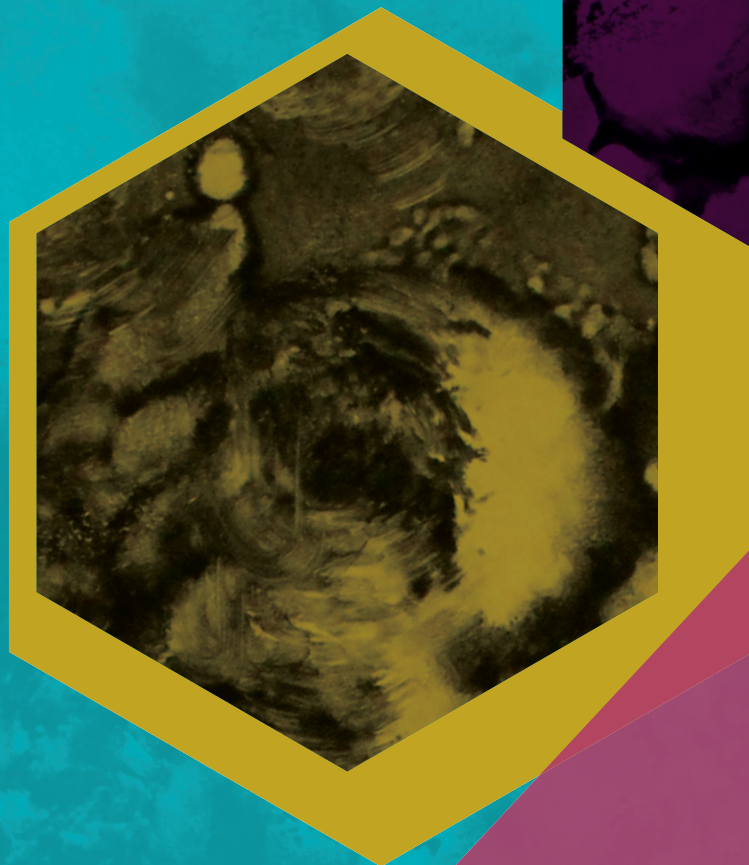


04 . 12 . 17



Student Scholars Day

Table of Contents

2017 SSD Committee	2
Welcome from Committee	3
Schedule of Events	4
Statement from Cover Artist	4
Keynote Lecture	5
Kirkhof Center Maps	6 - 7
Henry Hall Map	8
History of SSD	9
History of Undergraduate Research and Scholarship at GVSU	10
McNair Scholars and Student Summer Scholars	11
Highlights of GVSU Art & Design Student Work	12
fishladder	13
Poster Presentations Schedule and Abstracts	14
Oral Presentations Schedule and Abstracts	146
Panel Presentations Schedule and Abstracts	176
Exhibition of Art Schedule and Abstracts	178
Live Performance and Film /Video Schedule and Abstracts	183
Index of Presenters and Mentors	184

SSD Committee

Feryal Alayont	Mathematics
Alice Chapman	History
Andrew Lantz	Chemistry
Stacey Mathieu	Office of Undergraduate Research and Scholarship
Susan Mendoza	Office of Undergraduate Research and Scholarship
Melissa Morison	Classics
Debbie Morrow	Library
Ross Reynolds	Physics
Michael Scantlebury	Hospitality and Tourism Management
Shelley Sickrey	Office of Undergraduate Research and Scholarship
Richard Vallery	Physics
Patricia Videtich	Geology

Welcome to Student Scholars Day 2017!

It is with great pleasure that we welcome you to celebrate the diversity and excellence of faculty-student collaboration at GVSU. In its 21st year, Student Scholars Day continues to grow in scope, including six hundred students and mentors in over four hundred presentations. We are excited to support the achievements of these students representing seventy diverse majors across the university. We encourage you to visit presentations of interest in a variety of disciplines and presentation formats, and to engage these students in meaningful discussions of their work. This event is a true celebration of creative thought and practice.

Many have contributed to make this growing event a success. We are especially grateful for the hard work and patience of Shelley Sickrey, Stacey Mathieu, Dana Arnold, Natalia Blanco, Jordan Cauvel, and Lavar Green-Jackson who made this process manageable and enjoyable. We thank the members of the 2017 SSD committee, Feryal Alayont, Alice Chapman, Andrew Lantz, Melissa Morison, Debbie Morrow, Michael Scantlebury, Richard Vallery, and Patricia Videtich, for their dedication and continuous flow of creative ideas. It takes an entire year to put together a program like this, and we appreciate the hours spent engaging with us in this process.

Once again our deepest gratitude goes to Dan Slaughter for all of his work in the web registration redesign for SSD. We would also like to thank the Event Services staff for their assistance and patience. We would also like to thank Jeff Woollet for assisting in the preparation of Henry Hall.

Thank you to Kendra Smith for her artistic contributions to this abstract book. Her submission was one of several pieces submitted in response to a student competition hosted by the Office of Undergraduate Research and Scholarship. Kendra's piece was selected to serve as the cover by the SSD committee.

Thanks to our student, faculty, and staff volunteers for their commitment to the university's mission and values, as evidenced by their involvement in this important activity. We value the time and effort given to this event.

A very special thank you goes to the faculty mentors who work collaboratively with undergraduate and graduate students in their scholarly and creative pursuits. We know it takes a great deal of time and dedication, but these experiences make a formidable impression on the education of GVSU students. We applaud your commitment and passion for teaching and learning.

And finally, a day like this does not happen without outstanding students like this year's SSD presenters. These students have sought ways to connect their classroom experiences with scholarly and creative practice. They have engaged in a process of discovery that is often difficult and demanding. We thank these students for taking full advantage of their liberal education at GVSU. We are proud of their achievements and excited to share their success.

Please enjoy this day of celebration. Attend the many presentations available throughout the day. We extend a special invitation to attend the presentation given by this year's Keynote speaker, Dr. Liliana Dávalos from Stony Brook University. Today is sure to be a day of sharing and celebration.

Susan Mendoza, Ph.D.
Director, Office of Undergraduate Research & Scholarship
Center for Scholarly & Creative Excellence

Schedule of Events

Poster Presentations

Henry Hall Atrium and Kirkhof Center

9:00 a.m. – 5:00 p.m.

See page 14 for detailed schedule.

Oral Presentations

Kirkhof Center

9:00 a.m. – 5:00 p.m.

See page 146 for detailed schedule.

Exhibition of Art (Apr 1-16)

Mary Idema Pew Library Exhibition Space

April 12, 2017

9:00 a.m. – 6:30 p.m.

Artist Reception 5:30 p.m.

See page 178 for detailed schedule.

Panel Presentations

Kirkhof Center 2263

1:00 p.m.

See page 176 for detailed schedule.

Film & Live Performance

Mary Idema Pew Library Main Floor Video Display

2:00 p.m.

See page 183 for detailed schedule.

Keynote Lecture

Kirkhof Center 2204 (Pere Marquette), Allendale

6:30 p.m. Hors D'oeuvres

7:00 p.m. Lecture

Statement from the Cover Artist

Kendra Smith

This piece represents experimentation, transformation, and diffusion of ideas. It is comprised of abstract monotype prints created in printmaking. These one-of-a-kind prints were created by experimenting with thinning ink so it would diffuse once it reached the plate. It took many attempts to get the prints right and there was always a margin of error, like any experiment. As with any idea, the prints were shared and improved upon with each attempt. The black and white prints were then recycled and transformed with color, overlays, and shapes, transitioning from printmaking into digital art.



Keynote Lecture

Kirkhof Center 2204 (Pere Marquette), Allendale Campus
7:00 p.m.

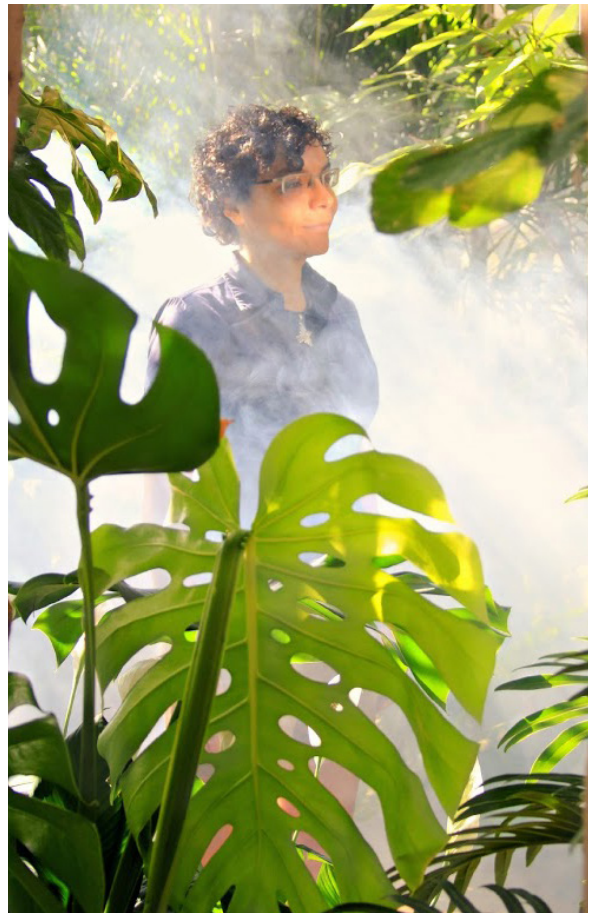
The importance of models dynamics of extinction and their drivers from the Miocene to the last 40 years

This talk will review recent work at the Dávalos Lab on quantitative approaches to understanding extinction throughout deep time and the forces driving habitat loss today.

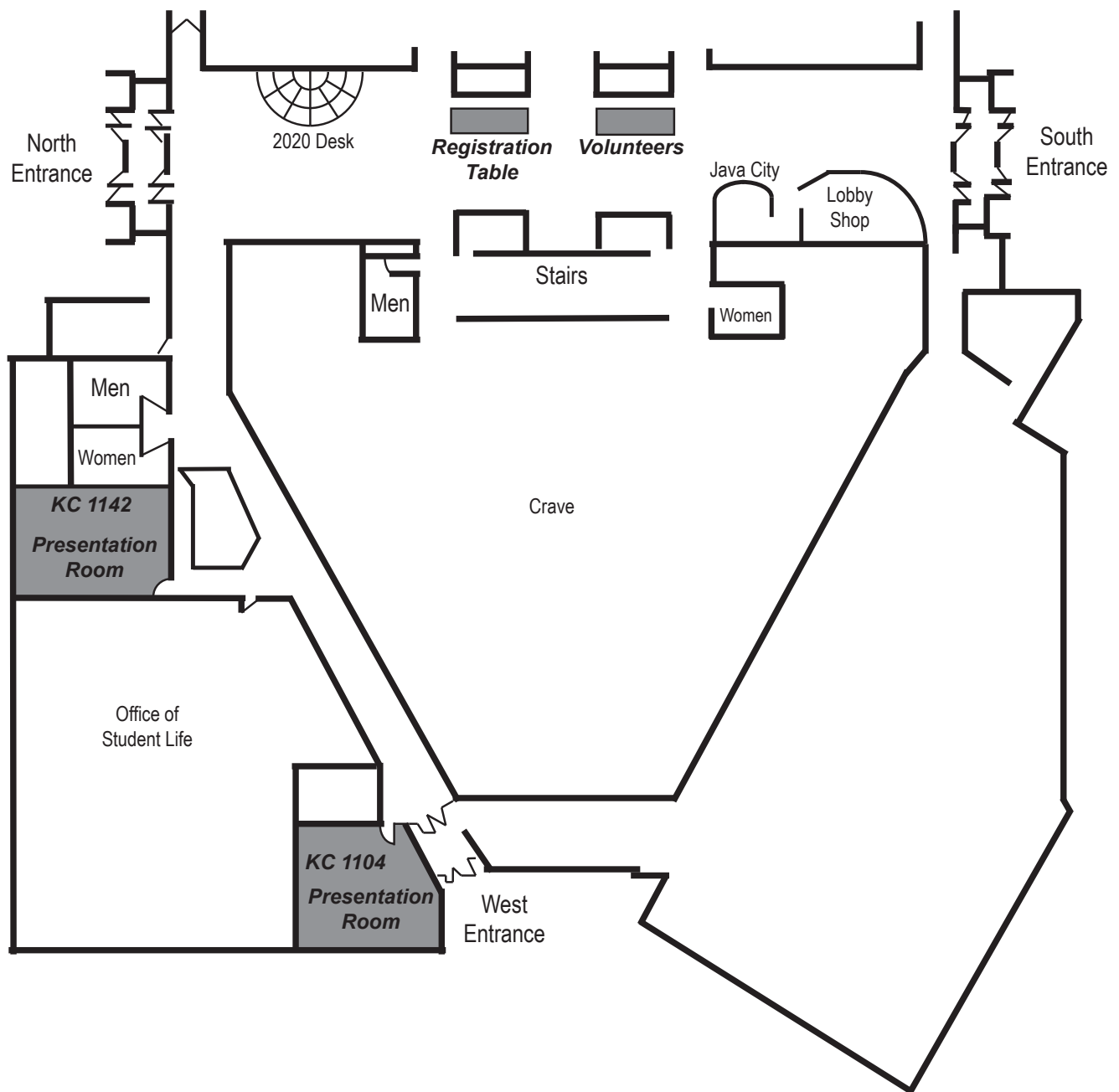
Dr. Liliana M. Dávalos

Liliana M. Dávalos is an Associate Professor of Conservation Biology at Stony Brook University, Stony Brook, New York. She is interested in the forces shaping biodiversity in time and space, including effects from human activities. Her research focuses on the evolution of species and trait diversity, and on how to conserve ecosystems today and into the future. Professor Dávalos is a 2013 Kavli Frontiers of Science Fellow for outstanding early career, a 2012 National Academies of Sciences Education Fellow in the Life Sciences, and has advised the United Nations Office of Drug and Crime on statistical analyses of deforestation since 2007. She is coauthor of the 2016 World Drug Report, responsible for thematic subsections on environmental sustainability.

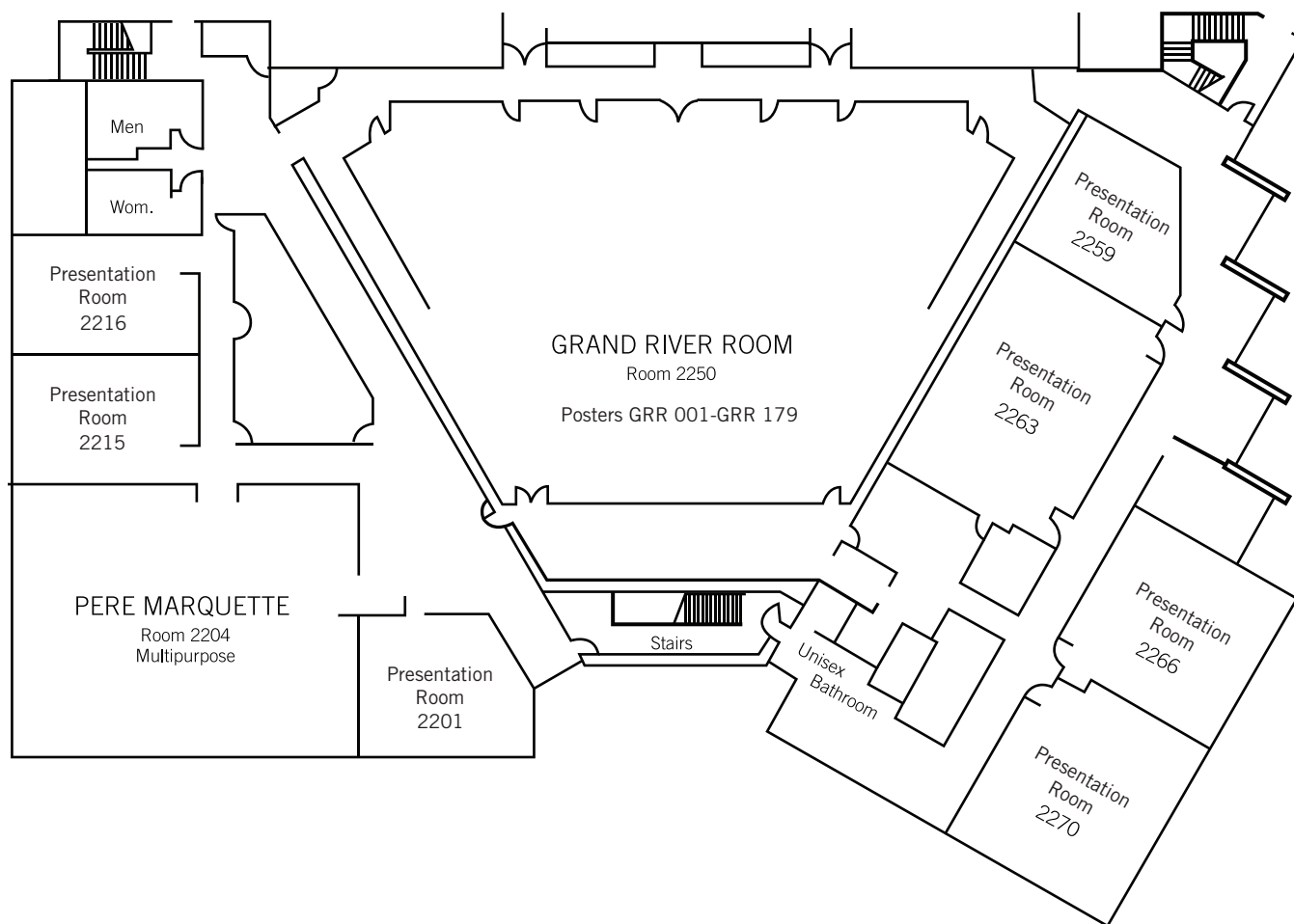
Dr. Liliana M. Dávalos
Stony Brook University
Stony Brook, NY



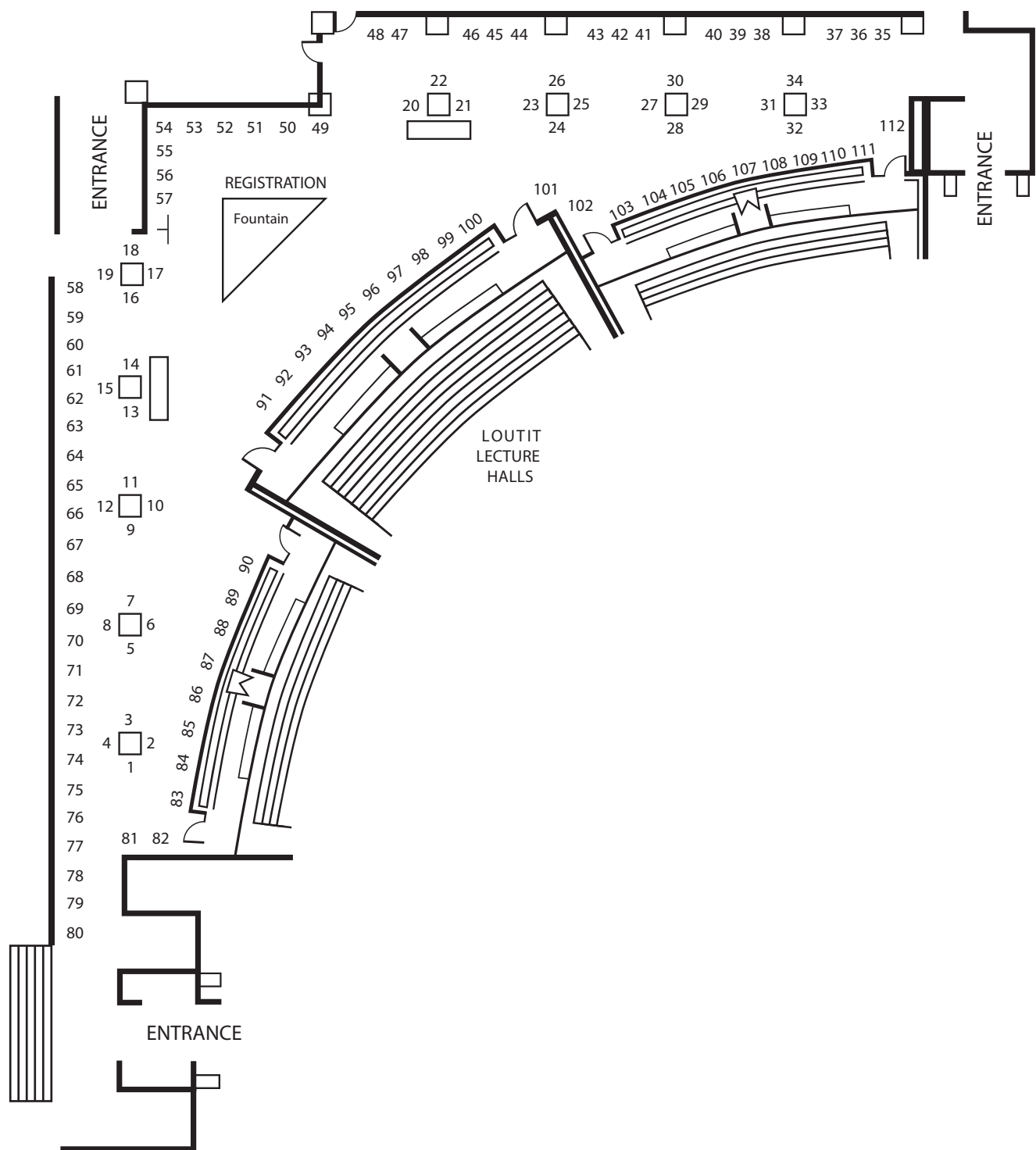
Kirkhof Center First Floor Map



Kirkhof Center Second Floor Map



Henry Hall Map



History of Student Scholars Day

by Neal Rogness and Shelley Sickrey

In the summer of 1995, a small group of faculty members in the Science and Mathematics Division met to explore the feasibility of creating an event where students could present their findings from faculty-mentored research to a university-wide audience. P. Douglas Kindschi, Dean of Science and Mathematics, was enthusiastically supportive, thus Student Research Day (SRD) was born.

It was decided to hold the event on April 12, 1996, in conjunction with the dedication and celebration of the new Seymour and Esther Padnos Hall of Science. The first-time event was expected to draw about thirty student participants. All expectations were exceeded when the registration period ended with over 150 presenters committed to present almost 100 presentations. The first event was a tremendous success; however, it was unknown whether SRD could be a successful “stand alone” event. These fears were quickly allayed when the second annual Student Research Day was held in April of 1997 and proved to be a great success with a similar level of participation. The event became popular enough to get requests from students outside of science and mathematics majors who wanted to present their work. An effort began to make the event truly university-wide, which then Provost Glenn Niemeyer whole-heartedly supported.

Students from all majors were encouraged to present and/or exhibit their faculty-mentored scholarly work at the event. To help make the event more inclusive, its name was changed from Student Research Day to Student Scholarship Day. The first university-wide event doubled in size with nearly 300 students giving almost 200 presentations in 1998. The first SSD keynote speaker was Dr. Robert Powell, Professor of Biology at Avila College, who talked about “Student/Faculty Collaboration: Teaching and Scholarship.” Another name change occurred in the Fall of 2009, this time to Student Scholars Day. The name change was instituted to combat occasional confusion over the nature of the event. “It’s still very focused on student work, but the new name takes away any ambiguity about what the purpose of the day is,” said Susan Mendoza, Director of the Office of Undergraduate Research and Scholarship.

What began as an event primarily composed of science and mathematics majors has grown to include student presentations representing majors from across the university. The GVSU community has truly embraced this annual event as a day in which to take pause and proudly celebrate the scholarly achievements of students from the past year. Student Scholars Day continues to grow, both in size and scope. The event continues to encompass interdisciplinary relationships among the presentations. Individually, the presentation is clear and focused. Taken as a whole, a larger, more inclusive picture of collaboration and learning emerges.



History of Undergraduate Research and Scholarship at GVSU

The pursuit of student research and scholarship at Grand Valley has deep roots in the history of the university. Original student research began in a number of the original Colleges at GVSU, namely Thomas Jefferson College, William James College, and the College of Arts and Science. This tradition continued through decades as the university grew.

Student Scholars Day (SSD) and Student Summer Scholars (S3), originally established in the Division of Math and Science, have served as the anchors for undergraduate research for almost twenty years. These programs have served thousands of students by encouraging original research and scholarship.

SSD and S3 moved to the Brooks College of Interdisciplinary Studies and became part of the Office of Integrative Learning in 2006. During this time, both programs were expanded to support student research from all disciplines and majors.

In 2010, the Office of Undergraduate Research and Scholarship (OURS) was established as part of the Center for Scholarly and Creative Excellence. The mission and intent of the office is to establish comprehensive services and programs which support students in their pursuit of inquiry, creativity, scholarship, and research. In addition to Student Scholars Day, the programs of OURS include:

Signature Programs

- Academic Conference Fund (ACF)
- Academic and Professional Enrichment Fund (APEF)
- Alayont Undergraduate Research Fellowship in Mathematics
- Beckman Scholars Program at Grand Valley State University (BSP at GVSU)
- P. Douglas Kindschi Undergraduate Research Fellowship in the Sciences
- Student Summer Scholars (S3)

Additional Programs

- GVSU Library Scholars Summer Program
- GVSU Undergraduate Research Scholar Transcript Designation
- McNair Scholars Program
- Michigan Space Grant Consortium (MSGC)
- OURS Project Supplies Grant
- OURS Ambassadors
- Supplementary Start-up Funds for New Faculty
- Sustainable Agriculture Place-Based Project Grants
- Undergraduate Research Assistants Program (URA)
- Undergraduate Research Fair

TRiO Ronald E. McNair Scholars

Post-Baccalaureate Achievement Program

The McNair Scholars Program is designed to prepare highly talented undergraduates to pursue doctoral degrees and to increase the number of individuals (from target groups) on college and university faculties.

The McNair Scholars are highly talented undergraduate students whose parents have no 4-year college degree and are low-income, or groups underrepresented at the graduate level for doctoral studies. The program accepts students from all disciplines.

The McNair Scholars receive academic counseling, advising, and GRE preparation. In addition, they are matched with a Ph.D. faculty mentor to conduct research and attend a McNair research conference to present their findings. In the first semester of their senior year, the scholars receive assistance with the graduate school application process.

McNair Scholars is a TRiO program funded through the United States Department of Education and Grand Valley State University.

The 2016 McNair Scholars, many of whom are presenting at this year's SSD, include:

Bria Atkins, James Bell, Parryss Carter-McGee, Sophie Delacruz, Carin Echols, Deseree Eudave, C'arra Miller, Bikash Mishra, Matt Oudbier, Darwin Perry, Chris Peruzzi, Daylin Pujol-Lopez, Gloire Rubambiza, Brittany Sincox, and Kayla Williams.

More information about the program can be found at www.gvsu.edu/mcnair

Student Summer Scholars

The Student Summer Scholars Program (S3) provides funds for a student and faculty mentor to devote fourteen weeks to a research and/or creative project during the spring/summer semester. Through these grants and the mentorship of a faculty member, the S3 program offers a unique opportunity for undergraduate students to do hands-on, professional research and creative practice in their chosen field. Combining academics, field work, and a reflection component provides students with a meaningful learning experience that helps to prepare them for graduate school and future careers.

For each S3 participant, the project begins with an innovative and thoroughly researched proposal. With guidance from faculty mentors, students identify a research question or an area of creative practice and shape the structure of their project. The value of mentorship is an important part of S3. Experienced faculty mentors act as support and sounding board for their students.

By building on a foundation of academic and critical thinking skills provided by undergraduate courses, self-motivated students can use S3 to further their knowledge in a specific area while learning to incorporate academics with professional work. S3 provides students with a new lens through which to view their long-term educational, work, and life plans.

The 2016 Student Summer Scholars presenting at this year's SSD include:

Brooke Armistead, Mark Baker, Daniel Beachnau, Brandon Beltz, Cameron Bunker, Aaron Capps, Kaitlyn Denney, Matthew Grace, Emma Hahs, Cory Highway, Allison Hoppe, Thomas Killeen, Kendra King, Jenna Koelsch, Allison Ludge, Michael Michalski, Emily Noordyke, Aaron Orellana, Megan Plekker, Jonathon Richards, Kelsey Rogers, Kelsey Scott, Eric Sheffield, and Jared Sweet.

More information about the program can be found at www.gvsu.edu/ours/s3

Highlights of GVSU Student Work

Although Student Scholars Day serves as the university's celebration of student scholarship and research, there are a number of department and college events that showcase student research and creative activity. Below is a sampling of such events on campus. If you would like to have your departmental activity listed in future abstract books, please contact ours@gvsu.edu.

Music and Dance Department

GVSU Dance Program seniors showcase their choreography and performance in their Capstone concert. This event is free and open to the public.

It was held April 7 and 8
7:00 PM

Dance Studio Theatre, PAC 1600

Original works will be presented by:

Delaney Dickens
Robin Hutchings
Amadeo Lopez-Keranen
Ashley Paradise
Kaye Suarez

Contact Person for More Information
Carrie Brueck Morris

Contact Email for More Information
morrccarr@gvsu.edu

Contact Website for More Information
<http://www.gvsu.edu/dance>

Biology Department

Students enrolled in Ornithology, the study of birds, were asked to select an art medium of their choice and compose a work inspired by birds. This work needed to reflect some aspect of avian biology, which should be clear in their artist statement.

These works will be displayed on April 12, 2017 in the Mary Idema Pew Library Multi-Purpose Room throughout the day. Works were submitted by:

Evan Corace	Kristin Schepke
Abby Fischer	Nicholas Shaver
Nicole Fredericks	Brendon Shepard
Tori Frailey	Moirá Thelen
Kaidyn Guilford	Erin Vargo
Nicole Hahn	Hannah Wadke
Connor Hanson	Lauren Zamplas
Rebecca Hippensteel	
Joe Huston	
Brittney Irish	
Sierra Kolatski	
Blake Lawson	
Brandon Lawson	
Mike MacEachron	
William Newstead	
Heather Noll	
Speros Panagos	
Michael PreFontaine	
Levi Ryfiak	

Spring 2017

fishladder

Student Journal of Art and Writing

Unveiling Party

Friday April 14th
Lake Ontario Hall room 174
6-8 p.m.

There will be free copies of the journal available to take with you.

Contributors

Jasmine Bruce	Alex Nowak
Brett Clark	Matthew Oudbier
Danielle Clark	Elise Riffle
Amy Creutz	Ashlyn Rowell
Cayla Dwyer	Daulton Selke
Amber Kelley	Chelsea Sheneman
Robyn Knoper	Rhiannon Sibbald
Paige Leland	Sarah Stanners
Anne Livingston	Courtney Tannir
Gracey Mussina	Abbie Wiles
Maria McKee	Teresa Williams
Kaitlyn Nix	

Poster Presentations, Abstracts & Schedule

HENRY HALL ATRIUM 001

Accuracy of Technology Imbedded Within Exercise Equipment to Measure Heart Rate During Exercise

Participants attending 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM

Presenters: Nicole Clover, Samantha Giles, Andrea Sowles, Taylor Whitling

Mentor: Ross Sherman

Background: It has been suggested that methods of measuring heart rate incorporated on exercise equipment are not very accurate at higher heart rates. Purpose: The aim of this study is to determine the accuracy of different heart rate monitoring devices compared to an electrocardiograph (EKG) at rest and during exercise. Methods: GVSU students, who self-reported no known underlying heart conditions, participated in this study. Resting heart rate was taken in a controlled lab condition using a 3-lead EKG. To allow steady state to be reached, heart rate was also taken after 5 minutes of low intensity cycling and 5 minutes of high intensity cycling until heart rate was above 140 b·min measured on the 3-lead EKG. Heart rate was assessed using 3-lead EKG, a Fitbit Charge, a Polar FT1, and handlebar-mounted metal plates. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 002

The Influence of Anticipatory Regulation on Exercise Performance

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenters: Spencer Dupon, Haley Moulton, Callie Zimmerman

Mentor: Ross Sherman

Background: Anticipatory regulation has been shown to have a negative effect on exercise performance. Purpose: To determine the effect of visual feedback on the number of leg press repetitions to fatigue at given intensities. Methods: Six college-aged, moderately trained individuals participated in this randomized crossover study. Participants were instructed to refrain from any other physical activity for the duration of the study. Prior to the first session, 1-RM was tested on the leg press with full awareness of the weight being lifted. Participants were told they were being tested for day to day variations in number of reps to fatigue. Participants actually performed as many reps as possible at 65%, 70%, and 75% 1-RM across three different sessions whilst blinded to the actual resistance. A minimum of 48 hours rest was given between each session. Results: Data will be presented as SSD.

HENRY HALL ATRIUM 003

Improving African Internet Traffic through Maximization of Node Centrality

Participants attending 1:00 PM - 2:00 PM

Presenter: Gloire Rubambiza

Mentor: Jerry Scripps

North America has 23 times the internet connectivity of Africa in population terms. This disproportionate connectivity creates a disadvantage for Africa's academic potential because most of its internet traffic is routed through international fiber optic links – which is costlier than direct connections within Africa. One of the causes for slower internet traffic is the lack than direct connections within Africa. One of the causes for slower internet traffic is the lack of cooperation between the Internet Service Providers (ISPs) across Africa. This study explores whether we can increase the average closeness of a sample network representing African internet traffic by designing and testing strategic link-prediction algorithms versus a random link-prediction algorithm.

HENRY HALL ATRIUM 004

Structural Analysis of Y150F Mutant of *Acinetobacter*-derived Cephalosporinases (ADC-7)

Participants attending 11:00 AM - 12:00 PM

Presenter: Sara Barlow

Mentor: Bradley Wallar

Antibiotic resistance has emerged as a serious medical threat in our world today. Of particular concern is resistance to β -lactam antibiotics, which are widely used to treat bacterial infections. The production of β -lactamases in pathogenic bacteria is the primary cause of this antibiotic resistance. In *Acinetobacter baumannii* infections, the expression of specific β -lactamases, *Acinetobacter*-derived cephalosporinases (ADCs), provides a bacterial mechanism for destroying the antibiotics. In order to design a molecule that inhibits the ADC enzyme, it is imperative to determine the structure of the active site with a substrate bound. Here, we determined the X-ray crystal structure of a mutant (Y150F) of ADC-7 that will allow for the future elucidation of how antibiotics bind in the ADC active site. This ADC-7 Y150F structure will provide the basis for the future characterization of the ADC-7 active site and improved design of inhibitors against a clinically relevant resistance target.

