarcerated
Raven Blahnik, Teagan McNary, Enosh Krupakar, Emily Bashus, Emma Kirby, Claudia Schwebach
Center for Academic &Global Engagement: AWOL
Faculty/Staff Sponsor: Kim Albracht

AWOL (Alternative Week of Off-Campus Learning) is a service-learning organization on campus which allows students to immerse themselves in communities and issues which may be foreign to them. During the 2017-2018 winter break, one AWOL trip-comprised of six students-traveled to Chicago and delved into issues facing previously incarcerated individuals. Throughout the week, our group worked with St. Leonard's Ministries which provides a plethora of free services-lodging, meals, classes, job training, employment opportunities-- to the recently released. Besides organizing their donation rooms and serving meals, our group had the opportunity to make connections with these individuals-including Tim, Chris, Bruce, Shay, Heather, Terry, Phil, and Glenwood-- by eating meals together and hearing their stories. Altogether, our group left Chicago with a newfound knowledge and awareness of issues affecting the previously incarcerated.

Poster 20
Giving Back to the City of Minneapolis: Refugee and Women & Children's Services
Christina Bushinger, Veronica Sanders
Center for Academic &Global Engagement: AWOL
Faculty/Staff Sponsor: Kim Albracht

For the course of a week, a team of university students traveled to Minneapolis, MN to assist non-profit organization that do work for refugees and women & children. During this time, we could work with food banks, homeless shelters, and an organization that houses single mothers and their children during their time in college while receiving an education. Take a look at our experience, what we were able to learn during our time, and skills we are able to adopt and bring back to our own communities.

Poster 21
AWOL 2017 Winter Break Trip to Detroit, Michigan
Brandi Merritt, Aaron Licht, Mark Maxon, Jennifer Kenaston, Mitchell Monif, Brayden Hilton, Jessica Wahlgren, Rachel Beckman, Raeann Patrick
Center for Academic &Global Engagement: AWOL
Faculty/Staff Sponsor: Kim Albracht

This poster provides a brief overview of the AWOL Winter break trip to Detroit. It describes where the participants volunteered at and who they helped.

Poster 22
Dallas AWOL Health Trip
Hailey Purves, Lucas Crownover, Cali Hensley, Bridget Fenger, Bridger Irons, Mariah Olson, Krayton Schnepf, Grayson Gruenhagen, Robin Do, Kailyn Mutsch
Center for Academic & Global Engagement: AWOL
Faculty/Staff Sponsor: Kim Albracht

In December 2017, eleven students and one faculty member embarked on a trip focusing on health to Dallas, Texas. The group participated in over 35 hours of service learning. During this week-long trip,
the students were able to engage with people of many different backgrounds. The Family Place was the first on their list. This organization provides shelter for women, children, and men that have been affected by domestic violence. As volunteers we worked to collect the Christmas presents donated by local people and make sure all the families received their Christmas wishes. The second stop was Dallas Animal Services where the group made dog toys and socialized with the animals. The participants then went to Texas Scottish Rite Children's hospital where they made fake snow and played games with the residents. The participants also spent time at two local homeless shelters, The Bridge and Dallas LIFE. The group provided popcorn, pop, and candy canes to the residents at The Bridge. At Dallas LIFE, the participants served a meal and worked in the children's playroom. Autism Treatment Center was the next stop on the trip. Participants baked goods, played games, gave away prizes, and worked with children of many different ages that have autism. The final stop was Hospice Select. The group worked at a local nursing home and played bingo, decorated cookies, made ornaments, and gave away prizes. Each night, the group participated in reflection. This process helps the group reflect about the day and show how the new experiences are affecting the participants. Upon returning to South Dakota, all winter break trips attended a reorientation meeting. All the trips come together to share their experiences from their trips.

Poster 23
AWOL Guatemala Service Trip
Madisyn N Waage, Jamie Anderson
Center for Academic & Global Engagement: AWOL
Faculty/Staff Sponsor: Kim Albracht

Twelve women from USD journeyed to San Raymundo, Guatemala, over Christmas break to partake in a service-learning opportunity. The student organization Alternative Week of Off Campus Learning (AWOL) partnered with Casas Por Cristo to provide a home for an impoverished family. The women learned construction skills on-site in order to complete the build in three days. This family of five previously lived in a home build of tarp walls and a tin roof; now, this family more comfortably resides in a home with three rooms, a cement floor, and a rainproof structure. This experience provided and opportunity for the twelve women to learn more about the Guatemalan lifestyle and living conditions by submersion into Guatemalan culture for a week. The adversities and triumphs of this journey compiled into a priceless learning experience for the USD students.

Poster 24
The Measurement and Development of Spin-Coating Methods using Ultra-violet/Visible Light Spectroscopy
Dylan J Lewis
Chemistry
Faculty/Staff Sponsor: Stanley May

Existing security printing technologies typically use dyes that convert UV light to visible light. While it is difficult to bypass these security measures, it is still possible. In attempt to develop security printing technologies that will be more difficult to counterfeit, and address other security applications such as fingerprint dusting, Dr. P. Stanley May and his research team have been developing NaYF4 nanocrystals doped with luminescent lanthanides. These nanocrystals convert near infrared (NIR) electromagnetic radiation to wavelength-shifted NIR or visible light. Dr. May and his research team have also developed gold cavity arrays to enhance the up-conversion properties of these nanocrystals. The nanocrystals, suspended in a polymer named poly(methyl methacrylate) (PMMA), are applied to the gold surface with a spin coating machine. The desired thickness of the coating is approximately 2μm thick which is too thin to be measured by a micrometer or caliper. As part of this research, a procedure for spin coating the
loaded polymer on gold cavity arrays is being developed. Accuracy for this procedure can be measured by producing a graph displaying transmittance vs. wavelength using a UV/visible light spectrometer. A process for consistently creating spin coatings of a precise thickness is in development. Preliminary tests of the current spin-coating strategy have proven successful in many but not all cases.

Poster 25
The Adsorption of Neurotransmitters in Metal-Organic Supercontainers for Biomedical Applications
Megan Bruns
Chemistry
Faculty/Staff Sponsor: Bess Vlaisavljevich

Type IV metal–organic supercontainers (MOSCs) are constructed from the assembly of divalent metal ions, 1,4-benzenedicarboxylate (BDC) linkers, and sulfonylcalix[4]arene-based container precursors. These synthetic supercontainers have applications in gas storage, catalysis, drug delivery, and biological sensing. MOSCs are molecular species that exist in solution and have many advantageous properties. MOSCs have a high tunability since both the metal and linker can be modified affecting adsorption properties. The host-guest binding interactions of porous materials have powerful implications for neurotransmitter sensing and binding. By understanding the distinct molecular interaction (Host-Guest, Solvent-Host, Solvent-Guest, and Solvent-Host-Guest) we can more effectively guide the design of these materials. Using computational methods, we aim to assess the biological compatibility of MOSCs and ultimately use our understanding of molecular-level details to improve their performance. Initial studies employ models of type IV MOSCs with different metal centers: Zn, Co, and Ni. Quantum chemical methods are used to explore the electronic structure and binding enthalpies between the MOSCs, solvent, and select neurotransmitters.

Poster 26
Speciation of Zirconium and Hafnium Molecular Metal Oxides
Ethan Hare
Chemistry
Faculty/Staff Sponsor: Pere Miro

Molecular metal oxides (MMOs) are a unique family of inorganic species composed of a variable number of metal centers usually in their highest oxidation state connected through a network of bridging and terminal oxygen ligands. MMOs self-assemble in solution to form a wide variety of structures; however, the growth mechanism as well as the nature and role of different intermediate clusters still remains vastly unknown. Moreover, whenever clusters can be isolated they not only provide insight into the growth of larger MMOs but often have unique properties. In this work, the MMOs of interest self-assemble in aqueous solution under acidic conditions. Two clusters have been crystallographically isolated, \((\text{ClO}_4)_6[\text{Zr}_4(\text{O})(\text{O}_2)2(\text{OH})_4(\text{H}_2\text{O})_{12}]\) and \((\text{ClO}_4)_8[\text{Hf}_4(\text{OH})_8(\text{H}_2\text{O})_{16}]\). The former MMO consists of four zirconium centers arranged in a tetrahedral geometry connected through both bridging peroxide and hydroxide ligands, and with a central oxo moiety. The latter has four hafnium centers forming a planar ring with only bridging hydroxides. However, little is known about other species present in solution that did not crystallize. Using density functional theory, we aim to understand the speciation and electronic structure of both Zr and Hf clusters under experimentally relevant conditions such as pH or peroxide concentration.
**Poster 27**

**Synthesis, Characterization, and Catalytic Activity of Hollow Mn3O4 Nanoparticles for Cyclohexene Oxidation**

**Chandra M Karki**

**Chemistry**

Faculty/Staff Sponsor: James D. Hoefelmeyer

Catalytic oxidation of alkenes into value-added oxygenated derivatives is a fundamental reaction in organic chemistry with many industrial applications. The use of oxygen as oxidant in the catalytic oxidation reactions has the obvious advantages of reduced costs and hazards compared to harsh chemical oxidizers such as peroxides. In this project, hollow Mn3O4 nanoparticles exhibiting uniform shape and size were prepared by oxidation of MnO nanocrystals that leads to a Kirkendall effect. The material was characterized with powder X-ray diffraction, electron microscopy, and UV-visible spectroscopy. We demonstrate catalytic activity of hollow Mn3O4 nanoparticles towards the oxidation of cyclohexene at 80°C in air. Using FTIR, GC-MS, and NMR data, it was found that cyclohexene was oxidized to 2-cyclohexen-1-one and 1-cyclohexen-1-ol as major products and cyclohexene oxide (7-oxabicyclo [4.1.0] heptane) as a minor product.

**Poster 28**

**Density Functional Theory Study of Cooperative Ligand-Centered Reactivity in Triaminoborane**

**Clara Kirkvold**

**Chemistry**

Faculty/Staff Sponsor: Bess Vlaisavljevich

A series of ligand centered reactions of Ph(TBDPhos)NiCl2 (1) with HF are studied at the density function level of theory by varying the coordination number around the metal as well as the nature of the coordinating anion. Despite the lack of measurable Lewis acidity on the ligand backbone, treating solutions of 1 with HBF4*Et2O resulted in fluoride abstraction from BF4- and net trans HF addition across the bridgehead N-B bond. Likewise, treating 1 with HNTf2 and HOTf, resulted in chloride loss from Ni and subsequent formation of trans N-H and B-Cl bonds on the TBD backbone. Similar reactivity was observed for other anions (NTf2- and OTf--) with HCl in CH2Cl2. However, when the two chloride ligand are replaced with less-labile thiolates or catecholate, the reactions do not proceed. Through the use of density functional theory, we have studied the overall energetics driving these reactions. In particular, experimental results suggest that the reactive species involves a three-coordinate metal center.

**Poster 29**

**Reactivity in Confined Spaces: Knoevenagel Condensation Inside Molecular Nanocapsules.**

**S M Gulam Rabbani**

**Chemistry**

Faculty/Staff Sponsor: Pere Miro

Selective carbon–carbon bond formation remains a challenge in many areas of modern organic chemistry. The Knoevenagel condensation is a well-known reaction involving the nucleophilic addition of a carbanion to a carbonyl group followed by a dehydration reaction to generate a C-C double bond. Recently, Qiao et al. synthetized a new family of supramolecular metal organic super containers (MOSCs) from the assembly of sulfonyl calix[4]arene-based container precursors, divalent metal ions, and polycarboxylate linkers.(1). Inside these species, there are water molecules that feature Brønsted acidity and have been inferred to catalyze the Knoevenagel reaction for substrates with sizes and shapes similar to the MOSC nanocavity. Determining the reaction mechanism inside the MOSC nanocavity,
the influence of the acidity of the internal water, and the effect of confinement are questions we aim to address using density functional theory. Here we present the mechanistic study of the Knoevenagel condensation of different aldehydes with and without the presence of a MOSC nanocavity, and the effect of the Brønsted acid pKa into the reaction kinetics. 1 Y. Qiao, L. Zhang, J. Li, W. Lin, Z. Wang Angew. Chem. Int. Ed. 2016, 55, 12778-12782

**Poster 30**  
**Size and Density Control of Cuprous Oxide Crystals by Electrochemical Methods**  
**Tanner Wilson**  
**Chemistry**  
**Faculty/Staff Sponsor: Chaoyang Jiang**

Cuprous oxide is a p-type semiconductor with a band gap of 2.17 eV and has potential application in the fields of catalysis, solar energy conversion, lithium-ion batteries, and gas sensing. There has been a variety of synthetic methods for cuprous oxide crystal growth, including wet chemistry, hydrothermal process, and electrochemistry. In particular the electrochemical method is attractive because it provides a rapid approach in making cuprous oxide nanomaterials. While also permitting a high degree of control over the size and shape of the nanomaterials, which allows for better control of their physical and chemical properties. In this work, we discussed the growth of cuprous oxide nanoparticles with an electrochemical method. An investigation into controlling cuprous oxide morphology was done by adjusting both voltage and deposition time. We found that the cuprous oxide crystals of only a couple hundred nanometers in size as well as growth of uniform films was possible. These nanomaterials were expected to have unique catalytic properties in certain electrochemical reactions.

**Poster 31**  
**Using Machine Learning and Statistical Methods to Predict Material Weaknesses in Internal Controls in Firms**  
**Murtaza Nasir**  
**Business Analytics**  
**Faculty/Staff Sponsor: Srini Ragothaman**

Wells Fargo employees and managers opened 3.5 million fake deposit and credit card accounts over a six year period and caused the bank to pay $185 million in fines. This debacle has squarely put the focus on the importance of tone at the top and effective internal controls. Models to predict MWIC firms would be of value to investors, management, auditors, and regulators since such control weaknesses disclosures are often followed by other disclosures such as earnings restatements and fraud (Myllymaki (2013) and Donelson et al., 2015). We examine a sample of firms that reported material weaknesses in internal controls (MWIC) matched with a control sample in the same industry. This study examines the predictive ability of two machine learning models, namely, support vector machines (SVM) and artificial neural networks (ANN), and two statistical models, logistic regression (LR) and discriminant analysis (DA) for identifying companies that are likely to report MWIC. We used predictors identified in prior studies and employed feature selection methods to find the most parsimonious models that performed the best at predicting MWIC for firms. In this study, we also employed two statistical models, namely, discriminant analysis and logistic regression to predict MWIC firms. The performance of the machine learning models is comparable to the logistic regression and discriminant analysis models in predicting firms with MWIC. The machine learning models and the two statistical models are complementary decision support tools and users would benefit from utilizing a combination of these models.
Poster 32
An Analysis of the Impact of the U.S. Dollar's Status as the World Reserve Currency on the Value of the U.S. Dollar Relative to Other Major World Currencies
Jared Waltz
Economics
Faculty/Staff Sponsor: David Carr

In the wake of two world wars the United States emerged as the leading industrial and economic power of the world in the 20th century. This role meant that the U.S. dollar was a preferable world reserve currency, and after the collapse of Bretton-Woods this status became even more important as the world sought stability in the dollar. In most nations, currencies are able to appreciate and depreciate in order to maintain a healthy balance of trade. These fluctuations prevent prolonged periods of growth or stagnation by changing the relative price of imports and exports. However, the U.S. dollar is in a unique position as the world reserve currency. This status means in simplified terms that demand is strong and consistent for the dollar regardless of economic conditions, potentially keeping its value above where it would naturally move to if allowed to fluctuate normally. This paper seeks to analyze whether it is possible to demonstrate mathematically that the value of the Dollar has been affected by world reserve currency status by comparing it to other world currency values over time. The analysis will be conducted by estimating a model of covered interest rate parity using monthly data over the course of 10 years.

Poster 33
International Trade Intensity and CO2 Emissions Analysis
Caitlin Garvis
Economics
Faculty/Staff Sponsor: Mike Allgrunn

Throughout history the world’s international economy has grown tremendously, but what impact does that have on the Earth? This research project explores the connection between international trade intensity and carbon emissions through a cross-country multiple regression analysis.

Poster 34
The Role of Foreign Direct Investment on the Economic Development of Estonia
Stephan Weikert
Economics
Faculty/Staff Sponsor: David Carr

In the second half of the twentieth century, many countries were able to experience tremendous economic growth by allowing for an influx of foreign investment. One such country, and the focus of this project, is the small Baltic nation of Estonia. Under Soviet control from 1940 to 1991, Estonia existed as a closed economy, with the little trade that did occur staying mainly in other Soviet countries. After gaining independence, Estonia took measures to open their economy with the chief of these measures being policies that encouraged investment from outside firms and nations. The country realized that with a population of just over a million people, the best way to spur economic growth was to allow for foreign investors to develop the country’s capital stock. This investment allowed for Estonia to increase their presence in international markets, further aiding in their transition to a developed economy. In the period following their induction to the European Union, when the greatest amount of foreign direct investment was received, to 2016, Estonia has had their GDP per Capita rise from 47% of the European Union average to 73%, and the value of exports has risen from $2.1 billion to $13.9
billion. Foreign direct investment has played a central role in Estonia's development and the purpose of this project is to report on the effects of foreign direct investment in Estonia from its post-Soviet transition to the modern day.

**Poster 35**  
The Impact of Obesity on Healthcare Cost and Quality  
Gifty Wheagar  
Economics  
Faculty/Staff Sponsor: Mandie Weinandt

The objective of my research/poster is to look at the impact of obesity on healthcare cost and quality. The annual cost of obesity in America is $147 million dollars. Obesity is one of the major contributors to a lot of chronic illnesses like heart disease, and diabetes. Obesity has become an epidemic in America and the numbers keep rising. Obesity affects the quality of life in people of all ages, and it's been linked to increased inpatient admissions and high usage of other medical services. Back in 2014, not a single state had an obesity rate of less than 20%. It is literally eating up the nation and my research is to find out how much are we spending on obesity, and how does it affect the quality of healthcare in America. It's affecting mainly the helpless and folks with lower socioeconomic status. How do we end this epidemic?

**Poster 36**  
Greek Life Affiliation and Social Capital in the Employment Context  
Sarah Barnhardt, Catherine Vietor  
School of Education  
Faculty/Staff Sponsor: Gabrielle Strouse

The University of South Dakota's Greek Life alumni have high expectations for finding a fulfilling job after graduation. During recruitment, Greek Life potential new members are promised that Greek Life will enhance his or her opportunities for finding a fulfilling job after graduation. Greek Life does help with social networking, but that does not guarantee that finding a job will be easier for Greek Life alumni. In this study, we will test if Greek Life does enhance a graduate's opportunities for finding a fulfilling job. We will pass out a questionnaire, with 24 questions, to about 40 former University of South Dakota students. 20 of the participants will be Greek Life alumni. The other twenty participants would not have participated in Greek Life. The participants must also have graduated from the University of South Dakota within the last 10 years. The questionnaire will focus on the participants experience while searching for a job. We expect to find that Greek Life did not enhance graduates' opportunities in finding a fulfilling job. The goal of this study is to find out if Greek Life does help graduates find a fulfilling job and what benefits Greek Life did provide for members in finding a fulfilling job after graduation.

**Poster 37**  
Family Cultures  
Jessilynn Bean, Mekko Bearkiller, Brittany Two Elk, Maggie Malathip  
Social Work  
Faculty/Staff Sponsor: Peter Kindle

This study explores the breadth of understanding of the different attitudes toward family culture, such as cohesion and conflict. It looks at these factors to see how they may influence inter-generational care for aging relatives. Additionally, it looks at how an individual's ethnic and cultural background impact the care and value of aging family members.
Poster 38
The Correlation Between Self-Perspective and Privilege
Allysha Duffel, Heather Folkers, Ally Helgerson, Maire Grupp
Social Work
Faculty/Staff Sponsor: Peter Kindle

Privilege affects everybody, no matter who you are or what you do some sort of privilege will impact how your life turns out. Mental illness is also a prominent topic within today's society, and it should be addressed as important. In this research project, we set out to see if there is a correlation between how much racial privilege you feel compared to your feelings of depression and/or anxiety. We did this in hopes of seeing how much, or even if there is, a relationship between one's own perception of racial privilege compared to their feelings of self-worth. Our rural setting set this up to be unique project focused mainly on white racial privileges, as well as the use of primarily college aged population. We composed a questionnaire that combined the DASS-21 depression and anxiety scale along with the white privilege survey to create the base questions for this study, and then we used Facebook as our baseline communication with our subjects. It was all anonymous and confidential.