HENRY HALL ATRIUM 005

Explorations in *Drosophila* Genomics Research: Sequence Improvement and Annotation of a Genome in a Classroom Setting

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM,

12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenters: Gabriella Born, Felicia Bozman, Jacie Buyers, Darian Frost-Stretten, Kayla Gallagher, Marisa Izrailov, Destiny Jackson, Kyle Kimble, Erica MacDonald, Bobbi Thursam
Mentor: Martin Burg

In this program, students research contemporary genomics questions using the model organism *Drosophila*. With support from the Genomics Education Partnership (GEP) based at Washington University in St. Louis, genomic sequence improvement is performed in various *Drosophila* species to enable further study by correction of errors in mononucleotide repeat regions. In addition, sequence improvement projects have secondary goals of correcting gaps in the genome sequence and identifying polymorphic regions using the program CONSED. Next, students in the course conduct annotation of a large DNA sequence region from the “dot” chromosome through comparison with the species *D. melanogaster*. As a result, gene models are created through the identification of conserved regions, including transcription start sites, using online tools such as BLAST. The completed student research results are entered into the GEP database, furthering the scientific knowledge of comparative genomics in *Drosophila*.

HENRY HALL ATRIUM 006

Midwest Religions After WWII

Participants attending 10:00 AM - 11:00 AM

Presenter: Claire Zuwala

Mentor: David Zwart

In the project, I am researching to find patterns in church historical data that represent how those churches and religions in Iowa identified themselves after World War II. With the world around them changing at a consistent pace, the churches' religion and cultures were changing as well. I have found many patterns in church anniversary books in how these churches recorded their history. For instance, the German Lutherans did not mention their heritage as much as the Norwegian Lutherans. I am also looking at the population Census to find out basic characteristics of the counties that the churches are in, and to see if what they said in the anniversary books lines up with the actual population data. The research shows that, for many of the churches, they had to rethink many of their cultural and religious traditions.

HENRY HALL ATRIUM 007

The Impact of Operational and Strategic Alignment at the Purchasing-Logistics Interface: A Statistical Consulting Experience

Participants attending 11:00 AM - 12:00 PM

Presenters: Nick Bis, David Brown
Mentors: Daniel Pellathy, Neal Rogness

Studies have shown a lack of research at the purchasing-logistics interface of supply chain management. In response to this lack of research, Daniel Pellathy, a supply chain management professor at Grand Valley, wanted to examine the performance impact of strategic and operational alignment between these two important functional areas. In his study, purchasing and logistics managers were surveyed to determine levels of alignment within their organization. Our job as statistical consultants was to use the data collected from the survey to analyze the relationship that operational and strategic alignments have with logistics and purchasing performance.

HENRY HALL ATRIUM 008

Characterizing Effects of Overexpressed Polarity Kinase Orb6 on Contractile Ring Proteins in *S. pombe*

Participants attending 2:00 PM - 3:00 PM

Presenter: Madison Spratt

Mentor: Dawn Hart

Aberrant cell division is the root cause of a number of human diseases, including cancer. Fission yeast *S. pombe* is a model organism that is ideal for defining mechanisms of cytokinesis, providing further understanding of such diseases. In *S. pombe* the formation and location of the actomyosin ring is critical to the execution of proper cytokinesis. The SIN and MOR pathways interact antagonistically to regulate polar growth and cytokinesis. Orb6 is the most downstream kinase of the MOR pathway, and is required for cell elongation. Prior studies have shown Orb6 possibly interacts with contractile ring proteins. However, the mechanism of this interaction remains unknown. The relationships between Orb6 and node proteins Mid1 and Cdr2 were investigated using overexpression vectors of Orb6. Results indicate a promising connection between the three. Understanding these interactions will further define the relationship between the SIN and MOR pathways.

HENRY HALL ATRIUM 009

Effects of Deep Pressure Therapy on Children with Autism

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenters: Makayla Rosekrans, Amy Wadaga

Mentor: Azizur Molla

The research question, "What are the effects of sensory integration through Deep Pressure Therapy (DPT) on improving attention and organization in children with Autism Spectrum Disorders

(ASD)?” was studied. The goal was to discover if DPT interventions (weighted blankets/vests, Sensory Processing Measures (SPM), and pressure pain thresholds) improved the quality of life by increasing attention, relaxation, and organization in children with ASD. Individuals 18 years or younger were selected as participants. Six databases were used to obtain valid information on 15 studies. Eleven studies were in favor of DPT interventions, while four revealed unsupportive results. The studies were divided into three categories, which included “Weighted Object Use (WOU),” “Cognitive Tests (CT),” and “Multisensory Assessments (MA).” Half the WOU studies showed positive results while the other half proved DPT to be disadvantageous. Both the CT studies and MA studies indicated all positive results.

HENRY HALL ATRIUM 010

Investigating the Interaction between Mid1 and Imp1 in *Schizosaccharomyces pombe*

Participants attending 10:00 AM - 11:00 AM

Presenter: Madison Schmidtman

Mentor: Dawn Hart

During the cell cycle, cytokinesis divides the mother cell into two daughter cells. In *Schizosaccharomyces pombe*, an acto-myosin contractile ring forms to carry out the cytokinetic process. Mid1 is required for the recruitment of the proteins that form the acto-myosin contractile ring. Mid1’s position is a spatial cue during the cell cycle for the ring proteins. During interphase, Mid1 is located in the nucleus. As cells continue through G2 and M phase, Mid1 migrates from the nucleus to the cytoplasm. By the end of anaphase, Mid1 has recruited the proteins required for the ring to the medial position and then returns to the nucleus. It is important that Mid1 is re-localized to the nucleus for cells to form properly. This happens through a combined mechanism of Sid2 phosphorylation and Imp1 function, allowing Mid1 to accumulate in the nucleus during proper times. The aim of this project is to determine the process of Imp1 interaction with Mid1 and other proteins in the nucleus.

HENRY HALL ATRIUM 011

Exploring the Changing Thermal Structure and Productivity of a Great Lakes Estuary

Participants attending 9:00 AM - 10:00 AM

Presenter: Zakry O’Brien

Mentor: Bopaiah Biddanda

One of the main predictions of global warming for the oceans is that warmer surface waters will intensify stratification, preventing phytoplankton’s access to nutrients below the thermocline

causing a drop in marine primary productivity which will weaken the ocean's carbon sink. Similar phenomena are occurring in freshwater lakes and estuaries around the world that are hotspots of carbon cycling. Muskegon Lake is a model Great Lakes estuary that connects the 2nd largest watershed in Michigan to Lake Michigan, and it has a world-class time-series observatory that has continuously monitored meteorological and water quality data of the lake during the past 6 years. By analyzing the changing trends in stratification and associated phytoplankton biomass in the time-series observatory data, and exploring its links to global and regional climate change, my project will advance NASA's goal 2.2 of improving our understanding of our watery home planet.

HENRY HALL ATRIUM 012

Characterization of Acetylcholine in Porcine Retina Using Fast Scan Cyclic Voltammetry

Participants attending 2:00 PM - 3:00 PM

Presenter: Brittany Sincox

Mentor: Eric Ramsson

Porcine eyes are an affordable resource that can be used to study retinal function in response to stimuli. Acetylcholine is a neurotransmitter with neuroprotective properties, and these properties can make it useful when regulated to prevent retinal diseases such as glaucoma. Fast Scan Cyclic Voltammetry, multiple electrode types and porcine eye dissections were tested for optimal acetylcholine readings. The electrode types and eye dissection techniques were tested for a future experiment which aims to measure acetylcholine release in response to DMP-543 within porcine retina. Carbon fiber and copper wire based electrodes were not able to repeatedly measure acetylcholine. We hypothesize that the eye cup dissection technique is ideal measuring acetylcholine release in response to DMP-543.

HENRY HALL ATRIUM 013

Measures of Body Composition: Bioelectrical Impedance Analysis Compared to Hydrostatic Weighing

Participants attending 4:00 PM - 5:00 PM

Presenters: Rachel Butler, Matthew Mccarthy, Jessica Solis

Mentor: Amy Gyorkos

This study aims to determine reliability and accuracy of Bioelectrical Impedance Analysis (BIA) compared to Hydrostatic Weighing (HW). The need for simple, valid techniques of measuring body composition among individuals is a growing concern for health and fitness specialists. This study aims to address the difference between BIA and HW. 2 male and 6 female GVSU students, ages 18-28 participated in the study. All measurements were taken after a 2-3 hour fast. HW

was performed in a standard HW water tank. Measurements were made with subject in a seated position suspended by a harness centralized over the tank. Residual volume was measured by hand-held spirometer. BIA was performed using a Tanita Body Composition Analyzer. There were no significant differences ($p < 0.05$) between methods of determining body fat percentage. On average, an 8% difference was determined between BIA and HW assessment, which is similar to other studies. BIA was found to be as effective as HW.

HENRY HALL ATRIUM 014

Learning Biochemistry through Virtual Reality: Developing a Spectroscopic Simulation of Protein Folding

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenter: Ryan Zahran

Mentor: Mary Karpen

The purpose of this project is to create a 3D visualization of protein folding, to help students better understand this complex process. Proteins consist of amino acid sequences, which specify the protein's shape, which in turn determines their function within a cell. Students often struggle with the concept of protein folding because it is difficult to visualize a 3D protein using 2D images. A good model of protein folding is a very small protein called Domain B of Protein G. Protein G is found on Streptococcus bacteria and helps these pathogens evade human antibodies. Domain B stably folds into a structure with alpha helices and beta sheets, common structural motifs found in protein structures. Using computational biochemistry methods, the folding pattern of Domain B was modeled and used to develop a 3D stereoscopic movie. This is the first phase in creating virtual reality simulations to help students learn biochemistry.

HENRY HALL ATRIUM 015

The Effect of Increased Resistance on Muscle Activation During Core Stix Push/Pull Motion

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenters: Sabrina Ahmad, Kayleigh Kaliniak, Elizabeth Malear, Jerrica Maloney, James Morris, Joshua Olson, Olivia Risko, Alexander Wong

Mentor: Stephen Glass

Core Stix® can be used with different resistance poles and different hand holds to accommodate various body types during exercise. The manufacturer provides a range of exercises for the user, and suggests these activate core muscles. However, to date, no research has established whether any of these movements indeed activate the core muscles as proposed. The purpose of the study

is to measure muscle activation during a push/pull movement. Results of muscle activation and torso rotation at different pole resistances will be discussed.

HENRY HALL ATRIUM 016

The Effect of the *ort*^{P306} Mutation on Homotypic Courtship Behavior of *Drosophila melanogaster*

Participants attending 10:00 AM - 11:00 AM

Presenters: Austin VanVelsen, Tyler VanVelsen

Mentor: Martin Burg

The lack of histamine has been shown to cause a negative impact on courtship behavior in *Drosophila*. This study focuses on whether neural pathways that respond to histamine can alter courtship behavior when they no longer are able to respond to histamine. This was accomplished by using a mutant defective in the histamine receptor, *Hc1A* (*ort*^{P306}). In the *ort*^{P306} mutant, histamine is present at normal levels, so alterations in behavior in the *ort*^{P306} mutant would indicate that the neurons which respond to histamine are also involved in courtship regulation. Homotypic courtship behavior of *ort*^{P306} was observed and compared to wild type and other mutant flies that were demonstrated to have strong negative effects on courtship. Current results indicate that the loss of the *hc1A* channel in *ort*^{P306} mutants had as significant negative effect on courtship behavior as the absence of histamine, indicating that the involvement of histamine in courtship regulation includes specific neural pathways.

HENRY HALL ATRIUM 017

A Study of Modeling Proteins Using X-ray Crystallography

Participants attending 11:00 AM - 12:00 PM

Presenter: Matthew Pedelty

Mentor: Ross Reynolds

An exploration of X-ray crystallographic techniques and how they are used in determining the molecular structures of proteins via application of the technique on HEW Lysozyme. Explanations of protein crystal creation via a supersaturated solution, x-ray production, how x-rays interact with the crystalline lattice to create a diffraction pattern, and finally how to generate a molecular model of a protein from its x-ray diffraction pattern.

HENRY HALL ATRIUM 018

Segregation in Educational Funding: From Past to Present

Participants attending 10:00 AM - 11:00 AM

Presenter: Jacob McCloughan

Mentor: Jennifer Stewart

This presentation aims to highlight the racial divide in the American education system by examining funding differences in black and white schools. When it comes to our schools, we have had a long history of putting up racial divides. While modern places of learning aim to be centers of unity and integration, they still carry the weight of the past on their shoulders. This presentation argues that we can still see racial divides today in school funding, where modern school systems still disproportionately put minorities at a disadvantage. My method utilizes historic statistics gathered from refereed journals and educational books, as well as photographic evidence to exemplify the disadvantages. I argue that while schools today are not necessarily using past methods to force funding segregation into school districts, we can see echoes of segregation in areas such as the granting of federal funding and standardized test systems.

HENRY HALL ATRIUM 019

Prions vs. Prion-like

Participants attending 9:00 AM - 10:00 AM

Presenter: Melody O'Hara

Mentor: John Capodilupo

Prions do not follow the central dogma of biology making them an anomaly to the scientific community. In 1982 Dr. Stanley Prusiner revealed the idea of an infectious protein particle called a prion. Current research has revealed that prions develop in different strains adding to the complexity of the proteins abnormal nature. While prions have been primarily linked to virulent diseases, such as Creutzfeldt-Jakob, Scrapie and Chronic Wasting Disease, they could provide insight on abnormal protein development in neurodegenerative disorders. Information regarding this novel type of "prion-like" protein development would not only illuminate target sites for potential therapies but may also hold the key information for curing certain neurodegenerative diseases. The goal of this presentation is to evaluate current data regarding the characteristics of prions, prion like particles and what the role of these proteins might be for neurodegenerative diseases.

HENRY HALL ATRIUM 020

Validation of Coding Rubrics to Measure Student Understanding of the Words Parameter and Statistic

Participants attending 2:00 PM - 3:00 PM

Presenter: Joseph McCartney

Mentor: Neal Rogness

Neal Rogness, faculty member in Statistics, has worked with other co-researchers to study the

role of lexical ambiguity in introductory statistics classes. The goal of this project was to assist professors in helping their students distinguish between the everyday and statistical definitions of keywords which are commonly used within the discipline of statistics, such as *parameter* and *statistics*. The collected data include written responses from students about the meanings of these words. Computer models were “trained” to categorize students responses into categories based upon a predeveloped coding rubric. The focus of my project was to assess the validity of these models by comparing computer categorization results with the same data that were also hand coded.

HENRY HALL ATRIUM 021

West Michigan Food Insecurity: Using Cluster Analysis and Geographic Information Systems to Identify Needs

Participants attending 9:00 AM - 10:00 AM

Presenters: Mary Jo Beeby, Blake Ferris

Mentor: Stephen Borders

This project details the results of efforts to assist Feeding America West Michigan (FAWM) in identifying and better understanding the characteristics of the individual communities likely to suffer from food insecurity in a 40 county service area in West Michigan. The research builds on the previous literature by examining the determinants of food insecurity using publicly available data from the American Community Survey while utilizing Geographic Information Services to examine the communities in the FAWM service area that are likely to suffer from food insecurity. Using data from 573 census tracts, we analyzed the determinants of food insecurity around demographic, socioeconomic, and environmental factors. We employed cluster analysis as a profiling technique to transform the data into more manageable units of analysis, which resulted in an eight cluster solution. We created a series of maps to visually present the cluster analysis results by census tract.

HENRY HALL ATRIUM 022

Studying Vibrating Objects with ESPI

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Bailey Groendyke

Mentor: Karen Gipson

The purpose of this project was to study the vibrational modes of objects using Electronic Speckle Pattern Interferometry (ESPI). ESPI uses electronic recordings to analyze the interference of laser speckle patterns; it has its basis in holography. For this project, a He-Ne laser beam was split into

a reference beam and a second beam which illuminated an object of interest; after reflection from the object, the two beams were recombined to form an interference pattern. The object of interest was vibrated at its resonant frequencies by an electromagnet driven by a function generator. Video images of the changing interference patterns were recorded on a CCD camera; a LabView program subsequently subtracted the differences in light intensity resulting from tiny differences in position at each point on the vibrating object. Where theoretical models of the vibrating objects exist, the resulting images were compared to the theoretical vibrational modes.

HENRY HALL ATRIUM 023

Compassionate Family-Centered Care Model: Empowering Parents in the Neonatal Intensive Care Unit

Participants attending 4:00 PM - 5:00 PM

Presenter: Jacquelyn Bateman

Mentor: Amy Rohn

Nursing practice has evolved to focus on caring for both the patient and the patient's family. This concept is particularly important in the neonatal intensive care unit because parents in the hospital environment can experience alienation from the parental role (Obeidat, Bond, & Clark-Callister, 2009). Altimier (2015) describes a Compassionate Family Centered Care Framework, which eliminates parental alienation and ensures quality care is provided to both the infant and parents. The Compassionate Family Centered Care Framework builds on three characteristics: affiliative behavior, bidirectional communication, and compassionate partnerships. This literature review analyzes interventions in the NICU which support these three characteristics. Research suggests that the interventions analyzed through the Compassionate Family Centered Care Framework allow for empowerment of parents of NICU infants and result in parents being more involved in patient care.

HENRY HALL ATRIUM 024

Dancing Skeletons: Material Culture after the Black Death, 1347-1500

Participants attending 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenter: Meghan Forest

Mentor: Alice Chapman

The Black Plague first struck Europe in 1347, decimating one third to one half of the previously existing population. The Plague continued to return every eleven to seventeen years for the next century and a half. Medieval Europeans struggled to come to terms with this devastating series of events, hypothesizing both causes and preventative measures. Over the next 150 years, this became increasingly evident in medieval works of art, particularly through the "Dance of Death."

In partnership with the Smithsonian Museum of American History, this project identified and researched these artistic trends as the basis for a virtual museum exhibit. This poster will examine artifacts related to *memento mori* and scientific interventions that attempted to counteract Plague. These artifacts display two opposite reactions that Europeans employed to confront the Black Plague, and both demonstrate that people were proactive in the face of massive social change.

HENRY HALL ATRIUM 025

Molecular Biomarkers for Early Detection of Cerebral Palsy

Participants attending 9:00 AM - 10:00 AM, 3:00 PM - 4:00 PM

Presenter: Brooke Armistead

Mentor: Sok Kean Khoo

Cerebral Palsy (CP) describes a group of complex neurological disorders that cause non-progressive, life-long motor impairments. Additionally, CP causes severe comorbidities including visual, speech, cognitive, and learning disabilities. Standard diagnosis of CP is primarily based on observation of delayed motor development at age ≥ 2 ; preventing ability to obtain therapies—physical, language, speech and occupational—at an early age. Previously, we used microarray technology to examine gene expression of CP children and healthy control (HC) from neonatal blood spots (NBS). Here, we applied quantitative real-time PCR (qRT-PCR) to validate gene expression of two differentially-expressed genes: S100 calcium binding protein A9 (*S100A9*) and ectonuclease triphosphate diphosphohydrolase-1 (*ENTPD1*). Our qRT-PCR results show up-regulation of *S100A9*, but not *ENTPD1* in all CP samples when compared to HC. *S100A9* in NBS may serve as an early diagnostic biomarker for CP to allow early intervention.

HENRY HALL ATRIUM 026

Hurricane on the Brain

Participants attending 2:00 PM - 3:00 PM

Presenters: W. Jend, Tracey McCoy

Mentor: Elena Lioubimtseva

The objective is to investigate the relationship in the Southeastern United States between mental health illness & climate change. Using MAGICC/SENGEN 5.3 model to study regional climate change scenarios for the Southeastern US, this research would solely be to study climate change, and could not reveal any information on the relationship between the two topics. Relational information will be obtained from various databases and interviews conducted with experts in these related fields. We will study the correlation between weather-related natural hazards, such as hurricanes, tornadoes, sea surges and mental health data while also analyzing connection between frequency and intensity of these natural hazards to climate change, keeping in mind many

other factors involved (poverty, homelessness, and so on.) The focus will be how climate change is leading to more intense and more frequent weather events that adversely affect people's livelihood and infrastructure and contribute to mental health crisis.

HENRY HALL ATRIUM 027

GVSU Study Abroad Survey Analysis: A Statistical Consulting Experience

Participants attending 10:00 AM - 11:00 AM

Presenters: Samantha Milano, Chloe Wentzlof

Mentors: Neal Rogness, Sherie Williams

Grand Valley is extremely proud to offer a wide variety of high quality study abroad opportunities, and is dedicated to maintaining and improving the quality of student experiences abroad. We analyzed a survey provided to students from the College of Education who have studied abroad in Spain. The survey examined the student experiences in the context of the three prongs of service: faculty advisor, international center, and local service provider. The goal of the survey analysis was to examine the student perception of the three major components in the study abroad process and to identify potential areas of improvement. This presentation will highlight the process of statistical consulting and explore the results of the analysis.

HENRY HALL ATRIUM 028

A Statistical Consulting Experience: Activity Trackers and Their Ability to Accurately Monitor Physical Activity

Participants attending 2:00 PM - 3:00 PM

Presenters: Matthew Duda, Daniel Ferris

Mentors: Christopher Dondzila, Neal Rogness

Dr. Chris Dondzila of the Movement Science Department acquired volunteers that fit into three different BMI groups to help him study commercial activity trackers. He wanted to examine the accuracy of these trackers, compared to an industry-standard activity tracker, across these different BMI groups. As statistical consultants, our role was to analyze the data and determine which commercial activity tracker most accurately measured a person's steps and time spent in moderate-vigorous physical activity for each BMI group.

HENRY HALL ATRIUM 029

Hyperostosis Frontalis Interna in Post-Menopausal Women

Participants attending 11:00 AM - 12:00 PM, 3:00 PM - 4:00 PM

Presenter: Nicole Goward

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

Removal of the calvaria of a 72-year-old female cadaver revealed abnormal bone growths on the interior surface of the frontal bone superior to the orbits. Hyperostosis Frontalis Interna (HFI) is a common occurrence prevalent in elderly women that have gone through menopause. HFI is characterized by one or more areas of cancellous bone growth, usually in the lamina of the frontal bone. These growths can vary in severity from small asymptomatic nodules to large overgrowths that compress brain tissue and are associated with frontal headaches, psychoneurosis, and acromegaly. It more often than not goes undetected because adverse symptoms are uncommon, but its prevalence in the population is increasing. Explanation for HFI are varied and include hormonal changes in estrogen, increased levels of leptin, endocrine imbalances, and relations to increased longevity.

HENRY HALL ATRIUM 030

The Development of a Mental Timeline

Participants attending 10:00 AM - 11:00 AM

Presenter: Marisa Schoel

Mentor: Tessa Jordan

The mental timeline is how we spatially represent the concept of time. It is assumed the orientation of the mental timeline is based on reading direction. English speakers, who read left-to-right, tend to represent the past on the left and future on the right. Arabic speakers who read right-to-left, tend to represent time in the opposite direction. However, this has not been empirically established. The current study was designed to examine the influence of reading on the direction of the mental timeline. 95 English speaking preschoolers, kindergartners, and college students participated in a card arrangement task in order to assess the direction of their mental timeline. The Concept of Print Test was administered to assess the child participants' familiarity with reading. A preference for a left-to-right arrangement emerged only in the kindergartners and adults. In addition, preschoolers' Concept of Print score was correlated to their preference for a left-to-right arrangement.

HENRY HALL ATRIUM 031

The Effect of American Sign Language on the Recovery of Aphasic Patients

Participants attending 11:00 AM - 12:00 PM

Presenters: Hannah Barnes, Amanda Maitland, Ashley Marshall

Mentor: Julia VanderMolen

Background: Aphasia is when trauma to the brain causes difficulty in the comprehension or expression of language. Purpose: This systematic review observes the different rehabilitation techniques, specifically American Sign Language, and the effects it has on recovery time of

aphasic patients. Methods: The databases CINAHL, ProQuest Medical, PubMed, in total yielded 6,232 results. The presented systematic review focuses on 15 of those articles. Results: While each study was unique, each one lead to the conclusion that American Sign Language is beneficial to quickening the recovery of patients with aphasia. The studies generally looked at sign language and fingerspelling abilities in relation to the part of the brain in which spoken and signed language are processed and affirmed the connection. Conclusion: While this particular topic has not been heavily researched, further studies, specifically on the topic of American Sign Language in aphasia recovery, would be greatly beneficial.

HENRY HALL ATRIUM 032

Sediments of a Pitted Lacustrine Plain and their Implications for Paleolake Level of Glacial Lake Chicago, Cedar Creek Township, Muskegon County, Michigan, U.S.A.

Participants attending 1:00 PM - 2:00 PM

Presenter: Thomas Valachovics

Mentor: Patrick Colgan

We mapped sediment in Muskegon County, Michigan to reconstruct geologic history and past lake level of Glacial Lake Chicago. Sediments were mapped using a digital elevation model, soils database, water wells, field sampling, and grain size analyses. Well records document sand with rare gravel, silt, and clay interbeds. Well records show an onlap of lake sediments onto a moraine. Five sediment types are identified based on grain size, sorting, and percent fines and gravel. Sediment types indicate deposition in a glacial lake setting by stream flow in channels, as turbidity currents, and as rainout of silt and clay. We interpret the source of the sediment was the ancestral Muskegon River. Lake sediment suggests a paleo-lake level of 215 meters above sea level for Glacial Lake Chicago. Kettles formed as ice buried by sediment melted after lake drainage.

HENRY HALL ATRIUM 033

Collaborative Research: Investigating Middle Grades Mathematics Teachers' Curricular Reasoning

Participants attending 2:00 PM - 3:00 PM

Presenter: Lydia Wright

Mentor: Lisa Kasmer

How do teachers make their decisions while teaching? This project aims to figure out how teachers' curricular knowledge affects their decisions when teaching. Do they take student answers and go off topic or do they take another route to focus and meet the lesson goals? In this NSF-sponsored project we aim to generalize teachers' decisions made while teaching, and apply that knowledge to

help educate pre-service teachers on knowing which student thoughts to follow. Testing a teacher's curricular knowledge and reasoning tells us their familiarity with the material. Using pre-interviews, lesson videos, and post-interview reflections, we will narrow down specific decisions made while teaching. This project will shed some light into the mind of a teacher as they teach an unfamiliar lesson and their reflections on decisions compared to the lesson plan. Knowing student goals and standards allow teachers to make decisions to move the whole class towards those goals.

HENRY HALL ATRIUM 034

Twitter Sentiment Analysis

Participants attending 9:00 AM - 10:00 AM

Presenter: Gage Vander Clay

Mentor: Jared Moore

Social media provides a platform to analyze the sentiment of the general public through automated approaches. Specifically, Twitter allows users to share opinions on any topic, thus presenting an excellent opportunity to automatically analyze public opinion. The purpose of my application is to provide live sentiment analysis on tweets relating to a specific topic. This is achieved through the use of the NLTK library in Python. The application searches for a topic, rating relevant tweets as either positive or negative, allowing for the analysis of live public opinion through sentiment analysis in real-time. This approach has applications in news, popular culture, investing, and politics.

HENRY HALL ATRIUM 035

Clarifying the Effects of Isoproterenol on Vascular Reactivity in Porcine Arteries

Participants attending 9:00 AM - 10:00 AM, 2:00 PM - 3:00 PM

Presenters: Jin Bak, Janet Chung, Madison Miller

Mentor: Francis Sylvester

This research clarifies the effects of isoproterenol on porcine arteries. Isoproterenol is a widely-used drug that typically induces dilation in arteries by acting as a β -adrenergic agonist. The adrenergic receptors play an important role in the circulatory system as they are capable of binding the catecholamines, epinephrine and norepinephrine. Previous studies in our lab using isoproterenol failed to induce vasodilation. Using organ baths that simulate *in vivo* conditions, arteries will be mounted on force transducers so vascular tension can be measured. The arteries will be pre-constricted with potassium chloride (KCl) followed by increasing concentrations of isoproterenol. After data collection, data will be analyzed to determine the effect of isoproterenol on the vasculature. Our hypothesis is that isoproterenol will act as a vasodilator in the porcine model.

HENRY HALL ATRIUM 036

The Relationship between Feeding Type and Temporomandibular Joint Morphology in Superfamily Musteloidea

Participants attending 10:00 AM - 11:00 AM

Presenter: Travis Garvin

Mentor: Melissa Tallman

Superfamily Musteloidea is a highly diverse taxonomic group comprising over 82 species. The most obvious diverse qualities of the superfamily can be seen in habitat, size, and diet. Musteloids have highly diverse diets ranging from strict herbivory to strict carnivory. The study aims to prove that when there is a large percentage of meat in the diet of a musteloid, the mandibular fossa has a more concave shape and the mandibular condyle has a matching convex shape to increase stability of the mandible during feeding. Digital models of each of the mandibles and crania used in the study were collected by three-dimensional (3D) surface scans using a NextEngine 3D scanner. Landmark Editor was used for data point collection. Principal components analyses illustrated that different feeding groups had different morphological features, regardless of phylogeny. Thus, the hypothesis was supported.

HENRY HALL ATRIUM 037

Axillary Arch Muscle

Participants attending 11:00 AM - 12:00 PM

Presenter: Joshua Quinn

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

The dissection of the cadaver of an 83 year old female revealed the presence of an axillary arch muscle (Langer's Arch). This is a common variant of the latissimus dorsi where a slip of muscle crosses the axilla where muscle fibers blend with pectoralis major or teres major, and is likely the result in anomalies in the development of the muscles of the pectoral girdle. The axillary arch may extend to the coracobrachialis, the long head of the biceps brachii, axillary fascia, and pectoralis minor. The presence of this muscle can lead to complications if surgeons confuse the muscle with latissimus dorsi when using the muscle as a landmark during surgery.

HENRY HALL ATRIUM 038

An Investigation of Handedness in Non-human Primates

Participants attending 3:00 PM - 4:00 PM

Presenter: Brandi Fleming

Mentor: Melissa Tallman

This research focuses on handedness in non-human primates and the purpose is to determine if primates have a dominant arm that they use for everyday activities. Two specific hypotheses were developed to examine: Non-human primates have larger muscle masses in the right arm and the difference in their bone size and shape will correlate with the larger muscles masses. Dissections of the individuals were conducted and data on each arm muscle were recorded. The bones were then cleaned of any remaining flesh, laser surface scanned onto a computer, landmarked, and analyzed. Two muscles, biceps brachii and anconeus lateralis, had a significant correlation with bone size in the proximal radius. Flexor carpi radialis had a significant correlation with bone shape of the entire radius. There were no data to signify a hand preference based on muscle weight differences between the left and right arms. In conclusion, the handedness of the species examined is uncertain.

HENRY HALL ATRIUM 039

Presentation of Hemorrhoidal Disease in a Cadaveric Specimen, with Comments on Development and Frequency.

Participants attending 2:00 PM - 3:00 PM

Presenter: Kevin Mittner

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

Hemorrhoidal disease is an anorectal disorder with symptoms including bleeding, itching, soiling and pain. While there are multiple causes of the appearance of hemorrhoids, BMI is the only risk factor associated with them. The risk of developing hemorrhoids increases 1.035% for every BMI increase of one. There are three categories of hemorrhoids: Internal hemorrhoids are mucosal, originating above the dentate line. External hemorrhoids are squamous epithelial, originating below the dentate line. Mixed hemorrhoids are a combination of tissues, originating on the dentate line. Internal hemorrhoids are further classified into degree status, I – IV, based on prolapse of the anal cushion out of the anus. Examination of the cadaver indicates class IV, internal hemorrhoids.

HENRY HALL ATRIUM 040

RAD: Perpetuating Dangerous Myths about Sexual Assault

Participants attending 11:00 AM - 12:00 PM

Presenter: Kortney Ondayko

Mentor: Cael Keegan

The literature surrounding sexual assault prevention both advocates for and against the effectiveness of self-defense programs. Much of the literature focuses on post-program effects on people who attend a self-defense program. However, this project goes further by using a feminist postmodern approach to analyzing the language used to describe the Rape Aggression

Defense (RAD) program and how this language adds to the harmfulness of self-defense as sexual assault prevention programming. This presentation argues that the language of RAD programs counterproductively perpetuates dangerous myths about experiences of sexual violence. Further, RAD program descriptions largely silence narratives of trans*women of color, as well as information regarding the prevalence of non-stranger assaults. It is argued that RAD not only sustains narrowed experiences of sexual assault but also further marginalizes the most vulnerable to sexual assault. Recommendations for RAD programming will be explored.

HENRY HALL ATRIUM 041

Chiral Separation of Silanes *via* Capillary Micellar Electrokinetic Chromatography

Participants attending 10:00 AM - 11:00 AM

Presenter: Sydney Shavaler

Mentor: Andrew Lantz

Chiral silanes have become very important in the field of chemistry due to their use in stereoselective synthesis and organometallic chemistry. Silanes are also of particular interest in the pharmaceutical industry due to their potential drug delivery abilities. Because silanes can react differently based on their enantiomeric or diastereomeric ratio, separating and quantifying these compounds is important for these applications. Typically, chiral separations are performed via HPLC using cellulose-based columns, however the limited flexibility of this method prevents it from separating certain chiral silane compounds. Here, we develop a method to separate novel chiral silanes using chiral micellar electrokinetic chromatography. Successful chiral separations were achieved for two different chiral silanes, (menthoxy)(methyl)(naphthyl)phenylsilane and (butyl)(menthoxy)(methyl)phenylsilane, using cyclodextrins and surfactants as additives in a non-aqueous methanol solvent.

HENRY HALL ATRIUM 042

“Just Keep Moving”

Participants attending 9:00 AM - 10:00 AM

Presenter: Elizabeth Wesley

Mentors: Susan Strouse, Melodee VandenBosch

Women with Type 2 diabetes do not participate in adequate amounts of physical activity. The purpose of this study was to discover the perceptions of middle aged women with Type 2 diabetes regarding physical activity. The perceptions are necessary to gain insight into the reasons behind the lack of activity. This study was composed of four group interviews consisting of three to four middle-aged women with Type 2 diabetes who live in West Michigan. The focus groups were

analyzed using a modified Giorgi approach. According to the women, many factors influence levels of physical activity including age, gender, disease, and social support. The women stated the benefits of physical activity and most expressed a desire to be more physically active. The majority of participants stated that women with Type 2 diabetes can participate in similar activities to those without the condition. Advice to women with Type 2 diabetes from the study participants is “Just Keep Moving”.