Poster 39
Measuring Basis on Food Pantry Assistance
McKayla Marie Foust, Margaret Mary Gell, Marissa Ann Reis
Social Work
Faculty/Staff Sponsor: Peter Kindle

When the topic of food assistance programs arises a negative stigma follows. We wanted to gather our research from opinions on food pantry attitudes. We think that people who use food pantries are going to be hesitant on who they tell. We also hypothesize that some people may have a bias towards individuals who use food pantry assistance programs. This bias can be seen through people that think they are better than people who use food pantries and avoid hanging out with people using food pantries. For our research project we want to see if our hypothesis is right about the biases on food pantry usage. Our research consists of a two part twelve questionnaire, at the beginning of the survey it will ask if the individual if they have or have not used a food pantry program and leads into the specific survey questions. We are giving a survey in Spanish as well to a Hispanic community in Nebraska to insure we measure individuals that use a food pantry anonymously to further our research.

Poster 40
Benefits of Autism Spectrum Disorder (ASD) Mentor Program at the University of South Dakota
Mackenzie Gustafson
Medical Biology
Faculty/Staff Sponsor: Chris Dallager

Drop-out rates of students on the autism spectrum are high especially within the college population up to 80% (National Institutes of Health). Also, as of 2015 only 17.1% of adults with autism spectrum disorder (ASD) are employed (United States Bureau of labor Statistics). Often, students with ASD excel academically and therefore these students are dropping out due to difficulties not related specifically to academic challenges. Frequently, problems related to residence life, communication, interpersonal difficulties, or co-occurring struggles with anxiety or depression may lead to an inability to succeed on campus. Neurotypical students, which would include students with ASD, often have difficulties in college due to the drastic transition from high school to post-secondary education. At the University of Minnesota, Morris a mentorship program was implemented for students with ASD in order to understand the benefits of a structured peer-to-peer relationship on the success of these students.
Mentors within this program were supervised by a disabilities counselor and assisted students with ASD in areas such as housing, daily living, social connections/relationships with peers and professors, communication using technology and in person in a professional manner, and career readiness and preparation. The University of South Dakota (USD) could benefit from a peer-to-peer mentor program and allow the students with ASD on campus to have a more successful experience at USD. At the University of Minnesota, Morris, often when students were assisted with acclimation to life as a university student they were often able to thrive and be more successful. Not only could an implementation of this program benefit students with ASD at USD, but also benefit these students with their future careers and life goals.

**Poster 41**
**Contrasting Views of Individuals Who Are Mentally Ill Compared to Developmental Disability Within the Upper Midwest**
Elizabeth Johnston, Aubrey Houska, Melanie Schneider, Cindy Benitez
Social Work
Faculty/Staff Sponsor: Peter Kindle

The purpose of the current study was to investigate the stigmatization of people who suffer from mental illness and disability within the upper Midwest rural area of the United States. The need for this study is to fill the gap of information in research relating to how the residents in the Upper Midwest of the United States stigmatize between someone who is Mentally ill, compared to someone who is Developmentally Disabled. Although further analysis is needed, which is currently being conducted, will help determine the statistical significance of these differences. Limitations of the study include short timespan to implement the program which may influence the results.

**Poster 42**
**Stigmatization of Single Motherhood: Rural Attitudes**
Maria Caroline Letcher, Briana Sargent, Clare Campbell, Tiffany Klug, Makenzie Anthony, Maddison Medbourn, Miles Ludwigs
Social Work
Faculty/Staff Sponsor: Peter Kindle

This project (N = 174) explores the level of stigmatization against single mothers in rural America and relates that stigma to the self-esteem and sense of mastery reported by single mothers.

**Poster 43**
**Effects of Therapy on Aggression and Political Ideology in Individual Adults**
Addison Craig McCauley, Alyssa Marie Weiler, Syreeta Jane Warrington, Hayley Jo Snodgrass, Diana Marie Kautz
Social Work
Faculty/Staff Sponsor: Peter Kindle

Political unrest and aggression are as prominent today as during the Civil Rights Era. Our research and poster presentation will consider the connections between aggression levels, therapy or counseling, and the formation of political ideologies in individual adults in response to the political divide.
Multiple sclerosis (MS), is a common disease of the nervous system that affects people of virtually all ages, and primarily occurs in women; it is an idiopathic disease. MS is an important disease to discuss because it is not well known, and there is currently no cure. This project will examine what multiple sclerosis is, what individuals can do in regards of prevention, and what treatment options are for a person living with MS; along with the four different kinds of MS being examined and discussed. This is a literature review of current published research on multiple sclerosis from Ebsco host; and from this more information will be learned about multiple sclerosis.

The goal of our research was to make a correlation between awareness of white privilege and negative attitudes towards immigrants. We proposed that a low awareness of white privilege was linked with having a negative attitude towards immigrants. We have selected several scales to measure the attitudes of our participants. By collecting quantitative data from surveys about the level of awareness of white privilege and attitudes on immigrants, we plan to discover that a low awareness of white privilege is correlated with a negative attitude towards immigrants.

The research evaluated an eight-week theatre program at the Minnehaha Juvenile Detention Center (JDC). The evaluation measured the changes in youths' self-esteem, self-consciousness (public, private, and social anxiety), and self-concept. The youth were given the surveys at the beginning and ending of their time in the program. The program consisted of eight weeks of theatre, including games, improvisation, mask making, scene rehearsals, scripts writing, and a final performance for JDC staff. The scripts written by the students during the sixth week were the scripts rehearsed and performed. Every three weeks, the researcher asked the youths what they have learned. After the final performances, the youth were given their final evaluation survey and staff that observed the program throughout the summer were also given surveys regarding the program. The surveys of the youths were then analyzed by the researchers to find a significant decrease in social anxiety and a less significant decrease in public self-consciousness and self-esteem.
Poster 47
Treading Water: Life in the Day County Flood Era
Matthew Miller‡†
English
Faculty/Staff Sponsor: Prentiss Clark

During the mid-1990s, repeating in 2011, mammoth snows and rainfall caused unprecedented flooding in Day County, South Dakota, USA, increasing lake levels by fifteen to twenty feet throughout the county. Because the area is a closed basin, much of the water has remained, unable to drain away. A natural disaster that has lasted over twenty years has altered the land and the people left behind, but it has also been a mixed blessing, for it has boosted fish populations and the sportsmen economy. Tensions brewing over decades came to a breaking point during spring of 2017 in the form of a landmark case, Duerre v. Hepler, which pitted farmers against sportsmen and prompted the SD Game, Fish and Parks to take drastic actions that damaged small businesses throughout the state. After an emergency session, the SD legislature passed the Open Waters Compromise, which has provided relief to small communities, sparked heated semantic debate throughout the state, and has started productive conversations about long-term disaster relief.

Poster 48
Facilitating Student Success: Effective Institutional Practices for Pell Grant Recipients at Selected Universities
Carol Voss-Ward*
Educational Adminstration
Faculty/Staff Sponsor: Karen Card

The purpose of this study is to determine the institutional variables that contribute to an institution's ability to graduate Pell-grant recipients at rates that are equal or near equal to their non-Pell-eligible peers. Research questions include: 1) What institutional variables exist at institutions that have six-year graduation rates for Pell grant-eligible students at the top of their institutional peer group? 2) How do institutional leaders view their role in student success efforts?, and 3) What do administrators and staff perceive as institutional practices that assist Pell grant-eligible students to graduate at rates comparable to non-Pell grant-eligible students? This research will offer an increased understanding of variables that affect students from low-income backgrounds as well as provide a framework of effective practices for higher education administrators interested in improving graduation rates and cultivating environments for student success.

Poster 49
Physiological Adaptions for Predation in Tyrannosaurus Rex
Ethan Jennings
Earth Sciences
Faculty/Staff Sponsor: Timothy Heaton

The Tyrannosauridae is a highly charismatic family of carnivorous theropod dinosaurs containing one of the most famous and recognizable dinosaurs: Tyrannosaurus Rex. However, despite some bitter disagreements, a comprehensive study considering physiology, environment, and prey habits to determine what kind of hunter Tyrannosaurus Rex was, or if it hunted at all, has yet to be written. This study will synthesize research from various fields of paleontology to determine what hunting strategies could have worked for T. Rex by considering the type of environment it lived in, the capabilities and abundance of its prey, specializations in T. Rex anatomy, exceptionally insightful fossil discoveries, and by comparing T. Rex and other theropods with modern carnivorous mammals. This paper intends not
only to establish feeding behaviour for T. Rex but to determine a general, standardized framework for evaluating predation strategies for extinct carnivores.

**Poster 50**

Using SAFMEDS Instruction Combined with Precision Teaching Measurement as an Alternative Formative Assessment Approach for Building Content Fluency in University Coursework: Three Years of Classwide Data and Samples of Individual Performances

Abigail C. Wiebers, Jennifer L. Jorgensen
Curriculum & Instruction

Faculty/Staff Sponsor: William J. Sweeney

This demonstration project evaluated the effectiveness of SAFMEDS on the classwide acquisition and fluency of basic concepts in curriculum-based assessment/Precision Teaching course. SAFMEDS, an acronym for "Say All Fast a Minute Each Day Shuffle," was coined by Lindsley (1983) as a functional flashcard procedure for building large repertoires of sight words in a given content area. Second, the instructor wanted to take advantage of the opportunity to model the importance of frequent and daily measurement of curriculum through the use of the SAFMEDS procedure with the class. Three university classes, across three consecutive years, with 41, 33, and 42 students respectively, participated in this research. Two individual students from the latter class display their individual data and describe the importance of utilizing their data for making instructional changes. The students in the class completed three decks of SAMFEDS across a 10-week period with an instructional aim of 40+ SAFMEDS flashcard correctly identified during a series of one-minute timing. Results from this study replicated the SAFMEDS data paths across three classes and seven decks of SAFMEDS. The monitoring of this procedure, by the instructor on a classwide basis and by the students managing their daily data, was used to determine whether the SAFMEDS procedures was effective for improving the acquisition of key concepts imbedded with in the curriculum of the Precision Teaching and informal assessment course. Additionally, this daily in class probing of students' performance was a means of modeling appropriate implementation, recording, charting, and evaluation of students' learning pictures. The consistent pattern of celerating data seemed to indicate that this was an effective instructional strategy for the class as a whole. Implications and limitations of the current study were also discussed.

**Poster 51**

The Social Media Craze: "Liking" Your Way to Depression

Karlie Warne, Sara Lemmer
Counseling & Psychology in Education

Faculty/Staff Sponsor: Gabrielle Strouse

The advancements in technology make it easier than ever to be up to date on everything happening around us. Smartphones, tablets, laptops, and computers make continuous news feed updating possible. With this increased accessibility, social media use has risen drastically. The current research available on social media and depression is scarce. It is important to observe the potential effects this increased social media use may create. Through this study, we plan to examine the potential link between social media use and depression rates in adults ages18 and older. Adults will be given a 15-20-minute online survey using Qualtrics. These participants will be voluntarily selected from the researchers' social media accounts. They will be asked to respond to several questions about their social media habits (i.e., how much time they spend on Facebook, Instagram, Twitter, and/or Snapchat) and their depressive symptoms. To measure the respondents' depressive symptoms, we will utilize the Beck Depression Inventory. The researchers expect that increased time spent on social media will be associated with increased depressive symptoms in this population. The goal of this study is to determine and understand
the potential impacts social media has on mental health, and to encourage healthier social media use habits.

**Poster 52**

_**Stigma Say What?!: Change in Perception Towards Mental Health in College Students from Rural vs. Urban Communities**_

_Clara Pierskalla, Cira Watson_

_Counseling & Psychology in Education_

_Faculty/Staff Sponsor: Gabrielle Strouse_

Mental health services can be limited when living in an area with geographic bareness, due to a lack of hospitals, counselors, and overall resources. However, there is little known about the effect moving to a new location (such as a college student beginning their academic career) can have on opinions about mental health. In this study we will be evaluating college aged students and whether or not urban/rurality has an effect on stigmatization of mental health. The study will consist of approximately thirty college students, who will complete an online survey to determine urban/rurality of hometown and perceptions of mental illnesses both within their community and with themselves. A modified version of Link's Perceived Stigma Questionnaire (1987) was used to assess thoughts about discrimination towards people with mental illnesses (as cited in Freidl et al., 2007). Demographic questions about their hometown and history of mental illness were added. Relationships will be analyzed between home town populations and perceptions of mental illnesses, including self-perception and community perceptions. We expect that college students that have lived in a more rural area will have a more negative bias towards mental illnesses and mental health care. The goal of this research is to help identify a deficit in resources and the barriers to adequate mental health services.

**Poster 53**

_**High School Class Size as a Predictor of Freshmen Satisfaction with College Life at USD.**_

_Karissa Jensen, Ashton Moody, Paige Hesselberg_

_Counseling & Psychology in Education_

_Faculty/Staff Sponsor: Gabrielle Strouse_

The transition to college, from high school, can provide emerging adults with a significant source of stress (Lee, Dickson, Conley, & Homlbeck, 2014). Researchers have identified key factors that predict college student stress levels, such as perceived social and parental support, self-esteem, and residency (Astin, 1999; Lee et al., 2014). The University of South Dakota examined the importance and satisfaction of different college attributes and found that 79 percent of students indicated a high overall satisfaction. Similarly, Ames et al., (2014) highlight the importance of the student attending a university that is proportional in size to the student's high school. Given that the University of South Dakota is comprised of a mixture of rural and urban students, we investigated how high school class size predicts freshmen college student satisfaction with college life. Freshman participants completed the Student Adaptation to College Questionnaire and demographic survey. We predicted that freshman students from smaller (rural) high schools will express higher levels of satisfaction than freshman students from larger (urban) high schools. A better understanding of potential hindrances to freshman satisfaction level will better serve the University of South Dakota with potential targets of intervention to mitigate sources of stress. This will also serve as a supplement to the University of South Dakota's annual student satisfaction survey.
Poster 54
How Women Experience Nutrition Counseling in the Siouxland WIC office
Alexandria Logan†
Communication Studies and Health Sciences
Faculty/Staff Sponsor: Leah Seurer

The purpose of the following interview-based study is to understand how women experience nutrition education in the WIC program, specifically in the Siouxland office. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides funding for nutritional food, referrals for basic health care, and nutrition education through federal grants. The nutrition education can either be completed through online modules or in-person appointment sessions with a dietician. Prior research has been conducted over the differences between online and in-person education for specific nutrition content knowledge, the efficacy of nutrition education, and the comparison of different programs. We interviewed 10 participants at the WIC clinic in Sioux City, IA. We found that most women prefer online nutrition education, but many explained that the in-person education was more useful or effective. The online nutrition education was largely less time intensive than the in-person sessions. Every participant had access to the online nutrition education, found it easy to navigate, and appreciated the ability to skip an appointment upon completing a module. WIC nutrition education is effective, but the research shows that there is room for improvement in both online and in-person nutrition education.

Poster 55
The Effect of Participation in Football on Auditory Evoked Electrophysiologic Potentials in Middle and High School Students
Adrian Aylor*
Communication Sciences & Disorders
Faculty/Staff Sponsor: Teri James Bellis

In the United States, football is one of the most popular sports activities among middle and high school students. However, the rough and tough nature of football leaves most players susceptible to repetitive head impacts that can have negative health consequences, even those that do not result in a concussion. Multiple studies have demonstrated that youth and high school football players are exposed to many high magnitude hits during a single season. Neuropsychological studies, which have traditionally been used to investigate the effects of repetitive head impacts in young football players, have demonstrated inconsistent results. Auditory evoked potentials (AEPs) may help to identify neural changes that are subtle in nature (Malloy & Bellis, 2013; Kraus et al., 2017), as well as those that may not be present clinically (Theriault, Beaumont, Gosselin, Filipinni, & Lassonde, 2009). Multiple studies have used electrophysiologic measures in populations with previous concussions, including football players; however, Malloy and Bellis (2013) found significant differences in ABR, MLR, and cortical AEPs of collegiate football players with no known history of concussion, the only study looking at this population. No studies have investigated AEPs in younger football players. The purpose of this study is to investigate if there are differences in AEPs (ABR, MLR, cortical AEPs, and P300) of students who do and do not play tackle football at the middle and high school level. The results of this study could add significantly to the available knowledge regarding the effects of participation in football on the central auditory system in young football players, and when these changes may begin to occur. Data are currently being collected for this research study.
**Poster 56**

**Campylobacter jejuni: Harder to Treat, but Easier to Find Thanks to PCR Diagnostics**

Kyle Robert Diveley

Medical Laboratory Science

Faculty/Staff Sponsor: Kari Potter

*Campylobacter* is a pathogenic thermophilic bacteria known as one of the leading causes of foodborne illnesses (campylobacteriosis) in industrialized nations, and is well-considered in Europe and numerous other countries as the main concern for public health.1 Of all *Campylobacter* species currently known, *C. jejuni* is one of the most clinically significant in humans due to its occurrence of causing gastrointestinal illnesses. Although many cases are self-limited, treatment of campylobacteriosis can be accelerated with the aid of antibiotics. However, alongside numerous other bacteria, *Campylobacter* is evolving to resist the effects of antibiotic treatment.2 The correct method of treatment is already heavily dependent on the differentiation of species, and differentiation between *C. jejuni* from other species of *Campylobacter* has been relatively challenging, primarily because numerous species of *Campylobacter* share similar genetic and phylogenetic characteristics.3 Molecular diagnostic methods, more specifically Polymerase Chain Reaction (PCR) testing, have been utilized more frequently for species differentiation.3,4 Although PCR testing provides a new insight for research into properly identifying *C. jejuni*, more studying is necessary to distinguish variables that could inhibit the accuracy of its results. This presentation will provide a general synopsis regarding the features of *C. jejuni*, highlight its growing complexity and resistance to antibiotics, and examine the importance of PCR molecular diagnostics.

**Poster 57**

**Determining Whether Contraceptive Availability or Income Most Directly Decreases Fertility Rates**

Kalei Wilson, Madison Kjera, Mitchell Culbertson

Biology

Faculty/Staff Sponsor: Daniel Soluk

This report examines the effects of gross domestic product per capita, adjusted to differences in purchasing power (GDP based on purchasing power parity (PPP)), and contraceptive use on total fertility rates in order to determine which of these factors most effectively decreases fertility rates. Furthermore, literature on contraceptive availability will be evaluated to ascertain its impact on fertility rates. Total fertility rates, contraceptive prevalence rates, and GDP (PPP) in different countries will be analyzed through the data provided by gapminder.com. The data reveals a general inverse association between both contraceptive use and fertility rates, as well as gross domestic product per capita and fertility rates. However, we hypothesize increased contraceptive use has a greater effect on decreased fertility rates than increased GDP (PPP). By isolating the relationships of contraceptive use and fertility rates and income and fertility rates, as well as statistically analyzing the correlations through Microsoft Excel and the R Program, we will produce results that distinguish which factor enforces a stronger influence on fertility rates.
Stopover Biology of Grassland Migrant Birds at a Restored Tallgrass Prairie
Amy West*
Biology
Faculty/Staff Sponsor: David Swanson

Migration is an energetically expensive but critical part of the life of migrant birds. Most birds cannot store sufficient fat to make the journey without stopping along the way, so migrants rebuild fat stores at stopover sites. Stopover biology has been well studied in woodland and wetland migrant birds, but very little research exists for stopover biology of grassland birds, despite prominent population declines in this group. In the Midwestern United States, grassland habitats have been reduced and fragmented, leaving grassland birds with limited options for migration stopover. In addition, while birds may be using grassland fragments as stopover habitat, this does not mean the habitat is providing the resources necessary for birds to rebuild fat stores. Numerous grassland bird species occur at Spirit Mound Historical Prairie during migration. Plasma metabolite profiling is routinely used to measure fattening success and habitat quality at stopover sites. Mist nets will be set up throughout Spirit Mound. Upon capture, blood samples will be collected from birds to determine triglyceride levels, an indicator of fat deposition, and beta-hydroxybutyrate levels, an indicator of fat depletion. Through capture of birds and measurement of plasma metabolites, we can determine what birds are using this prairie restoration for stopover and whether the site can provide the resources to replenish fat stores necessary for successful migration stopover for grassland migrant birds. Studies of stopover biology for grassland birds are needed to determine which features of grassland habitats facilitate successful stopover and migration. The data from this study will help inform recommendations to improve and create restored prairie habitats throughout grassland bird migratory pathways.

Insects in the Ocean? How the New Zealand Marine Caddisfly (Philanisus plebeius) Avoids Predators
Audra J Van Ekeren
Biology
Faculty/Staff Sponsor: Daniel Soluk

Despite their amazing success in terrestrial and freshwater environments, only a handful of insects live in the oceans. The caddisfly, *Philanisus plebeius*, is found in lower intertidal zones on the coasts of New Zealand and Australia. Unlike other insects found in marine environments, *P. plebeius* spends its entire larval stage in tide pools. Female *P. plebeius* lay their eggs in cushion starfish. The larvae escape the coelom of the starfish following hatching and subsequently make cases of coralline algae for shelter and camouflage. Little is known about the environmental pressures on marine caddisflies. It has been assumed that crustaceans are their main predator. We report the results of video observation experiments where larvae were exposed to potential predators to observe how the predator finds and consumes *P. plebeius* larvae.

DTP3 Vaccination Effects Child Mortality Rates
Noel Tolvanen, Spencer McAdoo, Dylan Stahly
Biology
Faculty/Staff Sponsor: Bernie Wone

Vaccinations are used to protect against harmful or deadly diseases, and are typically initially given to a child during their infancy or youth. The DTP3 vaccination vaccinates against diphtheria, tetanus, and
pertussis. Diphtheria, tetanus, and pertussis have proven to be a deadly disease, especially when contracted by a child. This paper analyzes the effects of the DTP3 vaccination on child mortality rates. Based on prior knowledge of the effects of the vaccination, we predict that there will be a negative correlation between DTP3 vaccination and child mortality rates. We hypothesize that increased use of the DTP3 vaccine will lead to decreased child mortality rates. To test this hypothesis, we gathered existing data from GapMinder and used the statistical software program R-Studio to look at the correlations between the percentage of one-year-olds vaccinated and the mortality rates of children ages 0-5. Keywords: diphtheria, tetanus, pertussis, mortality

Poster 61
Gene Expression and Muscle Performance in Anolis Lizards
Luke Smith†
Biology
Faculty/Staff Sponsor: Andrea Liebl

DNA primers are used by molecular biologists to measure gene expression of specific genes using a technique called qPCR. After determining which genes are of interest, primers are created to amplify a certain portion of the gene. These primers must be validated to ensure that they are effective. I have tested primers for three genes in the green anole (Anolis carolinensis) genome as part of a larger project to determine the molecular mechanisms that cause variation between the jaw and leg muscle of individual anoles. The primers were tested using DNA from muscle tissue samples of other species of anoles. I designed the primers using published gene sequences from NCBI and a primer design program from Integrated DNA Technologies. The specific genes measured are SOX6, parvalbumin, and troponin C. These three genes were selected because they have all been shown to affect muscle contraction in other species. I will use the primers along with probes to amplify the correct genes and measure their expression using qPCR. I expect the SOX6 gene will show increased expression in the jaw muscle and decreased expression in the leg muscle. The other two genes are expected to show decreased expression in the jaw muscle compared to the leg muscle. These results will elucidate the molecular mechanisms that generate variation in muscles both within and among individuals.

Poster 62
Factors Affecting Breast Cancer
Brady Skillingsstad, Taylor Gyfle, Myrna Niamba
Biology
Faculty/Staff Sponsor: Jeff Wesner

According to breastcancer.org, about 40,920 women in the U.S. are expected to die in 2018 from breast cancer. The purpose of this study is to determine if there is a positive or negative correlation between alcohol consumption and breast cancer rates, as well as nutritional habits and breast cancer rates. The study will be conducted by analyzing academic journals, and processing data from Gapminder through R Studio. Data already found has shown to both support our hypothesis and contradict it, so a goal of this study is to establish the exact relationship between alcohol consumption and nutritional habits, separately, and risk of breast cancer. Compared to women who do not drink at all, women who have three alcoholic drinks per week have a 15% higher risk of being diagnosed with breast cancer. Data from Riboli Elio and Teresa Norat show various effects of vegetables in either reducing or not changing the risks of developing various forms of cancer (Riboli Elio and Teresa Norat). The hypothesis of this study is that an increase in alcohol usage with come with an increased risk of breast cancer, and that bad nutrition habits, such as eating unhealthy foods or not exercising, will also increase the risk of breast cancer.
The fungal pathogen *Batrachochytrium dendrobatidis (Bd)* has been threatening amphibian populations across the globe. Recent work has discovered that bacteria isolated from certain populations of amphibians are able to protect hosts from this pathogen. This project focuses on the anti-fungal mechanisms of *Serratia marcescens*, a species of bacteria our laboratory has isolated from a Costa Rican frog that has proven to dramatically inhibit *Bd* in culture. Wild-type and recombinant *S. marcescens* will be introduced to the microbiomes of a live amphibian host, *Acris blanchardi* (Blanchard’s Cricket Frog) and then challenged with *Bd* to examine the protective effects of this bacteria. The experiment includes recombinant *S. marcescens* with key genetic pathways removed to allow us to determine which genetic mechanisms are utilized in its defense against *Bd*. These efforts will aid in the future conservation of amphibian species worldwide.

A number of things can influence a child's longevity from the time they are conceived until the time they hit adulthood and beyond. One lesser known factor that affects the susceptibility of children to mortality is the mother's education level. The objective of this study is to find a correlation between maternal education and the child mortality rate. Other variables we will be addressing for this study include sanitation, GDP, and average life spans of countries. The methods our group will be using to discover this connection between the two will be data gathered from Gapminder, research gathered from scholarly articles in databases, including information regarding factors that could potentially affect child mortality, both directly and indirectly. Lastly, we will be using software to compare data collected, including Microsoft Excel and R programming. We expect child mortality to decrease as the mother's education level increases, and also expect a decrease as sanitation levels, GDP, and average life spans increase. This could suggest that a mother's education is directly correlated to sanitation level, GDP, and average life span of a given country.

Previous research has shown that there is not yet an effective, easily replicable method of upstream movement of benthic invertebrates. Moving upstream is especially important in streams that flow into the desert since they can rapidly dry up after they leave the mountains. It is our goal to find an easy, effective way to measure benthic movement. Our research focuses on the upstream invertebrate behavior in Cave Creek located in the Chiricahua Mountains in SE Arizona. We propose to measure upstream behavior using pipes placed in the stream and with video recording of movement. The pipes will be
divided into sections that collect benthic invertebrates over a period of 6 hours. Once finished, the insects will be counted and the process will be repeated overnight. The video recording will be primarily used to count invertebrates moving upstream through a restricted area. This information will be helpful in determining effective ways to measure upstream movement and may be beneficial to future research.

Poster 66
The Relationship Between Measles Containing Vaccinations and Child Mortality from 1980-2011
Alexander Rodriguez, Nicole Bodine, Haley Molstad
Biology
Faculty/Staff Sponsor: Jeff Wesner

The purpose of this study was to examine the effects of Measles Containing Vaccine (MCV) on child mortality from 1980 up until 2011 to determine the effects that these vaccinations could have on mortality rates globally. Data was collected from countries all over the world, closely examined and graphed to be analyzed and interpreted. With the graphs that were produced from year to year, linear regression was applied to create a trend line to summarize the plotted data. During 1980, for every 1% increase in vaccinations globally, child mortality decreased by 1.228 and in 2011, child mortality decreased by 1.819 with each 1% increase in vaccinations. Just with this preliminary information it was able to be concluded that as vaccination rates increased, child mortality rates steadily decreased and over the three decades, the rate in which it decreased by, increased as well.

Poster 67
Stage-specific Predation as a Mechanism for Predator Coexistence While Competing for a Single Prey
Trevor Pease
Biology
Faculty/Staff Sponsor: Jeff Wesner

In natural communities, prey are usually shared by many different predator species. One of the long-standing puzzles of community ecology is understanding how such predators coexist while competing for the same prey. One potential solution is that some predator species may coexist by specializing on different life history stages of their shared prey. We hypothesize that this stage specific niche partitioning may occur among co-existing fish species, which could allow for a stable coexistence. To investigate this phenomenon, gut contents of fishes collected in Oklahoma will be dissected and identified to prey life-stage. The insect family, life stage, and time of sampling will be graphed and statistically analyzed to examine how each predatory fish diet changes in response to fluctuations in prey stage demographics. We predict that the fish will each specialize in a different, singular life stage in response to relative abundance of prey stages. Understanding stage specific predation is critical, as research increasingly shows that stage structures can modify the dynamics of consumer-resource communities. Stage structure interactions can alter conditions for coexistence of competitors, stabilize consumer-resource dynamics, allow for alternative community states, and alter the strength and direction of tropic cascades.
Poster 68
Alternative Agriculture: Aquaponics
Parker Robert Messerli
Biology
Faculty/Staff Sponsor: Jeff Wesner

The ability to produce food for a growing human population is plagued by weather unpredictability and a growing concern over fossil fuel consumption and the environmental consequences of large-scale agriculture. This poster presentation will describe an aquaponics system that is being built on campus that addresses some of these concerns and what has inspired its creation. I will discuss the basic ecological feedbacks that make the recirculating system viable to produce edible food. This information will also be compared to the way in which traditional agriculture is conducted.

Poster 69
Comparing the Variables Causing Child Mortality in Asia and Africa
Melanie Magana, Taya Rose DeVine, Hannah Lynn Heckert
Biology
Faculty/Staff Sponsor: Daniel Soluk

Child mortality continues to be a rampant issue in the continents of Africa and Asia. There are many causes behind the deaths of hundreds of children. Food supply, sanitation issues, the lack of immunizations, disease, and poverty are all leading causes of low survival rate. These issues have varying influences from country to country throughout the seven continents. Countries in the world today are working towards lessening these influences for their young citizens; this is evident after reviewing the decline in child mortality due to increase in food supplies, vaccinations, and sanitation standards shown in graphs from Gapminder. While the countries within each continent are following a steep trendline towards decreasing child mortality, Africa seems to be lacking improvement. Therefore, Africa's lowered rate of decline must be caused by another variable. This study aims to examine the differing trendlines for child mortality between Africa and Asia (plateau versus steep, respectively) including their influences from poor sanitation and malnutrition. Data will be extracted from Gapminder through its graphs as well as comparing multiple peer-reviewed scientific articles from databases. We are predicting that Africa's plateau in a trendline, regardless of the increase of food supply, vaccinations, and sanitation, is caused by the continent's high rate of malaria.

Poster 70
Energy Sources Affect Carbon Dioxide Emissions in the United States
Annika Diane Lilleberg, Shaina Marie Hunt, Chris Kinsley, Tanner Daniel Hall
Biology
Faculty/Staff Sponsor: Jeff Wesner

Various energy sources impact CO₂ emissions in the United States. This study compares coal energy sources to other energy sources such as electricity, hydroelectric electricity, nuclear electricity, and natural gas. The study's aim is to provide research on alternative energy sources with the goal to minimize CO₂ emissions. Despite the United States accounting for 4.42% of the world population, the country is responsible for 15% of global CO₂ emissions (United States Census Bureau 2018; United States Environmental Protection Agency 2017). This is a major issue regarding climate change. The study seeks to identify the leading CO₂ emitting energy source. The hypothesis is that non-coal resources will mitigate CO₂ emissions in the atmosphere compared to coal. This study used the average of the datasets retrieved from Gapminder.org to see if alternative energy sources increase or decrease
CO₂ emissions. A statistical analysis was used to compile and test the datasets in the statistical program, R. The study demonstrated that as non-coal energy sources increased, CO₂ emissions decreased over time. It also showed that nuclear energy emits less CO₂ than coal. Graphs from this study indicate that as coal consumption increases with time, CO₂ emissions also increase. From 1965 to 2011 coal consumption decreased by about 10% whereas, nuclear production increased by about 10%. These findings will be useful for identifying whether or not non-coal energy resources reduce CO₂ emissions.

**Poster 71**

**Anxiolytic Effects of Carbamoylated Erythropoietin (cEPo) During Social Stress**

Kevin T Krupp, Nathan T Jones

Biology

Faculty/Staff Sponsor: Cliff Summers

Decision-making is a key component in anxious behavioral responses, however the exact neurological mechanism that incorporates learning during periods of social stress is not completely understood. Neurotrophins, like brain-derived neurotrophic factor (BDNF), are neuropeptides that play a role in neuroplasticity, learning and memory formation, including during stressful situations. Like BDNF, erythropoietin (EPo), most recognized for its involvement in blood cell production and angiogenesis, acts on neurons and likely modulates behavior by targeting learning centers in the brain, like the hippocampus. When EPo is modified by attaching a carbamoyl group, the product (cEPo) exhibits similar neuronal effects to EPo without the erythropoietic properties. We hypothesize that neuroplastic and learning effects may be dependent on cEPo action in the dorsal dentate gyrus of the hippocampus, where neurogenesis may take place. The Stress Alternatives Model (SAM) is a 4-day social stress paradigm, in which a mouse is placed into an open field arena with a larger aggressive conspecific for 5 minutes. Unlike other social defeat models, the SAM allows the smaller mouse an opportunity to escape from the aggressor. Test mice display one of two behavioral phenotypes: avoiding social aggression (Escape) or submission to the aggressor (Stay). On day 5, mice are put through a Social Interaction/Preference (SIP) test to measure their susceptibility or resilience to social stress. In this study, mice were given a single intra-cranial injection of cEPo or vehicle after day 2 of the SAM. By day 4, 30% of cEPo treated mice reversed their phenotype (Stay to Escape); whereas, mice receiving vehicle injections did not change. Furthermore, nearly 100% of mice treated with cEPo exhibited resilience in the SIP test regardless of behavioral phenotype. Together, these results illustrate an anxiolytic role of cEPo during social stress and suggest a potential mechanism that influences learning in anxious situations.

**Poster 72**

**Sceloporus Lizard Thermoregulatory and Predator Avoidance Behaviors in the Chiricahua Mountains, Arizona**

Anna C Kase*, Hailey N Moodie, Andrew D DeWitt, Dennis Carlson

Biology

Faculty/Staff Sponsor: Dan Soluk

Sceloporus is a genus of lizard with seven species found in the Chiricahua Mountains in Southeastern Arizona. These lizards occupy a wide range of habitats within the mountainsides, thus they experience a range of biotic and abiotic factors that vary with elevation. Such factors as varying climatic conditions can heavily influence aspects of Sceloporus life history due to their ectothermal regulation (because they are ectotherms). One aspect is thermoregulatory behavior, which is when a lizard will raise its body temperature by basking in the sun, and hide when it becomes too warm. The body temperature of the
lizard, and thus its thermoregulatory behavior, then influence physiological processes within the body and other important behaviors. Basking behavior of these lizards is expected to change across the elevation gradient in the Chiricahua Mountains where lizards at higher elevations will have longer basking times and overall lower body temperatures. The relationship between predators and their prey is influenced by differences in elevation. The higher the elevation the slower the reaction time in Sceloporus lizards. This reaction time is due to the lizards need to conserve heat energy, shown by staying on the basking site absorbing heat from the sun for as long as possible without being predated upon. Basking behavior was observed using video recording technologies, and predator avoidance behaviors were observed by exposing basking lizards to a predator stimulus and timing stimulus exposure to flee time. There is expected to be correlations between body temperatures, time before fleeing, and elevation.

Poster 73
Factors That Influence Body Mass Index on a Global Scale
Zach E Brown, Jack Dailey, Elda Dubale, Morghan Byrnes
Biology
Faculty/Staff Sponsor: Dan Soluk

Maintaining a healthy weight is important for overall health and wellness of an individual. When people are overweight or obese, they are at a higher risk for developing serious health problems. Body mass index (BMI), is a very widely used method in healthcare for determining whether an individual is at risk for certain health issues. BMI is calculated by dividing an individual's weight in kilograms by their height in meters squared. We are doing this study to better determine what factors are causing an increase of BMI in different regions. In particular, we are looking at three factors and their relationship to BMI measurements. The local physique of the population, the social economic standing of individuals, and the amount of food available to the population will be the center of our research regarding BMI differences. We are currently investigating these factors with Gapminder and R squared in order to determine the strength of correlation between income, food supply, and height with BMI data. The stronger the correlation related to BMI, the more that can be drawn from these relationships. We hypothesize that income and food supply will have a strong positive correlation with BMI, and as a result, indicate a strong relationship with body mass index. From our preliminary findings we are able to detect a positive correlation between BMI and both income and food supply. This positive correlation led us to believe that as people have a higher income, and a higher food availability, their BMI increases. This is most likely due to the fact that when people have a higher income they can afford more food, or more calorie dense food types. It also shows that as people have a higher food availability they consume more food on average, leading to higher weights and subsequently a higher BMI.

Poster 74
Examining Possible Contaminants and Their Effects on Stream Biota in Southeastern Arizona
Jordan Bosch, Luke Thompson, Kierra Determan
Biology
Faculty/Staff Sponsor: Daniel Soluk

Contamination within stream systems can come in a wide variety of sources. The leading cause of a large majority of these contaminations are sourced from leaching of septic systems. Cave Creek, a pristine stream in the Chiricahua Mountains, was a perfect location to test for possible contamination from septic systems in the region. Data focusing on this creek ranges the span of approximately 10 years, allowing for further comparison of change in stream quality due to contamination. Water samples were taken from the creek and tested for pH, Nitrate, phosphorus, D.O., and sulfates. The invertebrate community along the stream was sampled to see variations in community structures that would result
from changes in water quality due to the contaminants. Algal biomass was also tested in the stream system since it is associated in higher amounts in areas of nutrient leaching (possible sites of contamination). Testing these parameters along Cave Creek is instrumental in looking at the degree of change due to contaminations and proximity within a stream ecosystem.

Poster 75
A Village to Raise a Child: Yearly Environmental Variation in Network Structure of the Cooperative Breeding Chestnut-Crowned Babbler (Pomatostomus ruficeps)
Lucia Guatney
Biology
Faculty/Staff Sponsor: Andrea Liebl

The chestnut-crowned babbler (Pomatostomus ruficeps) is a medium sized (50 g) passerine that inhabits arid to semi-arid woodland and shrubland of the Australian Outback. Chestnut-crowned babbler cooperatively breed, wherein non-breeding group members, or "helpers", aid in the rearing of offspring (e.g., by provisioning). However, not all individuals help: some disperse and others help only minimally. Previous research in chestnut-crowned babbler shows that non-breeding individuals are more likely to help rear offspring in highly related broods. Determining the factors that contribute to an individual's "decision" to help or disperse may lend valuable insight into the evolution of cooperation generally. Genetic structure, both among and within groups, is likely an important factor in helping behavior. Social interactions and the underlying genetic structure of a group can be characterized through social network analysis. Quantitative measures of network structure (e.g., connectivity, density) will be examined for yearly variation. Addressing changes across years will identify specific environmental factors that drive these variations in genetic structure of groups and cooperative behavior.