HENRY HALL ATRIUM 043

Novel Synthesis of Antibiotic Urea Precursors

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenter: Phillip Dietz

Mentor: Matthew Hart

Recently, our lab has discovered a family of antibiotics based on a diphenyl urea scaffold. The goal of this project is develop a better understanding of how the structure of these diphenyl ureas impacts their antimicrobial activity. In particular, the focus is on the synthesis of ester derivatives of these urea based antibiotics. By changing the length and topology of the esters we can learn valuable information about their biological activity. The project described herein outlines our synthetic strategy and covers our progress to date. All the compounds synthesized are characterized by ^1H and ^{13}C NMR spectroscopy. Moving forward, these ester derivatives will be coupled with amine compounds to form the final ester products to be tested for antibiotic activity.

HENRY HALL ATRIUM 044

Breastfeeding Support for African American Women with the Use of a Mentor-Mentee Program

Participants attending 11:00 AM - 12:00 PM

Presenter: Jamie Platt

Mentor: Kelli Damstra

The Kent County Health Department (KCHD) and its grant partners are focusing on transforming public health practice toward greater racial equality in breastfeeding. To encourage increased breastfeeding among African Americans living in Grand Rapids, the KCHD is implementing a breastfeeding peer mentor program and is partnering with WIC, Home Visiting programs, and a local hospital to engage potential peer mentors and those who wish to be mentored. The purpose of this study is to identify facilitators that have assisted with higher breastfeeding duration rates.

HENRY HALL ATRIUM 045

Evaluating miR-34b, miR-34c, miR-7, and miR-153 as Diagnostics

Biomarkers for Parkinson's Disease

Participants attending 3:00 PM - 4:00 PM

Presenters: Brooke Armistead, Emma Hahs

Mentor: Sok Kean Khoo

Parkinson's disease (PD) is a highly prevalent neurodegenerative disease that causes impaired motor movement and neurological symptoms. Currently, there is no cure or definitive method to diagnose PD at its early stages. Here, we investigated the expression of alpha-synuclein related microRNAs—miR-34b, miR-34c, miR-7, and miR-153—in blood plasma to gain evidence for diagnostic biomarkers. Quantitative real-time PCR (qRT-PCR) was used to compare the expression of these microRNAs in newly diagnosed and advanced PD patients, as well as healthy controls. We showed that miR-34b and 34c are significantly down-regulated in PD patients and can differentiate PD from healthy controls, while miR-7 and 153 do not show significant difference. Our results suggest miR-34b and 34c may be used as potential biomarkers to diagnose PD.

HENRY HALL ATRIUM 046

Adopters of Korean Adoptees (Impact of KAAN): Student Statistical Consulting Experience

Participants attending 11:00 AM - 12:00 PM

Presenters: Jason Hicks, Hripsime Mamassian

Mentors: Kimberly McKee, Neal Rogness

There are many different adoptees just within the United States. Dr. Kimberly McKee's primary focus is on Korean adoptees. The focus is not only on Korean adoptees but those who are involved with the Korean American Adoptee Adoptive Family Network (KAAN). The survey administered provided a well-rounded group of randomly selected participants via Facebook. Our job as statistical consultants was to find out the role that KAAN has played in shaping the identities for both adopters and adoptees.

HENRY HALL ATRIUM 047

A Statistical Consulting Experience: Analysis of Muskegon Lake and Lake Michigan Water Conditions

Participants attending 9:00 AM - 10:00 AM

Presenters: Cameran Hren, Spencer Wejrowski

Mentors: Neal Rogness, Janet Vail

The Annis Water Resources Institute (AWRI) has been collecting and analyzing water samples from Muskegon Lake and Lake Michigan since 1996. AWRI was interested in comparing data from

their early years of collecting to the most recent year of 2016. The data provided contain twelve variables of which AWRI has been monitoring for over twenty years. The main focus of our analysis was to provide our client, Dr. Janet Vail, with an analysis of the 2016 data for her comparison with earlier data. Previous analyses included basic statistical measurements, box plots, scatter plots, and comparisons between top and bottom samples as well as between different sites. As statistical consultants, we analyzed the data to detect any statistically significant differences amongst these twelve variables.

HENRY HALL ATRIUM 048

Exploring Mathematics Competency: A Statistical Consulting Experience

Participants attending 1:00 PM - 2:00 PM

Presenters: Jordan Grochola, Faith Platz

Mentors: Nancy Levenburg, Neal Rogness

Dr. Nancy Levenburg, of the Management Department in the Seidman College of Business, wanted to assess mathematics competency in GVSU business students. She administered over 700 math skills surveys consisting of mini-problems and demographic questions to students in her 300-level management classes over several years. As statistical consultants, we were asked to explore potential associations between certain demographic characteristics (including major and gender) and math ability. Understanding these associations can help plan and implement programs designed to help students improve their quantitative skills.

HENRY HALL ATRIUM 049

Climate Change and its Effects on Rice Production in Southeastern Mainland Asia

Participants attending 3:00 PM - 4:00 PM

Presenters: Sarah Daniels, Mitchell Noworolnik

Mentor: Elena Lioubimtseva

Southeastern mainland Asia is home to a climate of high, uniform temperatures and a high amount of rainfall. This is what allows Southeastern Asia to produce most of the world's rice. Rice in Asia is not only depended on as a major export, but as a staple crop. What are the potential implications that global climate change may have on this important, historic aspect of agriculture? What kind of adaptations in agriculture are the people of this region considering to secure their future population? Observations over decades of research show an increase in temperature, more sporadic rainfall and longer periods of drought, and the threat of an increased number natural disasters in both frequency and ferocity. Collective data shows that if changes in climate keep going the same direction, climate change will threaten the stability of the rice industry and the most

vulnerable people who depend on it.

HENRY HALL ATRIUM 050

Role of the Free Fatty Acid 4 Receptor in Endothelial Cell Responses to Oleic Acid

Participants attending 10:00 AM - 11:00 AM

Presenter: Kelsey Rogers

Mentor: David Kurjiaka

Obesity is a major concern in the US. Thus, understanding the impact of fatty acids (FA) on the human body is an important step. Free FAs in the blood could bind to free FA receptors (FFAR) on the endothelium thereby impacting atherosclerotic plaque initiation: FAs promote (trans) or inhibit (cis) plaques development. We are focused on the protective effects of cis FA and the involvement of FFARs on endothelial cells (EC). The goal was to determine whether ECs express the FFAR4 that could be targeted by cis FA (oleic acid) to protect the endothelium. Experiments were performed on cultured EC that were observed to express the FFAR4 protein. Treating ECs with OA for 6 hours decreased their expression of Connexin 43 (Cx43: a marker of EC damage). Stimulating the FFAR4 receptor induced a similar reduction in Cx43 expression. Additional experiment are required to determine whether the oleic acid is acting through the FFAR4 (using a blocker).

HENRY HALL ATRIUM 051

You Are What You Eat: The Effects of DHA on Neurogenesis

Participants attending 1:00 PM - 2:00 PM

Presenter: Jenna Koelsch

Mentor: Merritt Taylor

Neural stem cells (NSCs) of the developing neural tube proliferate, differentiate, and mature to give rise to the central nervous system. Various factors, including factors in our diets, regulate this cycle. DHA is a polyunsaturated fatty acid (PUFA) in the brain that is obtained from our diet, and it has been shown to play a role in the development of neurons. Recent studies show that DHA can promote neuron formation from adult rat NSCs *in vivo*, but it has not been shown how DHA affects embryonic NSCs *in vivo*. This study examined the impact DHA has on neuron birth via embryonic NSCs *in vivo*. By administering DHA into the neural tube of *in vivo* chick embryos, the effects on embryonic NSCs compared to a vehicle control have been examined. Changes in cell proliferation, cell cycle arrest, and neuron counts were monitored. Investigating the influence of DHA on embryonic brain development is essential to better inform proper nutritional intake during pregnancy and throughout life.

HENRY HALL ATRIUM 052

Downtown Market Intercept Survey

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenters: Kanykey Begaliyeva, Meghan Kurza, Taylor Raymond, Justyne White

Mentor: Lisa Sisson

The purpose of our research is to create, conduct and analyze an onsite Customer Intercept Study (CIS) for the Grand Rapids Downtown Market. The CIS examined and set a baseline for customer demographics and shopping patterns at the Grand Rapids Downtown Market. We developed a custom questionnaire and analyzed the results using an online survey development cloud-based software. This software allowed us to use ipads when conducting the survey which made analyzing the data much easier. The data we collected consisted of demographic information including ethnicity, age, occupation as well as spending patterns. We then compared the information to census data collected from Kent county. The information gathered will help the Downtown Market have a greater understanding of their customer base and who to market towards in the future.

HENRY HALL ATRIUM 053

Creation & Implementation of Grand Rapids Coffee Crawl 2017 Event

Participants attending 10:00 AM - 11:00 AM

Presenters: Deanna DeWitt, Emily McKenzie, Savannah Paez, Jaimee Risher

Mentor: Lisa Sisson

As part of Grand Valley's community-based learning program, GRNow partnered with four HTM students to create and implement a coffee crawl event for the city of Grand Rapids. GRNow is a Grand Rapids' event, entertainment, and restaurant guide whose audience is those that plan and love to attend events. The goal of the coffee crawl was to build an awareness of Grand Rapids coffee shops while benefiting the local charity, Heartside Gleaning Initiative. Heartside Gleaning Initiative (HGI) empowers Heartside and surrounding communities to become healthier through nutrition education and increased access to healthy foods. The scope of work for the project included: work with a budget, create a timeline, create pricing options, contact & secure coffee shops, create the offering for the event, create ticket portal, create all marketing materials, create a marketing strategy for signups, contact local media to secure segments for the events, and debrief at the end of the project.

HENRY HALL ATRIUM 054

Temporomandibular Joint Disease

Participants attending 11:00 AM - 12:00 PM

Presenter: Benjamin Pichette

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

The temporomandibular joint (TMJ) is a hinge/modified bicondylar joint that articulates the mandible and the temporal bone. The shape of this joint allows movement on multiple axes in order to facilitate mastication. The joint contains an articular disc that eases movement and divides the joint capsule. Repetition of movement through life, misaligned dentition or other dysfunction can lead to the degeneration of the joint, especially the articular disc. During the dissection of the cadaver of a 96 year old male, we observed that the disc of the left TMJ had been completely obliterated, whereas the right side was intact. Using this example, we will discuss temporomandibular joint disease including its causes, symptoms, and treatment.

HENRY HALL ATRIUM 055

Biere De Mac Brew Works Calendar of Events

Participants attending 10:00 AM - 11:00 AM

Presenters: Melinda Kloosterman, Madison Larson, Casey McNamee, Kayla Myers

Mentor: Lisa Sisson

The goal of this project is to grow the affiliation of Biere De Mac Brew Works with annual events in the Mackinac Straits area. Through research of local events, both large and small scale, we created recommendations as to which events may create particular synergy with Biere De Mac and why. The Straits area cities of particular interest for events were Mackinaw City, St. Ignace, Mackinac Island and Les Cheneaux. Analysis of craft brewery demographics, competition and a similar small scale facility influenced which type of events were chosen based on their added benefit to Biere De Mac. We developed relationships with these annual events, coordinated promotions, improved and expanded the events and or affiliated through advertising.

HENRY HALL ATRIUM 056

Causes of Meter-Scale Cyclicity in the Upper Ordovician Fairview Formation, Kentucky

Participants attending 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenters: Matthew Della Mora, Max Korndorfer, Madison Koth, Benjamin Pummell

Mentor: Peter Riemersma

An analysis of interlayered shell-rich limestones and siliciclastic mudstones will be used to determine the causes of meter-scale cyclicity. The processes of literature review, some field work, and examination of thin sections/photographs will aid us in determining the causes of cyclicity and the conditions under which the Fairview Formation was deposited. Of particular interest are the processes and conditions that caused the deposition of shell-rich limestone layers. Observations

of the distribution and types of fossils in the limestones will be used to constrain the depositional conditions and help establish the ultimate cause of cyclicity. Previous hypotheses proposed to explain the rapid changes in deposition between mudstones and limestones are somewhat conflicted. These ideas range from changes in sea-level, intermittent periods of more intense weather conditions, to physical changes in sediment supply.

HENRY HALL ATRIUM 057

The Best Warm-up for the Vertical Jump in College-aged Students

Participants attending 1:00 PM - 2:00 PM, 3:00 PM - 4:00 PM

Presenters: Alexandra Crocenzi, Gabrielle Labioda, Joshua Olson, Rachel Shippy, Alexandra Stein

Mentor: Kimbo Yee

Background: Vertical jump performance is linked to lower extremity explosive power. Research has shown doing a warm-up prior to a vertical jump improves jump performance, but the best type of warm-up for maximum performance has yet to be determined. Purpose: The purpose of the study was to determine the most effective warm-up on vertical jump performance. Methods: College-aged individuals participated in a randomized, crossover study that took place across 4 different days. A total of 4 different warm-up conditions were evaluated: no warm-up, static stretching, sub-maximal, and weighted warm-ups. Vertical jump performance was assessed with a Vertec within 2 minutes following each warm-up protocol. Three vertical jumps attempts were allowed, and the highest jump was recorded. An ANOVA statistical test was used to examine differences in vertical jump across the 4 warm-up conditions. Post hoc tests (0.05) were conducted using Bonferroni analysis. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 058

Metro Health Grand Rapids Marathon

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM

Presenters: Anna Douglas, Zachary Gaule, Abigail Robichaud, Mikayla Sharp

Mentor: Lisa Sisson

The Metro Health Grand Rapids Marathon, consists of a kids 5K and a Sunday marathon, half marathon and marathon relay. The purpose of this community project was to create a marketing strategy timeline over 3 years. This work incorporates the existing logo, yet introduces a new theme or tagline each of the years. Designs will be produced for items including digital media such as the event website, e-mail newsletter, and social media, printed materials including posters, postcards, banners, and the event program; and the race shirt, medal and staff jackets. This project included the production costs for all materials as well as vendor's prices to compare. Our

deliverables for the Metro Health Grand Rapids Marathon were a report summarizing each task outlined in the Scope of Work, Marketing design and theme for the products, ordering package for year one theme items, and budget for printed and promotional materials.

HENRY HALL ATRIUM 059

Narratives from Both Sides of the Wall: The Development of Individual Identity in Post-War Germany

Participants attending 12:00 PM - 1:00 PM

Presenter: Stephanie Tanis

Mentor: Donovan Anderson

Following a period of fascism in Germany where individual identity was suppressed for the supposed greater collective good, how were the individuals in post-war East and West Germany able to negotiate the tension between the new development of an individual identity while maintaining membership in a national community? Through an intensive study of East and West German films and scholarly articles, which narrate the process leading to the establishment of individual identity, this study examined how individual identity in East Germany was seen through the lens of West and East German post-war cinema.

HENRY HALL ATRIUM 060

Exploring the Reaction Mechanism and Origin of Regioselectivity in Di-Nickel Catalyzed Alkyne Cyclotrimerization

Participants attending 12:00 PM - 1:00 PM

Presenter: Trey Pankratz

Mentor: Richard Lord

This work focuses on utilizing computational methods to better understand how a di-nickel catalyst cyclotrimerizes alkynes to form substituted benzenes. Recent work by the Uyeda and Groysman groups has shown good chemoselectivity, but varying regioselectivity, for similar di-nickel catalysts supported by iminopyridine ligands. Our goal is to map the reaction thermodynamics and model the transition states to estimate kinetics to rationalize these experimental findings. Density functional theory results will be presented on unsubstituted and monosubstituted (with electron-withdrawing and electron-donating groups) alkynes with the xanthene-bridged Groysman catalyst.

HENRY HALL ATRIUM 061

Variation in Density of Human Cranial Dura Mater Using Computerized Tomography

Participants attending 9:00 AM - 10:00 AM

Presenter: Eric Sheffield

Mentor: James Reed

The meninges – connective tissue coverings of the brain – are vital structures as they help protect the health of the brain. Other research has suggested that due to the close relationship to the brain, the meninges – especially the dura mater – might be affected by diseases of the brain and show changes. There is currently a dearth of research on the normal density and thickness of the dura from which to compare. This project evaluates the normal variation in the density of the dura mater from thirty-three individual CT scans obtained from Saint Mary's Hospital System. Density of the dura mater, reflecting the amount of collagen and strength of the tissue, was measured in Hounsfield units. The coronal suture was used as an anatomical landmark to facilitate comparison. A total of eighteen data points were collected for each scan. Six of these were directly deep to the coronal suture, with the other twelve points being two slices anterior and posterior of the suture.

HENRY HALL ATRIUM 062

Traumatic Brain Injury, CTE, Alzheimer's Disease: A Review of Association

Participants attending 1:00 PM - 2:00 PM

Presenter: Zachary Harper

Mentor: John Capodilupo

Chronic traumatic encephalopathy (CTE) is a neurodegenerative disease found most commonly in athletes and members of the military who have experienced multiple head traumas. Typical CTE neuropathology consists of the presence of hyperphosphorylated tau proteins in the sulci of the brain. Alzheimer's disease (AD), another neurodegenerative disease, has comparable neuropathology with hyperphosphorylated tau proteins, as well as amyloid beta plaques present in patients' brains. Both CTE and AD have comparable symptoms yet the lack of beta amyloid plaques in CTE patients brains has previously been a defining difference in the presentation of each disease. Recent research, however, has found that following traumatic brain injury there is an immediate response of amyloid beta, suggesting a connection in the pathogenesis of each disease. This report will attempt to summarize the current research regarding the association of traumatic brain injury, CTE, and Alzheimer's disease.

HENRY HALL ATRIUM 063

Bière de Mac Brew Works: Bière Garten

Participants attending 2:00 PM - 3:00 PM

Presenters: Andrew Barry, Adelina Fischer, Rebecca Howard, Mallory Miller, Lauren Van Timmeren

Mentor: Lisa Sisson

Bière de Mac Brew Works opened Winter 2016 in Mackinaw City, MI. The purpose of this project was to work alongside our community partner, President and Owner, George Ranville, to design a beer garden for the facility that will open in Summer 2017. We researched different beer gardens in the nation with an emphasis on Michigan. After exploring different concepts and ideas used by various beer gardens we finalized a set list of ideas and a budget for Bière de Mac's Beer Garden. With these concepts in hand, we obtained quotes from contractors and suppliers to set up the logistics of actually constructing the beer garden. After reaching the final approval from George Ranville, the Beer Garden will be installed in Summer 2017.

HENRY HALL ATRIUM 064

Community Based Learning: Preparing Students for Interacting with Business Partners

Participants attending 2:00 PM - 3:00 PM

Presenters: Lindsay Cannon, Cassandra Elwartowski, Loren Hansen, Alexandra Klempay, Marselina Sanchez

Mentor: Lisa Sisson

Community based learning takes the student out of the classroom and places them with community partners to complete community projects. The goal of the project was to design online learning modules. These modules will be used by students to learn appropriate techniques for interacting with business partners as well as diverse populations and include a wide range of topics. Research for the necessary modules has been obtained by surveying and discussing student learning needs with present and past community partners. Research also focused on the appropriate methods to deliver modules that help the student engage, retain, and learn. A sample module will be presented at SSD.

HENRY HALL ATRIUM 065

The Search for Resonance in Vinylsilyl Anions: Synthesis of Silyl Substituted 9-methylenefluorene

Participants attending 9:00 AM - 10:00 AM, 4:00 PM - 5:00 PM

Presenter: Craig Fowler

Mentor: Randy Winchester

The vinylsilyl anion has two major contributing resonance structures; one with the lone pair of electrons located on a silicon atom, which can also be viewed as a simple vinyl silyl anion and a second structure with the lone pair of electrons localized on a carbon atom. In this poster we will present our attempts to synthesize tris(trimethylsilyl)dibenzofulvene, a precursor to the

tristimethylsilylsilyldibenzofulvyl anion. These efforts have included several different approaches including an addition-elimination on 9-methylenefluorene and a novel Wittig reaction.

HENRY HALL ATRIUM 066

Ball and Pillow Structures of the Upper Ordovician Fairview Formation in Maysville, Kentucky

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenters: Megan Haessly, Megan Heath, John Ouellette, Zachary Stuart

Mentor: Peter Riemersma

Ball and pillow structures are soft sediment deformation features found in the Upper Fairview Formation in Maysville, Kentucky. These masses are comprised of layered sediment that formed unique shapes after detaching from the original bedding and sinking into the underlying mud, a process that is commonly associated with density instability. They are recognizable by their spherical or elliptical shape within the bed. These ball and pillow structures may have been triggered by regional seismicity and far-field tectonics. Although we are aware of what causes these structures, it is unknown what controls the vertical and lateral distribution. Characteristic features of ball and pillows will be identified using literature reviews, hand samples, and thin sections comparing deformed and un-deformed samples. We will be looking for seismically induced liquefaction and the process that deformed the bedding, creating the ball and pillow structures.

HENRY HALL ATRIUM 067

Fano-Type Resonances Detected at Catalytic Surfaces with ATR-IR

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 1:00 PM - 2:00 PM

Presenter: Jacob Lindale

Mentor: Dalila Kovacs

A method for studying the non-covalent binding of aromatic adsorbates to carbon-supported metal surfaces has been developed using attenuated total reflection infrared spectroscopy (ATR-IR) in effort to study the mechanistic repercussions of physical adsorption interactions at Pd/C and Ru/C surfaces. The strength of adsorbate binding was quantified by calculation of the changes in bond force constant, $|k|$, from the observed frequency shift, $-\nu$, for all of the adsorbates' bonds. Asymmetric spectral line shapes were observed in the spectra of surface-bound adsorbates. They were studied with mathematical line shape analysis and two-dimensional correlation spectroscopy. It was noticed that not all vibrational modes afforded identical peak asymmetry when the adsorbate was bound to the surface. A physical explanation as to the origin for this asymmetry in the context of IR spectroscopy and mathematical treatment of the line shape will be discussed.

HENRY HALL ATRIUM 068

Factors That Have Influenced Infant and Maternal Mortality in Ghana: A Review

Participants attending 10:00 AM - 11:00 AM

Presenter: Kaylee Case

Mentor: Sylvia Mupepi

Objectives: This paper aims to explore the factors that influence maternal and infant mortality rates in Ghana. These include: cultural practices, demographics, quality and type of healthcare, health insurance, traditional midwifery, treatment of women, and transportation. **Methods:** A literature review was conducted followed by observational visits to healthcare institutions in Ghana. **Results:** Ghana had a reduction of both maternal and infant mortality rates from 2005 to 2015. Healthcare usage increased from 2003 to 2014 with more women seeking early prenatal care and an increase in the use of healthcare facilities for delivery. Also, since 2003, children attained higher vaccination coverage and had better access to healthcare services. **Conclusion:** The increase in the use of healthcare services, along with the supervision of community healthcare by licensed professionals, has reduced mortality rates in both women and children in Ghana.

HENRY HALL ATRIUM 069

First Fridays & The Market: Promotional Package

Participants attending 1:00 PM - 2:00 PM

Presenters: Alexandra Candela, Nicole Henderson, Samantha Lucenti, Katlyn Navetta, Darby Reynaert

Mentor: Lisa Sisson

The purpose of this partnership was to help in the promotional aspect of First Fridays & The Market for June through August 2017. This art series blends vendors and artists on a 3-block stretch of South Division Avenue. First Fridays is used as a method to raise awareness and better the perceptions of the area in order to change the stigma around this neighborhood. By producing a promotional checklist for vendors, they were able to both self-promote as well as promote the First Fridays & The Market as a whole. In addition, a marketing kit was produced and included various promotional pieces for the June First Friday & The Market date. A press release and ideas towards a cohesive logo that all vendors could display aided in participation awareness. The takeaway from this partnership is a promotional package that can continue to be used for future First Friday events.

HENRY HALL ATRIUM 070

A Programmatic Evaluation and Analysis of Grand Valley's Gender Based

Violence Prevention Programming

Participants attending 1:00 PM - 2:00 PM

Presenter: Kortney Ondayko

Mentor: Ashley Schulte

This project examines GVSU's gender based violence prevention programming based on the Center for Disease Control's Nine Principles of Effective Prevention Programs and the Social-Ecological Model. The purpose of this programmatic review is to understand the depth of GVSU's prevention programming - specifically looking for areas that need improvement. This is the first comprehensive evaluation of GVSU's gender based violence prevention programming. Each GVSU program is analyzed based on all of the CDC's nine principles by performing a discursive analysis on presentation/activity materials. In addition, the project analyzes the audience of GVSU's gender based violence prevention programming by collecting data from participant evaluations. The premature results show that GVSU's prevention programming is lacking in a variety of teaching methods, dosage and being socially and culturally relevant but is excelling in outcome evaluation, being theory driven and having well trained staff.

HENRY HALL ATRIUM 071

Identity on the West Side of Grand Rapids: A History of Westown

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Kenny Urena-Gonzalez

Mentor: Tara Hefferan

This paper traces the history of what it means to be a "Westsider" in Grand Rapids, Michigan. Westown is a neighborhood with a history and identity distinct from other areas of the city. Drawing on interview and archival data, as well as participant-observation, the paper suggests that Westown identity is rooted in the neighborhood's history of immigration, its working-class character, and the impacts of construction projects in the past that served to physically separate Westown from other parts of the city.

HENRY HALL ATRIUM 072

Analysis of the Electronic Structure and Formation Mechanism of an Iron-Tetrazene Supported by Bulky Alkoxides

Participants attending 2:00 PM - 3:00 PM, 4:00 PM - 5:00 PM

Presenters: Caleb Huizenga, Elizabeth Washnock-Schmid

Mentor: Richard Lord

Recently, the Groysman group (Wayne State University) isolated an iron tetrazene complex after

an iron imido was exposed to various azides. The purpose of our research is to understand the relationship between the iron center and its non-innocent tetrazene ligand. Using computational software, we assess energies, bond lengths, frequencies, etc. of possible metal and ligand charge permutations of the iron tetrazene core. Data is collected using multiple density functionals (B3LYP, OBPE) as well as basis sets (6-311G(d), def2TZVP). By comparing the results of these computations using the lowest energy spin states, the probable oxidation state of the iron and tetrazene is assessed. From this structure, we work in reverse to computationally build the mechanism of formation for the tetrazene compound- a feat not easily accomplished via experimental methods- to assess the overall reaction thermodynamics and kinetics.

HENRY HALL ATRIUM 073

Relative Timing of the Chertification and Dolomitization in Facies of the Lower Silurian Brassfield Formation in Northern Kentucky

Participants attending 10:00 AM - 11:00 AM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenters: Nathan Allen, Gavin Balcom, Isaac Entz, Micaela Fischer

Mentor: Peter Riemersma

Plants and animals alike can be preserved for millions of years within rock formations as fossils, but later diagenetic events are capable of dissolving them. Although fossils are abundant in Brassfield Formation outcrops in Ohio, this research focuses on an outcrop located in northern Kentucky where fossils are rare due to dolomitization. Chert forms in the same area as isolated nodules and linear beds within which, unlike dolomite, fossils could potentially be found. The goal of this research is to ascertain whether the process of dolomitization or chertification occurred first. This will be done by looking for the preservation of fossils in the chert hand samples, as well as thin sections, from our outcrop. Evidence of fossil preservation only in the chert would indicate that chertification preserved the fossils before the process of dolomitization could dissolve them.

HENRY HALL ATRIUM 074

Health Resources in Study Abroad

Participants attending 10:00 AM - 11:00 AM

Presenter: Emily Konen

Mentor: Elizabeth Lambert

This poster will explore the various accessibility and health care options for individuals who wish to study abroad. Research has been done on the top 15 countries that US students tend to visit for a study abroad length of two months or more, and was done in conjunction with the Gilman program.

HENRY HALL ATRIUM 075

Determination of Binding Affinity Between an Antibiotic Resistance Enzyme and Fragment-based Inhibitors

Participants attending 3:00 PM - 4:00 PM

Presenter: Uyen Pham

Mentor: Rachel Powers

β -lactams are the most prescribed antibiotic since their introduction in the 1940's due to their effectiveness, low cost and minimal side effects. Extensive and irresponsible use of antibiotics has contributed to the emergence of adaptation and development of several defense mechanisms that bacteria utilize to counteract the activity of β -lactam antibiotics. The production of β -lactamase enzymes is the most common resistance mechanism to β -lactam antibiotics. β -lactamases catalyze the hydrolysis of the amide bond in the four-membered β -lactam ring, inactivating the antibiotic before it can reach its target site in bacterial cell membrane. The key to β -lactamase suppression is the study of novel inhibitors that do not share the four-membered β -lactam ring. We successfully expressed and purified wild type OXA-24, a member of the carbapenem-hydrolyzing class D β -lactamases (CHDLs). Kinetic assays of analogs of NK3 fragments were obtained to determine their binding affinity with OXA-24.

HENRY HALL ATRIUM 076

Religiosity and the Preference for Punishment Versus Compensation

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenters: Mia Flynn, Katelin Leahy, Margaret McElroy

Mentor: Luke Galen

In a Third Party Punishment and Compensation paradigm, lower participant religiosity was associated with greater compensation of victims of unfair offers as well as lower fairness ratings of (unfair) offers between partners. This is contrary to a religious prosociality effect in that lower religiosity was associated with greater altruistic compensation.

HENRY HALL ATRIUM 077

Investigation of the Sternalis Muscle

Participants attending 9:00 AM - 10:00 AM

Presenter: Spencer Pageau

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

The sternalis muscle is a relatively rare muscle found in about 8% of individuals. This muscle is found on the anterior thoracic wall, typically unilaterally, lying superficial to the fascia covering the

pectoralis major muscle and deep to the fascia covering the anterior thoracic wall. The sternalis muscle is variable in its shape, ranging from a flat band shape to a flame-like shape. It is also variable in its origin, which has been documented as the sternum, inferior clavicula, upper ribs, among others, and the attachment which has been seen in the lower ribs, pectoralis major, rectus abdominus sheath, and the external abdominal oblique aponeurosis. While the sternalis muscle has no apparent physiological function, it does have clinical significance. This muscle can be misidentified as breast tumors in simple mammograms, and can complicate thoracic surgeries if not identified properly. The sternalis can also be used in reconstructive surgeries as a muscle flap.

HENRY HALL ATRIUM 078

Comparison of GAL4-induced GFP Expression Between Larval and Adult Gut Tissue in *Drosophila melanogaster*

Participants attending 9:00 AM - 10:00 AM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM

Presenters: Joel Bonilla, Kelly Tekiela

Mentor: Martin Burg

The presence of Green Fluorescent Protein (GFP) induced by GAL4 expression in a number of gut-specific GAL4 fly lines in *Drosophila* adults has been used to provide tissue and region-specific markers for gut-related research projects. Currently, this GAL4-induced GFP expression has not been characterized in the gut of *Drosophila* larvae, even though current studies of larval gut histamine localization could be aided by knowing what cells or gut regions contain histamine. In order to determine the efficacy of using GAL4 fly lines identified through study of the adult gut to use in identifying similar regions in the larval gut, GFP expression in both the larval and adult gut (induced by GAL4 expression) was characterized from nine unique GAL4 driver lines. The gut tissues from both larvae and adults were dissected, fixed, mounted, and examined using an epifluorescent microscope for similar patterns of GFP expression, which then will be used in studying larval gut function.

HENRY HALL ATRIUM 079

Investigating Heterogeneous Catalysis Using ATR-IR Spectroscopy

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenter: Evan Christoffersen

Mentor: Dalila Kovacs

Heterogeneous catalysis has been used for thousands of years to optimize the efficiency of chemical processes, and plays a significant role in the modern day lab. Yet the exact mechanism for heterogeneous catalysis remains poorly understood. In an attempt to better understand the

ways in which heterogeneous catalysts interact with a given substrate, IR spectroscopy was used to examine binding of heterocyclic aromatic compounds on palladium, and ruthenium surfaces. Of the compounds examined, pyrrole, pyridine, and benzene provided the most interesting data, as noticeable shifts in specific vibrational modes were observed when successively increasing volumes of each compound were added to the catalytic surface. From these, the difference force constant ($| -k |$) was calculated for each mode to indicate a physical change in the bond as a result of binding to the surface. Specific vibrational modes were assigned with density functional theory (DFT) at the B3LYP/6-311+G(d,p) level of theory.

HENRY HALL ATRIUM 080

The Grand Rapids Engaged Department Initiative: AQ, GRCC, and GVSU Catalyze Collaborative Engagement

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Gloria Mileva

Mentor: Danielle Lake

The Grand Rapids Engaged Department Initiative is an innovative eighteen-month cross-institutional collaboration designed to incentivize and resource cultural shifts within seven academic departments. Unique to this initiative, Grand Valley State University, Aquinas College, and Grand Rapids Community College were interested in working together to catalyze place-based change in the Grand Rapids area. Designed to increase faculty knowledge and skills in community-based teaching, foster inter- and intra-collaborations between institutions, expand students' community-based learning opportunities, and enhance community partnerships, initial findings reveal that such an initiative can be an effective starting point for catalyzing engaged curriculum when supported by additional and sustained support (leadership, funding, a community of practice, and training) and that structural and cultural barriers pose significant challenges to deep, pervasive, and integrated community engagement.

HENRY HALL ATRIUM 081

Synthesis and Characterization of Phosphine Derivatives for Complexation Studies

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenters: Evan Christoffersen, Austin Ronspees

Mentor: John Bender

In a world where carbon-based energy is gradually being replaced with cleaner alternatives,

nuclear power plants have become one potential source of vast amounts of energy. However, hazardous waste produced in nuclear power plants can have irreparable environmental consequences, and takes significant time and energy to safely store. The goal of this research is to synthesize novel air-stable multidentate phosphine-derived ligands capable of extracting heavy *f*-element metals from nuclear waste, effectively reducing the volume of nuclear waste and opening up the possibility of reusing some of the extracted heavy metals. Using inert-atmosphere synthetic techniques, various derivatives have been synthesized with the intent to test their viability for *f*-element coordination and extraction. Ligands were characterized by FT-IR, ¹H-NMR, ³¹P-NMR, elemental analysis, and X-ray crystallography.