Poster 76
Malnutrition Within the University
Martha Zere
Health Sciences
Faculty/Staff Sponsor: Rebecca Wolff

Nutrition intake is very important in children for a successful cognitive development, proper organ functioning, and body growth. The lifestyle between children in Eritrea and the children in North America are drastically different when it comes to their economic environment, their education, social standards, and their access to healthcare. There is an importance to these factors because it determines the overall health of the child, and if a child is not meeting the acceptable amount of nutrients for their body, then internal problems of the child develop with age. With all these differences between Eritrea and The United States, there are many similarities including the overall cognitive effect of an adult who suffered from malnutrition.
Thursday Poster Session #2

Poster 1
The Correlation Between BMI and Rate of Decomposition Seen in Human Cadavers in Grand Junction, Colorado.
Bailey Oettel
Anthropology
Faculty/Staff Sponsor: Melissa Connor

This research was conducted with the purpose of determining the correlation between Body Mass Index (BMI) and the rate at which human cadavers decompose at. It was predicted that cadavers on either end of the spectrum, i.e. having a very high or very low BMI would decompose the fastest. Twenty human cadavers of various BMIs, ages, and sexes were used for this study, which took place at the Forensic Investigative Research Station (FIRS) outside of Grand Junction, Colorado. Daily Total Body Scores (TBS) representing the different stages of decomposition were recorded daily for each individual on a scale of 3-30. Accumulated Degree Days (ADD) were used to normalize temperature and calculated using the Megyesi method for each individual at four TBS increments which represented key stages in the decomposition process. The ADD was then graphed against the TBS with the mean ADD for the three BMI groups (</=18.5, 18.5-25, >/= 25) at the four TBS increments representing the data points. The BMI was also plotted against the TBS to determine the correlation between the two. The r-value for the first TBS group of >/= 6 was found to have the highest r-value, while the other three were not significantly different. The graph showed no significant difference between the three BMI groups. Overall, the research indicated that having a very high or very low BMI does not seem to correlate with increased rates of decomposition within human cadavers. However, further research is needed to affirm this.

Poster 2
Incan Metallurgy: The Use of Metal Tools and Weaponry Among the Inca
Logan Christopher Bullard
Anthropology
Faculty/Staff Sponsor: Silvana Rosenfeld

In the art of warfare tremendous importance is placed upon the soldier and how the soldier can best and most efficiently conduct themselves in battle. While volumes upon volumes of material in military history has been written about the discipline required to be a soldier one must also take into consideration the equipment a soldier carries into battle. While neither numerical or technological superiority are guarantees for victory in battle, they sure can make victory much easier to achieve. Within the discipline of archaeology archaeologists have historically classified civilizations and cultures by the tools they used. Under this classification system cultures have usually been divided under such categories as stone age, bronze age, and iron age cultures. One of the first academics to try and codify civilizations under this system of technological was the Danish academic Christian Jurgensen Thomsen under his "Three Age System". When Francisco Pizarro engaged the Inca's in battle in 1532 he was definitely outmatched, but not necessarily out gunned. While it has almost become a cliché to describe the Inca as doomed to fail in the defense of their empire, they were not going up against muskets with only stone weapons and tools as one might believe. In fact, the Inca were unique among many Amerindian nations in that they had a long history of metallurgy and metalworking utilizing forged metals in their sacred ceremonial objects and some select weaponry. However, the Inca never forged metal weapons on a large scale, as those in the Old World such as the Greek and Romans did, because the environment in which they lived provided materials of comparable efficiency to their metal tools.
Poster 3
To Bear Witness: First Generation Narratives
Dillon Bryant‡†
Art
Faculty/Staff Sponsor: Johntimothy Pizzuto

Within the realm of higher education, first generation students, is a loosely defined umbrella term that refers to students of all races, sexualities, ages, and social classes and denotes individuals coming from homes where neither guardian possesses a college degree. These individuals possess unique and underrepresented narratives and in today's tumultuous environment regarding education, it is imperative that these concerns are given the opportunity to be expressed. Utilizing portrait photography, screen printing, interviews, and other techniques, a series of multimedia prints were created reflecting the narratives of selected participants. Participants were asked to sit down for an informal interview exploring their motivations and struggles in obtaining a higher education. Portraits of participants were photographed with a medium format film camera and were printed in a darkroom. From here, these prints were layered with excerpts from the interviews between participant and artist, along with imagery from family photographs, with color and surface modulated through screen printing. The end result of these prints reflects the fluid and changing nature of personal identity as one grapples with pursuing a college degree.

Poster 4
Cognitive Bias Modification for Risky Sex and Alcohol Use
Austin M. Hahn*
Clinical Psychology
Faculty/Staff Sponsor: Raluca Simons

Sexual risk taking is associated with many negative outcomes such as STI infection, unplanned pregnancy, and sexual assault. Research indicates that alcohol use is a significant predictor of risky sexual behavior (George et al., 2014), and reducing alcohol use might be important in reducing risky sex. Sexual risk taking may occur when deliberative cognitive control processes are weaker than automatic approach tendencies. Approach biases toward alcohol cues are associated with increased drinking behavior and may also impact an individual's decision-making process regarding condom use. Joystick cognitive bias modification (CBM) interventions using a modified version of the approach avoidance task (AAT) are emerging as effective treatment tools by modifying implicit processes for many disorders and problematic behaviors. Namely, if an individual is trained to attend to or attend away from specific information, symptoms may be reduced and behavior may be changed. Previous experimental research has been successful in modifying various cognitive biases away from alcohol stimuli and subsequently reducing drinking behavior (Wiers et al., 2010; 2011). This study examined whether implicit cognitive biases can be modified to decrease approach bias toward alcohol stimuli and increase approach bias toward condoms using a 2 (Training: training/sham) x 3 (Time: pretest/posttest/3-month follow-up) design. Participants were college students between the ages of 18-24, who drink moderately, and have engaged in sexual intercourse without a condom with a casual, non-committed partner during the three months prior to data collection. Preliminary analyses indicate that the intervention was successful in modifying participant's approach and avoidance tendencies, such that individuals assigned to the training condition increased their approach bias for condoms and decreased approach bias for alcohol. Additionally, the intervention was associated with significant decreases in alcohol use and increases in condom use.
The intaglio printing process is a historic method of creating art and mass-produced illustration, but it is largely unknown to those outside of the artistic sphere. The purpose of this project will be to make a poster that shows an easy to follow step-by-step description of the process used to create an intaglio print using copper and ferric chloride. Photographs illustrating the specific actions being done in the process will accompany each major step and finished prints, as well as fully etched copper matrices will be displayed for greater clarification of the process.

Early Colonization of the Gut Microbiome and Obesity: A Focus on Infant Feeding Practices and Method of Birth
Jena Dreyer
Basic Biomedical Sciences
Faculty/Staff Sponsor: Andrea Liebl

Childhood obesity is a complicated multifactorial condition. To address the rising rates of obesity, researchers have focused on the composition of gastrointestinal microbiome and its role in metabolism, energy absorption, and weight regulation. The gut microbiome of overweight individuals has an increased ratio of Firmicutes to Bacteroidetes and decreased Bifidobacteria, while the opposite occurs for normal weight (BMI < 25) individuals. Colonization of the gut begins in early life and is highly influenced by method of birth (vaginal versus Cesarean) and method of feeding (formula feeding versus breastfeeding). To promote the colonization of a healthy infant gut microbiome, the optimal strategy is to have a vaginal delivery followed by exclusive breastfeeding until the infant reaches 6 months of age. However, in cases with overweight or obese mothers, infants may develop an aberrant microbiota colonization if the bacteria associated with weight gain translocate to the infant gut during breastfeeding-predisposing the infant to develop obesity later in life. As preventative measures, it should be recommended that pregnant women follow a diet of naturally prebiotic and probiotic foods to increase the levels of beneficial bacteria in both the mother's and infant's gut. For overweight mothers, alternative options to breast milk are available to reduce the infant's risk for developing obesity later in life.

Dynamic Regulation of Vesicular Trafficking by Altered Sterol Homeostasis
Elle Anderson
Basic Biomedical Sciences
Faculty/Staff Sponsor: Kevin Francis

A fundamental cellular process critical for normal neurodevelopment and neuronal function is clathrin-mediated endocytosis. Within the CNS, clathrin-mediated endocytic pathways are well-documented to be functionally coupled to the exocytosis of synaptic vesicles for neurotransmission and essential for vesicular receptor desensitization. Depletion of membrane lipids has been recognized to disrupt clathrin-mediated endocytosis, though the underlying mechanisms remain unclear. Interestingly, autosomal recessive disorders of cholesterol synthesis, characterized by substitution of cellular cholesterol for sterol intermediates, constitute a group of malformation syndromes that severely affect nervous system development and function, resulting in neurological deficits such as microcephaly, intellectual disability,
self-injury, and autistic behaviors. We hypothesize that structural alteration of cellular membranes by cholesterol precursor accumulation disrupts clathrin-mediated endocytosis, detrimentally impacting neural function. To determine the consequences of altered sterol homeostasis on endogenous clathrin trafficking, CRISPR/Cas9 gene editing was utilized to fluorescently label the clathrin light chain A (CLTA) gene. Live cell imaging experiments utilizing inhibitors of post-squalene cholesterol biosynthesis enzymes within 293t cells demonstrated striking immobilization of clathrin dynamics at the cell membrane, as well as functional impairment of clathrin. In order to study neural specific effects, an induced pluripotent stem cell (iPSC) model was generated in which CLTA was fused to a cyan fluorescent protein, followed by directed differentiation to neural lineages. While iPSCs exhibited clathrin trafficking deficits, cholesterol biosynthesis inhibitors had negligible effects on post-mitotic neural lineages. These finding suggest cholesterol mediated vesicular trafficking is tissue specific and exhibits a high degree of lipid specificity. Ongoing mechanistic studies for the inhibition of clathrin endocytic events include membrane bending dynamics and cytoskeletal involvement. Delineating the impact of altered sterol homeostasis on endocytosis will provide mechanistic insight into clathrin-mediated trafficking and elucidate signaling deficits possibly underlying neurological dysfunction in these rare disorders.

Poster 8
Social Discounting: An Examination of the Neural and Behavioral Performance of Individuals Making Altruistic Decisions About Family Members
Chesney Arend
Basic Biomedical Sciences
Faculty/Staff Sponsor: Lee Baugh

Social Discounting is defined as the decrease in generosity between the decision maker (participant) and the recipient of a gift as the social distance (perceived closeness) between the two increases. To date, there is little data that has been collected that compares both the responses of behavioral performance and the corresponding neural activity when individuals are asked to make decisions about money based upon how close they feel to someone of their kin or not of their kin as their perceived social distances or relationships change. This specific study includes both fMRI and behavioral data analysis and takes into account the difference in perceived social distance between kin and non-kin relationships in correspondence with blood flow to specific areas of the brain that are being activated when participants are asked to make decisions regarding altruistic or self-motivated decisions. Before the scan, participants in this study were asked to rank seventeen different individuals of either kin or non-kin relationships from one to seventeen based on how close they perceived their relationship with the individual in question to be. The fMRI portion of this study prompted the participant to answer questions about how they would feel giving a gift to someone, how the individual would feel receiving that gift, and if they would keep or give specified amounts of money to the individuals that they ranked first, second, fifth, tenth, or fifteenth in the questionnaire prior to scanning. The preliminary analysis of the imaging data collected showed 4 main regions more active when participants imagined how they would feel receiving a gift versus giving the gift. These active regions were observed within the right superior temporal gyrus, right middle frontal gyrus, BA8 in the frontal cortex, and the left superior frontal gyrus.
**Poster 9**  
The Potential for Stress to Produce Both Pro-Nociceptive and Anti-Nociceptive Effects Through Endocannabinoid Mediation  
Danielle Lee Brown  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Brian Burrell

Stress-induced analgesia (SIA) is characterized by a reduction in response to painful stimuli following a noxious stimulus. However, stimuli sufficient to elicit SIA could potentially cause sensitization to non-painful stimuli. Previous studies in our laboratory suggest that endocannabinoids reduce responses to nociceptive stimuli, but can increase responses to non-nociceptive stimuli. To explore whether endocannabinoids mediate SIA, our lab used the medicinal leech (Hirudo verbana). Hirudo was shocked two times per minute for fifteen minutes and this reliably raises serotonin levels in the CNS, suggesting a stress-like state. Responses to a thermal nociceptive stimulus and to a non-nociceptive mechanosensory stimulus were measured as well as a non-reflexive measure of body tension. Electric shocks did not change response to nociceptive stimuli in either the control or tetrahydrolipstatin (THL)-injected animals (THL inhibits endocannabinoid synthesis). Shocks did sensitize responses to non-nociceptive stimuli in the control and THL groups. The body tension ratio decreased following shock in both groups. THL did not produce sufficient differences from the control results. Putative-stress inducing stimuli did not produce an SIA effect, but did result in sensitization to non-nociceptive stimuli. While there is no evidence for a role of endocannabinoids, further experiments are being carried out.

**Poster 10**  
Stress & Drug Relapse: The Effects of Stress on Dopamine Output and Reward Value in Healthy and Amphetamine Withdrawn Brains  
Kaci Clement†  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Gina Forster

Amphetamine abuse is a widespread problem, due in part to high relapse rates and lack of treatments that can prevent relapse during withdrawal. Amphetamine withdrawal is characterized by hypersensitivity to stress and blunted reward responses, which amphetamine users attribute to relapse. Stress exposure causes release of the stress hormone cortisol (corticosterone in rats, CORT), and CORT can act as a neurotransmitter in the brain. For example, CORT in the ventral hippocampus (vHipp) is known to mediate a variety of stress responses. Rats in amphetamine withdrawal have enhanced vHipp CORT in response to stress (relative to drug-naive controls), which may contribute to stress hypersensitivity and dysphoria experienced in withdrawal. The nucleus accumbens shell (NAcS) is a reward center in the brain that contains high amounts of dopamine, a neurotransmitter associated with reward value. Because the vHipp sends excitatory projections to the NAcS, we tested whether CORT in the vHipp could alter dopamine output, thus linking stress to reward responses. To test this, we used a rodent model of amphetamine withdrawal. Animals received either amphetamine or saline for two weeks, and then underwent two weeks of withdrawal where no injections were given. Directly after the withdrawal period, we infused CORT into the vHipp while measuring dopamine. We found a CORT-induced increased of dopamine output in the NAcS in drug-naive animals. This implies that vHipp CORT enables stress to increase dopamine, to promote goal-motivated behavior. However, in amphetamine-withdrawn rats, CORT infused into the vHipp resulted in a biphasic decrease of NAcS dopamine output. This suggests that the link between vHipp CORT and NAcS dopamine becomes disrupted during amphetamine withdrawal, which could underlie the dysphoria seen during withdrawal. In the future, this pathway could be targeted to prevent the negative psychological symptoms seen in amphetamine-dependent individuals who are trying to discontinue their drug usage.
Poster 11
Optogenetic Inhibition of Methamphetamine-Seeking in Rats
Rebecca Cordie
Basic Biomedical Sciences
Faculty/Staff Sponsor: Lisa McFadden

Methamphetamine (METH) is a highly addicting psychostimulant. There is a high prevalence of use in the United States that leads to an increasing number of METH related fatalities. There are currently no pharmacological treatments available for METH addiction. To help guide the development of treatment options, it is important to understand changes underlying METH addiction in the brain. Two key brain regions in the reward circuit of the brain are the medial prefrontal cortex (mPFC) and the nucleus accumbens (NAcc). Glutamatergic neurons project from the mPFC to the NAcc to modulate its activity. The purpose of this study was to investigate this pathway and its role in METH-seeking behavior in male and female rats. Male and female rats were allowed to self-administer METH and underwent extinction and two reinstatement sessions. Reinstatement sessions were counterbalanced such that optogenetic inhibition of the mPFC neurons only occurred during one reinstatement session. Results revealed an increase in METH consumption during self-administration in males and females animals. Further, during extinction, this drug-seeking behavior decreased as training progressed. When animals reinstated with the laser off, female rats exhibited significantly higher drug-seeking behavior. However, when the optogenetic inhibition was applied to the mPFC, both males and females significantly decreased drug-seeking. In conclusion, excitatory activity in mPFC pathway may play an important role in drug-seeking behavior related to METH addiction in both males and females.

Poster 12
Disrupting Cortical Dopamine in Adolescence Alters Reward Seeking and Related Neural Activity in Adulthood
Shaydel Davies
Basic Biomedical Sciences
Faculty/Staff Sponsor: Michael Watt

Victims of teenage bullying show increased psychiatric disorders in adulthood, including substance abuse. This may result from stress-induced disruption of the developing adolescent brain, which undergoes dynamic reorganization in areas related to impulse control, such as the prefrontal cortex (PFC) dopamine (DA) system. This scenario can be studied using a rodent adolescent social defeat paradigm, a model of teenage bullying, which we have shown enhances seeking of amphetamine-associated cues in adulthood. Adolescent defeat also reduces adult medial PFC (mPFC) DA activity, and pharmacological depletion of mPFC DA is known to increase psychostimulant responses. However, a causal link between decreased adult mPFC DA resulting from perturbations in adolescence, such as those caused by social stress, and later increases in amphetamine responding has yet to be established. Here, we tested this by pharmacologically blocking mPFC DA activity in defeated adolescent males, then determined if this prevented increased adult drug seeking. Adolescent male rats received daily bilateral infusions of either vehicle (aCSF) or the DA D2 receptor agonist amisulpride into the mPFC from postnatal day (P) 35 - 39. Upon reaching early adulthood (>P56), conditioned place preference (CPP) was used to assess drug cue seeking, with animals receiving either saline or amphetamine. At P63, brain tissue was collected by rapid decapitation and then sectioned to confirm cannula placement, with efficacy of drug infusions in restoring mPFC DA determined using HPLC. Additional neurotransmitter levels in brain regions associated with reward, including the nucleus accumbens subregions, were measured to explore potential widespread effects of stress or amisulpride infusion. Although our findings indicate specific roles for the nucleus accumbens, the role of reduced mPFC DA
cannot be ruled out at this point. Establishing this causal link between adolescent social stress, cortical dopamine, and drug seeking is crucial, as it will facilitate development of targeted pharmacotherapies for preventing the onset of drug addiction following teenage bullying.

**Poster 13**

**Analyzing the Relationship among Socioeconomic Factors and Drug Overdose Mortality in the United States**

Alexandra Dolezal  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Lisa McFadden

The drug overdose mortality rate has increased throughout the United States. The purpose of this study was to determine what socioeconomic factors are associated with the overdose rate on a state-by-state basis. Statistical models were created using previously collected survey and epidemiological data. Results revealed the drug overdose mortality rate significantly increased from 2013 to 2015. In 2014, the following six variables were significantly associated with the drug overdose mortality rate: prevalence of any mental illness in the past year, percentage of employees being let go by employers, prevalence of fentanyl positive drug seizures by law enforcement, high school education as highest degree earned, prevalence of cocaine use in the past year, and the Gallop Poll percentage of Obama disapproval. By improving associated factors, such as mental health, education, and economic stability, the consequences may lead to reductions in drug overdose mortality.