HENRY HALL ATRIUM 082

The Effects of Motivational Video and Music During Warm-up on Anaerobic Performance

Participants attending 10:00 AM - 11:00 AM

Presenters: Marisa Connell, Christina Hammond, Hailey Pellegrom, Zachary Schurkamp

Mentor: Amy Gyorkos

Physical activity and exercise are crucial elements to a healthy lifestyle and require both motivation and enjoyment for continued adherence. Previous studies have shown that an intervention of motivational music and video pre-exercise have improved exercise performance by decreasing time to complete a set distance, improved perceived exercise enjoyment and decreased ratings of perceived exertion (RPE). Most studies have examined the effects during aerobic performance. The purpose of this study, therefore, is to examine the effects of motivational music and video pre-exercise on peak anaerobic output using a Wingate cycle test. This study will consist of six college students who will complete the cycle test under three conditions; motivational music, motivational music with video, and a control with no intervention. We will measure peak anaerobic output and mental readiness using the Felt Scale following both the 5min warm-up and 30s Wingate Test. Data collection is ongoing.

HENRY HALL ATRIUM 083

The Effects of Dynamic Stretching on Peak Power Output During the Wingate Cycle Test

Participants attending 10:00 AM - 11:00 AM

Presenters: Hannah Haas, Chloe Heine, Darius Walker, William Wolgamood

Mentor: Amy Gyorkos

Dynamic stretching has been widely debated on its effectiveness to increase anaerobic performance. Differing results have been found based on the types of dynamic stretches used

and the duration of the stretch. Past studies have shown that too strenuous of a dynamic warm-up with a long duration causes the muscles to fatigue when performing an anaerobic activity, such as the Wingate cycle test. The purpose of this study is to determine if a shorter duration dynamic stretching routine prior to the Wingate cycle test will have a more positive impact on peak power output. Subjects consisted of six college students (three female, three male; 21 ± 2 years old) who underwent the Wingate cycle test twice within a two week period. All subjects performed the Wingate Test on a cycle ergometer under two conditions: once with a 2 minute dynamic stretch routine, and once with no stretch routine. Research collection and analysis is currently in progress.

HENRY HALL ATRIUM 084

Changes in the Hydrogen Bonding Networks in the Clinical Mutants of OXA-66 Beta-Lactamase

Participants attending 11:00 AM - 12:00 PM

Presenters: Alyssa Benn, Jessie Jones

Mentor: Agnieszka Szarecka

Antibiotic resistance has become a serious threat for public health. Beta-lactamases are a major mechanism of resistance and class D of β -lactamases are rapidly evolving activity against carbapenems and 3rd generation cephalosporins. Among them several clinical variants of OXA-66 were identified and evidence from earlier studies shows that P130Q and P130A mutants provide increased hydrolysis of carbapenems. The mechanism of this gain of function is unclear. 250-nsec molecular dynamics simulation trajectories of fully hydrated models of OXA-66 wild type (WT), and P130Q / P130A mutants were analyzed. We hypothesized that the mutations cause changes in the hydrogen bonding networks affecting the binding pocket and promoting carbapenem binding. We found several pairs of hydrogen bonded residues that vary significantly between the WT and the mutants in terms of structure and stability. Most pairs are located near the active site, which is consistent with the enhanced ligand binding.

HENRY HALL ATRIUM 085

Diets of Kit-Rearing Female Martens in West Michigan: She Ate What?

Participants attending 9:00 AM - 10:00 AM

Presenter: Cory Highway

Mentor: Paul Keenlance

American Martens (*Martes Americana*) are small arboreal carnivores that inhabit forests in northern latitudes. Due to their high metabolic rate, food availability is essential, especially for lactating female martens who are also providing calories for their kits. This project focused on the diets of kit rearing female American Martens in the Manistee National Forest. Radio telemetry was

used to track females to their dens. Scat, prey remains, and game cameras were used to collect data at den sites. Diet analysis determined that gray squirrels (*Sciurus carolinensis*) provided the majority of kit rearing females' caloric intake. However, small mammals such as white-footed mice (*Peromyscus leucopus*) were consumed frequently. By realizing what prey items are being selected, management practices can be developed by wildlife agencies to increase and preserve optimal marten habitat. An abundance of coarse woody debris and dense forest canopy are essential for both marten and prey species.

HENRY HALL ATRIUM 086

The Effects of Sleep Restriction on Cardiorespiratory Factors and Perceived Exertion Among Female College Students

Participants attending 10:00 AM - 11:00 AM

Presenters: Kylyn Boetsma, Hannah Huff, Alexis Mencotti, Julia Yancy

Mentor: Amy Gyorkos

The autonomic nervous system regulates cardiovascular function, and disruptions to this system, such as sleep deprivation, result in performance and cardiovascular impairments (Cincin et al., 2015). Effects on cardiorespiratory variables were examined following sleep *deprivation*, or extreme sleep loss of 30 or more hours. Previous research has explored these effects following sleep *restriction*, defined as a partial disturbance to an individual's typical sleep-wake cycle, such as four or less hours of sleep loss (Fullager et al., 2015). This study examines the effects of sleep *restriction* on cardiorespiratory performance and perceived exertion among female college students. Six females performed a maximal exercise test after a normal sleeping pattern (6-8 hours) and after one night of sleep restriction (3-4 hours). The participants completed two experimental trials performed at least a week apart. Maximal oxygen uptake, BP, HR, RPE, and HRR were evaluated.

HENRY HALL ATRIUM 087

Effects of Single Amino-Acid Mutations on Dynamics of OXA-66 Beta-Lactamase

Participants attending 9:00 AM - 10:00 AM

Presenter: Johnathan Hall

Mentor: Agnieszka Szarecka

The number of cases of bacterial infections resistant to all available antibiotics has increased drastically in recent years. Much of this problem is caused by *Acinetobacter baumannii*, and its ability to express β -lactamases hydrolyzing carbapenems and 3rd generation cephalosporins – two most important groups of beta-lactam antibiotics. Several mutants of OXA-66 show greater

carbapenemase activity than that of the parent enzyme, and therefore are the focus of this study. 250 nanosec molecular dynamics trajectories of OXA-66: WT, P130Q, and P130A, were analyzed in order to determine the mutation effects on protein dynamics, specifically on the flexibility of secondary elements and major loops. The flexibility was assessed via root mean square deviation from the X-ray reference structure as well as root mean square fluctuations of the alpha carbon atoms. We found increased mobility of the P loop and $\beta 6$ - $\alpha 9$ loop in the P130Q mutant which is consistent with stronger carbapenem binding.

HENRY HALL ATRIUM 088

Preliminary Trials Adapting the GreenTEG gSKIN U-Value Kit to Measure the Thermal Conductivity of Primate Skin

Participants attending 2:00 PM - 3:00 PM

Presenter: Rebecca Hrit

Mentor: Cynthia Thompson

With the eventual goal of measuring the thermal conductivity of primate skin, this project involves adapting the methodology to best utilize the greenTEG gSKIN U-Value Kit in measuring thermal conductivity of materials with known values. Styrofoam and polyester have been used in two phases, each composed of ten trials obtained on two separate days. In the first phase, the setup consisted of two metal sheets surrounding the material, heat flux sensor, and temperature sensors 1 and 2. The second phase did not include the metal sheets and the system was covered with a plastic container. Setup 1 yielded lower U-values than setup 2. However, this increased the discrepancy between the obtained and known thermal conductivity values for polyester, but decreased this discrepancy for Styrofoam. Before using to test primate skin, the greenTEG gSKIN U-Value Kit should undergo further testing with additional materials to best understand these conflicting trends and ensure proper methodology.

HENRY HALL ATRIUM 089

Influence of Self-Esteem on Stopping Rule Decision-Making

Participants attending 2:00 PM - 3:00 PM

Presenter: Cameron Bunker

Mentor: Mario Fific

One of the most important topics in the decision-making domain is how individual subjects determine to stop evidence collection and make effective decisions. This is defined as the stopping rule problem. To answer this problem, researchers have focused on developing successful models for stopping rules, usually from the point of optimal (or suboptimal) decision performance. In the current study, we explored whether self-esteem could be used to explain individual differences

in decision making; can self-esteem be used to develop personality-driven decision making strategies? We manipulated self-esteem, through false feedback on a “Critical Thinking” exam, to assess how participants’ stopping decision behavior (deferred decision task, measuring decision accuracy, and the number of recommendations opened) would be affected. By exploring this relationship, we find that personality enables us to better understand decision-making processes involving stopping rules.

HENRY HALL ATRIUM 090

Situational Self-Awareness as a Moderator in Death Thought Accessibility Relationships

Participants attending 11:00 AM - 12:00 PM

Presenters: Cameron Bunker, Kayleigh Lambert, Audrey Tarbutton

Mentor: Todd Williams

It has been shown that the threat posed by inducing self-awareness leads to increased existential anxiety (Silvia, 2001). Froming, Walker, and Lopyan (1982) used different ways for inducing self-awareness: public (being exposed to a group of other people) or private (being exposed to one’s reflection in a mirror). However, there has been no research to determine whether these effects are limited to those who are high in situational self-awareness (Govern and Marsch, 2001). To examine this, we induced self-awareness in participants (public or private), had them indicate their situational self-awareness, and then measured their level of existential anxiety. Results show that the effects of self-awareness on existential anxiety were moderated by participant’s level of situational self-awareness. Specifically, participants who were high in situational awareness and were high in private self-awareness had the highest level of existential anxiety. No mediational effects were present.

HENRY HALL ATRIUM 091

Strength and Balance Training on Gait for Cerebral Palsy

Participants attending 2:00 PM - 3:00 PM

Presenter: Michael Hodges

Mentor: Julia VanderMolen

Cerebral palsy is a congenital disorder that is often characterized with an abnormal gait pattern. There are multiple different physical therapy techniques that are employed by therapists to work towards a more normalized gait pattern for children with CP. The purpose of this presentation is to compare balance-focused training and strength-focused training, and to determine which is more effective in correcting gait problems. The articles used as research for this presentation were searched in three separate databases: PubMed, CINAHL, and ProQuest. Six articles

were collected using the databases. These articles covered topics such as basic information on gait, balance, strength in children with CP. They also discussed the effect of balance training and strength training on gait, and the effect of assistive technologies and surgeries that helped compensate for lack of balance or strength on gait.

HENRY HALL ATRIUM 092

The Impact of Olfactory Communication on Food Choice of the Common Marmoset

Participants attending 12:00 PM - 1:00 PM

Presenter: Lauren Blanck

Mentor: Cynthia Thompson

Marmosets are among many mammals that use olfaction to communicate information; they regularly deposit scent marks on exudates produced by gouging trees. To better understand the function of scent marking and the impact of food quality on tree choice, we conducted two sets of trials in which captive marmosets were presented with two pieces of bark; the first set with scent-marked and unmarked bark, the second with high and low quality food. Marmosets spent more time at scent marked bark than at unmarked bark, but did not sniff one resource more frequently than the other. They also spent more time gouging bark containing high quality food than low, although frequency of sniffs did not differ between resources in these trials either. These trends suggest that marmosets use scent marking to communicate information about food resources, though further research is necessary to elucidate this relationship.

HENRY HALL ATRIUM 093

Tag Team

Participants attending 2:00 PM - 3:00 PM

Presenter: Alissa Gillman

Mentor: Vinicius Rebello Lima

Tag Team is a group fitness application that allows two or more people to group up and work on achieving their fitness goals. This app allows the user to be involved with other people through their profile so they can work out on the same activity but not necessarily be together. The application will provide a multi-faceted work out experience where the group can select challenges that they will like to overcome. These obstacles will vary from weightlifting, running, walking and yoga. This app will keep the users accountable and motivate to maintain their momentum to reach their fitness goals. This will be accomplished by sending the group updates on the other members progress and reminders to work out and live a healthy life style. Tag Team will also be able to connect to other fitness devices, social media, and sync with your phones fitness tools as well.

HENRY HALL ATRIUM 094

Nurses' Knowledge of and Attitude Toward Complementary and Alternative Medicine

Participants attending 4:00 PM - 5:00 PM

Presenter: Sarah Schmidt

Mentor: Haiying Kong

The purpose of our study was to determine nurses' knowledge of and attitude toward complementary and alternative medicine (CAM). As leading providers in long-term care, nurses must be receptive to CAM therapies and be willing to deliver, promote, or refer patients to CAM specialists. Information on this topic was gained through a systematic literature review of 15 scholarly articles. To gain a greater knowledge of the entire health care environment concerning CAM we also included articles on physicians' knowledge of and attitude toward CAM. Overall, we found that while nurses have a very limited knowledge of CAM, they have a positive attitude toward the practice and integration of CAM. These findings will be used to develop an interview guide. This guide will be used to interview nurses to gain insight into the knowledge of and attitudes toward CAM in West Michigan.

HENRY HALL ATRIUM 095

Mapping Images onto Solids in *Mathematica*

Participants attending 4:00 PM - 5:00 PM

Presenter: Zachary Ash

Mentor: Edward Aboufadel

The goal of this research is to design a flexible method for mapping a two-dimensional grayscale image onto the surface of a three-dimensional solid. The approach used should be relatively easy to adapt to various solids without redesigning the entire process as well as able to map the entire image onto the entire object – partial coverage of the object and partial usage of the image are to be avoided. Having decided on an approach, the method is then to be designed in *Mathematica* to produce an STL file of the object with the desired grayscale image embossed or engraved onto it. This STL file can then be used to create a 3D print. This research focuses on algorithms similar to those used in texture mapping, a class of methods often used in computer graphics to add detail to a model by wrapping some image onto it. Overall, the primary method that is developed in this paper yields consistent results, with minimal distortion on low curvature surfaces.

HENRY HALL ATRIUM 096

Ethylene-Induced Modification of EIN2 C-terminus in *Arabidopsis thaliana*

Participants attending 11:00 AM - 12:00 PM

Presenter: Steven McKenzie

Mentor: Matthew Christians

Ethylene is an important plant hormone responsible for fruit ripening, senescence and abscission, and pathogen defense. Although much of the components involved in the detection of ethylene are known, there are still several unanswered questions. The ER membrane-bound protein Ethylene Insensitive 2 (EIN2) plays a key role in ethylene signal transduction. When ethylene is present, EIN2 is cleaved, allowing the C-terminus to translocate to the nucleus. Although recent work has shown EIN2's role in the nucleus, it is still not known which cellular components are involved in the cleaving event. We have uncovered some evidence that the COP9 signalosome (CSN) may play a role in this process. To confirm this, we collected several CSN-component mutants in *Arabidopsis thaliana*, and will be determining the ethylene responsiveness and modification of EIN2 protein in each. Further investigation of these mutants will allow us to better understand the function of the CSN in ethylene signaling.

HENRY HALL ATRIUM 097

Compassion for a Common Future: Art Projects with Special Need Students

Participants attending 10:00 AM - 11:00 AM

Presenters: Tessa Glashower, Emily McKenna, Tuyetnhi Pham

Mentor: Katalin Zaslavik

Over the Fall 2016 and Winter 2017 semesters, Art Education students taught 18 students with special needs from Cedar Springs and Rockford High School. Students between the ages of 16-24 came to work with the Art Education students to learn about the big idea of compassion through three art projects. Throughout the projects Art Education students gained experience in the classroom by developing lessons, working one on one, and experimenting with a variety of visual media. The process was seven-fold: getting familiar with students with special needs, brainstorming projects, researching, preparation, implementation, reflection, and advocacy. By experiencing and advocating, Art Education students hope to show the importance of dismantling stereotypes of students with special needs.

HENRY HALL ATRIUM 098

Community Based Learning Through Art

Participants attending 10:00 AM - 11:00 AM

Presenters: Andrea Burns, Jacob Galey, Taylor Gilbert, Ryleigh Wilson

Mentor: Katalin Zaslavik

Over the Fall 2016 semester Art and Art Education students engaged in three community based

service learning art projects with the following partner organizations and their members; Ottawa Area Center CBI- special need young adults, Allendale Nursing and Rehabilitation Community-residents, D.A. Blodgett – ST. John's Homes for Children- at risk female teenagers. The poster presentation outlines the planning, implementation, outcome, reflection and learning from the three partnering groups. Demographics varied in age, life experiences and abilities which shaped the educational and studio practice as well as the outcome of the community based learning. Media included painting, collage, ceramics and mixed media utilizing recycled materials. Research data collection consisted of photo documentation, discussions, and written reflections. These projects were beneficial to all participants for communication, project adaptation, planning and public speaking.

HENRY HALL ATRIUM 099

Does Field-Goal Percentage Relate to Winning in D2 Men's Collegiate Basketball?

Participants attending 11:00 AM - 12:00 PM

Presenters: Garrett Beaudry, Jeffrey Depew, Royce Lamoreaux, Jordan Reid, Brandon Strautz

Mentor: Ross Sherman

Background: There appears to be a correlation between field goal percentage and winning in basketball. Previous literature states that the higher the field goal percentage, the more likely that team is to win the game. Purpose: The aim of this study is to determine if field goal percentage increases or decreases per half and its impact on winning in collegiate basketball, and what other technical variables are affecting this shooting performance. Methods: One DII men's GLIAC collegiate basketball game was analyzed for this study. The type and location of shots, and made versus missed were notated by hand using a pen and paper technique. A number of other recognized key performance indicators were also notated to determine their effect on field goal percentage. Data was analyzed using parametric statistical testing to determine whether differences existed between the first and second half, and their relationship to scoring and winning. Results: The results will be presented at SSD.

HENRY HALL ATRIUM 100

Analysis of Professional Hockey to Identify Key Performance Indicators

Participants attending 9:00 AM - 10:00 AM, 2:00 PM - 3:00 PM, 4:00 PM - 5:00 PM

Presenters: Robert Albert, Ronald Fancher, Tara Galovich, Lorenza Garofalo

Mentor: Ross Sherman

Background: Hockey is a competitive sport that has very limited research done in regards to key performance indicators that may be very beneficial to inform coaches and enhance athletic

performance. Purpose: The purpose of this study was to fill this gap by defining key performance indicators in hockey. Methods: One recent NHL game was analyzed for the purpose of determining key performance indicators. Previous literature and statistics were used to determine key characteristics in winning and losing a game of hockey in order to define and interpret key performance indicators of the sport. The game was notated by using the ICODA2 application and analysis of patterns of game play and performance indicators were performed using standard parametric testing. Results: The results of the study are to be presented at Student Scholars Day.

HENRY HALL ATRIUM 101

Key Performance Indicators in D2 Women's Collegiate Lacrosse

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenters: Alexis Awdziejczyk, Kira Dosenberry, Austin Gorden, Connor Montgomery

Mentor: Ross Sherman

Background: Almost no published notational analysis studies have been completed on lacrosse, allowing multiple approaches to be taken when analyzing the sport (Oldham, 2012). Purpose: This study explored the previously assessed key performance indicators' (KPIs) significance and their accuracy in game outcomes. Methods: A single game notational analysis of the Grand Valley State University Women's Varsity Lacrosse team was used to compare Oldham's declared KPIs. Offensive KPIs included "shooting efficiency" and "unforced errors." Defensive KPIs included "fouls against" and "turnovers." Finally the neutral game, when neither team had possession, were "draws won" and "face off possessions won." Gameplay was notated using the analysis software iCODA and Dartfish Note. These KPIs, among others, were recorded and tested for statistical significance. Statistically significant results were then compared to Oldham's data. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 102

Influence of Home-Field Advantage on Key Performance Indicators in Professional Soccer

Participants attending 2:00 PM - 3:00 PM

Presenters: Casey Coleman, Cody Pfof, Alexxis VanPelt, Randy Walch

Mentor: Ross Sherman

Background: Playing in front of your home fans might provide a psychological advantage, but it is unclear whether that extends to the technical elements of team sport performance. Purpose: To look at the influence of home-field advantage on key performance indicators in the first and second half of a professional soccer game. Methods: One English Premier League soccer game was analyzed for the purpose of this work. A wide range of key performance indicators were pre-

determined from published soccer notational analysis literature and used to interpret the technical outcomes from the game and overall team performance. The game was notated manually by hand, using pen and paper. Analyses of patterns in game play and performance outcomes were performed using standard parametric testing. Results: To be presented at SSD.

HENRY HALL ATRIUM 103

Effects of Caffeine on Power Output and Fatigue during Repeated 6-s Sprints

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenters: Emily DeMoss, Kyra Lauzon, Bethany Scott, Bailey Seeger

Mentor: Ross Sherman

Background: It has been investigated that caffeine will have a beneficial effect on variables related to power output and fatigue. Purpose: The purpose of this study was to determine the effect of caffeine on fatigue, power output, and the time it takes to achieve peak power during repeated sprints. Methods: Participants were apparently healthy, undergraduate students who maintained an active lifestyle, completed the study that followed a randomized crossover design. Participants were restricted to no more than 8 oz of caffeinated beverages per day, and total abstinence 12 hours prior to testing. Subjects consumed $3 \text{ mg} \cdot \text{kg}^{-1}$ body mass of caffeine or a decaffeinated liquid one hour prior to testing. At least one hour post-ingestion, ten 6-second maximal cycle sprints with 20-second rests between each sprint were completed. Heart rate was assessed pre-ingestion and pre-exercise, and power output and fatigue was recorded for each trial. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 104

Effect of Static and Dynamic Stretching on Y Balance Test Performance

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenters: Alexis Awdziejczyk, Paul Bump, Connor Montgomery, Daniel Montgomery

Mentor: Ross Sherman

Background: Previous research indicates a significant difference in ROM as a result of static, dynamic, or combination stretching (Morrin & Redding, 2013). Purpose: This study explores the effects of lower body dynamic and static stretching on motor functional capacity, range of motion (ROM), and balance. Methods: Ten GVSU students, self-reported as active, volunteered for this study. Volunteers performed two Y balance tests on their dominant leg with two different stretching regimens assigned at random. On the first day of testing participants were randomly assigned a ten-minute dynamic or static stretch routine and performed the opposite condition the following test day, separated by a minimum of three days, but no more than seven. Goniometry measures were

taken on both days prior to Y balance testing to evaluate changes in ROM. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 105

The Effect of Single-Dose Pre-Workout Ingestion on Muscular Endurance

Participants attending 11:00 AM - 12:00 PM

Presenters: Jacob Drelles, Kyle Moran, Joshua Steible, Randy Walch

Mentor: Ross Sherman

Background: It has been shown that pre-workout (PW) has a positive effect on maximal strength output, but less is known about endurance effects. Purpose: To determine the effect of PW on muscular endurance. Methods: Eight participants volunteered for this randomly assigned, single blind study. They were apparently healthy, performing upper body pressing exercises two times a week, and non-users of PW. They also did not consume caffeine or perform pressing exercises three days prior and were hydrated prior to testing. Participants reported to the lab on three different occasions, once for 1-RM bench press to be determined and then for two testing trials, which comprised of a 5-minute warm up and three sets of bench press to failure at 60% 1-RM with 2-min rest between sets. The PW or placebo was ingested 30 minutes prior to exercise. Heart rate and blood pressure were measured at rest, 10 min prior to exercise, and upon completion of testing. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 106

Culvert Operations: Longitudinal Influence of Problematic Road-stream Crossings on the Macroinvertebrate and Fish Communities of Cedar Creek, MI

Participants attending 9:00 AM - 10:00 AM

Presenters: Nicholas Preville, Adam Walker

Mentor: Eric Snyder

This study explores the effects of a road stream crossing at the mouth of a cool water, 4th order stream in south-central Michigan. The crossing consisted of two perched culverts slated for removal and replacement with an open span timber bridge in the Fall of 2016. Our study focused on gathering pre-culvert replacement data on the sediment, water quality, fish, and macroinvertebrates at this crossing. We found that accumulation of fine sediment and organic matter upstream of the culverts coupled with the passage barrier created by the culverts resulted in significantly degraded macroinvertebrate and fish communities upstream. The downstream had 18 more macroinvertebrate families, 13 more Ephemeroptera/Plecoptera/Trichoptera (EPT) taxa, a healthier family biotic index, and was more diverse overall. In addition, the downstream reach had

a higher Catch Per Unit Effort (CPUE) and nine more fish species.

HENRY HALL ATRIUM 107

Some Factors Associated with Egg Hatching in Tree Swallows

Participants attending 1:00 PM - 2:00 PM

Presenters: Nicole Keck, Stacy Keydel, Brianna Wilson

Mentor: Michael Lombardo

We tracked the hatching success of 7,095 eggs laid by Tree Swallows in 1,387 nests on the GVSU campus from 1992-2016. The year an egg was laid, the date it was laid, clutch initiation date, egg mass, and clutch size (CS) affected the hatching of eggs laid by second-year (SY) females, but did not affect the hatching of eggs laid by after-second-year (ASY) females. For SY-, but not ASY-females, eggs that did not hatch weighed less than those that did. In the most common clutch sizes (CS = 4-6), an egg's position in the clutch did not affect its hatching probability, but eggs 1-3 were as likely to hatch as eggs 4-6 in SY-female nests. In contrast, eggs 4-6 were more likely to hatch in ASY-female nests. Whether all the eggs in a clutch hatched or not was associated with female age and clutch size. These results suggest that depending on female age class, different factors affected the probability of an egg hatching.

HENRY HALL ATRIUM 108

The Design of an Evidence-Based Protocol for Primary Care of Patients with Dementia

Participants attending 12:00 PM - 1:00 PM

Presenter: Kaitlin DeMaagd

Mentor: Dianne Conrad

The Dementia Performance Measure Sets (DPMS) are ten evidence-based recommendations to improve outpatient care to patients with dementia (American Medical Association-convened Physician Consortium for Performance Improvement [PCPI], 2014). A primary care practice has identified a need to improve the quality of care provided to patients with dementia through the development of a standardized protocol based on the DPMS recommendations. The purpose of this Doctor of Nursing Practice scholarly project is to assess the current status of dementia care in the practice, design a protocol, and develop a business plan to address the sustainability of the protocol. The Transitions Theory is utilized to frame and define key concepts related to primary care delivery practices to patients with dementia, and the Promoting Action on Research Implementation in Health Services framework is utilized to guide the implementation of the proposed practice change.

HENRY HALL ATRIUM 109

Comparative Effects of PNF Stretching and Foam Rolling on Flexibility

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM,
12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 3:00 PM - 4:00 PM

Presenters: Joni Farran, Svetlana Fischer, Ashley Koenes, Jacob Suckow

Mentor: Ross Sherman

Background: Flexibility aids in joint mobility, increases muscular pain tolerance and quality of daily living. Purpose: To compare roller-massage and contract-relax proprioceptive neuromuscular facilitation (PNF) stretching on immediate and sustained hamstring flexibility. Methods: Eight young adults participated in this randomized cross-over design study. Participants were asked to continue normal physical activities, but to avoid eccentric and/or vigorous activity 24 hours prior to testing. Each test day included a standardized warm-up on a cycle ergometer and flexibility intervention (contract-relax PNF, roller-massage, and passive supine rest), followed by sit-and-reach and hip goniometry tests. Ten minutes of passive supine rest was then completed, followed by repeated sit-and-reach and hip goniometry tests. Data was analyzed for significant differences in sit-and-reach and hip goniometry between flexibility interventions. Results: Data will be presented at SSD.

HENRY HALL ATRIUM 110

Demonstrating the Efficacy of the GAL4-UAS System to Determine the Histaminergic Cell Types in Larval Gut Tissue of *Drosophila melanogaster*

Participants attending 3:00 PM - 4:00 PM

Presenter: Daniel Beachnau

Mentor: Martin Burg

The presence of histaminergic cells and pathways are well documented in neural tissue of *Drosophila melanogaster*, but is lacking in other tissues. This study provides evidence that histamine is present in the larval gut and can be further localized to cell type using a co-localization strategy. First, transgenic variants with expression of cell- or region-specific GFP (green fluorescent protein) were identified that have expression in gut tissue, "labeling" cells with GFP. By applying an immunofluorescence technique to detect histamine in larval gut tissue in the transgenic variants, the location of fluorescently detectable GFP and histamine can be compared simultaneously. These gut tissue preparations were viewed using confocal microscopy to image both GFP fluorescence and histamine immunofluorescence. Initial investigations indicate that histamine is localized in four discrete regions, primarily concentrated to the outer margins of gut tissue.

HENRY HALL ATRIUM 111

Burn Pain Management: A Review of Literature and Current Practice

Participants attending 4:00 PM - 5:00 PM

Presenter: Kristen Collins

Mentor: Janet Winter

The main focus of this study is on which pain management methods are most effective for burn patients in an acute care setting. Not every hospital has a dedicated burn unit or specialized burn care training for nurses, which can result in under treatment of burn pain. Synthesizing and disseminating effective pain management interventions in caring for burn patients to nursing students and/or practicing nurses will inform nursing practice toward improved patient outcomes. The project involves reviewing current evidence-based pain management interventions for burn patients, and to compare and contrast this information with interviews to determine what currently practicing nurses most commonly use and find to be most effective.

HENRY HALL ATRIUM 112

Enhancement of Fast-Scan Cyclic Voltammetry Detection of Dopamine with Tryptophan Derivatives

Participants attending 11:00 AM - 12:00 PM

Presenter: Sarah Thompson

Mentor: Eric Ramsson

Dopamine is a neurotransmitter in the brain whose function is altered by many different drugs and diseases. My thesis focuses on Fast-Scan Cyclic Voltammetry (FSCV) detection of dopamine through electrodeposition of tryptophan derivatives onto carbon fiber microelectrodes. FSCV works by applying a voltage in a triangular waveform (vs. Ag/AgCl) repeatedly, to cause the oxidation of DA to DQ, and the reduction of DQ back to DA. This reaction produces a current proportional to the concentration of DA. For my thesis I will be testing 8 different tryptophan derivatives electrodeposited onto these electrodes to examine their ability to increase sensitivity, investigate their selectivity of the electrode against other chemicals found in the striatum, their durability over time, and finally confirming I am seeing DA ex vivo using rat brain slices treated with the DA uptake blocker nomifensine.

KIRKHOF CENTER GRR 001

A Case Study Examining Participants' Perceived Stress after Hot Yoga and Restorative Yoga

Participants attending 4:00 PM - 5:00 PM

Presenter: Kendra King

Mentor: Brandon Youker

Participants who engage in yoga interventions throughout their lifetime experience decreased stress, yet few studies compare types of yoga and their effect on participants' perceived stress. This study examines the cases of participants who were non-randomly assigned to eight classes of either hot yoga or restorative yoga. Yoga classes lasted an hour and fifteen minutes, twice a week for four weeks. Participants completed a self-administered standardized assessment, a 25-item Likert scale examining physical, mental, emotional, spiritual, and social aspects of their lives. Participants responded to six open-ended questions asking them to describe their perceived stress before and after each class. The open-ended questions were analyzed by examining word frequency. Restorative yoga participants used words such as "relaxed" and "good" while hot yoga participants used similar words and included "peace". In both yoga groups, there was even an increased strength in feelings towards God.

KIRKHOF CENTER GRR 002

Effectiveness of Stuttering Intervention and Quality of Life: A Systematic Review

Participants attending 3:00 PM - 4:00 PM

Presenters: Kaitlin Chauv, Kaylor Mikolowski, Savannah Vance

Mentor: Julia VanderMolen

This systematic review attempts to examine and evaluate the effectiveness of stuttering interventions on quality of life in children who stutter (CWS) and adolescents who stutter (AWS). Three medical databases were assessed based on relevance: (1) PubMed, (2) ProQuest, and (3) CINAHL. Articles were required to include children and/or adolescents who stutter between the ages of 2-18 years diagnosed with a stuttering disorder. A total of 15 articles met the inclusion criteria. Evidence shows various interventions are effective for stuttering disorder and improving quality of life. Results demonstrate the reduction of stuttering, long-term outcomes of interventions, and the improvement of quality of life. Early intervention is crucial for speech fluency in children and adolescents. Further research should demonstrate how stuttering interventions specifically affect quality of life for children and adolescents.

KIRKHOF CENTER GRR 003

Private Schools: A White Enterprise?

Participants attending 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Christian Carroll

Mentor: Jeroen Wagendorp

As a research project focused on the lack of income and education in non-white counties, the private school enrollment and non-white population for the 83 counties of Michigan was analyzed.

The goal of this spatial dataset was to determine if a low rate of private school enrollment was linked to counties that have high non-white populations. The methods used to gather data include sources from *mLive* and the *Michigan DTMB*. Data was compiled in Microsoft Excel and used in ArcMap to create two individual choropleths based on the location quotient, which quantifies data per county, so it is comparable to the state rate of one location quotient. Based on the results of the analysis, there is no definitive evidence that a low rate of private school enrollment is linked to counties with high non-white populations. However, certain variables could be changed for further studies to make the study more region-specific.

KIRKHOF CENTER GRR 004

Relationship between Body Fat Percentage and Both Cardiovascular Fitness and Cardiovascular Disease Risk Factors

Participants attending 9:00 AM - 10:00 AM, 12:00 PM - 1:00 PM, 4:00 PM - 5:00 PM

Presenters: Rae Albert, Kayla Decker, Megan Kamsickas, Leigha McDaniel, Paige Pryson

Mentor: Ross Sherman

Background: There is a perception that low body fat percentage (BF) is correlated with a high cardiovascular fitness level (CVF) and low cardiovascular risk factors. Purpose: To determine whether there is a relationship between BF and risk factors for cardiovascular disease. Methods: Apparently healthy, college-aged participants, who had completed a PAR-Q to determine readiness to exercise, volunteered for the study. All participants were required to be hydrated (USG<1.020) and refrain from vigorous exercise for 24 hours before testing. An 8-hour fasted blood sample was taken to determine lipid profile, triglycerides, and blood glucose levels. A foot-to-hand bioelectrical impedance analysis was used to determine BF. Participants performed a Bruce treadmill test to determine CVF. Data was compared to determine the relationship between BF and both CVF and cardiovascular risk factors. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 005

Effect of a Pre-Exercise Inspirational Video on 1-Mile Run Time and Motivation

Participants attending 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM

Presenters: Abriana Burrill, Tiara Butler, David Duthinh, Courtney Ingles, Marta McLaughlin

Mentor: Ross Sherman

Background: Previous research has shown that an increase in motivation leads to improvement in motor skill performance. However, there is an absence of data examining the effect on running performance. Purpose: To determine if viewing an inspirational video immediately prior to exercise will improve one mile run time. Methods: Ten college-aged individuals who were

apparently healthy participated in a randomized cross-over design study. Participants completed a survey of motivational and psychological status and then either watched a video intended to provide inspiration prior to completing the one mile run or immediately completed the test without the stimulus. Following a cool down, participants completed a second survey analyzing for the same motivational and psychological status. The second test was completed a week later. Data were analyzed to determine if the inspirational video positively impacted run performance and motivational status. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 006

The Effects of Acute Beta-Alanine Supplementation on Power Output and Fatigue during a 30 s Cycle Sprint Test

Participants attending 12:00 PM - 1:00 PM

Presenters: Morgan Doherty, Royce Lamoreaux, Shannon Rollins, Alexander Warner

Mentor: Ross Sherman

Background: The effect of long-term supplementation (4 weeks) of beta-alanine on anaerobic performance has been investigated and was found to have a positive effect on mean power output. Purpose: To discover the effect of acute (single dose) beta-alanine ingestion on power and fatigue during short-duration sprint cycling. Methods: Six college-aged participants, all healthy and moderately active, volunteered for this randomized cross-over design study. Participants did not ingest caffeine or other stimulants, participate in high-intensity or lower-body exercise, and ensured similar dietary intake 24 hours prior to testing, and furthermore did not eat or drink 60 minutes prior to testing. Upon arrival at the lab, participants completed a 5 min warm-up and then a standard 30 s Wingate sprint cycle test following ingestion of either beta-alanine (2 g) or a maltodextrin control. The supplement was ingested at least 30 minutes before each test. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 007

The Tail-Suspension Test: Impact of Diet on Stress-Induced Depression-Like Behavior in Mice

Participants attending 11:00 AM - 12:00 PM

Presenter: Mckenna Below

Mentor: Elizabeth Flandreau

Rodent models of depression rely on behavioral tests that assess depression-like behavior in response to manipulations. The tail suspension test (TST) is a model for despair-like behavior; mice are suspended by their tail for 6 minutes and the amount of time immobile is measured. Stress increases despair-like behavior, measured by increased immobility, while antidepressant

treatment reduces immobility, showing that the TST is a valid test of depression-like behavior. The following study investigates how an “unhealthy” diet high in fat or sugar influences social-defeat stress-induced changes in depressive-like behavior in the TST. We hypothesized that mice exposed to social defeat stress will have a greater percent time immobile in comparison to control mice. Also, mice exposed to the high fat or sucrose diets will have an increased sensitivity to stress, as measured by increased depressive-like behavior, compared to chow-fed mice.

KIRKHOF CENTER GRR 008

The Revive and Thrive Project: Establishing a Client Database

Participants attending 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenter: Megan Ponke

Mentor: Deborah Lown

The Revive and Thrive Project of Grand Rapids is a non-profit organization that is modeled after the Ceres Project, which combines healthy foods, community education, and teenage volunteers to provide healthy meals for cancer patients and their families. The purpose of this internship was to establish an electronic database of clients (n=88) who have been served over the past 2 years. An additional goal was to develop a database that would be easy to use in the future by other volunteers. The enrollment forms from all clients were compiled and entered into Fundly's Nonprofit Easy CRM (customer relationship management) software. Information on clients entered included dates of service, cancer type, cancer treatment, contact information, income and ethnicity. The outcome product of this internship is important, as the Revive and Thrive Project will use this electronic client database to evaluate the services they provide and for future grant applications.

KIRKHOF CENTER GRR 009

From Aristotle to *Wunderkammer*: The Development of Entomology and Insect Collections

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Erica Fischer

Mentor: Carolyn Shapiro Shapin

This poster analyzes the development of insect classification and the shift from the realm of the amateur naturalist to professional scientific pursuit. While earlier historians of science have explored the field of entomology in specific eras, this poster explores continuity and change in the study of insects and natural history collections from the ancient world to the 20th century. Period entomology texts, modern entomology and history of science journals, entomological displays and preserved specimens, and histories of entomology reveal that, though entomology developed as a private pursuit for the wealthy, it came to represent an ideal starting place for numerous systems of

classification and a piece of the pursuit of conservation undertaken by natural history museums.

KIRKHOF CENTER GRR 010

Phenology of Seed Maturation in Invasive Baby's Breath (*Gypsophila paniculata*) and Its Importance for Restoring Coastal Sand Dune Communities in Michigan

Participants attending 9:00 AM - 10:00 AM

Presenter: Emma Rice

Mentor: James McNair

Gypsophila paniculata was recently listed as a priority invasive species in Michigan's northern Lower Peninsula and is a problem invasive in much of the northern US and southern Canada. Due to its high potential for seed dispersal, removal efforts during the summer are often ended prior to seed maturation, which is thought to occur in early-mid August. However, the phenology of seed maturation is poorly known, as is the efficacy of glyphosate spraying in preventing seed maturation. If managers can estimate the timing of seed maturation on an annual basis, this would aid in limiting the number of germinable seeds deposited per year and allow them to optimize use of management resources.

KIRKHOF CENTER GRR 011

The Effect of Dietary Specialism and Generalism on Evolutionary Longevity in an Early Paleogene Mammalian Community

Participants attending 9:00 AM - 10:00 AM

Presenter: Samantha Glonek

Mentor: Laura Stroik

Across mammals, generalist and specialist taxa differ greatly. Generalist mammalian taxa, in contrast to specialist taxa, utilize a broad spectrum of resources in order to survive and are thus considered "generalized" because their resource preferences are "generalized." Dietary niche breadth was examined in this study and was measured by the amount of variation in relief index, a measure of dental topography. The main hypothesis of this study was that taxa with larger dietary niches (i.e., "generalists") will have greater evolutionary "success" (measured by longevity) than taxa with smaller dietary niches (i.e., "specialists"). Relief index of mandibular molars was measured in 56 genera of mammals from the early Paleogene site of the Bighorn Basin, Wyoming. Results indicated that dietary niche breadth was associated with evolutionary longevity within this community, suggesting that evolutionary "success" is linked, at least in part, to flexibility in resource use.

KIRKHOF CENTER GRR 012

Representation of World War II Nurses in Novels: Truth or Fiction

Participants attending 3:00 PM - 4:00 PM

Presenter: Shelby McKenzie

Mentor: Joy Washburn

The accurate representation of nurses through the media is important for the profession of nursing as it affects societal perceptions regarding nurses and nursing practice. The purpose of this project was to analyze the portrayal of professional competence, nursing values, and the sexual objectification of nurses in novels in order to compare/contrast these aspects to the lived experiences of nurses of the same time period. Few works of literature exist with nurses in prominent roles with the exception of novels set during World War II; therefore, the works selected for this project include: *Atonement*, *The English Patient*, and four novels in the *Cherry Ames* series. Multiple books about the lived experiences of nurses during this time period exist and were used for this project. Kalisch and Kalisch's model was used to analyze similarities and discrepancies between nursing and nursing practice as it is portrayed in these novels and the lived experiences of nurses of the time.

KIRKHOF CENTER GRR 013

Stereoelectronic Effects in the Nucleophilic Ring Opening of Phenyl Aziridines

Participants attending 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Alexander Wong

Mentor: Matthew Hart

The structure of compounds can dictate their chemical reactivity and biological activity. The primary focus of this study is to examine the synthetic utility of various aziridine compounds during a nucleophilic ring opening reaction. By gaining a greater understanding of the regiochemical outcome of this process, it is possible to direct the synthesis of compounds in order to control the final structure. The project described herein examines the regiochemical outcome of differentially substituted phenyl aziridines. A series of compounds were synthesized and evaluated in this reaction. A correlation between the electronics of the system and the regiochemical outcome was established. This research can be applied to the synthesis of biologically relevant agents.

KIRKHOF CENTER GRR 014

Generalized Frobenius Partitions with Nonzero Row Difference

Participants attending 3:00 PM - 4:00 PM

Presenter: Kelsey Scott

Mentor: Karen Novotny

We extend the theory of generalized Frobenius partitions to include arrays with nonzero row difference. We focus on uncolored partitions in which no integer appears more than k times and on k -colored generalized partitions. We show that when enumerated these arrays satisfy a number of congruences analogous to those which arise when counting ordinary generalized Frobenius partitions whose rows are of equal length. In particular, we present results about congruences modulo 5 and modulo k^2 .

KIRKHOF CENTER GRR 015

Fighting Food Deserts and Chronic Disease: What We Can Learn from the YMCA of Western North Carolina

Participants attending 9:00 AM - 10:00 AM

Presenter: Danielle Paquette

Mentor: Sheldon Kopperl

My goal with this project was to describe my experiences volunteering with the YMCA of Western North Carolina (WNC), and explain how this chapter is taking huge, innovative steps in the direction of community health. I compared the WNC YMCA with the Y right here in Grand Rapids as well as the Y in Northern Michigan, a more rural area. I explained related topics such as food deserts, YMCA health and wellness programs, and the nature of preventable chronic diseases like diabetes. I also incorporated a proposal for the smaller YMCA of Northern Michigan with suggestions for health and wellness program additions. The health programs at the two larger YMCA chapters I researched provided inspiration for the proposal.

KIRKHOF CENTER GRR 016

Investigating a Novel Type of Protein Degradation in *Candida albicans*

Participants attending 2:00 PM - 3:00 PM

Presenter: Allison Hoppe

Mentor: Derek Thomas

Previous experiments studying protein changes in *Candida albicans* during filamentation at 37 degrees Celsius revealed that certain proteins may be degraded by a unique mechanism distinct from ubiquitin dependent protein degradation. To further study this we constructed two different strains that expressed proteins that represented this discordance, these being C4_00700c_a and Smt3. The parent was manipulated to contain the proteins with Myc tags added to the end of these proteins. Western Blot Analysis used antibodies to detect the tags and demonstrate the discordance of the individual proteins at 37 and 30 degrees Celsius respectfully at time points of 1

and 3 hours. An inhibitor of ubiquitin dependent protein degradation was used to test the method by which these proteins were degrading. Our data correlated with the interesting finding from the previous experiments and demonstrated the importance of one of these proteins to filamentation.

KIRKHOF CENTER GRR 017

Effects of Exercise Intensity on Working Memory Capacity in College-aged Students

Participants attending 11:00 AM - 12:00 PM, 3:00 PM - 4:00 PM

Presenters: Courtney DeSana, Olivia Doezema, Emily Meier, Chelsea Thiele, Courtney Tolar

Mentor: Kimbo Yee

Research has shown exercise to promote acute working memory capacity (WMC), a function of individual differences throughout the lifespan that has been found to mediate outcomes in reasoning tasks, IQ scores, academic attainment, and reading. However, it is unknown if exercise intensity affects how much WMC increases after exercise. Aim: To determine the effect of treadmill exercise intensity on acute WMC in college-aged students. Methods: Seven undergraduate students participated in both high-intensity interval training (HIIT) (30-second full sprint; 30 second rest; 10 intervals) and low-intensity exercise (walking at 4.0 mph, 0% grade; 5 minutes). WMC was assessed using a 2-back WMC test after both exercise exposures. Results: There was no significant difference ($p=0.11$) in WMC between HIIT (90.5 ± 11.1) and low-intensity exercise (81.3 ± 11.3). Conclusion: Present results suggest that exercise intensity has no effect on the increase in magnitude of WMC after exercise.

KIRKHOF CENTER GRR 018

The Effectiveness of Dynamic and Static Stretching on Sprint Performance

Participants attending 12:00 PM - 1:00 PM

Presenters: Kristin Hazel, Samantha Martin, Brian Wicks

Mentor: Ross Sherman

Background: Static stretching has been seen as the best way to increase flexibility while dynamic stretching is viewed as the best way to loosen up joints and muscles before activity. Purpose: The purpose of this study is to compare different types of stretching on 20-m sprint performance. Methods: This randomized crossover study was performed by apparently healthy college-aged students. Everyone ingested 32 oz of water 12 hours prior and ate a consistent diet 24 h prior maintained through each trial. Participants then performed a standardized warm up, the designated stretching for that trial, and then completed a 20-m sprint three times, with a two-minute break between trials. Stretches were done on large muscle groups in the lower extremities, with each static stretch held for 60 seconds across three reps. Dynamic stretching time will be matched to

the static stretching time. Data will be presented in a T-Test with two independent means. Results: SSD.

KIRKHOF CENTER GRR 019

Effects of Chocolate Milk vs. Non-Dairy Chocolate Milk on Delayed Onset Muscle Soreness

Participants attending 9:00 AM - 10:00 AM

Presenters: Stacey Goebel, Vanessa Sanchez, Emily Waypa

Mentor: Ross Sherman

Background: It has been investigated that chocolate milk will have an effect on recovery, minimizing delayed onset muscle soreness. Purpose: This study determined the effect of chocolate almond milk compared to regular chocolate milk on post-exercise delayed onset muscle soreness. Methods: Six apparently healthy and injury free college aged individuals participated in this randomized, single blind study. Participants refrained from any other exercise within the 48 hours of testing. Participants performed 3 sets of back squats at 70% of their 1-RM until fatigue. The experimental group consumed $0.8 \text{ g} \times \text{kg}^{-1}$ body mass protein while the control group consumed an equivalent volume of water, 20 minutes post-exercise. Muscle soreness was quantitatively measured using a pain/pressure gauge during exercise and subjectively assessed through a visual analog scale 24 and 48 hours after exercise. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 020

Validity of Wrist-Mounted Wearable Devices to Track Step Counts and Heart Rate at Rest and During Exercise

Participants attending 11:00 AM - 12:00 PM, 3:00 PM - 4:00 PM

Presenters: Jordyn Boitos, Korynn Hincka, Blake Loudermilk, Hector Vargas

Mentor: Ross Sherman

Background: As the popularity of personal fitness and activity trackers has increased, there remains uncertainty as to the accuracy of the data that they track. Purpose: To examine the accuracy of the recorded heart rate and step count of three different commercially available wrist-worn personal activity trackers. Methods: Six inherently healthy college age individuals participated in this randomized study. At the beginning of each trial, the type of tracker was randomly assigned - Apple Watch, Garmin, or FitBit. Each trial consisted of a 10-minute walk and 10-minute run. During each of the phases, steps were recorded both manually (criterion standard) and also by the tracker during the walk/run. Heart rate data was recorded at the end of each minute and was averaged for each 10-minute trial. Change in and steady state heart rate measured by all three trackers were compared against a 3 lead EKG (criterion standard). Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 021

Exploring the Potential for Fluvial Processes on Mars using Geospatial Analysis

Participants attending 10:00 AM - 11:00 AM, 3:00 PM - 4:00 PM

Presenter: Matthew Collins

Mentor: Peter Wampler

The exploration of our terrestrial neighbors has captured the imagination of the world over the recent century. With the recent Mars rover missions, as well as high resolution satellite imaging, scientists have been able to better understand the history of the red planet. Of particular interest is the prospect that Mars may have once possessed liquid water early in its planetary lifespan. Evidence of liquid water is found in both polar ice deposits and large channels that resemble fluvial deposits on Earth. High-resolution Digital Terrain Models (DTM) of Mars were created by the University of Arizona from HiRISE stereo pairs. 3D analyst and other geospatial tools in ArcMAP 10.3 will be used to interpret Martian landscape features near the Valles Marineris Complex and southern highlands and compare them to earth analogs by focusing on channel morphology and cross-cutting relationships.

KIRKHOF CENTER GRR 022

Effect of Standard and Higher Protein Chocolate Milk on Post-Eccentric Exercise Muscle Soreness and Pain Tolerance

Participants attending 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Allen Gardette

Mentor: Ross Sherman

Background: Post-exercise recovery is especially important following eccentric exercise. Purpose: To test chocolate milk and differing protein content within chocolate milk on post-exercise soreness and pain tolerance. Methods: 17 college-aged people (age 20.6 ± 1.6 years) volunteered for this independent group design study. Participants completed three sets of back squats at 65% 1-RM before consuming 1.0 g CHO·kg⁻¹ body mass of standard (8 g) or high (13 g) protein chocolate milk or one cup of water. Participants recorded hamstring muscle soreness as well as tolerance to pressure applied to their hamstrings. This was repeated 24 h and 48 h post-exercise. Results: Standard chocolate milk had similar soreness and pain tolerance responses compared to water. High protein chocolate milk demonstrated a trend towards significantly lower perceived soreness compared to water ($p=0.08$). Conclusion: Higher protein content chocolate milk may provide some limited benefit to post-exercise recovery.

KIRKHOF CENTER GRR 023

Synthesis of Tri-substituted Benzene Compounds Used in Nuclear Waste Remediation

Participants attending 1:00 PM - 2:00 PM

Presenter: Brandon Wackerle

Mentor: Shannon Biros

Increased nuclear waste production causes problems with long term storage and stockpiling. Spent nuclear fuel contains environmentally dangerous metals, such as actinides, that are difficult to isolate. Current methods of remediation utilize organic ligands that coordinate and extract the desired metal. New ligands based on tri-substituted benzene scaffolds are being modeled and synthesized in our group. These ligands utilize a fixed binding site in order to effectively bind the metal. Computational and experimental results of these metal-ligand complexes will be presented.

KIRKHOF CENTER GRR 024

Protecting Groundwater

Participants attending 12:00 PM - 1:00 PM

Presenter: Grant Pell

Mentor: Jeroen Wagendorp

Groundwater accounts for nearly 98% of Earth's fresh water supply. The majority of public water systems and nearly all individual water supplies depend on groundwater. Hence, there are things that people can do every day to protect groundwater; such as inspecting/maintaining septic systems and avoid flushing unneeded or expired medications. Half of all the groundwater in the U.S. supplies public drinking water, so the Safe Drinking Water Act was enacted to ensure that people are drinking potable water. DRASTIC scores modeling, determine the susceptibility of groundwater contamination for any given area. The use of DRASTIC empowers protection policies for the most vulnerable groundwater lithologies in any given area. Regulatory and non-regulatory measures can be taken by local, regional and state governments to protect groundwater. Durable and sustained groundwater quality equates to the overall quality of the surface estate it is supporting.

KIRKHOF CENTER GRR 025

An Examination of Dental Trait Variation Within Chiropteran Species

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenter: Dominique Donatelli

Mentor: Laura Stroik

Certain dental traits have been routinely used to define the classification of fossil chiropteran (bat) species, but it is not clear if these characteristics are appropriate and effective for accurate species delineation. Specifically, if the traits that are currently used to define fossil species are variable within related living species, then the use of such characteristics in the fossil record would be unsuitable. Using microCT scans and 3D reconstructions, the amount of variability in five dental traits was evaluated in thirteen extant chiropteran species. The results revealed that some traits that defined particular species, such as hypoflexid presence, were not consistent across all specimens within a species. This finding indicates that these traits are not appropriate in species classification, revealing that more research is needed to standardize the characteristics that are used in defining extinct chiropteran species.

KIRKHOF CENTER GRR 026

The Impact of Braces for Adolescent Idiopathic Scoliosis Over Time: A Systematic Review of Literature

Participants attending 9:00 AM - 10:00 AM

Presenter: Ashley Seath

Mentor: Julia VanderMolen

Scoliosis is defined as a lateral curvature of the spine that is 10 degrees or greater on a coronal radiographic image while the patient is in a standing position (Hresko, 2013). The most common type of scoliosis is idiopathic scoliosis and the population it affects the most is from ages 10 to 18. In patients with adolescent idiopathic scoliosis (AIS), the spinal column curves continually while the patient experiences growth spurts. AIS plays a major role in the quality of life (QoL). The questions that arise are absence or the presence of pain, levels of motivation, mental health and absence or presence of discomfort in daily life, respectively with pain.

KIRKHOF CENTER GRR 027

An Assessment of Microsatellite Loci in *Myotis austroriparius*

Participants attending 9:00 AM - 10:00 AM, 1:00 PM - 2:00 PM

Presenter: Faith Ureel

Mentor: Amy Russell

This project was undertaken to determine viable microsatellite loci in *Myotis austroriparius*, the southeastern myotis bat, for population genetic analysis. DNA from wing tissue samples of *M. austroriparius* was extracted and purified according to a protocol provided by the Qiagen DNeasy Kit. Upon isolation of the DNA, 52 microsatellite primers known to work in similar species were applied to the samples, which were then amplified in single-load PCR reactions. Product from these reactions was visualized in agarose gels. Reaction mixes and PCR temperature profiles in

previously published literature were used. Of those tested, 17 primers yielded positive results, and will be used to genotype the individuals in the spring. This research is part of a larger project to compare remnant and naïve populations of North American bats facing the white-nose syndrome epizootic.

KIRKHOF CENTER GRR 028

The Effect of 3-Day Montmorency Cherry Juice Supplementation on Delayed-Onset Muscle Soreness

Participants attending 1:00 PM - 2:00 PM

Presenters: Gabrielle Martino, Katelyn Oberts, Jane Perry, Elise Shaffer

Mentor: Ross Sherman

Background: It has been suggested that tart cherry juice reduces post-exercise muscle soreness. Purpose: To determine the effect of cherry juice on delayed-onset muscle soreness following eccentric exercise. Methods: Eight college-aged individuals participated in this cross-sectional study. Independent groups were randomly allocated to either cherry juice or no cherry juice. Participants refrained from exercise for 24 h prior to and during the testing days, as well as large consumptions of antioxidants. Participants consumed 11 oz of Montmorency cherry juice the day preceding exercise, the day of exercise and one day following. This contained 40 mg of anthocyanins and 600 mg of phenolic compound. Both groups performed 10 sets of 10 reps of depth jumps using an 18 in box. Muscle soreness was measured using a force gauge and perceived muscle soreness using a visual analog scale immediately before, after, 24 hours, and 48 hours post-exercise. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 029

Using Building Stones on the GVSU Campus to Educate the General Populace about the History of the Earth

Participants attending 9:00 AM - 10:00 AM, 4:00 PM - 5:00 PM

Presenter: Isaac Entz

Mentor: Peter Riemersma

Although building stones used to construct buildings on Grand Valley State's campus may not appear to be anything more than just rocks to the average person, they have a fascinating geological story to tell. This study examines the 330 million year old Indiana Limestone that composes much of Padnos Hall and the 500 million year old Mount Simon Sandstone that is used in the architecture of the Pew Library. Both sedimentary stones accumulated in marine environments when global sea levels were much higher than they are currently and much of the North American continent was flooded. Photographs will be used to illustrate where and how

the stones were quarried, microscopic analysis will reveal the composition of each stone and a literature review will help identify the environment in which they were deposited. The ideal outcome of this project should give people a deeper appreciation for building material they see on a daily basis.

KIRKHOF CENTER GRR 030

**Development of a New Method for the Treatment of Nuclear Waste:
Synthesis of Compounds with Soft Donors**

Participants attending 1:00 PM - 2:00 PM

Presenter: Andrew LaDuca

Mentors: John Bender, Shannon Biros, Thomas Neils

Nuclear waste contains primarily actinides and lanthanides, which are rare, expensive, and create problems if not disposed of correctly. As it stands, waste remediation methods use organic synthesis to create ligands to complex with and draw out certain actinides and lanthanides, specifically targeting uranium so it can be recycled. But, the ligands currently in use aren't completely selective at drawing out uranium; they draw out lanthanides as well. Our proposed molecules incorporate soft donor atoms, which will have stronger bonds to uranium but weaker bonds to lanthanides. We predict that these new molecules will be more selective at extracting uranium out of nuclear waste. The synthesis and analysis of these compounds, as well as their effectiveness, will be presented.

KIRKHOF CENTER GRR 031

**A Wax Moth Larvae Model for American Foulbrood in Experimental
Bacteriophage Therapy of *Apis Mellifera*.**

Participants attending 9:00 AM - 10:00 AM

Presenter: Megan Damico

Mentor: Steven Hecht

American Foulbrood (AFB) is a bacterial disease caused by *Paenibacillus larvae* that plagues the Western Honeybee (*Apis mellifera*) and severely impedes the health of bee brood. Spores produced by *Paenibacillus larvae* contaminate food that is fed to the honeybee brood; upon digestion the spores germinate and ultimately starve the larvae. A potential way to combat AFB is by using viruses to eradicate the bacteria. We are isolating phage and will be testing their ability to work in the model system of wax moth larvae.

KIRKHOF CENTER GRR 032

Synthesis and Characterization of Unsymmetrical Mono- and Diphosphines

for use in Selective Metal Complexation

Participants attending 1:00 PM - 2:00 PM

Presenters: Jonika Forbes, Betsy Trinklein

Mentor: John Bender

Phosphorus compounds such as *P*-sulfido-*P'*-selenido-bis(diphenylphosphino)methane, *P*-sulfido-*P'*-oxido-bis(diphenylphosphino)methane, *P*-oxido-bis(2-thienyl)phenylphosphine and *P*-sulfido-(*o*-anisyl)diphenylphosphine with novel, local chemical environments are synthesized and investigated for their potential to selectively bind transition-metals and lanthanide metals from waste metal mixtures. Molecular structures are analyzed and confirmed primarily through the use of the GVSU High-Field NMR facility.

KIRKHOF CENTER GRR 033

Post-dinner Satiety with the Paleolithic Diet Compared to Usual Diet

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenter: Michael Jones

Mentor: Deborah Lown

The Paleolithic (Paleo) diet mimics the diet consumed by Paleolithic humans. This diet is low in carbohydrate and high in meat. Since diets with high meat intake have been found to be highly satiating, we theorized that consumption of a Paleo diet would result in higher satiety ratings as compared to a usual diet. Men and women with metabolic syndrome ($n=6$) consumed their usual diet at both baseline and the wash out period and the Paleo diet with high and sedentary exercise. Satiety was measured with a validated tool twice with usual diet and once with the Paleo diet with sedentary exercise. The satiety rating was lower comparing post dinner with 90 minutes post dinner with the Paleo diet (0.25) as compared to the usual diet (0.83) indicating a greater satiety with the Paleo diet. The greater satiety rating with the Paleo diet may explain weight loss with this diet.

KIRKHOF CENTER GRR 034

Embryonic Stem Cell Research: Is it Ethical?

Participants attending 12:00 PM - 1:00 PM

Presenters: Mitchell Couturier, Evan Hausig, Chase Reynolds

Mentor: Osman Patel

In our study we surveyed roughly one hundred students at Grand Valley State University to gain more knowledge on their opinions on the ethics of embryonic stem cells (ESC) use and research.

The survey was both voluntary and anonymous, and was broken up into two sections. The first section was for information on the student (age, sex, class standing, etc.), while the second section asked about their knowledge on ESC research and for their opinions on controversial questions relating to ESC research. Our results showed that while the majority claimed to have very little knowledge about ESC research, the majority still believed it was beneficial and/or necessary. In fact, most of the people we surveyed were in general support of ESC research altogether.

KIRKHOF CENTER GRR 035

Evaluating Trends in Grand Valley Alumni Donations: A Statistical Consulting Experience

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenters: Nathaniel DeGraaf, Trevor Dunham

Mentors: Mary Darrow, Neal Rogness

The GVSU Development Office works with alumni in respect to their generosity with university donations. Our client, Mary Darrow, was interested in understanding factors which may contribute to repeat giving. Our role, as statistical consultants, was to explore a variety of indicators which might influence alumni donations and the propensity for repeat donations. In addition, we will highlight some of the many attributes statistical consultants need to ensure an overall successful consulting experience.

KIRKHOF CENTER GRR 036

Absence of the Long-Head of the Biceps Brachii Muscle

Participants attending 10:00 AM - 11:00 AM

Presenter: Eva Andrews

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

During dissection of the anterior upper arm of a cadaver of a 100-year-old female, it was revealed that the long-head of the biceps brachii was absent bilaterally. The biceps brachii is typically made up of two heads, the short-head and long-head, which have different insertions and then converge to form what is commonly called the biceps. The cadaver has the tendon for the long-head, but lacks the body of the muscle. In this study, we describe the absence of this muscle head and discuss the possible etiology and implications.

KIRKHOF CENTER GRR 037

Synthesis of Phenoxy Acetals of α -bromo Acetaldehyde: Precursors to a New Class of Asymmetric Iron Olefin Complexes

Participants attending 9:00 AM - 10:00 AM

Presenter: Christopher Peruzzi

Mentor: Stephen Matchett

Acetals are often synthesized from aldehydes by reacting them with alcohols. Phenol derivatives, however, typically lack the needed nucleophilicity to enable this reactivity. As part of a larger project looking at asymmetric iron olefin complexes, our current work has been exploring the synthesis and isolation of a series of phenoxy acetals of α -bromo acetaldehyde. Reaction conditions, yields and reactivities will be discussed.

KIRKHOF CENTER GRR 038

GMOs: Terrifying or Terrific?

Participants attending 9:00 AM - 10:00 AM, 2:00 PM - 3:00 PM

Presenters: Kayleigh Bos, Kaylin Zaroukian

Mentor: Osman Patel

Genetically modified organisms (GMOs) are organisms, in this case, plants, that have had their genome modified in order to express a desirable trait the organism does not naturally exhibit. Crops are commonly genetically modified in order to increase yield, protect against herbicides, increase pest resistance, preserve freshness, and countless other reasons. Through our study, we examined the connotation and assumptions that exist about GMO crops within a population of Grand Valley students. One hundred Grand Valley State University students of a variety of majors, class standings, and gender were surveyed about their opinions and knowledge of GM foods. Our results indicated that many students consume GM foods on a regular basis and do believe that GM foods are harmful to their health. In addition, many students believed that organically grown foods are the healthiest option, but many said that they do not typically consume organically grown food.

KIRKHOF CENTER GRR 039

Genetically Modified Foods: A Solution or Health Hazard?

Participants attending 9:00 AM - 10:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenters: Benjamin Burger, Kenneth David, Caleb Wetherholt

Mentor: Osman Patel

The purpose of our investigation was to see how much GVSU students know about GM foods and also to gain some insight on the student population's opinions about these foods. One hundred Grand Valley students filled out a questionnaire in regards to their knowledge of GM foods, the sources of that knowledge, and also the students' opinions of GM foods. The results from the questionnaire show that almost all of the students had moderate to little knowledge

about GM foods. Many of the students had learned about GM foods from online articles, college, and the news. Most of the students either agreed that the production of GM foods is bad for the environment or they didn't know. Overall, students feel that the government does not provide enough information about GM foods in order to make an informed decision. It is abundantly clear that the student population as a whole does not know much about GM foods. It is critical that students be correctly informed about GM foods.

KIRKHOF CENTER GRR 040

The Effect of Muscle Temperature on Oxygen Uptake During Exercise

Participants attending 2:00 PM - 3:00 PM

Presenters: Josephine Miller, Stevie Pennepacker, Arianna Stark-Norton, Mary Welch

Mentor: Amy Gyorkos

Elevated core temperature has shown a positive correlation with increasing performance credited to the observed increase in oxygen uptake during maximal efforts. There are many studies involving an exercise warm up through *active* means of movements, but limited data exists on means of *passive* heating. The purpose of this study is to identify if a passive-induced elevated core body temperature will improve exercise performance. 4 college females were selected to perform a VO₂max test on two times at least 7 days apart; once after sitting in a hot water tub until core temperature of 100.5 is reached, and once after sitting in room temperature for 30 mins. Core temperature will be measured by a rectal thermometer for both groups. An adjusted Bruce Protocol is used to determine oxygen consumption, RPE, HR and, BP. Hydration consists of 16-20 fl oz of water least four hours before exercise and 8-12 fl oz of water 10-15 minutes before exercise. Data collection and analysis are ongoing.

KIRKHOF CENTER GRR 041

Synthesis and Study of a Vinylsilole

Participants attending 12:00 PM - 1:00 PM

Presenter: Joseph Robertson

Mentor: Randy Winchester

The silaallyl anion has two major contributing resonance structures; one with the lone pair of electrons located on a silicon atom, which can also be viewed as a simple vinyl silyl anion and a second structure with the lone pair of electrons localized on a carbon atom. We are interested in studying vinylsiloles as part of a larger study on the silyl anion. We will present a crystal structure of 1-trimethylsilyl-1-vinyl-2,3,4,5-tetraphenylsilole, and its synthesis. Particular emphasis will be placed on the need for a higher yield synthesis of this compound using techniques reported by Tamao.

KIRKHOF CENTER GRR 042

Mackinac Breccia, Diagenesis and Geologic History

Participants attending 11:00 AM - 12:00 PM

Presenter: Kyle Gregory

Mentor: Peter Riemersma

Mackinac Straits is home to a feat of modern day construction: The Mackinac Bridge, which is the third longest suspension bridge in the United States. Construction of the bridge required investigation of the Mackinac Breccia, the Late Silurian to Middle Devonian formation that underlies and supports the bridge. This study uses peer-reviewed literature to summarize the geologic and diagenetic history, and describes the texture of the Mackinac Breccia. Hand sample and thin section analyses reveals the Mackinac Breccia to be a wackestone with angular micrite clasts ranging from pebble to cobble in size with secondary calcite cement. Texture and type of cementation of the Mackinac Breccia will be compared to other breccia formations to better understand the uniqueness of this formation. These observations will be compared to the proposed origin of the breccia as a sinkhole deposit.

KIRKHOF CENTER GRR 043

A Stratigraphic and Petrologic Study of the Unconformity at the Top of the Middle Silurian Bisher Formation in Kentucky

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenters: Olivia Jamrose, Bryce Thiel, Daniel Tjapkes, Lindsey Wiley

Mentor: Peter Riemersma

A prominent unconformity separates the dolomite of the Bisher Formation from overlying shales of the Ohio Black Shale Unit. This research aims to determine the processes that caused the unconformity at the top of the Bisher Formation. A review of the regional geology and stratigraphy will allow the geometry and time scale of the unconformity to be determined. Analysis of thin sections, outcrop pictures, and previously collected hand samples will provide insight into the nature of the unconformity. Potential causes of the unconformity could include sea level fall corresponding to an increased erosion rate, or sea level rise corresponding to a decrease or cessation of deposition. We are particularly interested in characterizing the lithology and texture of the uppermost Bisher as it should provide further insight into the processes that occurred.

KIRKHOF CENTER GRR 044

Geospatial Analysis of Household Radon levels in Michigan

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenters: Connor Cain, Joseph Nichols

Mentor: Peter Wampler

Radon is a carcinogenic gas that is naturally formed by the decay of Uranium over long periods of time. Being a gas, radon rises through the ground until it reaches the surface, where it is denser than air and collects in low-lying areas. Radon is the second leading cause of lung cancer in the United States. A data set compiled by the Michigan Department of Environmental Quality (DEQ), comprised of 152,250 radon tests, was used to find the average radon levels in each zip code in the state of Michigan. Centroids for each zip code were used to interpolate a continuous map of average radon levels using a kriging method in ArcMap 10.3. Preliminary results suggest several well-defined areas of elevated household radon levels that may correlate with bedrock or surficial geology. Polygons of the bedrock and surface units will be analyzed with additional geostatistical methods to find a correlation to radon levels.