**Poster 14**

**Enhanced D2 Autoreceptor Function in the Adult Medial Prefrontal Cortex Following Adolescent Social Defeat**

Eric Thomas Graack  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Michael J. Watt

Stress-induced disruption to the developing adolescent medial prefrontal cortex (mPFC) dopamine system may promote the cognitive deficits inherent in psychiatric disorders associated with teenage bullying. Adolescent male rats exposed to repeated social defeat, as a model of teenage bullying, show increased mPFC dopamine levels during and for 9 days following the stress experience, which is followed by a decrease in mPFC dopamine activity along with cognitive impairment in early adulthood. Here, we investigated whether heightened inhibition of terminal dopamine release by dopamine D2 autoreceptors (D2AR) contributes to lowered dopamine availability in the adult mPFC, and determined when functional changes occurred in relation to defeat experience. Rats were defeated by an adult male rat from postnatal day (P)35-39, with age-matched controls exposed to a novel empty cage. To assess D2AR function, electrochemical probes were implanted in anesthetized rats at either P40 (mid-adolescence), P49 (late adolescence) or P56 (adulthood) to measure changes in mPFC dopamine release in response to local infusion of the D2 receptor agonist quinpirole. Previously defeated rats showed more rapid and greater quinpirole-induced reductions in dopamine than non-defeated controls, indicating greater function of D2ARs, but only as adults (P56). However, controls showed an age-related decline in D2AR function that was not evident in defeated rats, suggesting adolescent defeat impairs D2AR maturation. We posit this retention of enhanced D2AR function occurs in response to the sustained elevation in mPFC dopamine activity following the stress experience, promoting a maladaptive state in early adulthood. Pharmacological blockade of mPFC D2ARs to restore dopamine activity may prove effective in rescuing cognitive processes in bullying-associated disorders.
**Poster 15**  
**Comparison of Chronic Kidney Disease in the United States versus Germany**  
Mackenzie Gustafson  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Becky Wolff

The impact of Chronic Kidney Disease on two specific countries, the United States and Germany, is examined. The author explores social and economic status within each country along with the overall general population and health statuses, in order to compare and contrast the impact of Chronic Kidney Disease. Health care systems are also examined by the author to include common beliefs and rituals of each system. The effects of Chronic Kidney Disease in each of the two countries is the most thoroughly investigated topic. The author explores the nature and magnitude of Chronic Kidney Disease in each country. It identifies not only the risk factors, but who is most at risk of developing Chronic Kidney Disease. Exploration of the similarities and differences of Chronic Kidney Disease within the United States and Germany is explained to include economic and social consequences. Finally, recommendations for improvement for each country in relation to the health care issue, Chronic Kidney Disease, are made by the author. Keywords: Chronic Kidney Disease, United States, Germany, health, health care, health care issue

**Poster 16**  
**The Role of Endocannabinoids during Transfer of Habituation**  
Alex D Hanson†  
Basic Biomedical Sciences  
Faculty/Staff Sponsor: Brian Burrell

Over two million people suffer from some form of chronic pain. However, many available treatments are either ineffective or have side effects that include the risk of addiction. Transcutaneous Electrical Nerve Stimulation or TENS therapy is a well-known treatment for chronic pain. It is based on a concept, Gate Control Theory, in which nociceptive (pain-sensing) signaling is reduced when non-nociceptive stimulation is taking place. However, this treatment has had mixed results primarily because the basic biological mechanisms of this form of neuromodulation are poorly understood. We hypothesize that decreases in nociception by way of a repetitive, non-nociceptive stimulation are actually a form of habituation: a simple form of learning in which an animal learns to de-emphasize responses to repetitive stimuli. Specifically, it is thought that decreases in nociceptive signaling following non-nociceptive stimulation represent a generalization or transfer of habituation. Following the habituation training using non-nociceptive stimuli (von-Frey fibers), responses to noxious thermal stimuli were reduced as shown in the figure below. Surprisingly, the antinociceptive effects of this habituation training were long lasting (8 days; data not shown). Previous studies in the lab have indicated that nociceptive synaptic transmission could be depressed by endocannabinoid transmitters acting on TRPV receptors. Consistent with these findings, injection of a drug that blocks either the synthesis of the endocannabinoid transmitter or activation of the TRPV receptor, prevents habituation-induced decreases in responses to noxious thermal stimuli (no transfer of habituation). However, injection of these same inhibitors after training does not prevent transfer of habituation suggesting that endocannabinoids are involved in the initiation of the habituation memory, but not in its maintenance. These results show that repetitive stimulation of non-nociceptive afferents produces a form of habituation that generalizes or transfers to nociceptive signaling pathways and persists for multiple days. These findings indicate a need to re-consider how TENS unit therapy is applied and indicate a potential advantage to combining such therapy with treatments that enhance endocannabinoid signaling.
Influenza A (H3N2) is a viral disease that manipulates the cellular machinery of its host to ensure its existence and its ability to successfully pass on its progeny. This negative sense RNA virus is composed of eight gene segments. For this project, the constituent of concern is the hemagglutinin (HA) protein due to the role it plays in the virus's infectivity. The HA of this pathogen is made of two regions, the head and the stalk. These regions contain what are known as glycosylation sites, where oligosaccharides can be bound, creating what is known as glycosylation shielding. This shielding process has been shown to increase the survival rate of the virus by disrupting neutralizing capabilities utilized by antibodies that would normally defeat the virus. The process of glycosylation occurs once H3N2 has conquered a cell. The virus replicates itself and sends duplicates through the endoplasmic reticulum and golgi apparatus where oligosaccharides are then attached to the potential glycosylation sites creating antibody resistance.

History has shown that ever since the 1968 pandemic the H3N2 virus has been positively selecting for increased numbers of glycosylation sites. What has not been considered is the effect of cellular metabolism on the potential for glycosylation. This project will model the effects of type 2 diabetic conditions on the glycosylation of H3N2. Patients afflicted with diabetes are shown to have increased levels of glycoproteins in the blood. This response suggests that H3N2 will undergo increased glycosylation and exhibit greater survivability compared to those without diabetes. The virus will be grown in MDCK, CHO, and chemically defined CHO cell lines to create the scenario of diabetic vs. non-diabetic conditions. Using SDS-PAGE and western blotting techniques, glycosylation and antibody resistance of the virus will be measured. This study characterizes how H3N2 behaves in different environments.

Over the last two decades it has become well understood that fetal cells can be identified in maternal circulation as a result of fetal-maternal transfer via the chorion. During fetal development in utero, dizygotic (DZ) twins traditionally are described as having two independent chorions (dichorionic) but new findings have identified rare cases of monochorionic DZ twinning (Peters et al., 2016). As a result, monochorionic twins are able to have twin-twin transfusion and cell grafting through connected fetal circulation resulting in a chimera which has implications in development of autoimmune diseases (Nelson, 1999). Studies of ABO blood groups in twin pairs has revealed that upwards of 8% of DZ twin pairs demonstrate mixed blood typing as a result of chimerism (van Dijk, Boomsma, & de Man, 1996). While this phenomenon has been previously explained the frequency of this occurrence requires further study. We hypothesize that microchimerism within DZ twins is more common than previously explained in literature and seek to further examine the frequency of microchimerism in DZ twins on a molecular level. We will selectively identify blood derived DNA from DZ twin pairs within the Netherlands Twin Registry that are discordant for sex and utilize quantitative polymerase chain reaction (qPCR) to subsequently target the Y-chromosome specific gene DYS14 in the female co-twin. Optimization of the assay for this study has required validation of target specificity and standard calibration to produce a broad range assay able to detect the DYS14 gene at a minimum input of one male genome equivalent (6.6 pg male DNA) within female DNA. Future study will utilize this technique to collect quantitative
data of DYS14 gene frequency to evaluate the quantity of male cells within the samples of the female co-twins of the DZ twins selected for the study.

**Poster 19**

**Ouch! That Could Have Been Avoided: A Content Analysis of Work Place Safety Videos Using Message Sensation Value**

Jescy Carlos Rodriguez, Maria Nicole Potratz, Andrew Candela, Hannah Kelly Diggins, Joey Michael Bader

Biological Sciences

Faculty/Staff Sponsor: Travis Loof

As a whole, work related injuries and fatalities have decreased within the US. However, these accidents still pose a persistent threat to thousands every year across a variety of vocations. (United States Department of Labor, 2015; Fatal occupational injuries, 2013). Proper training can help reduce the number of work place injuries. Presently, mediated training programs are implemented to reduce these accidents; however, these trainings often do not receive the attention nor retention that is needed to stop work place injuries or fatalities (Cullen, 2005). Indeed, research has found that training videos can be successful in increasing awareness and attention to appropriate safety procedures. Unfortunately, these videos are often passively viewed (Burke et al., 2006). Put simply, safety videos need to engage viewers. The purpose of this content analysis is to identify message characteristics that will engage and capture an audience's attention to create safer work environments. Using previous occupational safety and communication as a framework, this study will seek to understand how occupational safety videos use message sensation value to increase engagement. This study is the first study in a research project examining workplace safety video engagement and consumption.

**Poster 20**

**Independent and Interdependent Self-Construal as Predictors of Help-seeking Attitudes in Rural Communities**

Levenae Buggs*, Rathna Garigipati

Clinical Psychology

Faculty/Staff Sponsor: Randy Quevillon

There are a high number of rural individuals with untreated psychiatric illnesses (Stewart, Jameson, and Curtin, 2015). Yet, rural populations utilize professional mental health services at lower rates than urban populations (Deen, Bridges, McGahan, Andrews, 2011). Consequently, it is important to evaluate barriers related to help seeking. Barriers related to accessing mental health in rural settings include: cost, distance, and shortage of mental health professionals (Judd et al., 2006). However, attitudinal barriers are a better predictor of professional help seeking in rural populations compared to other structural barriers (Handley et al., 2014). Self-definition greatly influences a person’s attitudes (Kühnen, 2009) and self-construal is a specific aspect of self-definition. Self-construal is an individual’s view of themselves, others, and their relationships with others. There are two distinct types of self-construal: independent and interdependent (Markus and Kitayama, 1991). The role of self-construal in help-seeking attitudes and behaviors has been thoroughly studied in diverse populations (Shea & Yeh, 2008; Yeh, 2002). Researchers have documented that the level of interdependent self-construal tends to be high in people from rural backgrounds (Zhang, Ding, Lee, & Xu, 2013). However, research regarding the way in which self-construal influences help-seeking attitudes in rural populations has been sparse, and needs more exploration (Rughani, Deane, & Wilson, 2011). The current authors hypothesize that in a college sample, individuals with a rural background are more likely to endorse a higher magnitude of the interdependent self-construal. Additionally, the independent and interdependent self-construal are hypothesized to significantly predict attitudes towards help-seeking. The interdependent self-construal is
hypothesized to predict help-seeking attitudes over and above the independent or the relational self-construal. Participants will be recruited from a mid-sized Midwestern university campus. Data collection is in progress.

**Poster 21**
Autism Spectrum Disorder and the Sibling Relationship: A Phenomenological Study  
Emma Austin Ranum, Tanya Marie Ochsner, Ali Vagelsang  
Clinical Psychology  
Faculty/Staff Sponsor: S Jean Caraway

Statistics show that 80-90% of individuals grow up with a sibling and recent research has demonstrated the importance of such relationships for children's healthy development and overall social skills. Having a sibling with a developmental disability can impact this sibling relationship. To date, research indicates that the experience of being a sibling to a child with Autism Spectrum Disorder (ASD) can be difficult, but specifics about how the typically developing sibling is impacted are not clear or consistent. AA 2017 study conducted by the primary researcher, Ranum, demonstrated that there is a connection between sibling relationship quality, warmth and conflict, and negative affect experienced by typically developing siblings of children with Autism Spectrum Disorder (ASD). More specifically, typically developing siblings in sibling relationships, which were characterized by higher levels of conflict than warmth, endorsed a greater amount of negative affect. There is also limited qualitative research in this area. Thus, the purpose of the proposed phenomenological study is to understand the overall experience of being a sibling of a child with ASD and how this impacts siblings' emotions, positive and negative affect, and perception of sibling warmth and conflict. In this study, 9 siblings of children with ASD were recruited from local ASD clinics and parent connection services, and were interviewed by the primary researcher. The study utilized Phenomenological methods to capture qualitative themes from interviews in which the participant described their sibling relationship, how it impacts negative affect, and how negative affect manifests in their daily life (i.e. social relationships, academic performances, interests). Major themes found in the interviews were warmth, conflict, and family dynamics. The findings of this study have potential to inform parents and professionals about the experience of being a sibling to a child with ASD and could inform interventions for this population.

**Poster 22**
Rural vs. Urban: A Factor Associated with a Child's Risk for Admission to a Residential Treatment Center  
Alison Vogelsang, Ashley Brage  
Clinical Psychology  
Faculty/Staff Sponsor: S Jean Caraway

Individuals who live in rural areas tend to experience less access to various resources. More specifically, such individuals experience significant healthcare disparities when compared to non-rural populations. Difficulty accessing necessary healthcare services often results in overall poorer physical and mental health. However, lack of mental health services tend to be especially scarce among rural populations and research has demonstrated that being from a rural area is a risk factor for mental health difficulties. One option for individuals experiencing mental health difficulties is residential treatment. Residential treatment centers (RTCs) serve individuals who struggle to function in a less restrictive setting such as outpatient mental health services, a home, or a group home. Both children and adults utilize RTCs for various reasons that typically include behavioral difficulties (i.e. aggression, substance use, self-harm, etc.). To date, literature has focused mainly on adult populations, thus, examining use of RTCs among kids in a rural population would enhance knowledge of this population. The current study is in the data
collection phase and will utilize data from a RTC for children suffering from behavioral and emotional disturbances. More specifically, the current study will examine whether children from rural areas are overrepresented in a RTC when compared with children who are not from a rural area. Overrepresentation of children from a rural area in such facilities may further highlight the need for easier access to mental healthcare for kids from rural populations.

**Poster 23**  
**Life Satisfaction and Substance Use in College Students**  
Spencer M Hackler, Hayley Marie Warren  
Counseling & Psychology in Education  
Faculty/Staff Sponsor: Gabrielle Strouse

The link between perceived life satisfaction and substance use has been made clear through previous research carried out with a range of different sample populations. Understanding that there is a relationship is well enough, but understanding the relationship specific to college students in the United States may provide insight into the habits and risk-taking behaviors of college students in the United States. Students will be administered a 9 item survey on their substance use habits along with the 8 item Flourishing Scale (Diener, Wirts, Tov, Kin-Prieto, Choi, Oishi, & Biswas-Diener, 2010). Scores on the two instruments will be run through a bivariate correlational model in order to assess any possible correlation between perceived life satisfaction and substance use habits. We expect to find that students that score lower on the flourishing scale will report more alcohol and/or other substance use than those students that score higher on the flourishing scale. Further understanding the relationship between perceived life satisfaction and substance use in college students in the United States could better prepare and equip colleges and universities with the knowledge and tools necessary to support students’ mental and physical well-being. This research could also be used to educate students in why college students have the general experiences they do as well as how to be aware of their own habits and what resources may be used to aid them.

**Poster 24**  
**Gender-related Relationships Between Leisure Time and Physical Activity**  
Jessica Hofer, Kory Bromley  
Counseling & Psychology in Education  
Faculty/Staff Sponsor: Gabrielle Strouse

Physical inactivity has become a rising problem over the past decades. There is evidence of significant inequality in levels of activity among people in the US, including inequalities between men and women. How people spend their leisure time has played a role in the increasing numbers of sedentary lifestyles, especially among college-age students. Understanding how leisure time is spent among college students, and differences between men and women, is a step towards understanding potential targets for interventions aimed at creating active lifestyles. Undergraduate and graduate students enrolled with the University of South Dakota will be hand-given surveys in the university’s student center containing questions on their demographics and how they spend their leisure time. Questions from the survey are based off the Godin Leisure-Time Exercise Questionnaire. The data analyses will specifically look at gender-related differences among leisure time and physical activities. We expect male students to spend more of their leisure time on active behaviors compared to female students. We expect female students to spend more of their leisure time on activities such as social engagements and studying. The goal of determining gender-related differences is to decrease the gap and help all genders partake in active lifestyles.
**Poster 25**  
The Relationship of Anxiety and Career Indecision in First Generation and Non-First Generation College Students  
Kasandra Girard, Torrian Neeman  
Counseling & Psychology in Education  
Faculty/Staff Sponsor: Gabrielle Strouse

First-generation (FG) college students, those who are the first in their families to complete a college degree, are a unique population and may already be at a disadvantage when compared to their non-first generational peers when it comes to being prepared for college. Students face career-choices in college and often experience levels of anxiety that may or may not affect their levels of decision-making skills. We chose to study how first-generational students and non-first generational students experience anxiety and whether or not this makes an impact on their ability to make a career choice. Both undergraduate and graduate students were surveyed at the University of South Dakota and filled out the State-Trait Anxiety Scale-6 Item form and the Career Decision Scale. Participants indicated whether or not they were a FG student and results were separated into two categories. We predict that both groups will experience levels of anxiety but there will be no correlation between anxiety and career-decisedness for FG students, due to a hypothesis that FG students will have high levels of career-decidedness in order to achieve educational mobility in society. We predict that anxiety and career decidedness will have a negative correlation in the non-first generational group. The impact of this study is to add to the limited research surrounding FG college students, and to help better understand what contributes to a successful decision-making process when advising students on major or career selection.

**Poster 26**  
Parent Beliefs and it's Relationship to Children's Skills Using Digital Media  
Shanel Marie Goranowski, Ashmita Ghosh  
Counseling & Psychology in Education  
Faculty/Staff Sponsor: Lisa Newland

In this research presentation, the main focus will be an examination of previous and current research data on the technology skills of children between the ages of 3 and 5, and related developmental outcomes including technology skills and reading. Although this project is part of a larger study that is exploring a broader set of research questions, our study will focus on the correlation between parents' expectations of their child's performance on a measure of iPad skills and the child's true skill set. Based on a literature review of previous studies, our goal is to identify whether self-fulfilling prophecy and expectations of authority figures are related to the children's performance. Additionally, self-fulfilling prophecies originate from social backgrounds. Because of this phenomena, we will also be examining gender and socio-economic differences within the research participants will be examined. Ultimately, the goal of this analysis is to identify if there is a difference between parents beliefs about children's technology skills within certain demographic groups, and how this is associated with the child's performance. We believe this analysis would be beneficial as it can help to identify if there are subconscious biases present at home. Furthermore, knowledge of these biases can be useful for parents to encourage growth in their child's skills, rather than preventing them by underestimating or overestimating them.
Poster 27
Parental Attitudes Toward Digital Versus Print Media: Exploring Differences in Motivations and Beliefs
Danielle Hertel, Cylie Hanson, Arianna Feller
Counseling & Psychology in Education
Faculty/Staff Sponsor: Gabrielle Strouse

With the advances in technology that have occurred over the past decade, digital media has become a prevalent part of the lives of young children both in the home and at school. With the rise in technology usage amongst children, much debate exists over the developmental benefits of digital media. Some researchers consider digital media advantageous for the development of young children (Burke & Marsh, 2013; Vittrup et al., 2016), while others remain cautious about its potential negative influences (Vandewater et al., 2007; Rideout et al., 2003). Although research has begun to explore parental attitudes toward technology and child development, little research has explored the differences in parental attitudes toward digital versus print media within the same study. Thus, this study aims to fill the gap in the literature by comparing parental attitudes toward digital media with their attitudes toward print media. Our intention is to discover if parents view the benefits of digital media differently than the benefits of print media. Specifically, we will be examining differences in parental beliefs toward the educational, social, and entertainment benefits of digital versus print media. Furthermore, this study will also explore if parents use digital media for different reasons than print media to enhance the developmental processes of their children. To assess differences in parents’ preference for digital versus print media, we sampled parents of preschool aged children (3-5 years old). Parents completed a questionnaire, which uses a 7-point Likert-type scale (1= Strongly disagree and 7 = Strongly agree) to rank their level of agreement on statements concerning both print and digital media usage. We hypothesized that parents would show a stronger preference for print media over digital media for the educational develop of their children. Additionally, we hypothesized that parents use digital media as an avenue for their child’s entertainment.

Poster 28
Strengths and Limitations of a Rural College Access Program
Anna K Kuznik
Counseling & Psychology in Education
Faculty/Staff Sponsor: Kari Oyen

Many college access programs provide support to students as they transition to college. Understanding the impact of various components of college access programs is key to selecting and improving such programs in school districts. By examining the strengths and barriers of one college access program, school psychologists will be able to provide guidance and support to schools considering an outside college access program as well as to students considering participation as they transition to college.