KIRKHOF CENTER GRR 045

Variability in the Yield of Groundwater in Haitian Aquifers

Participants attending 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM

Presenters: Spencer Brower, Gabrielle LaFayette

Mentor: Peter Wampler

Haiti is located on the western half of the island of Hispaniola. In general, groundwater in Haiti is abundant but variable across the nation. Using ArcMap, a 1990 JPEG image of Haiti's hydrogeological features was georeferenced to the WGS 1984 Coordinate System. From this image, 903 points containing ranges of spring flow rates (in L/S) and polygons representing the different Haitian aquifers were digitized. The flow rate data, compiled from the map, was converted into a digital form that can be interpolated into a continuous surface representing flow groundwater flow from springs in Haiti. The continuous data set of spring flow rates was created using the average spring flow rate at each point and multiple interpolation methods in ArcMap 10.1 to determine the best fit for our data. Polygons representing the aquifers are used to extract zonal statistics from spring flow data.

KIRKHOF CENTER GRR 046

Effect of Long Term Nitrogen Fertilization on the Ecology of Plant Communities

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenter: Carly Hendershot

Mentor: Mark Staves

Soil rhizobacteria and legumes partake in a mutualistic relationship; the products of legume photosynthesis are exchanged for fixed nitrogen from rhizobia. Legumes are unable to fix nitrogen efficiently and rely heavily on this relationship. Nitrogen fertilization has been found to alter the legume-rhizobium relationship due to the evolution of less-productive bacterium (Lau et al. 2014). In this experiment, *Trifolium repens* (White Clover) was inoculated with bacterium isolated from either fertilized or unfertilized land. Overall plant health, herbivore preference and decomposition rate were all examined. Clover inoculated with less-productive bacteria had less mass overall and exhibited distress signs. These plants also experienced a decreased herbivore preference. The decomposition assay did not produce any significant results, but plants with non-cooperative bacteria tended to decompose slower in unfertilized fields. These results could affect future agricultural practices.

KIRKHOF CENTER GRR 047

Using ArcGIS and Remote Sensing Data to Examine Precipitation and Vegetation Patterns on Hispaniola in the Caribbean

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenters: Hayley Schram, Valerie Voisin

Mentor: Peter Wampler

The Cordillera Central mountain range of the Dominican Republic is the tallest of the Caribbean islands at 3,098 meters, and runs along the middle of the island of Hispaniola. The range influences easterly winds and moisture to create tropical, temperate, and dry conditions in both Haiti and the Dominican Republic. Satellite imagery and other remotely sensed data, including Normalized Difference Vegetation Index (NDVI) data from USGS EarthExplorer, are used to map vegetation patterns using ArcMap 10.3. Polygons defining vegetation differences are used to extract precipitation data from the best available precipitation dataset. Once extracted, zonal statistics data will be used to determine average precipitation for each vegetation polygon. These data will then be used to evaluate whether vegetation patterns are due to deforestation, precipitation, or other anthropogenic changes.

KIRKHOF CENTER GRR 048

Olivine EBSD and Equilibrium Assemblage Constraints on Conditions Of Formation and Emplacement of the Buck Creek Ultramafic Complex, North Carolina

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM

Presenter: Samuel DeYoung

Mentor: Virginia Peterson

New studies utilizing the interpretations of olivine lattice preferred orientation (LPO) may help constrain the emplacement history of the Buck Creek (BC) ultramafic complex. This complex is dominated by dunite, interlayered at map scale with rocks of troctolite protolith and enclosed by mafic rocks (gabbroic protolith). Prior work indicates that it is a fragment of cumulate ocean crust. LPO of olivine grains in samples from the BC dunite was measured using the Electron Backscatter Diffraction (EBSD) technique. Most samples show a well-developed LPO fabric with clustering of [100] axes. Further characterization of macroscopic shape fabrics and the Bulk Vorticity of strain are in progress to more confidently interpret shape fabrics. Results of misorientation analysis are consistent with Type B or C olivine fabrics that form in the presence of water, matching earlier interpretations of peak/post-peak metamorphic hydration and emplacement of the complex into the lower crust.

KIRKHOF CENTER GRR 049

Contributions of a *Candida*-specific Protein to Virulence in the *Galleria* Model of Systemic Candidiasis

Participants attending 1:00 PM - 2:00 PM

Presenters: Genevieve Colter, David Thom

Mentors: Ian Cleary, Derek Thomas

The co-repressor Nrg1p is a key regulator of cell morphology in the opportunistic fungal pathogen *Candida albicans*. Expression of many genes is activated during hyphal growth as a result of relief of Nrg1p-mediated repression, but the functions of some of these genes are not yet known. The gene *orf19.2302* encodes a *Candida*-specific protein whose only homologue is a hypothetical protein in the closely related species *Candida dubliniensis*. In a strain where we deleted both copies of this gene we found that when grown in cell culture medium cells showed increased adhesion. During an infection cell adhesion is important for both biofilm formation and interaction with host cells. Although loss of this gene does not appear to influence biofilm formation *in vitro*, we found that it showed attenuated virulence in the *Galleria* model of systemic candidiasis.

KIRKHOF CENTER GRR 050

Coronary Artery Obstruction Location and Region of Myocardial Necrosis in Acute Myocardial Infarction

Participants attending 10:00 AM - 11:00 AM

Presenter: Carly Zimmerman

Mentors: James Reed, Dawn Richiart, Timothy Strickler, Melissa Tallman

For this research, we will closely dissect the coronary arteries of a 77 year old male cadaver with cause of death listed as acute myocardial infarction (MI). We expect to encounter a with cause

of death listed as acute myocardial infarction (MI). We expect to encounter a vessel blockage in a coronary artery, most likely epicardial, that would have obstructed blood flow to an associated region of heart tissue, leading to necrosis of the myocardium. We will examine the relationship between the location of the vessel obstruction on the heart and the region of myocardium that necrotized to determine how locally a blockage impacts the tissue it supplies. The results may be useful for those investigating how local myocardial tissue damage can impact the entirety of the organ's function.

KIRKHOF CENTER GRR 051

Students' Perception of Embryonic Stem Cell Research

Participants attending 9:00 AM - 10:00 AM, 11:00 AM - 12:00 PM

Presenters: Jacob McCloughan, Alexander Pavey, Jason Putman

Mentor: Osman Patel

Embryonic stem cell research has been a controversial area of medical studies since its introduction. The moral and ethical implications of doing such research have caused much debate within society. For this presentation, we administered a simple survey to a small sample of diverse students and gathered their opinions. This study found that a large portion were in support of embryonic stem cell research. Those individuals also felt similarly on abortion. These results suggest a person's view of when life begins affects their view on embryonic stem cell research. Our presentation aims to highlight the thought process behind the justification of stem cell research.

KIRKHOF CENTER GRR 052

A Statistical Consulting Experience—GVSU Business Students' Experiences with Team-Based Learning

Participants attending 1:00 PM - 2:00 PM

Presenters: Morgan Maley, Cassandra Skinner

Mentors: Michael Ricco, Neal Rogness

Our client, Michael Ricco, is a faculty member in the Management Department of the Seidman College of Business. He created a survey in which students were asked about their experiences with team-based learning in their business classes. Dr. Ricco wanted to analyze these data to gauge student perceptions, determine effectiveness, and find ways to improve team-based learning for GVSU business students. This poster presentation outlines our journey through this project as statistical consultants from data cleaning to explaining results, including any challenges we encountered and how we overcame them.

KIRKHOF CENTER GRR 053

A Statistical Consulting Experience: Modeling Genetic Differences In Paper Wasps

Participants attending 4:00 PM - 5:00 PM

Presenters: Andrew Johnson, Alexander Kloska

Mentors: Michael Henshaw, Neal Rogness

Dr. Michael Henshaw from Grand Valley's Biology Department gathered genetic and ecological data on a species of wasp located across the entire east coast of the United States. Genetic differences are known to rise when the distance between two populations of a species increases; the client was interested in determining which variables contribute to these changes the most. Our role as statistical consultants was to assist in determining if the partial memberships to genetic clusters at these locations could be explained by certain ecological factors such as temperature and humidity.

KIRKHOF CENTER GRR 054

Can New Technologies Improve Beekeepers' Management Decisions Through the Winter? A Study in Comparative Advantages of Thermal Imaging and Temperature/Humidity Sensing Technologies

Participants attending 12:00 PM - 1:00 PM

Presenter: Andrea Kress

Mentors: Jonathan Engelsma, Anne Marie Fauvel

Honeybees are the most important pollinators worldwide, and are declining at an alarming rate. Technology may improve beekeeping techniques. New devices can be useful for monitoring during winter months, when opening the hives is possibly detrimental. With infrared (IR) cameras, the location and size of the honeybee cluster can be determined. Point-and-shoot IR cameras are still too expensive for most beekeepers to purchase, though new smartphone attachments could be plausible compromises. Sensors for temperature and relative humidity data collection may be useful in providing hive information. While the automated data collection is convenient, little is known about the sensors' hardiness. Temperature and humidity sensors, an IR accessory, and applications were used to collect data from multiple hives over several months. The study hypothesis, supported by preliminary analyses, show that new technologies may be useful in improving beekeeping management techniques.

KIRKHOF CENTER GRR 055

Sex Education Curriculum and Communication

Participants attending 12:00 PM - 1:00 PM

Presenters: Kimberly Maurer, Kourtney Millard

Mentor: Cael Keegan

When it comes to sex education, there are many different aspects that are missing from the curriculum. This includes LGBTQ+ information and sexual communication. In this research, we will be analyzing the sex education programs that are in place in Michigan and the curriculum they are allowed to teach. Our research will aim to explore the various subjects that are neglected by Michigan's policies regarding sex education, and will focus on working towards teaching sex education that is comprehensive and inclusive, in particular focusing on sexual communication between sexual couples and their overall satisfaction in their relationships. We will be conducting several interviews with college students regarding their experiences with sex education and sexual communication and the implications it creates.

KIRKHOF CENTER GRR 056

Extraction, Isolation, and Hydrogenation of 6-gingerol

Participants attending 9:00 AM - 10:00 AM

Presenter: Connor White

Mentor: Dalila Kovacs

6-gingerol is a compound that makes up roughly 1% of fresh ginger root. It is metabolized into 6-gingerdiols in living cells where it exhibits anti-carcinogenic and anti-inflammatory properties, making 6-gingerol a compound of interest for pharmaceutical companies. Extraction from ginger rhizome is difficult due to the many other components found in ginger, mainly terpenes such as Zingiberene and -sesquiphellandrene. These compounds are soluble in many of the same solvents that also dissolve 6-gingerol. In this study, extraction and isolation of 6-gingerol are attempted in order to produce the metabolites via its hydrogenation. A variety of solvents were tested for 6-gingerol extraction and isolation. Analysis via Gas Chromatography Mass Spectroscopy (GC-MS) indicated that methanol extraction followed by isolation with hexane is the most efficient method under our conditions. To mimic hydrogenation of 6-gingerol, reduction of model compounds was attempted.

KIRKHOF CENTER GRR 057

Estimating Risk to Bee Diversity among Insect-Pollinated Crops in Ottawa County

Participants attending 9:00 AM - 10:00 AM

Presenter: Ryan Murray

Mentor: Jeroen Wagendorp

Matrix quality interacts with distance from main natural habitat (MNH) on bee diversity in agricultural landscapes. Using NASS's Cropland Data Layer for Ottawa County, MI, 2010-2015, the percentage of insect-pollinated crops (IPCs) for which bee diversity was likely affected by distance is shown to decrease slightly. Among this distance-affected proportion, average distance also decreases. Assuming other factors have no effect, this suggests an increase in IPC bee diversity. In reality, it shows an increase in the percent of IPCs where diversity is more strongly affected by other factors. Considering also that acreage of IPCs decreased by more than 40%, change in IPC distribution itself (as opposed to change in local matrix qualities or extent of natural habitat) was likely the driving spatial force of any change in risk to IPC bee diversity.

KIRKHOF CENTER GRR 058

Structural Analyses of Overturned and Sheared Rocks in the Caribbean Orogen Hinterland

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenter: Joseph Nichols

Mentor: John Weber

The Caribbean orogen along the northern edge of South America formed largely during the Tertiary oblique collision of the Caribbean plate with South America. The Galera Grit is a white, coarse-grained, competent, faulted meta-sandstone that outcrops near Toco in NE Trinidad that is completely overturned. The Galera Grit sits on top of an intensely deformed, less competent, sheared sedimentary unit called the Toco Cataclasite. We are performing field-based kinematic analyses on the scaly fabrics (D_1), folds (D_2), and faults (D_3) in these units. Preliminary results from the Galera Grit show normal faults with multiple orientations, indicating stretching in multiple horizontal directions. We hypothesize that D_3 multidirectional "spreading" took place after the Galera Grit was emplaced over the Toco Cataclasite by low-angle, layer-parallel shearing D_1 . We are dividing the Toco Cataclasite into structural domains to study earlier D_1 and D_2 fabrics to determine the kinematics of shearing.

KIRKHOF CENTER GRR 059

The Effects of Honey and Cherry Juice on Power Output and Lactate Levels In Anaerobic Exercise

Participants attending 11:00 AM - 12:00 PM

Presenters: Joshua Boonenberg, Loren Burfiend, Kylie Courtney, Jessica Loftis, Ryan Marshall, Anderson Miller, Vanessa Stojanovski

Mentor: Amy Gyorkos

The aim of this study was to examine the effects cherry juice and honey have on blood lactate levels after performing a Wingate anaerobic test. We hypothesized consuming cherry juice/honey will lower blood lactate levels during anaerobic exercise, and that lower blood lactate levels will allow an increase in peak power output as well as an increase in power drop off. The effects of cherry juice and honey on peak power output and power drop off over the course of the test were compared. Although the results proved to not be statistically significant, trends were seen between lactate values and peak power and drop off. Lower blood lactate levels, as seen when consuming cherry juice, allowed subjects to reach a higher peak power. These subjects experienced the highest drop off rate as well, due to the fact that peak exertion was greatest compared to the other two groups, control and honey.

KIRKHOF CENTER GRR 060

Path to Dentistry

Participants attending 9:00 AM - 10:00 AM

Presenter: Virgilia Gaska

Mentors: Vinicius Rebello Lima, Laura Stroik

The field of dentistry is a rapidly progressing branch of medicine, focused on the preventive care and treatment of the teeth and oral cavity. Before becoming a Doctor of Dental Surgery (DDS), undergraduates must become competitive applicants for Dental School, which requires them to single themselves out as uniquely qualified and passionate. The purpose of this research was to focus on what molds a strong applicant, and to provide this information to potential students in the form of a helpful website. In order to adequately portray the best resources out there, an extensive amount of research about schools, programs, and requirements was done to ensure the most updated information. The project was compiling all the resources in a visually satisfying way that is easy to navigate. The website was created to address all aspects of the Pre-Dental student's life in a convenient and straightforward digital manner.

KIRKHOF CENTER GRR 061

Study of Polymers at Cryogenic Temperatures

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenter: Thomas Killeen

Mentor: Richard Vallery

In this experiment, we studied the porosity, the empty space between the chemical chains, of polymer samples. Porosity plays an important role on a material's properties, including strength and flexibility. Using Positron Annihilation Lifetime Spectroscopy (PALS) we can determine the

porosity of our samples. We are interested in observing transitions the material undergoes as it is cooled. One example is the glass transition temperature (T_g), a transition from a rubbery to a glassy phase. By analyzing the lifetime of the positronium we can study how a material and its porosity evolves under different conditions. The polymers we will be examining, PDMS and Thiol-ene Networks, have a T_g below room temperature. The system used is a custom built vacuum chamber which incorporates an Air Products Displex cryopump. This system can control temperatures down to 70K. Using these techniques and this system we can study all sorts of materials at cryogenic temperatures.

KIRKHOF CENTER GRR 062

An Investigation into the Importance of the Lysine-84 Side Chain's Nitrogen in OXA-24

Participants attending 1:00 PM - 2:00 PM

Presenter: Mitchell Haynes

Mentor: David Leonard

In this project I carried out a “mutant rescue” experiment on a protein involved in bacterial antibiotic resistance (β -lactamase). In a mutant rescue, the enzyme is first debilitated by “mutating”, or altering, its structure. The second step was to “rescue”, or restore, the original function of the enzyme by chemically modifying it. Multiple chemical modification reagents were used, and the results gave information about the chemical and structural requirements for full enzyme activity. Several different methods were used including: protein purification, ellman’s free thiol test, ampicillin kinetics, bicarb titration kinetics, and x-ray crystallography. From this research I was able to determine that the side-chain nitrogen of K84 is important to OXA-24’s ability to hydrolyze Beta-lactam rings. Further research will help determine which steps of the hydrolysis nitrogen must be present for.

KIRKHOF CENTER GRR 063

Metacognitive Awareness of Belief Change

Participants attending 3:00 PM - 4:00 PM

Presenters: Sarah Confer, Brielle Johnson, Kayleigh Lambert, Jacob Robbins

Mentors: Todd Williams, Michael Wolfe

Under certain circumstances, beliefs change after reading inconsistent evidence or arguments. One method to assess awareness of these changes is for people to recollect their previous belief after change occurs. Previous research has found that such recollections tend to be inaccurate and biased toward current beliefs, which suggests that metacognitive awareness of belief change may be poor. Two potential causes of these recollection errors were examined. First, recollection

of previous beliefs may be constructed from salient and easily accessible information at the time of the recollection. Salient information can include current beliefs, text content, and evaluations of the author. Second, when people encounter belief inconsistent information, they may experience psychological threat and alter their memory to achieve consistency. We find that both belief change and author liking mediate the relationship between belief consistency of the text and recollection accuracy.

KIRKHOF CENTER GRR 064

Mutagenic Analysis of BshC: the Final Enzyme of the Bacillithiol Biosynthesis Pathway

Participants attending 11:00 AM - 12:00 PM

Presenter: Emily David

Mentor: Paul Cook

BshC is the final enzyme in a three step biosynthesis pathway of bacillithiol, a compound that enables resistance to the antibiotic fosfomycin. BshC is unique from other enzymes of its kind because of a second ligand binding pocket of unknown function. To explore BshC function, several site-directed mutants have been produced in the second ligand binding pocket. Fluorescence assays have been utilized on the wild-type BshC and four mutations: Y510Q, Y510L, H386A, and W506L. This revealed that all mutants do not bind ATP as effectively as wild-type BshC. X-ray crystallography was used to analyze Y510Q revealed that there was no ligand binding. Together these results indicate ATP is binding within the second ligand binding site. Gaining more understanding of the structure of these mutants and how they bind ATP will give a better understanding of what is necessary for BshC to bind its substrate *in vitro*, allowing for the development of inhibitors to combat fosfomycin resistance.

KIRKHOF CENTER GRR 065

Is there a Sex Difference in Making Music? A Test of the Male Show Off Hypothesis

Participants attending 3:00 PM - 4:00 PM

Presenter: Carl Wilson

Mentor: Robert Deaner

Throughout history, men have dominated expressive cultural domains such as athletics, painting, music, and literature. One explanation is that women have been excluded from participating. Although exclusion must be important, evolutionists suggest that male dominance can be partly understood as a manifestation of male adaptations to “show off” and demonstrate their talents compared to those of other men. If men are more predisposed to “show off,” we should find

evidence of greater male effort even in domains where women have equal opportunities. We will test this prediction by quantifying the number of tracks and albums uploaded by male and female musicians at SoundCloud and FreeMusicArchive. At these sites, anyone can share their music without constraint. We will present our results, explore alternative explanations and discuss the significance of our findings.

KIRKHOF CENTER GRR 066

Effects of Inclusion Properties on the Viscoelastic Properties of Silica/Polydimethylsiloxane Composites

Participants attending 9:00 AM - 10:00 AM

Presenter: Nathaniel Orndorf

Mentor: Richard Vallery

Polymers are an important class of materials that are a part of many of our everyday products, as well as a key component in new materials and technology. Polymer composites are often used in products because they offer economical and physical advantages over other materials, including the pure polymer. Although commonly used, the effects of inclusion properties (such as size, shape, material, etc.) on the composite's material properties are not fully understood. In this study, an apparatus was built in order to study the viscoelastic properties of Silica/Polydimethylsiloxane(PDMS) composites of varying filler volume fractions and particle sizes.

KIRKHOF CENTER GRR 067

Investigation into the Molecular Mechanisms Associated with Tau-Mediated Neurodegeneration in Alzheimer's Disease

Participants attending 12:00 PM - 1:00 PM

Presenter: Michael Hudson

Mentor: John Capodilupo

Alzheimer's disease is a neurodegenerative disorder characterized by wide spread neuronal death and pathological formation of β -Amyloid plaques and Neurofibrillary tangles within the brain hippocampus. In normal, healthy neurons the specialized protein Tau binds to the microtubule support system and stabilizes it. In Alzheimer's disease a chemical alteration to Tau is induced, the microtubules system disintegrates, collapsing the neuron's transport system, which forms these neurofibrillary tangles (NFTs). Recent studies have shown EFhd2, a highly conserved protein found in the central nervous system, is found to be associated with the microtubule associated protein tau in the tauopathy mouse model for Alzheimer's disease. Further investigation has identified that deregulation of protein kinases as a molecular mechanism associated with the pathobiology of tau-mediated neurodegeneration and the EFhd2 protein.

KIRKHOF CENTER GRR 068

Effects of Breastfeeding Support on Duration Rates

Participants attending 11:00 AM - 12:00 PM

Presenter: Kayleigh Kibler

Mentor: Kelli Damstra

The purpose of this study is to identify facilitators that have assisted states with higher breastfeeding duration rate percentages in increasing their rates, and to review studies that have implemented community based breastfeeding support to identify themes. In the United States, 79.2% women initiate breastfeeding, however many do not follow the recommendation of the American Academy of Pediatrics and World Health Organization that infants be exclusively breastfed for the first six months of life. As of 2014, the national average of women non-exclusively breastfeeding at six months was 49.4%. This number is well below the Healthy People 2020 goal of 60.6%. Michigan is below the national average at 46.6%, with 28 states having higher percentages of women non-exclusively breastfeeding at six months. Literature review has shown that the best way to promote breastfeeding duration is through online resources and community-based support groups.

KIRKHOF CENTER GRR 069

Hierarchy in the Medical Field

Participants attending 12:00 PM - 1:00 PM

Presenter: Rachel Eaton

Mentor: Sheldon Kopperl

I am studying different forms of hierarchy among health professionals in order to discover where and why these hierarchies do or do not exist. I am also examining the effects of these relationships on the medical professionals themselves as well as their patients. A few areas of interest include regional differences, generational differences, and specialty differences in hierarchical structure. Due to the large number of GVSU students seeking entry into one of the health-related professions at various levels of profession, and due to the increasingly large medical community in the Grand Rapids area, this study will be of interest to the University and West Michigan communities. I am performing an in-depth exploration research project to learn more about hierarchy in the medical field, by reaching out to and conducting interviews with medical professionals. My research also uses scholarly articles and books to obtain background knowledge and theories on the issue.

KIRKHOF CENTER GRR 070

Cougar (*Puma concolor*) Dispersal Corridor Analysis

Participants attending 3:00 PM - 4:00 PM

Presenter: Denise Peterson

Mentor: Wanxiao Sun

Since 2008, there have been thirty-five DNR-confirmed cougar sightings in Michigan. While there has not yet been any evidence to suggest that the state supports a breeding population of the felids, it is likely that these confirmations have been dispersing males in search of a mate. In an attempt to assess how cougars, also known as pumas and mountain lions, may be arriving in Michigan, we are conducting a corridor analysis. Our goal is to be able to isolate pathways that the cougars may be using as they move from western source populations into Michigan. Using Geographic Information Systems (GIS), we will attempt to identify potential island habitats that cougars may be using for shelter and hunting opportunities as they disperse. Additionally, we will assess terrain and land cover types, as well as looking at proximity to roads, cities, and waterways, which cougars have been known to travel along as they move through the prairie states.

KIRKHOF CENTER GRR 071

Abundance of Eastern Hemlock Trees (*Tsuga canadensis*) in Pigeon Creek Park, West Olive, MI

Participants attending 2:00 PM - 3:00 PM

Presenters: Cory Highway, Rachael Noteboom

Mentor: Kin Ma

The objective of this study is to take GPS locations of Eastern Hemlock trees (*Tsuga canadensis*) in Pigeon Creek Park and overlay them onto a land cover/soil shapefile. This project is examining the abundance of Eastern Hemlock, which will fulfill the Ottawa County Parks' need for such a map. The Eastern Hemlock is a staple in the northern temperate forests of North America (Nichols 1935), and are a major winter food source of whitetail deer, which are abundant in Pigeon Creek Park (Frelich & Lorimer 1985). In West Michigan, Hemlocks can fall victim to disease which can wipe out local populations (Kotanen 2007) (Walker et al. 2014). Between deer browsing and disease, Eastern Hemlocks are at risk of population decline. It is pivotal that we understand where healthy populations are located, especially those within public lands that can be managed easily. This project maps Hemlock locations to show where they are declining and allow public land managers to promote population growth.

KIRKHOF CENTER GRR 072

New Zealand's Adaptations to Climate Change and its Effects on Water Systems

Participants attending 10:00 AM - 11:00 AM

Presenters: Allie Berends, Dominic Bongiorno, Courtney Wilber

Mentor: Elena Lioubimtseva

Using climate and environmental data collected from New Zealand's government websites, the IPCC, and climate modeling systems such as MAGICC and SCENGEN, we will explore how the changes in climate have affected New Zealand's water systems and how the country has adapted to such changes. Some of the changes in climate have caused sporadic precipitation patterns causing droughts and flooding in addition to agricultural issues and bush fires. We will also delve into New Zealand's projected plans for adaptations in the future. We have found that they take climate change quite seriously and have already incorporated a number of adaptations. New Zealand is in the process of making more preparations and adaptations to better their survival within the changing climate.

KIRKHOF CENTER GRR 073

Effects of Precursor Solvent Polarity on the Organolead Halide Perovskite Photoactive Layer in Perovskite Solar Cells

Participants attending 10:00 AM - 11:00 AM

Presenter: Nathaniel Orndorf

Mentor: Richard Vallery

Organolead Halide Perovskite hybrid solar cells (pero-HSCs) have quickly emerged as a promising technology for renewable energy, due to the superb photovoltaic properties of the perovskite photoactive layer. However, such a fast-crystalizing hybrid material usually shows poor film morphology with various crystal grain boundaries, numerous pin-holes, and low homogeneity, which decreases the device efficiency and enlarges the batch-to-batch deviations of the corresponding solar cell performance. In this study, we tuned the two-step spin-coated perovskite film quality of the pero-HSCs by varying the polarity of the $\text{CH}_3\text{NH}_3\text{I}$ precursor solvent, and determined whether it can influence the final device performance. Pero-HSCs have high potential as a cheap replacement of the expensive silicon solar cells that are currently used, but more work on improving the efficiency and lifetime is a necessity before commercialization.

KIRKHOF CENTER GRR 074

Maternal Mind-Mindedness: A Review of Demographics and Developmental Outcomes

Participants attending 9:00 AM - 10:00 AM

Presenter: Nguyen Pham

Mentors: Naomi J. Aldrich, Jing Chen

This systematic review, in preparation for a meta-analysis, studied the construct of maternal

mind-mindedness (MMM), which is the tendency of mothers to think of and treat their infants as mental agents. The idea that a child's understanding of other's minds can be shaped through their mother's ability to attribute mental properties to their actions as infants, is recent, and her ability to accurately perceive and be sensitive to these mental states has been shown to be crucial to child development (Meins *et al*, 2003). Using the PsycINFO database, we collected articles using the keyword "maternal mind-mindedness" and used reverse citation searching to find additional articles that did not fall under the keyword search but still related to MMM. We then examined the studies published between 1990 and 2016 to see if a consistent pattern of relation emerged between MMM, various demographic variables, and developmental outcome measures such as attachment style and mentalizing abilities.

KIRKHOF CENTER GRR 075

Vector-Borne Diseases Along the United States Gulf of Mexico Coast

Participants attending 9:00 AM - 10:00 AM

Presenter: Bryan Saunders

Mentor: Elena Lioubimtseva

The U.S. Gulf Coast is home to over eighty million people, and these individuals are currently being threatened by the increase of illnesses that are transmitted by diseased vectors such as ticks, fleas, and mosquitoes. These vector-borne diseases are detrimental to human health because they can carry infectious bacteria, viruses, and protozoa from animals to humans. The West Nile virus alone has infected an estimate of three million people in this region from 1999-2010. This study will examine possible correlation of the upsurge of vector-borne diseases with an increase of the regional annual and seasonal temperatures—which have been on a steady climb for the past fifty years. This increase of annual mean temperatures in the region allows for longer summers and shorter winters, in order to give vectors more time to infect a larger population. To conduct this study, I will compare the historical climate data from the past century to human health data, in regards to vector-borne diseases.

KIRKHOF CENTER GRR 076

Monitoring Collisions of Single Pd, Pt, and Rh Nanoparticles Using Hydrazine Oxidation and Proton Reduction

Participants attending 11:00 AM - 12:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Aaron Capps

Mentor: Scott Thorgaard

Single Pd, Pt, and Rh nanoparticles (NPs) were studied by their ability to catalyze hydrazine oxidation and proton reduction while isolated at the surface of an ultramicroelectrode (UME). The

reactions proceed slower at the surface of a Au UME compared to Pd, Pt, and Rh NPs which land on the electrode, resulting in a jump in electric current any time one NP struck the Au UME surface. The nanoparticles were also characterized using transmission electron microscopy, which allowed rough correlation of the particle sizes to the jumps in current observed in collision experiments. The collisions of Rh and Pt nanoparticles were also observed using proton reduction in the presence of hydrazine. The effect of changing hydrazine concentration on proton reduction nanoparticle collisions was investigated. The objective of this research is to extend electrochemical collision methods to new materials and reactions, generating fundamental insights to catalysis at metal NPs.

KIRKHOF CENTER GRR 077

Streamflow, Runoff, and Flooding

Participants attending 11:00 AM - 12:00 PM

Presenter: Dexter Larabee

Mentor: Jeroen Wagendorp

Streamflow, runoff, and flooding all sound innocuous; however, they can result in environmental degradation in several ways. They can result in water contamination affecting lakes, streams, ponds; soil contamination, improper drainage, runoff pollution, and threats to the overall natural environments. Stream flow, runoff, and flooding are posing a threat to wildlife, humans, and vegetation within the riparian corridors. However, remediation is possible to reduce the amount of pollution from rain events. These include: permeable surfaces of streets, innovative road designs, promotion of natural waterways, and other solutions promoting safe recharge of the groundwater.

KIRKHOF CENTER GRR 078

Cabo Verde's Road Map to 100% Renewable Energy

Participants attending 12:00 PM - 1:00 PM, 3:00 PM - 4:00 PM

Presenters: Jessica Crawford, Jacob McLaughlin, Chad Wilcox

Mentor: Erik Nordman

Cabo Verde, a small island archipelago off of Africa's west coast, depends on imported fossil fuels for electricity production. Although their greenhouse gas emissions are small, the island's location and lack of infrastructure leave it vulnerable to climate change's effects. Cabo Verde's National Energy Policy set a goal to obtain 100% of its electricity from renewable energy (RE) sources by 2020. This report analyzed the wind, photovoltaic solar, hydrokinetic, and geothermal source potential for Cabo Verde. Models were created in Long-range Energy Alternatives Planning software to assess the goal's feasibility. In assessing RE potential for Cabo Verde a 'business as usual' scenario and a 50% RE scenario were constructed for the islands. It was found that switching over to at least 50% RE will cause CO₂ equivalent reductions of over 40,000 tonnes in

Santiago and over 30,000 tonnes in São Vicente.

KIRKHOF CENTER GRR 079

Energy Harvesting through the Piezoelectric Effect

Participants attending 9:00 AM - 10:00 AM

Presenter: Brandon Coates

Mentor: Harold Schnyders

Energy harvesting thorough piezoelectrics is the harvesting of an induced flowing current due to a mechanical stress. When a non-conductive material is loaded with a force a stress is produced, and a voltage is induced within the material's crystals. When these crystals are placed next to each other (such as that inside a material) a circuit is then formed thus allowing an electric current to flow. Different piezoelectric materials have been tested to determine the one possessing the highest electrical output in response to vibrations characteristic of those found induced by pedestrian traffic in the iconic GVSU blue bridge. An analysis of accelerometer data from the bridge has guided the construction of a mechanically resonant device that will aid in capturing the energy, as well as the preferred orientation of that device. We have also developed a transducer to render the resulting electrical voltage useable.

KIRKHOF CENTER GRR 080

Analyzing the Spatial Relationship of Median Household Income and Divorce Rates in Michigan

Participants attending 9:00 AM - 10:00 AM

Presenter: Andrea Lussier

Mentor: Jeroen Wagendorp

This mapping project studies both the median household incomes and divorce rates for all 83 counties in Michigan. The overall goal of this study was to find how strong a spatial correlation there is between the two subjects and how they come to impact one another based on their location quotients. It was interesting to find which parts of Michigan had a stronger correlation than other parts and to further the study of why these particular patterns were occurring. While many factors played into the results, it was found that Michigan counties with fewer divorces often had a lower median household income. Therefore, it is safe to say that more divorces occur in counties where the median household income is higher, matching our beginning hypothesis.

KIRKHOF CENTER GRR 081

Putative Pathogenicity Island in *Salmonella enterica* Serovar Typhimurium

Participants attending 10:00 AM - 11:00 AM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenters: Adam Pickrum, Steven Wilkinson, Shaowen Xu
Mentor: M. Aaron Baxter

Salmonella enterica serovar Typhimurium is a Gram-negative bacterium that causes localized gastroenteritis. The disease is initiated by the activation of virulence genes responsible for the invasion of the intestines, and subsequent survival in phagocytic cells. The genes needed for virulence are often clustered in regions known as pathogenicity islands. A region of DNA was discovered in *Salmonella* that has all of the attributes of a pathogenicity island. Subsequently, polar mutations were created in most of the putative operons, and assays are being performed to determine the impact of these mutations on invasion, adherence, motility and macrophage survival. Our current work has focused on testing the impacts on motility and invasion, with assays that compare each the mutants to wild type *Salmonella*. Future work will expand our analysis of this region employing additional assays to determine whether these *Salmonella* specific genes have an effect on pathogenesis.