Poster 29
Psychological and Biological Indicators of College Students with Alcoholic Parents
Kami Pearson‡†
Counseling & Psychology in Education; Basic Biomedical Sciences
Faculty/Staff Sponsor: Kathleen Brown-Rice

About 25% of college students meet criteria of being an adult child of an alcoholic (ACoA), which is associated with higher rates of anxiety, depression, college attrition, and increased rates of alcohol use disorder (AUD). Previous neuroimaging studies show that adolescents with a family history of AUD present with reduced activation and structural differences in areas associated with executive functioning
and appropriate emotional processing and responding. However, it is unclear whether these outcomes are due to negative childhood experiences or the individual's alcohol use. Furthermore, most research about individuals with a family history of AUD exclude individuals who use alcohol themselves, limiting findings to resilient subpopulations only. Our research aims to fill these gaps. We predict that ACoA college students who engage in hazardous alcohol use will show poorer psychological health and scholastic performance than those who do not, as well as altered activity and structure in frontal and subcortical emotional processing areas of the brain. ACoA college students were recruited and alcohol use assessments were used to divide participants into hazardous (vulnerable) and non-hazardous (resilient) alcohol use groups. We have found that ACoA college students who engaged in hazardous alcohol use showed higher rates of depression, anxiety, and posttraumatic stress disorder (PTSD) symptoms when compared to their resilient counterparts. Analysis of single nucleotide polymorphisms (SNPs), variants of a single base pair, show that a variant of a nicotinic receptor gene associated with early initiation of substance use and dependence and impulse control appeared more often in the hazardous group than the non-hazardous group, suggesting that the risk for hazardous alcohol use is dependent on a combination of adverse childhood experiences and variations of certain genes. Overall, findings point to several important psychological, neural, and biological consequences that distinguish ACoA college students based on their current alcohol use that may be used for early intervention and preventative programs.

Poster 30
Type II Diabetes Mellitus Prevalence in the United States and Greece
Mikayla Leuer
Health Sciences
Faculty/Staff Sponsor: Becky Wolff

Type II diabetes is a chronic condition that is a leading cause of death worldwide, and takes millions of lives each year. The rates of diagnosis of the disease are set at a steady increase and type II diabetes is becoming a worldwide epidemic. The existence of type II diabetes in the United States and Greece is very prevalent and demands immediate preventative measures at an individual level, and as a global community to terminate the rapid growth of the disease. Type II diabetes is a leading cause of death in the United States, while not even breaking the charts in Greece due to a number of factors, such as unhealthy eating habits and sedentary lifestyles. While the United States and Greece have different lifestyle patterns mainly due to geographic location, the worsening diet and activity levels of the general population have been seen worldwide, which are the main contributors to obesity and type II diabetes. Despite the many opposing ways of life in these two countries, both have extremely high rates of people affected by type II diabetes. Those most likely to be affected by type II diabetes are older adults and certain racial groups, although, younger generations are on the rise. With advances in medical and psychological aspects of the disease and knowledge in preventative measures from clinical studies, there are positive implications for a solution to the millions of people who are victimized by type II diabetes; as well as the economic and social consequences that accompany it in the United States, Greece, and at a universal level.
Poster 31
Differences in Relationship Values of Offspring From Divorced vs. Intact Families
Melisa Miftari, Abbie Marie Johannesen, Chazni Madison Zwaan, Haley Nicole Nettinga,
Wednesday Danielle Westerhold, Jessica Lynn Goldsmith, Tayler LaRaye Hoogeveen
Social Work
Faculty/Staff Sponsor: Peter Kindle

Through the use of an online survey that was available for participants 18 years and older, we looked to find patterns that offspring from divorced families have different views and values than the offspring from intact families about marriage, relationships, and divorce. Divorce impacts more than fifty percent of United States' families. The offspring from these families have to deal with many challenges after the separation of their parents. These challenges could possibly alter the values and systems these individuals have later in life. We hope to fill a small gap in the literature about how these offspring value marriage and relationships versus offspring from intact families.

Poster 32
Telepsychiatry in Rural Populations Case Study
Katie Rodig
Health Sciences
Faculty/Staff Sponsor: Amy Nelson

The use of modern technology has provided many advances in health care, often times improving the health outcomes for patients. Many populations, especially rural, are experiencing a shortage of adequate health care providers, but the use of technology may be useful in solving this issue. Telehealth is the use of video-conferencing between patient and provider to provide medical services. In particular, telepsychiatry plays a major role in improving the mental health of many populations by increasing access to mental health providers. With the use of telepsychiatry, patients have more access to providers and are able to receive a wide variety of services to help improve their mental health condition. Rural populations tend to see higher rates of mental health concerns, and often face difficulties accessing providers due to the misdistribution of health care professionals and transportation challenges. Increasing access of mental health providers to these populations may result in better overall mental health outcomes for the population. To examine the benefits and challenges of telepsychiatry, students in a Heath Sciences Technology in Health Care course created a case study about a rural patient utilizing telepsychiatry as a treatment delivery method for depression. In the case study, the use of telepsychiatry to benefit these populations is examined. Keywords: Telehealth, Telepsychiatry, mental health, rural populations

Poster 33
Medication Administration Error in Hospitals
Savannah Walter, Brandi Merritt, Chase Watson, Morgan Engelkes
Health Services Administration
Faculty/Staff Sponsor: Carole South-Winter

The purpose of this study was to eliminate medication administration errors in a theoretical hospital. A medication error is an error from a commission or omission of an act at any step from when a clinician prescribes a medication to when the patient actually receives the medication. One of the largest contributors to these errors results from nurses being interrupted or distracted during medication setups. In this research different hospitals, including Cleveland Clinic, Massachusetts General, and a teaching hospital in Sydney Australia were compared. Each of these hospitals were able to reduce the number of medication administration errors in different ways. To combat errors made from nurse and other medical
staff interruptions, the hospitals have implemented practices such as eliminating phone calls during administration, or using a closed door policy when administering. This study shows how the implemented practices decrease medication error.

**Poster 34**

**Wonder-Never Land**

Ethan K Beck, Jessilynn Bean, Caitlin Bolte, Drew Miller, Cami Brenner, Megan Erickson  
Health Services Administration  
Faculty/Staff Sponsor: Carole South-Winter

Our presentation represents the pseudo-country Wonder-Never Land, and this country has been built from the ground up using real world analytics, research and healthcare system structure. In this presentation, we have gathered information and established our psuedo-country's education and health systems, which are directly effected by a conscription model of military. Furthermore, we have established an insurance program, a gross domestic product model, and lastly, an economic system that effects our chosen population for the psuedo-country we have created.

**Poster 35**

**Misdiagnosis of Alzheimer's: Effective Measures of Lowering the Rate of Misdiagnosis**  
Mackenzie Hellwig, Danielle Slaughter, Casey Johnson, Quinn Fawcett, Cole Brody  
Health Services Administration  
Faculty/Staff Sponsor: Carole South-Winter

With the baby boomer generation approaching retirement age, demands for effective Alzheimer's Disease diagnosis procedures are increasing. Current statistics suggest nearly 1 in 5 patients diagnosed with Alzheimer's Disease are misdiagnosed. Common factors contributing to the misdiagnosis rate include the presence of a mental health disorder, inadequate hearing examinations, detrimental interactions of prescription medications, and misinterpretation of alternative dementia disorders. The misdiagnosis rate can be dramatically decreased with innovative measures to improve the effectiveness of diagnostic tests. By implementing hearing and psychiatric examinations to diagnostic tests as well as reviewing each patient's current medications, alternative sources of memory loss can be established preventing a multitude of patients from being misdiagnosed.

**Poster 36**

**Veterans Hospital Opioid Prescriptions**  
Kacie Nicole Jacobsen, Brianna Marie Sparks, Dasashe Wase Gelaw, Kylie Jeanne Vandry, Jamie Lyn Holscher  
Health Services Administration  
Faculty/Staff Sponsor: Carole South-Winter

The Hot Springs Veterans Hospital prescribes an exceptionally high number of opioids each year in comparison to other Midwestern Veterans Hospitals. The purpose of this project was to bring the Hot Springs yearly prescription rate of opioids down from eleven percent to between five and six percent. Hot Springs Veterans Hospital was compared to three other Midwestern Veterans hospitals which prescribed opioids between five and six percent each year. These three hospitals were in Saint Cloud, Fargo, and finally Grand Island. In order to effectively decrease the number of opioid prescriptions the following areas were assessed; number of previous opioid prescriptions, the patient's level of pain, their true need of pain management, and previous addictions the patient suffered. The 2001 Institute of Medicine report entitled Crossing the Quality Chasm, states that patient care should be customized to the patient's needs and values. Another approach that was taken to reduce the number of opioid
prescriptions at the Hot Springs Veterans Hospital was to look closer at patient needs and values to potentially find a different solution for pain management. After three months of implementation, if little to no changes in prescription numbers were seen, further initiatives would be taken. *Richardson, W. C. (2001). Crossing the Quality Chasm . Institute of Medicine, 1-8. Retrieved February 7, 2018, from http://www.nationalacademies.org/hmd/~~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%202001%20%20report%20brief.pdf

Poster 37
Health Care System for "Balow"
Payton Larson, Grant James Wunder, Kyle Jonathan Bergeson, Kaitlyn Erin Ashley, Rachel Marie Orton
Health Services Administration
Faculty/Staff Sponsor: Carole South-Winter

We will be presenting a health care system for a pretend country. Our system is based on a modified Bismarck system within a free democracy. We have included information on funding, taxes and budgets, international relations, demographics, climate, and resources.

Poster 38
Mandating Flu Vaccinations for Healthcare Employees
Kate Liveringhouse, Jeremy Coss, Nathan LaCroix, Connor Larson, Sydney Schad
Health Services Administration
Faculty/Staff Sponsor: Carole South-Winter

Our project aims to inform the audience about issues with hospital-acquired illnesses such as the flu. We are researching the effects that the flu has on a health system and why it is imperative that healthcare employees receive vaccinations. With a focus on the flu vaccine, our poster will identify the needs, impacts, and results of mandating flu vaccinations within a healthcare facility. The topics of cost-savings, employee burnout, patient readmission, employee productivity and employee health will be discussed.

Poster 39
Music Therapy in Long-Term Care Facilities
Madison Marie Reimer
Health Services Administration
Faculty/Staff Sponsor: Jewel Shepherd

Long-Term Care Administrators are becoming more active in redesigning the delivery of health services to ensure that they are enhancing the quality of life of residents particularly among those of the aging population. One of those interventions include music therapy. The American Music Therapy Association (AMTA) defines music therapy as a clinical and evidenced-based use of music interventions geared toward individualized goals. Research has shown music therapy to be therapeutically beneficial in promoting wellness, managing stress, alleviating pain, improving communication, expressing feelings, and enhancing memory. Successful outcomes of music therapy interventions include measurable improvements in activity and counseling participation; maintaining cognitive functioning, reducing agitation or slowing the progression of symptoms related to such conditions as dementia among long-term care facility residents. In contrast, research supports that music therapy is further capable of eliciting prior memories and therefore it is imperative for caregivers, family members and trained music therapists to utilize the correct genre of music therapy. The purpose of this proposed study is two-fold. First to explore the literature on the impact of music therapy implemented in long-term care facilities by
reviewing the measurable outcomes. Second, to develop a framework on how to implement a music therapy program modeled on existing music therapy programs shown to be successful in evidence-based research. It is hypothesized that music therapy when implemented appropriately will positively impact quality of life among the aging population who are receiving long-term care services.

**Poster 40**  
**The Model Healthcare System of "The Banana Republic"**  
Jackson Shriver† †, Braeden Jay Edleman, Anthony Thomas Drazick, Charlie Ann Mechling, Anna Madsen  
Health Services Administration  
Faculty/Staff Sponsor: Carole South-Winter

Our group designed a fictitious country called "The Banana Republic." As part of our project, we determined geographic location, resource distribution, GDP, income distribution and government type. The point of this exercise was to develop a healthcare model that effectively provided sustainable care to all citizens. The Banana Republic utilizes the Beveridge model, with universal governmental coverage paid for through a national income tax. Our system minimizes expenses accrued by the individual while maximizing quality and access to healthcare.

**Poster 41**  
**The Effect of Socioeconomic Status on Readmission Rates**  
Dan Wetering, Madison Harrington, Jennifer Walz, Justin Jones, Gfyti Wheagar, Bret Pearson  
Health Services Administration  
Faculty/Staff Sponsor: Carole South-Winter

The objective of our poster is to demonstrate the differences between qualities of health amongst individuals with different socioeconomic status based on their readmission rates. We take an even closer look at three different levels (low, mid, and high) of socioeconomic statuses (SES) around the St. Louis, M.O. area. The benchmark that we are comparing our data to is the Medicare 30-day hospital readmissions rate being per 1,000 beneficiaries (U.S. Average 27%). While researching different SES in the St. Louis area, we found St. Louis City to have considerably low SES and their readmission rates per 1,000 beneficiaries was at 35%. The next area that we found, St. Louis County, was in the mid range for SES and their readmission rate per 1,000 beneficiaries was at 27% (which is the U.S. average). Lastly we found that in the area of St. Charles County, they were on the higher scale of SES and their readmission rate per 1,000 beneficiaries was at 26.7% (which is just under the U.S. average). Through our research we have found evidence that shows a correlation between an area's SES and their readmission rates per 1,000 beneficiaries. The data that we have collected of the St. Louis area shows that there is a clear correlation between SES and the quality of healthcare, which could be leading to the beneficiaries' readmission. We recommend that low-income areas to look into why they are showing higher readmission rates and options they have to improve their services.

**Poster 42**  
**Nonpharmacologic Interventions for Agitation in Patients with Dementia**  
Cassie Pieschke  
Honors Program  
Faculty/Staff Sponsor: Randy Quevillon

Many older adults diagnosed with dementia experience higher levels of stress and anxiety which leads to agitation. These symptoms can be further aggravated by living in a long-term care environment. Agitation in a patient with dementia can easily lead to problem behaviors such as restlessness,
wandering, pacing, screaming, hitting, kicking, or biting. These behaviors, which can be displays of agitation or anxiety, can be managed by several different interventions that can be either pharmacologic or nonpharmacologic. Currently, pharmacologic methods such as antipsychotics are still being utilized as a solution to combat these challenging behaviors. These drugs have been proven to have limited efficacy and numerous harmful side-effects. On the other hand, nonpharmacologic interventions provide a much safer alternative to address these behaviors. These interventions all have different levels of effectiveness, and they all work in different ways. Many of these interventions are presented in different pieces of literature. The major objective of this presentation is to compare the evidence behind several nonpharmacologic interventions in order to determine if any of these methods are evidence-based. In addition, this presentation will also look at the need for personalized interventions and the Unmet Needs Theory. By looking at both individual interventions and the Unmet Needs Theory, the purpose of this study is to improve evidence-based and patient-centered care for patients with dementia.

**Poster 43**

The Construction of Race and White Racial Identity in Rural Populations
Maxwell Hunhoff, Ashley Wilson, Chelsie Hatcher, Caelan Miles, Mariah Kosidowski
Social Work
Faculty/Staff Sponsor: Peter Kindle

Our team wants to investigate the construction of race in a rural population. Since rural populations in the American Midwest are overwhelmingly white, that group will be the focus. How white individuals identify themselves racially should give fascinating insight into why they believe what they believe, particularly in a rural setting. We believe how white individuals construct their idea of race and their own racial identity strongly impacts their views of other racial groups. In a conservative, majority-white region, we hope to find a strong correlation. Very little research has been done on white racial construction, and even less in a rural setting. The scale we intend to use was created specifically to measure white racial identity, but it has not been used enough to confirm its validity. Therefore, our team wants to close the research gap in the area of white individuals living in rural areas while also strengthening the validity of the WRIS.

**Poster 44**

Brain Derived Neurotrophic Factor in Slow and Fast Twitch Muscles
Anthony Drazick
Medical Biology
Faculty/Staff Sponsor: Yifan Li

Emerging evidence reveals that skeletal muscles can produce and release numerous proteins and peptides, termed myokines, to regulate metabolism and functions in an autocrine, paracrine and endocrine fashion. Brain derived neurotrophic factor (BDNF) has been identified as a myokine. It has been suggested that muscle derived BDNF may be involved in exercise-induced beneficial effects on cardiovascular and nervous systems. However, the expression, secretion, and function of muscle derived BDNF remain to be fully understood. This project was to characterize the secretion of BDNF from two different types of muscles. Mouse soleus, which is a slow oxidative muscle, and extended digitorum longus (EDL), a fast glycolytic muscle, were isolated and incubated at 37°C with O2. The BDNF protein level in muscle homogenates and incubation media were measured using Western blot. The preliminary data showed that both soleus and EDL expressed and released pro-BDNF (28 kDa). A greater level of pro-BDNF was released from soleus as compared to that from EDL. Additionally, the mature BDNF (14 kDa) was only released from soleus. The ongoing study is examining the effects of different stimulants on BDNF release from these two types of muscles.
Carbon fibers are ingredients for the rigid composite material used in aerospace and other applications. It is very important to ensure the strength of carbon fibers to meet the required standard. Lio et al. (2014) studied Burr type-X distribution for percentile quality control charts of carbon fibers through maximum likelihood estimator (MLE) and moment method estimation (MME). However, both MLE and MME did not provide close mathematics forms for the estimators of percentiles. Therefore, three additional methods, estimator based on percentile, least square method, and modified L-moment method, is used here. Empirical distribution data were collected through simulation using R language. Stimulation was carried out with different sample sizes, and different percentile of interest. Two thousand bootstrap repetitions, B=2000, had been used to determine the control limits for each bootstrap chart. The collected ARLs, UCLs and LCLs through stimulation can be compared with all proposed control charts and two existing procedure by Lio, et al.(2014) to monitor carbon fiber strength quality in terms of average running length for in-control and out-control procedures.

The Centralizer of a particular element of a group is the set of elements which commute with the particular element under the group's binary operation. A centralizer of an element is said to be 'trivial' if the only elements of the centralizer are iterates of the element. A seminal paper published by Bonatti, Crovisier and Wilkinson in 2009 proved that most diffeomorphisms on a compact manifold have trivial centralizer, answering a question Smale proposed in the '60s. We seek to provide examples of diffeomorphisms on the Circle, viewed as a one-dimensional compact manifold, with non-trivial, and better yet, non-abelian centralizer. It is very difficult to look at a particular function and determine its centralizer, so our approach is to construct functions with centralizers inherited from the structure of a particular group. The centralizer problem on the Circle is highly sensitive to the order of differentiability of the function. For twice-differentiable functions, the problem is for the most part resolved, and lacking in striking examples. We will therefore focus our attention on only once-differentiable functions, which will allow for the construction of very interesting diffeomorphisms with non-abelian centralizers.

There is a high demand for High Purity Germanium (HPGe) detectors because of their applications in radiation detection or in fundamental physics research experiments like neutrinoless double beta decay experiments or to search for dark matter. However, there is a limited supply of HPGe detectors because commercially produced detectors are very expensive and difficult to acquire for fundamental research purposes. As a solution, USD is making its own efforts to fabricate HPGe detectors. In order to complete the chain, a cryostat is required to test the detectors. Our project focuses on redesigning a cryostat so that...
it has everything it needs to efficiently and accurately be used to test Germanium detectors. The core aspects of the design include: the physical cryostat, the data taking circuit, the temperature readout circuit, and the high voltage power supply circuit. With this project, we were able to complete and stabilize the HPGe detector production chain at USD to address the increasing demand for HPGe detectors in the fundamental physics research field.

**Poster 48**
**Purification of Germanium Crystals by Zone Refining**
Kyler Kooi
Physics
Faculty/Staff Sponsor: Dongming Mei

Germanium zone refining is one of the most important techniques used to produce high purity germanium (HPGe) single crystals for the fabrication of nuclear radiation detectors. During zone refining the impurities are isolated to different parts of the ingot. In practice, the effective isolation of an impurity is dependent on many parameters, including molten zone travel speed, the ratio of ingot length to molten zone width, and number of passes. By studying the theory of these influential factors, perfecting our cleaning and preparation procedures, and analyzing the origin and distribution of our impurities (aluminum, boron, gallium, and phosphorous) identified using photothermal ionization spectroscopy (PTIS), we have optimized these parameters to produce HPGe. We have achieved a net impurity level of ~1E10 carriers per cubic cm for our zone-refined ingots, measured with van der Pauw and Hall-effect methods. Zone-refined ingots of this purity can be processed into a detector grade HPGe single crystal, which can be used to fabricate detectors for dark matter and neutrinoless double beta decay detection.