KIRKHOF CENTER GRR 082

A Study on the Synthesis of Modafinil

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Alexandra Williams

Mentor: Randy Winchester

Modafinil is a wake-promoting drug used in the treatment of narcolepsy and other sleep related disorders. Modafinil is a racemic mixture of its R and S enantiomers due to a chirality center on a sulfur atom within the compound. Modafinil currently has no known mechanism of action, but the drug demonstrates potential for treating a wide range of mental and physical conditions. Our research is on the synthesis of Modafinil and its precursors by testing different synthetic pathways. Subsequent research will be on synthesizing analogues of Modafinil. The findings and results from our research will be reported on our poster.

KIRKHOF CENTER GRR 083

Reproductive Changes in the Sedge *Carex aquatilis* in Northern Alaska in Response to Experimental and Climatic Warming

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Kelsey Mannard

Mentor: Robert Hollister

The Arctic is warming and it is expected to continue to warm as a result of climate change. The

sedge *Carex aquatilis* is a dominant plant species in Northern Alaska. To predict how *Carex* will respond to climate change, we examined differences in flowering over time and in response to experimental warming at sites in Atkasuk and Barrow, Alaska. We found that the inflorescence height increased as the temperature increased; inflorescences were taller at Atkasuk than in Barrow and taller in warmed plots than in the controls. We also found that the date of the first flower and first inflorescence was consistently earlier in Atkasuk than in Barrow, and earlier in warmed plots than in controls. We did not find differences in the number of inflorescences or seeds to be linked with the temperature of the summer in which they were measured. The response of *Carex* to warming in the tundra is indicative of the changing ecology of this biome, which could have consequences on organisms that live there.

KIRKHOF CENTER GRR 084

Identifying a Putative Pathogenicity Island in *Salmonella enteritidis* serovar Typhimurium

Participants attending 9:00 AM - 10:00 AM

Presenter: Shaowen Xu

Mentor: M. Aaron Baxter

Pathogenicity islands are clusters of virulence genes that a pathogen gains from exogenous sources during evolution. *Salmonella* species invade intestinal epithelial cells via forced uptake by utilizing a type 3 secretion system and its effector proteins, which are mostly encoded in a genetic region called *Salmonella* pathogenicity island 1 (SPI1). SPI1 is regulated by various environmental signals. *hilE* encodes a major repressor of SPI1, whose surrounding genetic region show characteristics of a novel pathogenicity island. To investigate this putative pathogenicity island, polar mutations in open reading frames (ORFs) around *hilE* were made. These mutations effects on motility, adherence, invasion, and gene expression are being investigated via various. One ORF showed potential inhibition of SPI1 expression under non-inducing environmental conditions. Future work for this project includes continuing the work of characterizing the role these ORFs have on *Salmonella* virulence.

KIRKHOF CENTER GRR 085

Synthesis and Characterization of Chalcogen Containing Phosphine Ligands

Participants attending 9:00 AM - 10:00 AM

Presenters: C'arra Miller, Christopher Peruzzi

Mentor: John Bender

Separation of lanthanides and actinides still remains a problem in nuclear waste remediation. To

address this, our group is synthesizing a series of phosphine ligands containing soft and hard donor atoms from the chalcogen family. The synthetic schemes and characterization of these ligands by ^1H NMR, ^{13}C NMR, and ^{31}P NMR will be presented. Also, the coordination chemistry of these ligands with transition metals will be described.

KIRKHOF CENTER GRR 086

Chronic Effects of Nonylphenol on Reproductive Behavior and Physiology of Crayfish

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Samantha MacKay

Mentor: Daniel Bergman

Nonylphenol is a commonly used surfactant in a variety of industries. Nonylphenol shows an affinity for estrogen receptors, hence its classification as an endocrine disruptor and potential danger to reproductive success. Nonylphenol accumulates in aquatic environments and several studies have demonstrated reduced olfaction and impaired gonad development in a variety of species after exposure. Although acute studies have been performed, chronic exposure studies are limited. We measured the ability of crayfish to locate a mate, electrophysiological recordings of olfactory neurons, and examined gonad morphology four months post-exposure. Exposing crayfish to varying sublethal concentrations of nonylphenol affects behavior and neuron responsiveness. We expect that reproductive maturation will also be effected. Observing both the behavioral and developmental effects of low, but chronic nonylphenol exposure, provides insight to its potential effects on crayfish populations and ecosystems.

KIRKHOF CENTER GRR 087

Chickens in Graph Theory

Participants attending 10:00 AM - 11:00 AM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenters: Samantha Law, Morgan Oneka, Mikaela Wyatt

Mentors: David Clark, Lauren Keough

Steven B. Maurer's *The King Chicken Theorems* is a historic paper in graph theory which uses the idea of chicken coops to explain directed complete graphs. In our MTH 399 class, we expanded on the ideas presented in this paper to develop our own definitions of different classes of "chickens in a coop", or vertices with given attributes in such a graph. For instance, we defined "Senator Chicken," "Boss Chicken" and "Most Efficient Chicken." After examining a variety of graphs, we have come up with theorems about these different classes of "chickens" that reveal interesting properties about directed complete graphs.

KIRKHOF CENTER GRR 088

A Systematic Review of Echocardiogram and Cardiac Computed Tomography: Effectiveness at Diagnosing Symptomatic Bicuspid Aortic Valve.

Participants attending 11:00 AM - 12:00 PM

Presenter: Samuel Bernier

Mentor: Brian Hatzel

Context: Bicuspid aortic valve (BAV) is one of the most common congenital heart diseases. Utilizing the proper imaging technique to get an accurate reading is crucial, and most healthcare professionals use either echocardiography (ECG) or cardiac computed tomography (CT) scans. Objective: To determine the effectiveness of ECG and cardiac CT scans in their diagnostic capability of identifying symptomatic BAV in symptomatic patients to determine which imaging technique should be utilized. Conclusions: Cardiac CT scans had higher sensitivity and specificity ratings compared to ECG when identifying symptomatic BAV, so cardiac CT scans should be utilized in the healthcare settings if the initial ECG images are deemed too difficult to determine the extent of the symptoms. Practical Application: Even though a cardiac CT scan is more diagnostically accurate, an ECG should be used first for patients with symptomatic BAV because of its ease of use and non-invasiveness nature.

KIRKHOF CENTER GRR 089

Impact of Oleic Acid on Endothelial Cell Function

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM

Presenters: Kaelyn Fiebing, Timothy Holloway, Sabrina Williams

Mentor: David Kurjiaka

The interaction of fatty acids (FAs) and the human body is quite complicated. Some FAs are cardioprotective while others are not (increase risk of disease). Structural differences in FAs (cis vs trans vs saturated) are likely important in this dichotomy. We were interested in the impact of cardioprotective cis FA (oleic acid: OA) on vascular endothelial cells (EC): those directly affected by circulating FAs. EC damage leads to the development of the plaques that characterize cardiovascular disease. We evaluated the expression of connexin 43 (Cx43) proteins as a marker of EC health: damage increases Cx43. Cultured EC were treated with OA at 30 μ M for 12 hr which caused a decrease in Cx43 expression. This change in Cx43 expression was dose dependent (300 μ M OA further decreased Cx43 expression). Interestingly, the saturated FA palmitic acid (30 μ M) increased Cx43 expression. These data are consistent with the hypothesis that the impact of FA on EC is a function of their structure.

KIRKHOF CENTER GRR 090

Synthesis and Characterization of Bidentate Phosphine Ligands Containing Chalcogenides

Participants attending 9:00 AM - 10:00 AM

Presenter: C'arra Miller

Mentor: Shannon Biros

A current challenge faced by society is the increased implementation of more sustainable energy sources. These sources must meet the immediate energy demands and minimize any detrimental effects on the environment. One alternative energy source is nuclear power. Unfortunately, the complete treatment of nuclear waste still remains an unsolved problem. This is, in part, due to the presence of long-lived radioactive actinides. To address this problem our group is developing a series of bidentate phosphorus ligands containing soft donor atoms. The synthetic schemes and characterization of these ligands by ^1H NMR, ^{13}C NMR, ^{31}P NMR, mass spectrometry, and X-ray crystallography will be presented. Also, the coordination chemistry of these ligands with platinum will be described.

KIRKHOF CENTER GRR 091

A Membrane Sensor Protein Contributes to Adhesion and Biofilm Formation in *C. albicans*

Participants attending 12:00 PM - 1:00 PM

Presenters: Genevieve Colter, David Thom

Mentors: Ian Cleary, Derek Thomas

In order to respond appropriately to outside stimuli, cells must sense changes at the cell membrane and transduce that information into the cell. *C. albicans* grows in numerous human host environments that vary in factors such as pH, oxygen concentration, and osmotic strength. The gene *orf19.6705* is predicted to encode a member of the cell membrane guanyl nucleotide exchange factor protein family and could therefore play a role in how *C. albicans* successfully adapts to its varied surroundings. When we deleted both copies of this gene we found that the adhesive properties of hyphae were altered with increased cell adhesion and corresponding increased biofilm formation in one growth medium. In other media cell adhesion was decreased, suggesting that the protein can activate or repress signaling pathways depending on the stimulus. To understand the specific signal sensed by this protein we are continuing our analysis in a variety of media and conditions.

KIRKHOF CENTER GRR 092

Development and Characterization of Microsatellite Markers for Invasive

Baby's Breath *Gypsophila paniculata*

Participants attending 9:00 AM - 10:00 AM

Presenters: Matthew Kienitz, Hailee Leimbach-Maus

Mentor: Charlyn Partridge

Baby's breath is an invasive perennial that thrives in the dunes along Lake Michigan. It is capable of growing a 4 meter long taproot, and producing 14,000 seeds annually, effectively crowding out threatened and endemic species. The project goal is to examine the population connectivity and dispersal patterns of baby's breath in the northwest Michigan dune system, so as to inform resource professionals of how best to approach its invasion. We are using both nuclear and chloroplast microsatellite markers to estimate levels of genetic diversity, population connectivity, and patterns of seed dispersal. We have developed and characterized 15 baby's breath-specific polymorphic nuclear microsatellite loci. These data will be used to identify populations with a high potential to contribute to the reinvasion of managed areas, and to continuing spread. This will allow natural resource professionals to maximize their resources by targeting removal of specific populations of baby's breath.

KIRKHOF CENTER GRR 093

Effects of a Single Bout of Resistance Training Exercise on Working Memory Capacity in College-aged Students

Participants attending 9:00 AM - 10:00 AM

Presenter: Brandon Strautz

Mentor: Kimbo Yee

Background: Research has shown exercise to acutely increase cognitive functions such as working memory capacity (WMC). However, most literature has shown this effect only with aerobic exercise; thus, leaving an insufficient amount of information regarding if resistance training has any effect on acute WMC. Aim: To determine the effect of a single bout of resistance training on WMC. Methods: Using a randomized, crossover study design, nine undergraduate students participated in both a resistance training exercise session comprised of barbell back squats (3 sets x 10 reps; 60% 1RM) and a control session (i.e., no exercise). WMC was assessed immediately after both sessions using a 2-back WMC test. Results: There was no significant difference ($p=0.50$) in WMC between the exercise session (83.2 ± 18.0) and control session (73.6 ± 18.7). Conclusion: The present study showed that a single bout of resistance training exercise did not improve WMC in college-aged students.

KIRKHOF CENTER GRR 094

Using Quality Data for Effective Cancer Registries: A Systematic Review

Participants attending 12:00 PM - 1:00 PM

Presenters: Darin Buchan, Mikayla Maloney, Abigail Mattson

Mentor: Julia VanderMolen

The primary purpose of this systematic review is to determine how cancer registries provide and evaluate data quality to ensure more accurate and effective in diagnosing and improving cancer treatment. The goal of cancer registries is to use electronic health records (EHR) to help figure out the morbidity in order to prevent mortality caused by cancer. Cancer registrars capture a complete summary for each of their patients, including their history, diagnoses, treatment, and status. The information collected by cancer registries can aid public health officials by providing information on ways to prevent cancer and the prevalence of cancer in different areas. Four researched found sources there were varied and diversified. Several sources were international, a few less came from just the United States, and a few did not specifically list a location so we labeled those as general. With better instruction, cancer registrars can enhance the quality of care for their patients.

KIRKHOF CENTER GRR 095

The Academic Success of Deaf Children With Cochlear Implants Compared to Deaf Children Without: A Systematic Review

Participants attending 9:00 AM - 10:00 AM, 4:00 PM - 5:00 PM

Presenters: Kristina Endres, Kourtney Lenz, Hailey Montemayor

Mentor: Julia VanderMolen

The aim of this systematic review was to evaluate the benefits of cochlear implantation for deaf children ages five through 18 in an academic setting. The three researchers used four different databases: PubMed, CINAHL, MEDLINE, and ProQuest Medical Library. A total of 15 peer-reviewed articles were evaluated and incorporated into this systematic review. The article findings were divided by age group into three tables: birth through 10 years of age, 10-18 years of age, and overall, birth through 18 years of age. In conclusion, deaf children who were using cochlear implants had more academic success than those not using a cochlear implant.

KIRKHOF CENTER GRR 096

Geological Mapping, Kinematic, Fault-slip, and Gigapan Image Analysis, Kentland Impact Structure, IN

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Andrew Alder

Mentor: John Weber

The Newton County Stone quarry exposes steeply dipping, brittlely deformed, Ordovician-Silurian

sedimentary rocks in the central uplift of a ~13 km diameter, ~97 Ma complex crater, that is deeply eroded and shallowly buried. We are working to determine the kinematics and relative timing of faults. This site was previously studied and mapped by Prof. Ray Gutschick. Quarry expansion has created many new exposures that we have recently mapped. Fault-slip analyses in pit 8 indicate that there are three distinct fault groups: 1) ~E-W striking, north-dipping, bedding parallel faults, 2) steeply southward dipping, ~E-W striking, reverse faults, and 3) steep, NE-SW striking, oblique- and strike-slip faults. We will apply forward modeling of general complex crater development to place fault groups into a viable chronology. We will compile available subsurface data and combine this with our quarry “outcrop” maps and data to understand the size, shape, and nature of the crater megablocks.

KIRKHOF CENTER GRR 097

Sex Differences in Breeding Site Fidelity in Tree Swallows (*Tachycineta bicolor*)

Participants attending 10:00 AM - 11:00 AM, 12:00 PM - 1:00 PM

Presenters: Nicole Keck, Stacy Keydel, Brianna Wilson

Mentor: Michael Lombardo

Nest site fidelity is the tendency of an individual to return to the nest site it used the previous year, and is common in birds. In migratory birds, nest site fidelity is more common in males than in females. Females show greater nest site fidelity than do males in non-migratory birds. We used data collected between 1992-2016 from Tree Swallows breeding in nest boxes on the GVSU campus to examine whether there are sex differences in nest site fidelity. Each year 95% of breeding birds were captured and banded for individual identification. On average, each breeding season there was a greater proportion of male than female returnees (i.e., birds that showed nest site fidelity). Over time, the proportion of males that were returnees increased while that of females decreased. These results are consistent with patterns of nest site fidelity in other migratory birds. Males may show nest site fidelity to reduce their costs of searching for suitable nest sites each breeding season.

KIRKHOF CENTER GRR 098

Effects of Authority Feedback Formatting on Student Writing-Related Confidence and Self-Efficacy

Participants attending 3:00 PM - 4:00 PM

Presenter: Elizabeth Washnock-Schmid

Mentor: Kristen Schrauben

The role of authority figure feedback format on college student writing self-efficacy and

apprehension was assessed. Students were surveyed at the start and end of an introductory writing course to determine whether their apprehension towards writing or self-confidence in their writing abilities were affected by the format of feedback they received from their professor. Results indicated that writing apprehension was not affected following a semester of writing instruction and the type of feedback did not affect whether students were less apprehensive. Students' self-efficacy ratings improved in strategic and creative aspects of writing following a semester of writing instruction, and students who received face-to-face conference-style feedback had greater self-efficacy post-semester than students who received hand-written comments and responses.

KIRKHOF CENTER GRR 099

A Structural and Functional Analysis of BshA: The First Enzyme of the Bacillithiol Biosynthesis Pathway

Participants attending 1:00 PM - 2:00 PM

Presenter: Christopher Royer

Mentor: Paul Cook

Organisms with knocked-out bacillithiol (BSH) biosynthesis genes have demonstrated an increased sensitivity to fosfomycin, making BSH production a logical target for inhibition. In the first committed step of the BSH biosynthesis pathway, the enzyme BshA catalyzes the formation of *N*-acetylglucosaminylmalate (GlcNAc-Mal) via an activated sugar donor and l-malate acceptor. Previous structures of BshA have been determined with product bound and support the S_Ni -like mechanism, but there have yet to be structures that demonstrate how substrate is bound. In order to further characterize BshA and other GT-B retaining glycosyltransferases, we embarked on a structural and functional analysis. A BshA crystal structure was determined with substrate, which could give key insights into the enzyme's reaction mechanism. These analyses further our understanding of BshA and other GT-B retaining glycosyltransferases, which may be used to increase the effectiveness of fosfomycin antibiotics.

KIRKHOF CENTER GRR 100

A Quality Improvement Program for a Safety Net Clinic Serving Vulnerable Populations

Participants attending 2:00 PM - 3:00 PM

Presenter: Kaitlin Hendriksma

Mentor: Dianne Conrad

Quality improvement programs are focused on improving healthcare quality with conscious efforts to decrease healthcare-associated expenditures. The purpose of this project was to formally implement a quality improvement program for chronic disease management in a safety net

clinic. The Donabedian model and the Plan-Do-Study Act model served as the conceptual and implementation models to guide the development and implementation of the quality improvement program. The deliverable outcomes of this project included a procedure manual, education modules for volunteer healthcare personnel, and a clinical dashboard. The implementation of the quality improvement program was evaluated by comparing pre-intervention to post-intervention documentation compliance by healthcare personnel to designated evidence-based practice guidelines for chronic disease management over a period of one month.

KIRKHOF CENTER GRR 101

Tree Swallow Predator Recognition: The Eyes Have It

Participants attending 3:00 PM - 4:00 PM

Presenters: Nicole Keck, Stacy Keydel, Brianna Wilson

Mentor: Michael Lombardo

Staring is a component of threat displays in vertebrates and may influence the outcomes of interactions between individuals. For example, birds often hesitate when approaching butterflies and moths with “eyespot” on their wings, allowing the prey to escape. We conducted experiments with Tree Swallows to determine if they were able to differentiate between objects at their nest with or without eyes. We presented nesting Tree Swallows with either a stuffed raccoon, human, plastic cap without eyes, or the same plastic cap with eyes near their nest boxes. We observed behavior during 5-minute trials. Swallows treated the stuffed raccoon and human as potential nest predators and dove at them but ignored the plastic cap without eyes. However, they delayed the start of feeding their nestlings when confronted with the plastic cap with eyes. Our results are consistent with the hypothesis that staring eyes acted as a threat display causing parents to delay feeding their nestlings.

KIRKHOF CENTER GRR 102

“Springers” Do Jerry Springer: Paternity Testing In Jumping Spiders To Assess Mating Frequency.

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Emily Hamel

Mentor: Michael Henshaw

Sexes have differing strategies to maximize mating success. Male gametes are easily produced. Often, males mate with multiple partners to produce successful offspring. Female gametes require more energy to make. This leads to females choosing fewer partners. However, females can benefit from mating multiply, by producing offspring with more diverse genes. *Phiddipus audax* is a

common jumping spider found throughout North America. Jumping spiders have been a common organism for studies of sexual selection due to elaborate mating strategies such as dances. Lab studies have shown that females may not be receptive to multiple mating, but behavior in a lab environment may differ from that in the field. This is the first genetic test of paternity in naturally-mated *P. audax*. We genotyped 6 females and their offspring at 7 microsatellite markers to sort them into sibling groups. If the offspring from one brood contain more than 4 alleles at a locus, then we can infer multiple fathers.

KIRKHOF CENTER GRR 103

Wayfinding Abilities in Persons with Alzheimer's Disease: An Eyetracking Study

Participants attending 1:00 PM - 2:00 PM

Presenters: Mackenzie Kohler, Sarah Moll

Mentor: Rebecca Davis

Wayfinding is defined as the ability of an individual to find their way in an environment. Cognitive impairments, such as Alzheimer's disease, may result in an immense impairment of wayfinding abilities, which can result in these individuals getting lost. Of interest in this study is how patients with early stage Alzheimer's disease (AD) and mild cognitive impairment (MCI) are able to fixate on environmental cues or landmarks while finding their way within a virtual environment. Data was collected using a combination of eye-tracking glasses and software to analyze time spent fixated on cues within the virtual environment. The fixations, wayfinding time, and trial success of the AD/MCI group over two days were compared to a control group of similar demographic make-up to understand the differences in wayfinding between the two groups. This information can help to determine how cues can be utilized to help persons with AD find their way.

KIRKHOF CENTER GRR 104

Using Geographic Information Systems (GIS) to Quantitatively Determine Paleowind Directions of Inland Eolian Dunes Found in Western Lower Michigan, U.S.A.

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Sara Therkettle

Mentor: Patrick Colgan

Several areas throughout both Lower and Upper Michigan are covered by inland eolian dune fields. The morphology and orientations of these dune fields are the key to understanding the local climate and environment present in Michigan during the Pleistocene-Holocene transition. A quantitative analysis was conducted on inland parabolic dune fields in both Muskegon and Ottawa

County, Michigan, in order to determine paleowind patterns. Using a line feature in ArcMap 10.4.1, orientations of several parabolic dune crests were measured. Orientation data were input into a stereonet program, which was used to generate a rose diagram. The rose diagram displayed the mean wind orientation vectors for the dune fields in each county. The wind orientation for the Ottawa County dune field was determined to be $\sim 266^\circ$, which displays westerly paleowind patterns, and the wind orientation for the Muskegon County dune field was determined to be $\sim 334.9^\circ$, showing north-westerly paleowind patterns.

KIRKHOF CENTER GRR 105

The Rape Schedule

Participants attending 1:00 PM - 2:00 PM

Presenter: Kalie Miller

Mentor: Cael Keegan

“The Rape Schedule” is a Women, Gender, & Sexuality Studies Capstone research project proposal which dissects the gender ideologies, specifically in relation to violence, that are created and sustained by the media, which control the decisions we make on an everyday basis to avoid being assaulted. Women, LGBTQ folks, and people of color are always living with this constant fear, due to the dominant ideologies of masculinity and femininity that are placed on our culture through the media. The ideas that are engrained into popular culture create a strict binary of perpetrator and victim, where women, LGBTQ folks, and people of color are taught to maneuver throughout the world with apprehensiveness and fear. Overall, the project looks at the intersections of the race, gender, and sexuality of the perpetrators and victims portrayed in the media, how those identities shape our visions of fear and safeness, and how this determines the ways in which we move throughout the world.

KIRKHOF CENTER GRR 106

The History of the Biomedical Sciences Department

Participants attending 4:00 PM - 5:00 PM

Presenter: Jordan Pretto

Mentor: Sheldon Kopperl

The Biomedical Sciences (BMS) Department at Grand Valley State University encompasses a significant number of students and faculty and will celebrate its 50th anniversary in 2022. In 2022, Sheldon Kopperl, PhD, one of the founding members of the BMS Department, will release a book that details the growth of the department from his perspective since its pre-1972 beginnings. As the senior editor of Dr. Kopperl’s research team, I have collected, edited, and compiled multiple faculty interviews for a detailed primary account. This account examines the key features of a

successful department such as participation in university committees, a feel of community within the department, and involvement of students in faculty research. My interactions with the faculty have given me insight about how rapidly this department has expanded. This growth comes with difficulties that the department is actively working to fix, but it also created countless opportunities for both faculty and students.

KIRKHOF CENTER GRR 107

An Eye-tracking Study of Visual Representation Use for Problem Solving in Organic Chemistry

Participants attending 2:00 PM - 3:00 PM

Presenter: Megan Plekker

Mentor: Jessica VandenPlas

There are many different molecular representations used within organic chemistry classes, and many students find it hard to choose the right one to use. This study examined students' use of different representations of molecules to answer questions on multiple organic chemistry topics. The goal of this study was to see if students favor some structures over others, or if they are using these structures correctly based on the type of question asked. To collect this data, 26 organic chemistry questions were created and an eye-tracking computer was used to see where the students looked on the screen during problem solving. Results showed that gender does not impact student choice of representation, but question type and experience in chemistry affected which representation students used when answering questions.

KIRKHOF CENTER GRR 108

The Effect of Essential Oils on Headaches: A Systematic Review

Participants attending 2:00 PM - 3:00 PM

Presenters: Emilie Pretzer, Marisa Rogers

Mentor: Julia VanderMolen

In the United States it is common to use traditional non-steroidal anti-inflammatory drugs in order to treat headaches. However alternative medicine is a common treatment outside the United States. The purpose of this systematic review is to determine the effectiveness of essential oils on headache relief. These oils include lavender oil, *Lippia alba* (Mill.) N.E brown leaves hydroalcoholic extract, feverfew, butterbur, chamomile, peppermint, Ginkgolide B and Juniper, Melissa, and Rosemary oil. The main results from this review are essential oils can have numerous benefits for headache relief including decrease in frequency, duration, and pain intensity. However, the analgesic effect of the essential oils may differ based on whether the oil was ingested, inhaled, or applied cutaneously.

KIRKHOF CENTER GRR 109

Growth and Developmental Timeline of the Patagium in *Petaurus breviceps*

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 3:00 PM - 4:00 PM,
4:00 PM - 5:00 PM

Presenters: Gabriella Barajas, Christina Byl, Ilissa Chasnick, Anna Folsom, Connor Hanson,
Laura Hartung, Haley Hope, Rebecca Kralik, Casey Malburg
Mentor: Bruce Ostrow

Sugar gliders (*Petaurus breviceps*) are small, nocturnal marsupials native to Australasia that have a patagium, a thin layer of skin that extends from the forelimb to the hindlimb that allows for gliding, similar to flying squirrels. Controlled experiments were conducted to identify the stage and development of patagium formation found in sugar gliders. We are maintaining a breeding colony; meeting basic husbandry needs, checking for pregnancy success through anesthesia, and observing young. We have discovered the patagium develops after birth while the young is in the marsupium, in an anterior to posterior direction, over the course of two weeks. This new information can provide data for further research applicable to other gliding species. In the continuation of our research we hope to discover which gene(s) are expressed to form the patagium and what other factors influence this formation and development. Our immediate goal is to solidify an exact date range for this phenomenon.

KIRKHOF CENTER GRR 110

Reconnecting Veiled Minds Through Music: A Quantitative Analysis

Participants attending 3:00 PM - 4:00 PM

Presenter: Carolyn Scharf
Mentor: Cindy Beel-Bates

Purpose: Measure the success of a Music and Memory program at Allendale Nursing and Rehabilitation Center based on resident experience. Problem: Determine the psychological impact music has on symptoms, frequency of behaviors and antipsychotic medications in people with dementia. Significance: Music and Memory Inc. is a successful non-pharmacological model. Success is dependent on individualized playlists for each participating resident. Observed behaviors of residents and antipsychotic medication changes will be assessed. Method: Staff record monthly objective assessments of 12 residents. This information will be analyzed, looking for trends in mood, behaviors, depression and medication dosing over 9 months. Results: Anticipated results will show improvements in mood, decreased disruptive behaviors, decreased depression and dosing reductions in antipsychotic medications in participating residents. The goal is to improve quality of life through a non-pharmacological intervention.

KIRKHOF CENTER GRR 111

Biofilm Growth Under Aerobic and Microaerobic Conditions

Participants attending 9:00 AM - 10:00 AM

Presenter: Rebecca Gordon

Mentor: M. Aaron Baxter

Escherichia coli are facultative anaerobes, living in the colon of warm-blooded animals. To improve survival, *E. coli* produce biofilms to aid in adherence and protection from a variety of stressors while in its host. Bacteria control complex structures through regulators that detect a variety of environmental conditions. Within the colon, oxygen levels are anaerobic, therefore we have theorized that *E. coli* use oxygen as a signal in regulating biofilm formation. Currently, with the development of a biofilm assay and the creation of a series of mutants via transposon mutagenesis we are screening for variations in biofilm formation when the cells are grown in normal and low oxygen conditions. Future efforts would be to extend the biofilm assay to anaerobic conditions, and compare the data to that of our previously completed assays. Once an oxygen dependent regulator is identified, it will be analyzed to determine how the gene regulates biofilm formation.

KIRKHOF CENTER GRR 112

Implementation of an Evidence-Based Process for the Management of Concussions in Adolescent Patients for a Primary Care Office

Participants attending 4:00 PM - 5:00 PM

Presenter: Ashley Karczewski

Mentor: Cynthia Coviak

The numbers of recreation and sports-related concussion (SRC) are estimated at 3.8 million every year in the United States. Recently there has been widespread media attention paid to concussion, and with this, there has been a rise in adolescents with SRC seeking health care. Primary care providers are often the first to evaluate and provide treatment for adolescents with concussion. Despite the abundance of literature on concussions, there has been little empirical data to support management practices for this patient population. The purpose of the project is to provide an evidence-based process to the providers of a primary care office. The main objective is to improve the confidence in primary care providers' abilities to evaluate and manage adolescents presenting with a concussion with the most up to date clinical guidelines and recommendations. This includes increasing confidence recommending RTP and RTL guidelines to patients and families.

KIRKHOF CENTER GRR 113

New Perspectives on Amazonian Palm Swamps Using GIS Mapping Techniques

Participants attending 9:00 AM - 10:00 AM

Presenter: Madeline Moldenhauer

Mentor: James Penn

This study examines the characteristics of Amazonian palm swamps rich in palm and other tree species of high ecological and economic value using data collected from fieldwork conducted in 2016. While many studies of palm swamps in Amazonia have been conducted in the last few decades, none of these studies have precisely mapped the swamps and the principal tree species within them. By using Geographic Information Systems (GIS), our study provides new insights about the size and extent of these swamps, and the spatial characteristics of their principal tree resources. The use of GIS also allows us to accurately determine the density, distribution, and economic value of these swamps. The results of this study will help local communities that utilize these swamps for fruit harvesting and the hunting of game animals to better understand the extent and limits of these forest resources, while informing conservation practitioners and economic planners in the process.

KIRKHOF CENTER GRR 114

Social Media in the Age of Fake News: The Example of Facebook

Participants attending 2:00 PM - 3:00 PM

Presenter: Sarah Cauzillo

Mentor: Laurence Jose

The current discussions of “fake news” raise important questions about how social media affects the way we communicate and filter information. Some of these questions include: how do social media platforms catalyze conversations? How do they impact the responsibility of writers and readers? More broadly, how do they shape public discourse? To address these questions, this presentation analyzes the specific functions and evolution of Facebook. By exploring its interface, its evolution, and the social practices it promotes, the presentation interrogates the impact of social media context on the content that is produced. Drawing from genre theory (Miller, DeWitt) and rhetoric, the poster presentation describes Facebook as a genre that promotes and shapes specific social actions. By reframing “fake news” as an occurrence of “folklore” (Philipps), the poster provides a framework that highlights opportunities for reclaiming social media as an ethical space.

KIRKHOF CENTER GRR 115

The Effect of Intercropping White Clover on Aspects of Soil Ecosystem Function in Small Scale Market Gardens

Participants attending 12:00 PM - 1:00 PM

Presenter: Michael Michalski

Mentors: Sheila Blackman, Jennifer Winther

There is considerable evidence suggesting current agricultural practices are unsustainable. Mainly, nutrients applied to fields in the form of fertilizers are non-renewable much like the fossil fuels that drive industrial agriculture today. The current system reduces ecological diversity, uses more water than can be replenished, and degrades topsoil quality. New systems must be created and tested to ensure crop growth, given an increasing population and demand for food. This project looks at the effects of intercropping legumes (white clover) on the soil microbial diversity of small scale market gardens. Clover roots are known to form symbiotic relationships with a certain type of bacteria that produce a usable form of Nitrogen - one of three main nutrients crops need. Current findings from soil microbial DNA extractions are presented.

KIRKHOF CENTER GRR 116

The Mechanisms of Inequality: Neighborhood Segregation

Participants attending 10:00 AM - 11:00 AM

Presenter: Heidi Marchi

Mentor: Jennifer Stewart

This project explores the role of government in segregation, specifically the policies and institutions behind the creation of social norms and their interlocking effect on neighborhood segregation. The research highlights various federal policies such as the Federal Housing Administration's blockbusting, redlining and outright loan refusal, and Chicago and National Real Estate Board efforts which placed an economic interest on residential segregation. The research also analyzes the chilling effect of local "neighborhood improvement associations" and especially the symbolic nature of racially restrictive covenants. These quasi-legal maneuvers sought to preserve the restrictions of slavery times, and have greatly influenced today's racial disparity.

KIRKHOF CENTER GRR 117

Cinnamon Bark and Oregano Essential Oils Show Promise as Antibacterial Agents Due to the Presence of Phenolic Compounds

Participants attending 12:00 PM - 1:00 PM

Presenter: Jared Sweet

Mentor: Roderick Morgan

Over the decades of antibiotic use, often overuse, bacteria have developed resistance mechanisms. The high rate of evolution of resistant bacteria, coupled with the low profitability of antibiotics has created an urgent need to identify novel sources of antimicrobial agents. In this study, we seek to test the antimicrobial potential of cinnamon bark (*Cinnamomum cassia* Blume)

and oregano (*Origanum vulgare*) essential oils. Our data show that oregano and cinnamon bark oil inhibit *Escherichia coli*, *Staphylococcus aureus*, and methicillin-resistant *S. aureus* at concentrations as low as 0.031% (v/v) in addition to having an antibiotic resistant mutation frequency of less than 5.1×10^{-11} and maintaining function in the presence of human serum. Further analysis verified that the phenolic components of each essential oil were responsible for the antimicrobial characteristics. The results indicate that plant based essential oils may provide a novel source for antibiotic development.