**Poster 49**
**Sensitivity Improvement of Scintillation Light Detectors by Introducing Novel Light Sensors and Crystal Cooling**
Nathan Saunders*
Physics
Faculty/Staff Sponsor: Jing Liu

This research was conducted to study the effect of temperature on the scintillating material Bismuth Germanate (BGO) with a silicon photomultiplier (SiPM) light sensor. This required constructing a new testing environment. This environment was made by placing a scintillating, or light producing, crystal inside a steel chamber along with a SiPM light sensor and various temperature sensors. This steel chamber can then be vacuum pumped and placed in a liquid nitrogen bath to keep the BGO at a stable, low temperature. When a radioactive source is brought near the BGO, it will produce a small amount of light which can be measured by the SiPM. As shown, by lowering the temperature of the BGO we can increase the amount of light produced up until a certain temperature. The reason for this phenomenon will be explored on this poster as well. This new environment was made much more compact and the complication of needing a high voltage to operate was removed by switching from previous light sensor technology to a SiPM light sensor. With this new environment, we plan to investigate the effects of temperature on other scintillating materials in the future as well.
Poster 50
Rural Brain Drain Project
Christina Mary Vogel, Sara Sue Napsey
Political Science
Faculty/Staff Sponsor: Julia Marin Hellwege

The Rural Brain Drain is the outward migration of college-educated graduates. This phenomenon that affects rural regions around the world, including South Dakota. The Rural Brain Drain has led to decline in local population and local economies throughout the state of South Dakota. Minnesota, South Dakota's neighbor sharing some of the effects of the rural brain drain, has launched a pilot program to encourage growth within its state. Based off the research of Dr. Ben Winchester from the University of Minnesota, the Minnesota pilot program's objective is to bring new residents to small towns, young families, rather than trying to retain eighteen to twenty-five year old's in these small towns. Modeled after Winchester's (2014) research, we conducted an online survey of 127 USD undergraduates. Most of the students, as predicted, planned on leaving South Dakota after completing their undergraduate degree; however, most students were leaving because of a perceived lack of job opportunities. The research from this project led to the creation of the 2018 House Concurrent Resolution 1001 in the South Dakota legislature. The objectives of HRC 1001 was to call for recognition of the rural brain drain in South Dakota and the call to action for a campaign modeled after Minnesota's pilot program drawing thirty to forty-nine-year olds to South Dakota.

Poster 51
The Relationship Between Hegemonic Masculinity and Aggressive Thoughts
Aimee Wieczorek†
Political Science
Faculty/Staff Sponsor: Bridget Diamond-Welch

The purpose of this study was to explore whether there is a relationship between hegemonic masculinity and aggressive thoughts and behavior. It was theorized that men who conform more to hegemonic masculine ideals will form more aggressive thought patterns as well because of their exposure to aggression as a desired trait, which will then lead to aggressive behavior. Data was collected through Amazon MTurk, where 350 people completed a three part survey. First, participants took the Male Role Norms Inventory - Short Form (MRNI-SF), which determined their level of conformity to masculine values; it is a seven point Likert-type scale measuring seven traits commonly associated with masculinity: toughness, dominance, restrictive emotions, avoidance of femininity, negativity towards sexual minorities, and self-reliance through mechanical skills. They then completed the Conditional Reasoning Test for Aggression (CRTA), which measures a person's implicit thought process in order to see how likely they are to act aggressively in the future. Finally, the Buss-Perry Aggression Questionnaire Short Form (BPAQ-SF) was completed, which measures a participant's self-perceived aggression; it is another seven point Likert-type scale measuring four types of aggression: physical aggression, verbal aggression, anger, and hostility. We hypothesized that those who scored high on the MRNI-SF and the CRTA would also score higher on the BPAQ-SF, showing that their endorsement of hegemonic masculine ideals led to more aggressive thought patterns and together they led overall acts of aggression. An analysis will be presented at IdeaFest showing the results of the study.
Poster 52
First-Generation College Students: Are They More Academically Motivated?
Harrison Smith, Rachel Krause
Psychology
Faculty/Staff Sponsor: Gabrielle Strouse

Academic motivation is a crucial tool for successful college students, and some groups of students have more of it than others. College has become the natural progression for many young adults in the United States as the demand for a secondary education has become standard in many fields. With the demand for secondary education, more students are coming to colleges and universities than ever before. Many of these students come from families where neither parent has graduated with a college degree (a group known as first-generation college students). This research project will investigate whether first-generation college students are more academically motivated than their non-first-generation peers. Participants will complete a 28-item Academic Motivation Scale. The responses to Academic Motivation Scale items take the form of a 7-point Likert-type scale with responses that range from "does not correspond at all" to "corresponds exactly". Each item on the Academic Motivational Scale is measuring some kind of intrinsic motivation (to know, toward accomplishment, or to experience stimulation), extrinsic motivation (identified, introjected, or external regulation), or amotivation. Along with the 28-item Academic Motivation Scale, there will be a supplemental questionnaire that will ask some basic demographic information. It is hypothesized that college students of first-generation status will be more academically motivated than non-first-generation college students. The results of this research project may help to shed light into the motivational differences between first-generation and non-first-generation college students. The data about these motivational differences may help those who work in higher education to better understand and support the students they serve.

Poster 53
What Does it Mean to be a Man or a Woman? An Examination of the Social Construction of Gender
Joshua D Fox
Psychology
Faculty/Staff Sponsor: Jae Puckett

As social understandings of gender expand and become less rigid, it is important to learn more about the ways that individuals attribute meaning to gender categories. This type of information is likely useful in understanding more about what factors influence social biases and in-group out-group relationships. In this research study, we conducted a thematic analysis to identify the associations people formed around the concepts of "man" and "woman." Participants included 360 cisgender individuals (63% women, 38% men; M age = 31 years old) who took part in an online survey. For the categories of "man" and "woman" similar types of descriptions were provided that aligned with a total of 13 themes. Answers pertaining to personality traits and physical characteristics were used more than any other category. For instance, women were described as "gentle" and "kind" whereas men were described as "powerful" and "strong." Overall, personality traits were the most frequently reported type of response. This suggests that when thinking of "man" and "woman" people are more likely to report the personality traits that they associate with those concepts than what they believe a "man" or "woman" looks like. Further, people were equally likely to think of physical characteristics for "man" as they were to think of physical characteristics for "woman." This trend continued for all the categories. Examples of other themes included references to specific individuals and examples of clothing and adornments associated with "man" and "woman." This research helps to provide insight into how people think of "man" and "woman" as a whole. This research provides insight to help future research understand our society's everchanging concepts of gender and sex.
Facebook and Google can track what we look at and search for, to target us with specific content. The positivity or negativity of this example is up to each individual, yet it does demonstrate systems which attempt to detect behavioral and psychological characteristics of users, modifying themselves accordingly - prototypical antecedents of emotionally intelligent artificial intelligence (AI). There is a fear of AI becoming more human than us, of being able to read our thoughts, of manipulating and taking advantage of us, of travelling back in time to kill our leaders. Humans as a whole, however, are surprisingly comfortable with the gradual integration of these types of AI into their everyday lives. Desire for the convenience of smart phones, smart televisions, smart refrigerators, smart homes, and personal AI assistants to order pizzas and dim lights, seemingly outweighs desire for privacy of personal information. As an Internet meme pertaining to Amazon's Alexa and similar devices puts it, "People in the 60's were saying, 'The government will wiretap your home.' Now people are saying, 'Hey Wiretap, can cats eat pancakes?" What better way can scientists utilize this plethora of freely given verbal information than by determining how speakers feel in order to improve their lives in some way? As temporary psychological state, or emotion, changes, so do the physical characteristics of speech waves. The problem lies in taking this information-riddled signal and decoding it in a way to extract usable data. With the right modeling procedures, systems could detect underlying emotions of their users with equal or greater accuracy to that of other humans. The present project bridges several gaps in research, utilizing real-time emotion detection of user speech, while adapting the difficulty of a task with the goal of maintaining positive emotion throughout (engagement or enjoyment in particular).

Our research team of undergraduate psychology majors designed an original 121-item questionnaire to measure the racial/ethnic climate on the University of South Dakota campus and in the Vermillion community. After IRB approval, the survey could be accessed on Sona and PsychData. We recruited participants from campus student groups such as the African American Student Association, Tiospaye, and Greek Life. Our final sample consisted of 173 white students and 62 students with ethnic backgrounds. For experiences of prejudice, 51% of ethnic students compared to 21% of white students had heard an embarrassing race-based comment in their presence. Also, 40% of ethnic students had experienced an offensive racial slur as opposed to 4% of white students. Only small percentages of either group reported serious acts of prejudice such as verbal threats and physical attacks. In the classroom, 0% of white students as compared to 14% of ethnic students reported being graded unfairly based on race. For community experiences, 24% of ethnic students reported being watched or followed in a Vermillion store by an employee compared to 4% of white students. More white students (25%) than ethnic students (7%) reported being stopped by the Vermillion police. For attitudes on social issues, both white and ethnic students were unfavorable toward the election of Donald Trump as president, but ethnic students were significantly more unfavorable. Both white and ethnic groups were favorable towards the Black Lives Matter movement, but ethnic students' attitudes were significantly more
favorable. These and other findings relating to race relations at USD and in the Vermillion community will be presented at Idea Fest.

**Poster 56**  
**Formulating Predictions of Future Errors Using Classification Analysis of EEG In a Multi-Component Environment**  
**Denis Kozhokar***  
**Psychology**  
**Faculty/Staff Sponsor: Doug Peterson**

With such a high amount of accidents attributed to human errors, the possibility of being able to correct human errors would be able to save lives and reduce monetary costs. The accuracy of error detection and prediction improves safety measures, training techniques, and system designs. Past research in error prevention developed processes that have focused on broader facets of human error. The concept of eliminating human errors based on individual occurrences has not been thoroughly developed. To perform such a feat, an electroencephalogram (EEG) was an established tool to use for assessing individual events. Producing a correct error prediction model prior to the development of errors in individual events, would possibly reduce preventable accidents. A dual-task paradigm called the Air Force Multi-Attribute Task Battery (AF-MATB) was used to induce error rates of individuals. The AF-MATB consisted of a compensatory tracking task and a system monitoring task. Possible errors of omission trials were analyzed to predict the onset of errors. An Engagement Index (EI) and Task Load Index (TLI) had shown to be good predictors of errors and were used in a classification analysis.

**Poster 57**  
**Pain Sensitivity and Behavioral Markers of Self-Harm**  
**William Madsen†, Jose Ramon Dominguez**  
**Psychology**  
**Faculty/Staff Sponsor: X.T. Wang**

The objective of this study is to investigate the association between behaviors of self-harm and pain perception. Past studies indicate that individuals who self-injure occasionally report an absence of pain during self-injury. Furthermore, suicide attempts have been associated with self-injury without pain. Current medicine and psychology research address the study of pain conditions with the help of biological, psychological, and social influences, as pain can be understood as a biopsychosocial occurrence. However, most behavioral research involving pain uses only psychological influences to measure pain perception. To fulfill this gap, this study is designed to integrate a pain sensitivity threshold by using the chemical capsaicin to induce an easily measurable biological response. As such, the present study will examine the relationship between the prevalence of non-suicidal self-injury (NSSI) behaviors with the pain thresholds of tolerance, intensity, and sensitivity. To measure the pain thresholds, pain will first be inflicted on participants via a cold-pressor task, during which the pain thresholds of tolerance and intensity will be measured. Once the task is over, the chemical capsaicin will be topically applied on the participant's forearm to measure pain sensitivity. As capsaicin takes time to stimulate the nerve endings on the skin, questionnaires that measure impulsivity (BIS-11), depression (PHQ-9), anxiety (PSWQ), borderline personality assessment (PAI-BOR), and self-harming behaviors (Deliberate Self-harm Inventory) will be administered to the participants. The results of this study should verify that higher prevalence of NSSI behaviors will result in higher pain tolerance but lower pain intensity and sensitivity.
Poster 58
Exercise, Oxygen Consumption Rates and their Effects on Self-control and Decision Making
Kouadio Marc-Antoine Niamba†, Sean Callahan
Psychology
Faculty/Staff Sponsor: X.T. Wang

There is evidence that levels of exercise affect self-control and are associated with various health problems (Hagger, Wood, Stiff, & Chatzisarantis, 2010). The objective of this study is to analyze the influence of metabolic rates measured by oxygen consumption at rest and after exercise on self-control and decision making. After oxygen consumption, the body strikes for metabolic balance. We hypothesize that different oxygen consumption profiles in reaction to exercise are associated with different physiological and behavioral reactions. Greater variation in oxygen consumption is expected to decrease self-control or increase the preference for more immediate rewards. We use a portable and digital device (BREEZING TM) to measure oxygen consumption rate at both resting and reactive conditions. Two aspects of self-control and decision making will be assessed, namely delay discounting (the degree of preference for a smaller-and-sooner to larger-and-later reward) and risk propensity. The oxygen consumption rates are measured three times for the participant: basic rate at rest, reactive rate immediately after exercise, recovery rate two minutes after exercise. Following the baseline measurements, participants are required to perform a moderate-to-vigorous exercise for 1 minute, followed by a second metabolic and decision-making measurements. A final measurement is conducted after a short break, to measure the oxygen consumption recovery rate of the participant. The results will be analyzed and discussed in terms of our hypothesis and predictions.

Poster 59
Survey of Attitudes and Behavior of Facebook Users
Shannyn Tate, Whitney Thies
Psychology
Faculty/Staff Sponsor: Cindy Struckman-Johnson

In 2015, a social media source at Harvard reported that more than 87% of college students are on Facebook. In recent years, increasing research evidence suggests that there is a link between Facebook usage and depression and anxiety. The current study, started in the spring of 2017 and continuing through spring 2018, investigates these concerns of the effects of Facebook on mood in college students. The purpose of this study is to find what people like and dislike about Facebook, how their mood is impacted by Facebook, and if there is any correlation between Facebook use and depression, anxiety, and other personality factors. We designed an original questionnaire of 99 questions that was approved by the USD IRB and uploaded onto PsychData through Sona. Survey participants are asked questions such as how long they have had Facebook, how many hours a day they use it, and what days of the week they use it most. They are asked to imagine they had just used Facebook for an hour and how they felt right after regarding their energy, sociability, loneliness, and an overall down mood. Participants are also asked if they have ever been bullied on Facebook and if so, to describe the experience. Next, participants are asked about the major reasons why they use Facebook. In the final section of the survey participants answer questions about their level of depression, level of anxiety, dependence on their cell phone, and level of extroversion. It is expected that there will be a correlation between the amount of time spent on Facebook and higher levels of depression and anxiety. Data collection was started in February, 2018. Preliminary results of our study will be presented at IdeaFest.
Poster 60
Constructing Competing Value Claims of the Upper Missouri River Basin
Kriston Lynn
Sustainability
Faculty/Staff Sponsor: Meghann Jarchow

From large-scale changes such as the land use moving from mostly ranching to individualized farming use, to changing the entire landscape surrounding the Missouri River, these settlers have molded themselves into the backbone in what we now consider South Dakota. As time continues on, newer changes are faced, such as the conflict between the economic and cultural significance of family farming contrasting the ability of being able to provide hunting grounds for the culturally and economically significant act of hunting the ring-necked pheasant. With the guidance of personal memoirs, historical nonfiction, and other collections of work surrounding the Missouri River Basin, this research has been able to construct a foundation for examples of how values of all peoples within the region have changed over time, particularly women and settlers of non-Native ancestry.

Poster 61
Understanding the Effects of the Herbicide Glyphosate on the Microbiome of the False Map Turtle
Drew R. Davis*
Biology
Faculty/Staff Sponsor: Jacob Kerby

False Map Turtles (Graptemys pseudogeographica) are state-threatened and a Species of Greatest Conservation Need in South Dakota. Although the Missouri River below Gavins Point Dam supports large numbers of False Map Turtles, threats to this population still exist. Much of eastern South Dakota is dominated by row-crop agriculture and many agricultural chemicals that are applied to croplands are transported into aquatic habitats such as streams, which eventually make their way to the Missouri River. Two large rivers that run through eastern South Dakota and are highly affected by agricultural contaminants are the James River and the Vermillion River. When these rivers drain into the Missouri River, they are also transferring contaminants into the river. One widely used agricultural contaminant of concern which may negatively affect False Map Turtles is the herbicide glyphosate. Glyphosate has the potential to negatively affect key pathways in many bacterial taxa that comprise the bacterial microbiome. In recent years there have been an increasing amount of studies that have highlighted the importance of the bacterial microbiome and the role it plays in immunity and health. In order to better understand this, we examined the bacterial microbiome of adult False Map Turtles before and after exposure to environmentally-relevant concentrations of glyphosate. We collected ten adult False Map Turtles near Goat Island in the Missouri River and collected a pre-exposure cloacal microbiome swab from each. Individuals were then brought back to the lab and half were exposed to 10 μg/L glyphosate. After a 72-h exposure period, we collected post-exposure cloacal swabs to examine how the cloacal microbiome changed for each individual. Here, we present preliminary results on the effects of glyphosate exposure on the cloacal bacterial microbiome and comment on potential effects to individuals and populations of False Map Turtles.
Poster 62
Psychological Health and Academic Progress of College Students Raised by Alcoholic Parents
Garrett Adam
Biology
Faculty/Staff Sponsor: Jeff Wesner

It is apparent to most prominent psychologists that a child's relationship with their parent or primary caretaker is influential in determining the condition of said child's mental health when they become adults. The reason why parent-child interactions are important is that not only do children have a critical period for learning and motor skills, but also a critical period for emotional development. Adult college students are of particular concern due to the stressful nature of academia and meeting the demands of a post-secondary institution. How stress is handled is indicative of mental health. The goal of this research is to determine if there is a link between growing up in a household with active substance abuse and psychological health and academic performance. Some general questions regarding adult children of alcoholic (ACoA) parents include: What is the role of "nature vs. nurture" in the well-being of ACoAs? What factors are involved in becoming a vulnerable or resilient ACoA? How does being raised in a household with avid Alcohol Use Disorder (AUD) affect mental health and academic performance? To begin addressing these gaps in research, this project looked at gross data of the prevalence of psychiatric disorders of adult children of alcoholics and then the academic status of those individuals. After looking at the demographics of ACoAs there is correlation data about ACoA status, depressive symptoms, coping motives, social motives, and academic status that is analyzed. Furthermore, I looked at various data sets that describe the behavioral differences and the variety of stress coping strategies of resilient and vulnerable ACoAs. What was found is that there is a strong connection between vulnerable ACoAs and poor mental health and poor academic performance. Also, ACoAs engaged in substance abuse are deemed vulnerable and more likely to suffer from psychiatric disorders, which hinders academic success.

Poster 63
DNA Extraction From Leather and Drumheads: Developing an Authentication Method
Irene P Aplan
Biology
Faculty/Staff Sponsor: Hugh Britten

Native American artifacts attract a great deal of public interest giving authentic artifacts considerable economic value leading to a thriving counterfeit market. Our goal is to develop DNA-based authentication techniques to detect fraudulent items. We will explore methods to extract mitochondrial DNA (mtDNA) from putative artifacts. The mtDNA Cytochrome Oxidase I gene will be sequenced to identify the animal of origin. The focus has been on drum heads obtained from the National Music Museum in Vermillion, SD, and vegetable-tanned cow and brain-tanned deer leather. Extraction methods include Qiagen(TM)DNA tissue extraction kits, Zymo(TM) kits, and silica-based extraction processes. Some sequenced samples matched their expected animal species based on comparisons with sequences in GenBank while others did not due to possible contamination. We aim to increase our consistency and reproducibility. Future research includes replication of previous successes and the exploration of other methods.
Poster 64
Surveillance of Ranavirus and Characterization of Gut Bacterial Microbiome in False Map Turtles (Graptemys Pseudogeographica) within the Missouri River in South Dakota
Madeline M Butterfield‡†
Biology
Faculty/Staff Sponsor: Jacob Kerby

The False Map Turtle, Graptemys pseudogeographica, is a state-threatened species in South Dakota that is locally abundant in the 59-mile stretch of the Missouri National Recreational River. The False Map Turtle is believed to be susceptible a group of viral pathogens, ranaviruses, which cause ranavirosis: a systemic disease transmitted through the water that can cause epizootics in reptiles, amphibians, and fish. We trapped False Map Turtles in July of 2017 at three different spots along the Missouri River between Yankton, SD and Vermillion, SD and describe the Ranavirus infection status of all 79 False Map Turtles trapped in this area. Additionally, the bacterial microbiome within the digestive tract of False Map Turtles is presumed to vary along different geographic locations within the river. The gut bacterial microbiome, or community of bacteria that naturally inhabit the gut of an animal has been shown to have significant effects on the overall health of the animal, with certain compositions of bacteria being shown to support innate immune function against emerging pathogens. From the 79 sampled individuals, 30 were analyzed for the bacterial genera present within the bacterial community of their gut microbiome by 16S rRNA gene sequencing and the major bacterial genera as well as community structure based on taxonomic relationships is presented. We conclude that there is no Ranavirus present in any individuals sampled this summer and are continuing to analyze 16S rRNA gene sequencing data to determine community structure.

Poster 65
The Effects of Chemical Stressors Across an Environmental Gradient on Host Susceptibility and Prevalence of Batrachochytrium dendrobatidis (Bd)
Kaitlyn Campbell*
Biology
Faculty/Staff Sponsor: Jacob Kerby

Midwestern agriculture has resulted in highly modified landscapes and is the greatest source of wetland loss in South Dakota. Subsurface tile drains are buried beneath the ground's surface and can empty directly into nearby protected wetlands. Although drainage systems can increase crop yields, they can also negatively impact wetlands by altering nutrient cycles, depositing agricultural contaminants into wetlands, and modifying aquatic communities. Pesticides found in agricultural wetlands, presumably from tile drains, have been shown to contribute to physiological, behavioral and morphological abnormalities in amphibians that can ultimately lead to population declines. The objective of the current study will be to determine the effects of environmentally relevant concentrations (i.e. those measured in South Dakotan tile wetlands) of neonicotinoids and selenium on amphibian susceptibility to the fungal pathogen, Batrachochytrium dendrobatidis (Bd). To investigate the effects of agricultural contaminants on disease susceptibility, Rana pipiens tadpoles will be randomly exposed to treatments of imidacloprid, thiamethoxam, clothianidin, or selenium at 0 (control), low, medium, or high concentrations (0.1 μg/L, 1 μg/L, 10 μg/L). Individuals in each above treatment group will be randomly exposed to Bd or no Bd at 2 days post hatching or at the beginning of metamorphosis (Gosner Stage 40) to explore the effects of timing of exposure on Bd susceptibility. Based on tadpole's high sensitivity to abiotic and biotic factors during early life stages, we expect tadpoles exposed to agricultural contaminants and Bd at 2 days post hatching will result in higher mortality compared to those exposed at the beginning of metamorphosis. Future studies will focus on the impacts of pesticide mixtures and potential synergistic effects of these chemicals on Bd susceptibility in various amphibian populations. Future studies will focus on the impacts
of pesticide mixtures and potential synergistic effects of these chemicals on *Bd* susceptibility in various amphibian populations.

**Poster 66**

Differences in Cactus Community Composition Regarding Variations in Altitude and Bedrock Substrate

Zack Dibbern, Jed Jacobson, Kristie Schmidt

Biology

Faculty/Staff Sponsor: Daniel Soluk

A staple of the American southwest, the cactus is an integral part of the thriving desert ecosystem. Not only do they supply many species food and shelter, but they also have an important role in human life. This study focused on variables affecting the cacti family while focusing on the biodiversity and community composition. The variables collected were slope angle, slope aspect, elevation, and bedrock substrate composition. Randomly selected transects of 20 meters in length were used for recording data. The study was conducted in the Chiricahua mountains of southeastern Arizona. This location was selected because it allowed for the greatest range of elevation change from the traditional desert to the ponderosa pine forests. The Chiricahua mountains and surrounding desert, also known as the sky islands, allow for 9 or more potential genera of cactus to flourish. Due to the geology of the area, the main types of bedrock substrate expected were igneous and sedimentary rock. It was expected that genus richness would decrease as altitude increases, and individual species frequency would decrease with altitude increase. The change of bedrock substrate from sedimentary to either igneous or metamorphic substrates was expected to cause a decrease in species diversity and richness. Lastly, it was expected that cactus genus diversity and richness would be higher on south facing slopes. The further implications of the information gathered will help future projects potentially target locations for specific studies of cactus.

**Poster 67**

A Novel Integrative Approach that uses Protein-protein Interaction Networks and Anatomy Ontology Data to Increase the Candidate Gene Prediction Accuracy

Pasan Chinthana Fernando*

Biology

Faculty/Staff Sponsor: Erliang Zeng

Candidate gene prediction unravels genes with important molecular functions, diseases, and phenotypes, which is a critical step to understand the role of genes and a web of interactions formed by them in a living system. Wet lab methods, such as gene knockout experiments are used to predict gene candidates with a high accuracy, but they are time-consuming and costly. Therefore, computational methods, such as biological network-based candidate gene prediction are becoming popular. However, the main problem with the computational prediction methods is the low prediction accuracy. We developed an integrative framework that combines protein-protein interaction (PPI) networks with anatomy ontology data, which significantly increased the candidate gene prediction accuracy. PPI networks represent pairwise interactions of proteins within a cell of a specific organism. The interactions of proteins with known functions can be used to predict the functions of unknown proteins. However, PPI networks contain a high amount of false positive interactions that reduces the prediction accuracy. Meanwhile, anatomy ontologies can be used to extract the experimental knowledge about genes and their relationships to anatomical phenotypes. Using semantic similarity, we developed a method to generate protein networks based on the Uberon anatomy ontology and integrated them with the PPI networks downloaded from the STRING database. We predicted the candidate genes for mouse and zebrafish, and we demonstrated that integrated networks significantly increased the candidate gene accuracy compared
to PPI networks. It is evident that the integration increases the quality of the original PPI networks by mitigating the effects of false positive and false negative interactions. This integrative approach will be useful in predicting candidate genes associated with important phenotypes and diseases.

**Poster 68**  
A Comparison of the Different Factors that Affect CO2 Emissions  
Cameron S Frey, Averi Devish, Vienna Tang  
Biology  
Faculty/Staff Sponsor: Jeff Wesner

Carbon dioxide plays an important role as a product of various different processes, ranging from refinery, to simply breathing. With each of these processes, CO2 is emitted as a product. Three different reactions that will be examined are the combustion of coal, the burning of oil, and deforestation. The purpose of this examination is to compare and contrast the amount of CO2 that is emitted from each of the three reactions per country. To accomplish this, we utilize data found on gapminder.org, and create a series of plots and 'lines of best fit' to determine which of the three processes contributes the most CO2 into the atmosphere. A regression formula is also presented in order to determine if one of the three factors will become more influential in CO2 emissions, than another factor that has an initial higher concentration of CO2.

**Poster 69**  
Development of Complemented Serratia Marcescens Knockout Strains and Analysis of Restored Phenotype of Anti-fungal Potential in Vitro  
Josie M Galles†  
Biology  
Faculty/Staff Sponsor: Jacob Kerby

The objective of this project was to determine the role the Serratia marcescens (Sm) secondary metabolite prodigiosin had against the amphibian pathogen Batrachochytrium dendrobatidis (Bd) in vitro. This fungal disease has led to a decrease in amphibian populations and may be responsible for the extinction of several species. A complemented knockout strain of a previously constructed knockout, Sm ΔpigM, was used for the restoration of the desired phenotype and subsequent analysis of the phenotype in vitro. For this complementation, we used plasmid pBAD33G which was introduced to our dysfunctional Sm strain by electroporation. Specifically, we inserted a portion of the prodigiosin operon that contained pigM-pigN and the wild-type Shine-Dalgarno sequence from the prodigiosin operon. The restored phenotype was then used in a challenge assay in which we evaluated the anti-Bd activity of wild-type Sm, ΔpigM Sm, and ΔpigM Sm + pBAD33G:pigM-pigN. These assays were conducted in conjunction with Bd. Results from this study has seminal importance in understanding the role Serratia marcescens prodigiosin production has in inhibiting Bd.

**Poster 70**  
Effects of GDP per capita, Healthcare Spending, and Immunizations on Child Mortality Rates  
Ethan Hare, Rosie Blote, Michaela Ahrenholtz  
Biology  
Faculty/Staff Sponsor: Jeff Wesner

In 2016, there were 5.6 million deaths of children 5 and under (Roser, 2018). This number has decreased in recent years, but the reason behind that is still unknown. GDP per capita, healthcare spending per capita, and immunizations have certainly impacted these rates, but the question remains as to which one impacted it the most. Our hypothesis states that GDP per capita will have the highest correlation. We
based our hypothesis off of graphs taken from the website gapminder.org. Other than those graphs, we have read research papers from scholarly journals and databases online. Based on our primary research, all three of those variables have aided in the decrease of child mortality rates. Through further research, we will be able to determine the strength of the correlation between all of the variables to see which one is the strongest. By determining this, we will able to show how to decrease child mortality rates, especially in countries with higher rates than others.

Poster 71
Impacts of Invasive Trees on Nesting Success of Breeding Birds in Missouri River Riparian Forests
Amanda M Hegg*
Biology
Faculty/Staff Sponsor: David Swanson

Missouri River riparian forests support a high abundance and diversity of birds. However, decades of land use change and river management practices have had a major impact on native floodplain forests and have changed the processes that sustain these ecosystems. More specifically, these changes have hindered the geomorphic dynamism needed for colonization of pioneer species such as plains cottonwood (Populus deltoides) and willow (Salix spp) and facilitated the invasion of plant species such as the upland native species eastern red cedar (Juniperus virginiana), and non-native species such as Russian olive (Elaeagnus angustifolia). The introduction of invasive species into an ecosystem can create novel species interactions, and more specifically, may cause cues that birds normally use to select quality habitat to become unreliable when invasive species are chosen as nesting sites. While there is some evidence that shrub-nesting birds use both native and non-native tree species along the Missouri River, there are few data assessing avian breeding success in riparian woodlands with invasive elements, and bird abundance alone is not a sufficient indicator of habitat quality. In our study we examined whether birds nesting in invasive tree species affected nest success at 5 riparian sites along the Missouri River. Preliminary data suggest that while many birds nested in invasive trees, there was wide variation in daily nest survival probability among bird species and among nesting substrate types. Furthermore, this study provides evidence for the absence of a community-wide effect of invasive trees or shrubs on nesting success in Missouri River riparian forests. Instead, some species exploited invasive trees or shrubs as sites for successful nesting.

Poster 72
Metatranscriptional Interrogation of Microbiome in Soybean Rhizosphere in Response to Seed Treatments and Growth Stages
Miyuraj Harishchandra Hikkaduwa Withanage
Biology
Faculty/Staff Sponsor: Erliang Zeng

Soybean (Glycine max) is an agriculturally important crop worldwide. Hence, it is advantageous to eliminate any factors (e.g. pest activity) that has a negative effect on the crop's productivity. An array of different seed treatments is commercially available to prevent any pest-caused negative effects on the crop's productivity. Inevitably, this can cause an unprecedented shift of the natural microbiome in the rhizosphere of soybean. Being a legume, soybean is hard-wired to communicate and exchange essential services (e.g. nitrogen fixing at root nodules, and staving off certain pathogens) with the microbiome. The composition of the microbiome has been shown to depend on soybean's soil type of establishment and soybean growth stage. In-depth knowledge on the magnitude and the direction of the soybean community shift caused by commercial seed treatments will benefit future attempts to manipulate microbiome to increase the soybean crop productivity in more eco-friendly, sustainable, and economic
ways. To investigate the microbiome changes due to seed treatments and growth stages, we designed an experiment considering three factors: Seed Treatment (levels: Control, T2, T3, T4), Growth Stage: (levels: V1, V3, V5), and Soil Type (levels: Bulk, Autoclaved, Native). We obtained microbiome transcriptome data using Hi-Seq paired-end sequencing. After quality control, we computationally sorted and separated out rRNA, tRNA, and mRNA from the microbiome transcriptome data. The first stage of analysis focuses on the sorted rRNA sequences to generate bacterial Operational Taxonomic Units (OTUs) table, which records the taxonomic composition abundance profiles of different microbiomes across samples. Downstream analysis of OTU table revealed the taxonomic composition of the microbiome due to the factor of seed treatments, along with the factor of growth stages. Future work includes putative genes prediction and annotation using mRNA reads separated from microbiome transcriptome data, which will generate a functional profile of microbiome. Future work also includes a differential expression analysis to discover gene expression changes due to factors above-mentioned.

Poster 73
Effects of Human Development and Internet Users Throughout the World
Jensen Holzbauer, Orin Kaufman, Steven Honomichl
Biology
Faculty/Staff Sponsor: Bernie Wone

Human Development Index (HDI) is determined by many factors including the health, education, and living conditions of human beings across the globe. Internet usage is also a highly known and commonly used tool in today's society. We hypothesize that with the increasing amount of internet usage, the more developed the country will be and the higher the overall Human development index of each country will be. We managed to conduct this research by comparing the averages and means of the resulting Human Development Index to Internet Users per 100 people, from years ranging from 1990 through 2011. We then plotted our data obtained from Gapminder into a scatter plot and placed a trendline to see the evolving results. One of the major findings we encountered, was the HDI never ran above one. Another major finding was there was a huge jump in internet usage five years after it was invented, and steadily kept increasing ever since. The data we obtained supported our hypothesis as we came to the conclusion that as the internet usage increased so did the human development index.

Poster 74
Sex Ratio Significance in the Cooperative Breeding Chestnut Crowned Babbler
Kelly Howell
Biology
Faculty/Staff Sponsor: Andrea Liebl

In animals, relatively equal sex ratios allow reproduction costs versus benefits to balance. The most simplified explanation to describe sex ratios comes from Fisher's Principle, which assumes equal representation of both sexes following Mendelian segregation. However, violations to this principle create a biased sex ratio of more males or females. Avian species in particular, tend to show biases towards one sex over the other depending on what is the most beneficial contingent on a variety of characteristics, such as the heritable, social, or state-dependent status of the parents. This sex ratio variation bias has yet to be completely understood, as there have been conflicting results. Hence, there is an importance of additional study, especially among cooperative avian species, where sex ratio variation may have greater consequences due to sex-specific dispersal and helping. One such cooperative breeder is the chestnut crowned babbler (Pomatostomus ruficeps), endemic to the Australian outback. In chestnut crowned babbler females are generally dispersive and males tend to remain natal to help with future breeding attempts. This study aims to determine whether or not variation in sex-ratios exist at all on this species, and if so, under what circumstances. Here, blood was collected from chestnut crowned
babblers in the nest to molecularly determine the sex of each chick and how sex ratio changes. Some explanations for sex ratio changes may include maternal age (costs versus benefits of the sex), social status, territory quality, and/or non-breeding helper availability. Additional study will further sex ratio variation research in cooperative species to determine the strategies and reasoning behind dispersal or remaining natal.

Poster 75

Historical Patterns and Impacts of the 2011 Flood on Redcedar Distribution along the Missouri River

Nadeesha Dilrukshi Illeperuma Arachchige Done

Biology

Faculty/Staff Sponsor: Mark Dixon

Dam construction along the Missouri River has reduced flooding, altering geomorphic processes and flood-plain vegetation. A major threat to riparian habitats is the spread of invasive species. Over the last several decades, eastern redcedar (Juniperus virginiana L.), a native upland species, has invaded the understory of cottonwood forests along the Missouri River. A major flood in 2011, however, caused significant die-off of redcedar at some locations. Our goal was to map the historical spread of redcedar, assess the impacts of the 2011 flood on redcedar abundance, and determine where significant post-flood recovery of redcedar has occurred within the Missouri National Recreational River. To accomplish this, we used ArcGIS and remote sensing techniques, including the use of spectral vegetation indices (Normalized Difference Vegetation Index (NDVI) and Enhanced Vegetation Index (EVI)), to map redcedar abundance in the study area from the 1980s to present. We determined the relationship of NDVI values to redcedar canopy cover using 2017 satellite images and field data. Results indicated a linear relationship between redcedar cover and NDVI values (P-value: 0.0001, R-square: 0.88). Historical time series maps derived from Landsat NDVI images showed that redcedar cover was detectable on less than 10% of the woodland and grassland area in 1982, expanded to nearly 55% by 2010, and then declined by nearly 10% after the 2011 flood. Our results show the utility of remote sensing methods for tracking cedar invasion and suggest the importance of historical floods for constraining invasion and maintaining native forest communities.

Poster 76

Quantifying Feeding Patterns of Fish and Their Cascading Influences in a Stage-structured Food Web

Abraham Kanz*

Biology

Faculty/Staff Sponsor: Jeff Wesner

Aquatic insects are known to consume algae, however, previous work in a Missouri River backwater shows that the presence of a predator of aquatic insects (i.e. bluegill, spotfin shiner, or common carp) does not correlate with an increase in algal biomass as aquatic insect populations are decreased. This indicates that although the aquatic insect population is being reduced by predators, the total biomass and use of this aquatic insect food resource remains unchanged. This proposed study aims to determine which stages of aquatic insect development are fed upon the most by predatory fish. This study is also intended to explain previously observed connections between fish consumption of aquatic insects and algal biomass. Analysis of these interactions will be used to determine the dietary consistency of the fish species used in the study and how their diets can influence their own ecosystem. A stage-structured food web involving species present in the Missouri River will be created using data collected during this study. This proposed project will be conducted at the Experimental Aquatic Research Site (ExARS) located in Vermillion, SD. After a 60-day experiment, data will be analyzed in a linear model with the
treatments as predictor variables and the abundance of aquatic invertebrates (benthic larval biomass, emerging aquatic insect biomass, algal biomass, spider responses) and gut contents (quantified prey stage) of the fish as response variables.

Poster 77
Porn and Visual Culture
Emma Johnson
Art
Faculty/Staff Sponsor: Amber Hansen

This project will include a brief history of the usage of pornographic imagery within the visual arts. I will cover issues such as erotic art versus pornography, the history of nudity within art, and our increasingly sexualized society. This project will focus on both historic and contemporary queer artists who subvert pornographic imagery within their work. Lastly, I will discuss how these artists and issues are influencing my current artwork and research.
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<td>Poster Session 2</td>
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<td>MUC 2nd Floor</td>
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<td>Oral Session 1c</td>
<td>9:00-9:50 a.m.</td>
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<td>Voss-Ward, Carol</td>
<td>Poster Session 1</td>
<td>1:00-2:45 p.m.</td>
<td>MUC 2nd Floor</td>
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<td>Waage, Madisyn</td>
<td>Poster Session 1</td>
<td>1:00-2:45 p.m.</td>
<td>MUC Main Floor</td>
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<td>Walter, Savannah</td>
<td>Poster Session 2</td>
<td>2:00-3:45 p.m.</td>
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<td>Warne, Karlie</td>
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<td>Poster Session 1</td>
<td>1:00-2:45 p.m.</td>
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<td>Weikert, Stephan</td>
<td>Poster Session 1</td>
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<td>Welker, Logan</td>
<td>Oral Session 9b</td>
<td>4:00-5:20 p.m.</td>
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<td>Wetering, Dan</td>
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<td>Wetzelstein, Erin</td>
<td>Oral Session 6d</td>
<td>9:30-10:50 a.m.</td>
<td>MUC Pit</td>
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<td>11:00-11:50 a.m.</td>
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