KIRKHOF CENTER GRR 118

Benefits of Aquatic Therapy in Elderly Patients with Joint and Muscle Pain: A Systematic Review

Participants attending 1:00 PM - 2:00 PM

Presenter: Haley Klein

Mentor: Julia VanderMolen

Introduction: Aquatic therapy is a modality that is not used as frequently as manual therapy, but is a great tool for physicians to use. The purpose of this systematic review was to identify how aquatic therapy is best used, and the benefits of its use. Methods: The databases ProQuest Medical, PubMed, and CINAHL attained necessary articles to assess aquatic therapy as a modality for elderly patients with joint pain. Results: Sixteen scholarly articles covering joint pain in elderly individuals and the impact of manual therapy and aquatic therapy were evaluated. Articles compared conventional manual therapy to aquatic therapy as a means to decrease joint pain and increase overall quality of life, and aquatic therapy was identified as a better modality for treating elderly patients. Conclusion: Aquatic therapy better improves quality of life, decreases pain levels, and increases muscle strength making it more efficient than manual therapy in elderly patients.

KIRKHOF CENTER GRR 119

Improvement in 3200-m Running Performance Following Acute Inspiratory Muscle Training

Participants attending 12:00 PM - 1:00 PM

Presenter: Allison Ludge

Mentor: Kyle Barnes

The purpose of this study was to compare the effects of acute resisted IMT (IMP) to sham IMT (CON) as part of a warm-up on running performance. In a randomized cross-over design, 17 trained distance runners completed two 3200-m performance trials on separate days, preceded by two different warm-up procedures (IMP vs. CON). Inspiratory muscle function was measured pre and post IMP. Heart rate (HR), rating of perceived exertion (RPE), rating of perceived

dyspnea (RPD) and expired gases were collected during each trial. 3200-m run performance was significantly faster after IMP ($p = 0.01$). Following each warm-up condition peak volume, flow, and strength index were significantly higher ($p < 0.05$) after IMP. HR was not different between conditions, but VO₂ at each 800-m interval as well a peak VO₂ attained tended ($p > 0.05$) to be greater after IMP. RPE and RPD tended to be lower ($p > 0.05$) following IMP. These data indicate that IMP enhances 3200-m time-trial performance in trained runners.

KIRKHOF CENTER GRR 120

Care of the Older Adult: LGBT Residents in LTC

Participants attending 12:00 PM - 1:00 PM

Presenters: Cassandra Cummings, Jordyn Ebbitt

Mentor: Grace Huizinga

The purpose of this research is to increase knowledge for long-term care (LTC) staff and administration related to issues with LGBT residents within the LTC facility. The research conducted used a teaching module to increase knowledge with the intent that this will lead to an improvement of quality care for this population. The research was conducted using pre-/post-test methodology to evaluate an interdisciplinary training for increase of awareness and knowledge related to LGBT issues. This training occurred in a faith-based LTC facility in West Michigan. The training occurred twice, each for a period of 2 hours. The session will discuss the results of this research and implications/recommendations for future practice.

KIRKHOF CENTER GRR 121

A Geospatial Investigation of Conductivity Levels and Temperature of Surface Waters in the State of Georgia

Participants attending 3:00 PM - 4:00 PM

Presenters: Nathan Allen, Isaac Entz

Mentor: Peter Wampler

In order to gain a better understanding of temporal variations in surface water conductivity and temperature in the state of Georgia, data was compiled from 65 streamgages monitored by the USGS. Geostatistical Wizard in ArcMap 10.1 was used to analyze the data using kriging and zonal statistics on a county level. The geospatial data includes measurements regarding variations in annual conductivity levels and temperatures between 2010 and 2015. Several factors which may contribute to the observed water temperature and conductivity variations include agricultural land use, land cover, and topography. It is hypothesized that elevation and adjacent agricultural land use is related to variability in surface water temperatures and conductivity levels. Understanding the impacts of agricultural land use on water quality will help us more effectively protect our water

resources for the future.

KIRKHOF CENTER GRR 122

A Statistical Consulting Experience: The Influence of Bibliotherapy

Participants attending 3:00 PM - 4:00 PM

Presenters: Zachary Toth, Jun Zheng

Mentors: Dawn De Vries, Neal Rogness, Susan Sunden

Bibliotherapy is a therapeutic intervention using books and literature to help individuals cope with and understand a variety of issues. Children who grow up with a sibling who has a disability (mental or physical) can develop complicated feelings, perhaps leading to isolation, depression, and many other negative emotions. In this study, our clients focused on how bibliotherapy might help children, ages 7-12, cope with having a sibling who has a disability. A survey of children's behavior was administered to parents both before and after three two-hour long sessions, over a six week period. Our role as statistical consultants was to explore relationships between bibliotherapy and improved mental states of these children. In addition, we will share what we learned about being effective statistical consultants.

KIRKHOF CENTER GRR 123

Comparison of Albuterol and Aromatherapy Treatment in Adolescents with Asthma

Participants attending 9:00 AM - 10:00 AM

Presenter: Mackenzie Ritchie

Mentor: Julia VanderMolen

Objective: This systematic review examines effects of Albuterol compared to aromatherapy on adolescent children with asthma. We also came across other comparative and alternative medicine that help significantly with those with asthma symptoms. Methods: The articles were extracted from ProQuest Medical, Academic Search Premier, and CINAHL. Inclusions were full text available, peer-reviewed, both males and females, and published in English. Exclusions were in languages other than English and articles where adolescents were not the main focus. Results: Although Albuterol as an inhaler is the most common steroid used for asthma these other alternative aromatherapy methods have proven to help as well. Conclusion: Albuterol medicine has the greatest significance when pair with additional medications. Aromatherapy has also shown to be effective in decreasing asthma symptoms. Future research in comparing Albuterol to aromatherapy directly is still needed to truly see how they compare.

KIRKHOF CENTER GRR 124

Proposed Curriculum for Sustainable Tourism and Social Media

Participants attending 9:00 AM - 10:00 AM

Presenter: Sofia Martinez

Mentor: Lorie Tuma

When hospitality and tourism management students are asked to express their personal philosophies of sustainable tourism, their convictions are clear: Most are advocates of the environment who are willing to adopt new and sustainable practices that protect the planet, and they believe that to travel the world responsibly makes them more cultured, knowledgeable, and diverse. When the same group of digital, highly informed students are asked whether social media can be used to demonstrate their personal philosophies of sustainable tourism, raise awareness, and promote critical thinking about sustainability practices, they believe that this also can be done, but they are unsure how to proceed. This project identified disparities between sustainable tourism practices and the construct of social media content as a disseminator of hypertargeted information. Three rounds of questioning of student participants were used to reach a consensus on the criteria for the proposed curriculum.

KIRKHOF CENTER GRR 125

An Updated Study of Bone Landmarks and Muscle Mass Associations in Non-Human Primates

Participants attending 12:00 PM - 1:00 PM

Presenter: Haley Schaner

Mentor: Melissa Tallman

The goal of this project is to show the possible correlation between bone structure and muscle mass in non-human primates. Data, including muscle length and mass, were collected via the dissection of various species of non-human primates. The bones were cleaned and laser surface scanned to construct a three dimensional image of the bone. These scans were analyzed by identifying and marking the bony landmarks and other distinguishing features. For each bone for every individual, the right and left bones were averaged together to exclude any size variations. In addition, the muscle masses were averaged using the geometric means to exclude variations between individuals due to the size of the animal. The bone landmarks were compared to the corresponding muscle masses to establish a possible correlation between them. The goal is to see a correlation between larger bone landmarks and larger muscles which will theoretically indicate that the individual exerts movements with a greater force.

KIRKHOF CENTER GRR 126

Female Protagonists In Mainstream Broadcast Television Today

Participants attending 9:00 AM - 10:00 AM

Presenter: Elizabeth Finley

Mentor: Cael Keegan

Increased female representation over the decades has created the appearance of gender equality on television and overshadowed the ever-present gender roles, traditional female expectations and racial stereotypes women experience as protagonists on television. Using textual analysis and content analysis the percent of female protagonists in comparison to male protagonist is established in addition to racial stereotypes the females may face, how many of these females are portrayed in stereotypical female roles including the nurturer/caretaker role and how many of these females are shown as codependent on male counterparts.

KIRKHOF CENTER GRR 127

Clinical Efficacy of Erythromycin as a Prokinetic Agent

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenters: Johanna Squires, Jody-Leigh Steyn, John Wesley

Mentor: Francis Sylvester

The purpose of this study is to compare the efficacy of the prokinetic side effects of Erythromycin to that of Metoclopramide. Metoclopramide is a prescription prokinetic agent used to treat gastroparesis. Studies have shown that low-dose amounts of Erythromycin can have prokinetic side effects on the gastrointestinal tract. As such, the efficacy of Erythromycin as a prokinetic agent can be compared to Metoclopramide at clinical dosages. Approximately 1.0 cm segments of porcine intestine were mounted in isolated organ baths coupled to force transducers. Serial doses of potassium chloride, Erythromycin and Metoclopramide were independently added to the organ baths at a ratio between 0.5mg and 3mg per 1kg of porcine tissue. The subsequent amount and rate of change in contractile tension were then recorded. Further studies will be performed to determine if Erythromycin is more effective than Metoclopramide as a prokinetic agent, and the clinical benefits and risks will be assessed.

KIRKHOF CENTER GRR 128

Investigating the Causes of Fire Alarms in Student Housing on the GVSU Allendale Campus: A Statistical Consulting Experience

Participants attending 9:00 AM - 10:00 AM

Presenters: Steven Warda, Dominic Zuelch

Mentors: David Cox, Neal Rogness

David Cox and fellow staff members of the GVSU Facilities Services Department organized a database detailing fire alarm incidents in residential housing units on the Allendale campus over the past two years. One focus of the study involved identifying the most prevalent causes of fire alarms as a method of communicating appropriate preventative strategies to GVSU students living on campus. Their study specifically focused on the frequency and location of fire alarms set off by stovetops. Such information was desired as a way to target a housing building that could take part in a pilot program where a new stovetop type would be introduced. As statistical consultants, our role was to organize and present the data in such a way that could help the staff in the Facilities Department construct appropriate future programs in the goal of reducing the number of residential fire alarms.

KIRKHOF CENTER GRR 129

Quality of Life for Individuals Treating ALS with Riluzole

Participants attending 9:00 AM - 10:00 AM

Presenters: Travis Johnson, Victoria Morris

Mentor: Julia VanderMolen

This systematic review analyzes the impact of riluzole on quality of life in individuals with amyotrophic lateral sclerosis (ALS). Although riluzole has been clinically proven to prolong the expected lifespan of ALS patients, factors such as age, gender, and onset of ALS also influence perspectives on their quality of life. Riluzole increases life expectancy by extending the lifespan of motor neurons (Jablonski et al., 2014). As the disease progresses, patients' quality of life diminishes due to pain and lack of motor function. Riluzole doesn't reverse symptoms of ALS, it only prolongs motor function which deteriorates over time (Shamshiri et al., 2016). Riluzole is a temporary remedy to improve quality of life in ALS patients. Although symptomatic treatments exist, riluzole can't eliminate motor deficiencies from ALS. It cannot definitively improve the quality of life.

KIRKHOF CENTER GRR 130

Effects of microRNA 34b/c in SH-SY5Y Cells for Parkinson's Disease Study

Participants attending 2:00 PM - 3:00 PM

Presenter: Emma Hahs

Mentor: Sok Kean Khoo

Parkinson's disease (PD) is a neurodegenerative disorder with no cure. The hallmark of PD is the aggregation of alpha synuclein (aSyn) proteins in the neurons in the form of Lewy bodies and Lewy

neurites. Thus, developing new drug therapies that block aSyn aggregation could potentially stop the disease progression. MicroRNAs (miRNAs) are small RNAs that regulate gene expression. miRNA-34b and 34c are predicted targets for aSyn and are shown to be down-regulated in PD brains. We found miR-34b/c expression downregulated in rotenone treated cells that mimic PD when compared with non-treated control. However, aSyn expression was not upregulated in rotenone treated cells as expected. One possible explanation is that aSyn formed aggregates, deterring aSyn qRT-PCR probe to bind efficiently for its gene expression study. We will continue to establish the feasibility of this study to apply miRNA mimics/inhibitors to this cell model to investigate miR-34b/c effects on aSyn protein aggregation.

KIRKHOF CENTER GRR 131

Nutritional Analysis of GVSU-Managed Honey Bee Colonies

Participants attending 11:00 AM - 12:00 PM

Presenter: Emily Noordyke

Mentor: Anne Marie Fauvel

Managed honey bee colonies are in significant decline worldwide. The interaction between poor nutrition, pests and diseases, and pesticide use are most cited as potential culprits for the precarious state of the beekeeping industry. By evaluating food coming into the hive, conclusions can be drawn about the quality of hive location and forage availability. Pollen from an apiary with historically low honey production and poor colony health was compared to pollen from an apiary with high honey production and good colony health. Pollen was collected weekly in a 24-hour period, hive weight was monitored, and colonies were assessed for overall growth and health. There was no significant difference in pollen diversity or crude protein content between the study sites; however, there was a significant difference in the quantity of pollen collected. Colony production was also comparable.

KIRKHOF CENTER GRR 132

Acculturation of Mexican Immigrants and the Prevalence of NAFLD: A Review

Participants attending 4:00 PM - 5:00 PM

Presenter: Claudia Rivera-Salas

Mentor: Lori Houghton-Rahrig PhD RN

Negative acculturation occurs in immigrant residents in the United States over time and can lead to developing diseases linked to nonalcoholic fatty liver disease (NAFLD). Social and genetic predispositions of Mexican immigrant (MI) populations may show a higher prevalence of NAFLD development as compared to never-immigrant Mexicans and Mexican-Americans. An electronic

literature search used terms: nonalcoholic fatty liver disease, non alcoholic fatty liver disease, non-alcoholic fatty liver disease, nafld, Mexican immigrant, resulting in 245 articles from CINAHL, 94 results from Google Scholar, and no results from Pubmed. Inclusion criteria: adults born in Mexico and living in the U.S. No studies were found relating MIs in the U.S. with NAFLD. Articles were found about Latino or Hispanic immigrants with NAFLD and MIs with NAFLD-linked diseases. Findings suggest that MIs have an increased risk of NAFLD-related diseases which may mean higher prevalence of NAFLD than previously thought.

KIRKHOF CENTER GRR 133

Shotgun!: Investigating Fully Autonomous Intersection Navigation

Participants attending 3:00 PM - 4:00 PM

Presenter: Troy Madsen

Mentor: Jared Moore

Current traffic intersection flow models involve stopping vehicles, either through a stop sign or electronic signal. Drivers make the decision about when to go based on traffic rules or signal state. With the rise of autonomous vehicles, traditional traffic flow mechanisms may be replaced by supervised planning, or fully autonomous decision making onboard the vehicle itself. We investigate the feasibility of a fully distributed decision system, leaving traffic management to individual vehicles through onboard decision-making in a simulated environment. The model is compared to three others: a traditional traffic light, a four way stop sign, and no decision making or sensors. We evaluate performance based on the ability of a system to clear different volumes of vehicles through the intersection, how the system deals with vehicles building up during higher volumes of traffic, and how well the system controls vehicles to avoid unintended intervehicle interactions (UII or collisions).

KIRKHOF CENTER GRR 134

Determining the Role of the Amino Terminal Portion of the Light Regulating BTB E3 Ligase in *Arabidopsis thaliana*

Participants attending 9:00 AM - 10:00 AM

Presenter: Aaron Orellana

Mentor: Matthew Christians

Plant growth and development is controlled by the different wavelengths in the electromagnetic spectrum. Phytochrome B, a red and far-red light photoreceptor, plays an integral role in shade avoidance and flowering time. Proper degradation of this photoreceptor is crucial to the function of these processes and occurs via the ubiquitin-proteasome system. The light regulating Bric-a-Brac/Tramtrack/Broad Complex (LRB) protein is a component of an E3 ligase complex which

facilitates the attachment of ubiquitin to phytochrome B. Preliminary research has revealed a highly conserved region of the LRB protein near its N-terminus which may function in controlling rubylation. A truncated version of the LRB gene missing this region was inserted into a wild type and *lrb1 lrb2* double mutant *Arabidopsis thaliana*. Phenotypic and immunoblot analysis of homozygous lines featuring the truncated LRBs suggest that the N-terminal region may play a role in their function.

KIRKHOF CENTER GRR 135

Relief Index Applied to Balta Community

Participants attending 10:00 AM - 11:00 AM

Presenter: Christopher Coles

Mentor: Laura Stroik

An important aspect of paleoecological reconstructions of extinct mammal communities is the dietary preferences of individual species. In order to infer dietary behaviors from the fossil record, it is first essential to evaluate the diet-dentition relationship in related living species to establish a baseline for fossil comparisons. In recent studies, relief index (RFI) measured on molars has been shown to differentiate diets in primates and related species. This study aimed to further explore the RFI measurement and its effectiveness in analyzing dietary patterns in different types of mammals. The relief index of mammals (N=20) with known dietary patterns across the Balta, Peru community was evaluated. Results indicated that mammals with diets consisting primarily of insects and some fruit had higher RFI values than those that consumed mostly fruit and nectar. These data provide further evidence that RFI is a useful measurement to determine dietary patterns in extinct species.

KIRKHOF CENTER GRR 136

Accuracy of the Fitbit Alta and Apple Watch in Measuring Caloric Expenditure and Step Count

Participants attending 10:00 AM - 11:00 AM, 3:00 PM - 4:00 PM

Presenters: Bailey Fisette, Ryan Gard, Ryan McElroy, Austin Miller, Rebekah Westoby

Mentor: Kimbo Yee

Background: Consumer-based physical activity monitors are popularly used to track physical activity-related variables; however, there is a limited amount of research examining the accuracy of physical activity monitors to measure caloric expenditure and step count in comparison to criterion standards. Purpose: To examine the validity of the Fitbit Alta and Apple Watch for estimating caloric expenditure and step count during a single bout of walking. Methods: College-age students participated in a structured exercise protocol consisting of walking for 5 minutes at 3.5 mph on a treadmill. Each subject wore the Fitbit Alta and Apple Watch on their non-dominant wrists during

the exercise protocol. The validity of the caloric expenditure and step count were evaluated relative to indirect calorimetry and researcher counted steps, which served as the criterion measures for caloric expenditure and step counts, respectively. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 137

Using GIS and Historic Mapping to Analyze Grand River Changes Over the Past 100 Years

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenters: Adam Canute, Samuel DeYoung, Jaren Miller

Mentor: Peter Wampler

The Grand River flows 406 kilometers from its headwaters to Lake Michigan. The Grand River has historically been dredged and modified to facilitate navigation downstream from Grand Rapids. A set of historic bathymetry maps created in 1906 were obtained from the Grand Rapids Public Museum Community Archive and Research Center. The original maps, consisting of 19 separate sheets at a 1" = 200' scale, were scanned at 300 dpi and compiled. Maps were georeferenced to present-day landmarks, such as road crossings, railroads, and bridges. These maps contain about 12,000 depth sounding points. Soundings were done at a roughly 7 meter spacing across the river and approximately 60 meter intervals along the river. Map data will be analyzed using ArcMap 10.3 and 3D Analyst to interpolate elevations and create a digital terrain model to visualize depth change. Changes between historic and modern depths will be used to evaluate human-induced and natural changes.

KIRKHOF CENTER GRR 138

Variations in Spontaneous Activity and Stimulated Reflexes in Hdc Mutant *Drosophila* after Decapitation

Participants attending 1:00 PM - 2:00 PM

Presenter: Caroline Poirier

Mentor: Martin Burg

While the function of histamine in photoreceptors has been well documented in *Drosophila*, causing a hyperpolarizing effect in the target cells, less is known of the role histamine plays in the central nervous system. The enzyme histidine decarboxylase, which synthesizes histamine, is encoded by the *Hdc* gene of *Drosophila*. To better understand the role of histamine in regulating CNS function, spontaneous activity and elicited reflex responses of both decapitated normal and Hdc^{JK910} mutant flies lacking histamine were compared. The Hdc^{JK910} flies displayed an increase in spontaneous reflex activity after decapitation. This suggests that absence of histamine may remove an inhibitory effect of histamine in the CNS. Additionally, we have found that reflex responses in Hdc^{JK910} flies

are different when stimulating individual bristles, suggesting that histamine absence may also affect neural pathways underlying the reflex tested.

KIRKHOF CENTER GRR 139

Telomeres as Biologic Currency: Why Those with Older Fathers May Have a Greater Inheritance

Participants attending 3:00 PM - 4:00 PM, 4:00 PM - 5:00 PM

Presenter: Jonathon Richards

Mentor: Georgette Sass

Heterochromatin is densely structured DNA localized at centromeric and telomeric regions. Inheritance of telomeric silencing on nearby genes, telomere position effect (TPE) is of interest along with the role telomere length (TL) has on longevity in *Drosophila melanogaster*. We proposed that telomere maintenance mechanisms in spermatogenesis influence inheritance of telomere structure and length and that a paternal-age effect increases longevity of those inheriting extended telomeres from older males. Utilizing a telomeric reporter in a UAS/GAL4 ectopic expression system, we visualized TPE inheritance. We found changes in TPE in flies whose father expresses the GAL4 and UAS insert within TART and TAHRE regions of a *Drosophila* telomere. Also, we found that inheritance of long-lived phenotypes, due to TL, is likely confounded by genetic variations inherent in a population. These data combined demonstrate that telomere states and lengths are heritable, though the system is complex.

KIRKHOF CENTER GRR 140

A Data Driven Analysis Into the Consequences of Permafrost Melt in Northern Alaska

Participants attending 9:00 AM - 10:00 AM

Presenters: Joshua Catalano, Matthew Della Mora, Daniel Tjapkes

Mentor: Elena Lioubimtseva

This study seeks to determine the consequences of permafrost melt in the territory of northern Alaska, and its impact on global greenhouse gas concentrations. Analysis was conducted on a gradation of partial melt scenarios and their controlling factors, as well as the possibility of a runaway positive feedback mechanism leading to full melt. Satellite images, topographic maps, and several climate impact factors were correlated in this analysis. The extent to which increased photosynthetic potential can act to negate the resultant CO₂ emissions was evaluated as a potential negative feedback mechanism. Surficial terrane changes due to ground subsidence were explored as a potential long lasting consequence of melt in the area. Future emissions and concentrations of greenhouse gasses were modeled using several policy scenarios on MAGICC/

SCENGEN and compared against current policy. Temperature predictions made by these models were used to approximate rates of melt in the future.

KIRKHOF CENTER GRR 141

The Cause of Deformation in the Point Pleasant Formation, Northern Kentucky

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 1:00 PM - 2:00 PM, 3:00 PM - 4:00 PM

Presenters: Connor Cain, Michael Cleve, Sierra Nakano, Amy Tiemeyer

Mentor: Peter Riemersma

The mystery of how the deformation occurred at the Point Pleasant formation has been hotly debated among researchers. The deformed unit of the formation is a grainstone which has lamination near the top that is tightly folded. It is, as a whole, missing any of the large shell fragments which are located in the surrounding limestone beds. The deformation is believed to have been the product of either debris flows or turbidites triggered from downslope sliding in an ancient marine environment, which may be the result of several earthquakes that occurred in the late Ordovician. One key observation from an outcrop which may support a debris flow origin is the presence of floating clasts in matrix. For turbidites to be the cause there should be graded bedding present. To help solve the puzzle of what caused the deformation and its extent, analysis of hand samples, thin sections, and outcrop inspection of the Point Pleasant Formation hold the key to unravel this geological mystery.

KIRKHOF CENTER GRR 142

Grand Rapids White Water

Participants attending 2:00 PM - 3:00 PM

Presenters: Kylee Galer, Kyle Nishek, James Reed, Austin Tucker

Mentor: Lisa Sisson

Grand Rapids Whitewater is a not-for-profit organization formed to lead revitalization of the River and restoration of the rapids in the 2-1/2 mile stretch running through downtown. Our goal was to research and create an understanding of the existing rules and regulations, recommendations of needed ordinances or policies and who is responsible for them, an assessment of the gaps and how they were determined, and anticipated challenges of both adopting new rules and regulations and the enforcement of them in regards to new recreational opportunities on the Grand River.

KIRKHOF CENTER GRR 143

The Role of Emotion in Social Change: The French Revolution

Participants attending 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 4:00 PM - 5:00 PM

Presenter: Nicholaas Zomer

Mentor: David Eick

In this research project we examined the effects of social and emotional reactions/atmospheres during the late 18th century as it relates to the French Revolution and social change as a whole. A social science framework was used throughout this project, with additional research from leading sociologists such as William Reddy, Frank Kaffker and Sarah Maza. In regards to findings: various links were found between emotions and social change, and specific reactions and occurrences throughout the time period are also cited in regards to how the social environment during the time period affected them.

KIRKHOF CENTER GRR 144

Star Wars Art and Music Event

Participants attending 10:00 AM - 11:00 AM

Presenters: Catrice Conover, Kristopher Elam, Breana Ganton, Marissa Herring, Morgan Matthews

Mentor: Lisa Sisson

For our Hospitality and Tourism Management Capstone project we are partnering with the Harris Building to create an event that showcases Star Wars through art and music. The Art & Technology Hub is a multi-purpose center and art gallery located on Division Street in downtown Grand Rapids. Star Wars interests a large demographic, allowing our group to expand our event over three days, catering to Star Wars fanatics of all ages. Our goal is to involve the community while giving back. We want to explore the ideas of art and music and how they play a role in our Grand Rapids community and in this timeless series. For the event we established a budget, timeline, sold tickets, marketed the event, and contacted local media outlets and sponsors. Overall, this multiple day event will showcase local music and local artists, while focusing on the culture surrounding Star Wars.

KIRKHOF CENTER GRR 145

The Acute Effects of Infuze Pre-workout on Wingate Test Performance in Women

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM

Presenters: Kelcie Beck, Caitlin Carey, Cassidy Horvath, Morgan Hungerford, Molly Marlatt

Mentor: Kimbo Yee

Background: Previous studies regarding pre-workout supplement ingestion have reported

enhanced performance, shorten reaction time, improved strength and power, and delayed fatigue. It is unknown if pre-workout consumptions improves performance on the common anaerobic lab test, the Wingate Test (WAnT). Purpose: The purpose of this study was to examine the effects of Infuze pre-workout supplement on WAnT performance in college-aged women. Methods: College-aged women participated in an acute, randomized, crossover study. Participants refrained from any caffeine consumption or exercise for 8 hours prior to testing. Subjects performed the WAnT on 2 separate visits, 1 week apart. For the pre-workout visit, subjects consumed 1 serving size of Infuze pre-workout 30 minutes before completing the WAnT. On the control visit, no pre-workout was consumed prior to completing the WAnT. Peak power and mean power were recorded for each test. Results: Data will be presented at SSD.

KIRKHOF CENTER GRR 146

A Slow Experiment for Ultrafast Detection

Participants attending 12:00 PM - 1:00 PM, 2:00 PM - 3:00 PM, 3:00 PM - 4:00 PM

Presenter: Jacob Lindale

Mentor: Stephanie Schaertel

Can a traditional Fourier Transform Infrared (FTIR) spectrometer be used for ultrafast detection of molecular events? This poster will present theoretical and experimental progress towards answering this question. Other spectroscopists have used expensive and complex techniques to measure ultrafast dephasing times, telling the tale of molecular-level interactions on short time scales. We explore whether similar information can be obtained from a relatively inexpensive commercial instrument - the FTIR spectrometer. A new theoretical formalism is presented for understanding FTIR spectroscopy as a non-linear optical technique capable of yielding sub-picosecond time resolution.

KIRKHOF CENTER GRR 147

Cyclical Deposition in the Late Ordovician Kope Formation in Kentucky, USA.

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM, 12:00 PM - 1:00 PM, 2:00 PM - 3:00 PM

Presenters: Nicholas Brown, Adam Canute, Jory VanEss

Mentor: Peter Riemersma

The cause of cyclicity of limestone-shale in the Ordovician Kope Formation has baffled scientists for years, specifically the formation of the fossiliferous limestones. Kope Formation is composed primarily of shale (75%), but has interbedded limestones present (25%). As part of our study we will compare outcrop data to the regional stratigraphy of the Kope in the literature. Using hand samples

and thin sections to reconstruct the conditions under which fossiliferous layers formed, and with literary analysis of the formation, we can compare possible mechanisms for cyclicity. Alternation between mud and shelly deposits can be explained by several proposed theories, such as storm winnowing, variation in sediment supply, or changes in sea level. The aforementioned theories can be further explained by processes such as tectonic uplift and Milankovitch cycles.

KIRKHOF CENTER GRR 148

Fluorescence and Crystallographic Analysis of BshC Ligand Binding

Participants attending 10:00 AM - 11:00 AM, 11:00 AM - 12:00 PM

Presenter: Aaron Rosenberg

Mentor: Paul Cook

Bacillithiol is a compound found in Gram-positive bacteria that is responsible for redox homeostasis, detoxification of reactive oxygen species, and deactivation of electrophilic agents, such as the antibiotic fosfomycin. BshC is a cysteine ligase in the putative three enzyme bacillithiol biosynthesis pathway. While BshA and BshB enzymatic functions have been observed through *in vitro* assays, BshC activity has not. BshC has been expressed and purified from a number of orthologs including *Bacillus cereus* and *Staphylococcus saprophyticus*. To identify ligands that bind to BshC, intrinsic tryptophan fluorescence assays were utilized. The fluorescence binding assays yielded results that implicate that BshC binds ATP and citrate. X-ray crystallographic results have shown *Bacillus subtilis* BshC binding AMP or ADP in the secondary binding pocket. Considering the results of these assays thus far, we hope to advance our understanding of BshC function to combat fosfomycin resistant bacteria.

KIRKHOF CENTER GRR 149

Variation of the Antebrachial Flexors as Observed in Dissected Cadavers

Participants attending 9:00 AM - 10:00 AM

Presenter: Brian Cutler

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

During the dissection of a 91-year old female cadaver, the bilateral absence of palmaris longus was observed. The prevalence of such absence can range from 1.5% to 63.9%. Other variations in the appearance of the muscle include being agenetic, doubled, tendinous, split, incomplete, digastric, or exhibiting anomalous insertions. The dissection of a 65-year old male cadaver revealed a supernumerary muscle belly of the flexor digitorum superficialis (FDS). Other possible abnormalities include doubling of the tendon, tendon insertion anomalies, or additional muscle slips. This project aims to examine the developmental background of such abnormalities in the muscles of the antebrachium and the possible causes for their frequency.

KIRKHOF CENTER GRR 150

The Missing Links: Grand Valley's Gender-Inclusive Housing Policy

Participants attending 11:00 AM - 12:00 PM

Presenter: Chelsea Ortiz

Mentor: Cael Keegan

This research critically analyses Grand Valley State University's gender-inclusive housing policy. The goal of this research is to find the missing links over the years between the policy and students' needs by looking at past GVSU climate surveys, student activism, committee meeting minutes, and the gender-inclusive housing proposal.

KIRKHOF CENTER GRR 151

Engineering Social Evolution in Bacteria, 2.0

Participants attending 2:00 PM - 3:00 PM

Presenters: Jillian Green, Abigail Simons-Scalise

Mentors: M. Aaron Baxter, Douglas Graham

Evolutionary theory predicts that within a population of individuals cooperating to produce a common resource, 'cheats' will arise that benefit from the common resource without contributing to its production. We set out to engineer such a system using *Photobacterium luminescens*, a bacterial symbiont of the insect-pathogenic nematode *Heterorhabditis bacteriophora*. *P. luminescens* cells cooperate to kill an insect host by secreting digestive enzymes and toxins, thereby supporting the growth of multiple bacterial generations inside the insect cadaver. An early goal of this study is to create a 'cheater' strain of *P. luminescens* lacking a large 9 kb toxin gene, *mcf1* (makes caterpillars floppy). This gene is metabolically expensive to transcribe, translate and secrete. Cells that don't expend the metabolic energy will be at a competitive advantage when growing in insect tissue. This poster details the steps we are taking to create the $\Delta mcf1$ strain.

KIRKHOF CENTER GRR 152

Evaluation of DNA Preservation in Water Samples from Rural Haiti Using PCR

Participants attending 12:00 PM - 1:00 PM, 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenter: Melanie Edwards

Mentors: Margaret Dietrich, Roderick Morgan, Peter Wampler

Over 1.8 billion people worldwide are expected to drink contaminated water annually. Nearly 3.6 million, half being children, die from diseases contracted from this water. Contamination is widespread in Haiti, but the source of the *E. coli* contamination is unclear. Before DNA analyses

can be used to determine the source, samples must be successfully preserved and transported for testing. Five different preservation methods were done on water samples from different sites in Haiti. DNA extraction, PCR, and agarose gel electrophoresis were performed on these samples to define a minimum and maximum DNA template volume resulting in an *E. coli*-specific PCR product. This range will be used to compare *E. coli* abundance among multiple sites. Freezing is a successful method; however, it may not always be viable. Therefore we are now analyzing the additional preserved samples. Once a feasible method is identified, PCR will be used to determine if the *E.coli* is from human or animal sources.

KIRKHOF CENTER GRR 153

Small Scale Structures and Polarization in Butterflies

Participants attending 10:00 AM - 11:00 AM

Presenter: DaiLynn Dietz

Mentor: Benjamin Holder

Some butterflies have scales on their wings that dim under the rotation of a polarizing filter, suggesting that the wings polarize incident light by reflection. Several butterfly species that exhibit this polarization of light have a micro-scale ridge structure. In a project that combines theoretical and experimental techniques, we investigate whether these properties of the scales could be responsible for the observed polarization. We explore the theoretical physics behind polarization by reflection. We also use a scanning electron microscope to obtain images of the micro-scale ridges after quantifying the polarizing effect of a sample of scales. Finally, we analyze the structures seen in one set of scales compared to the structures of other polarization sensitive butterfly scales. This comparison is done by creating a model which is a simplified representation of the optical system that we apply the derived equations to.

KIRKHOF CENTER GRR 154

A Systematic Review of Accelerometers and Their Diagnostic Capabilities of Detecting Concussive Forces on Football Players

Participants attending 2:00 PM - 3:00 PM

Presenter: Katie Putnam

Mentor: Brian Hatzel

Objective: To determine if accelerometers are effective tools in detecting forces leading to concussion. Data Sources: Literature searches were conducted using PubMed and SportDiscus databases. Study Selection: Sources initially yielded 125 results. The next search yielded 25 results. 10 articles were clinically significant of use. Data Synthesis: Among the studies included there is a discrepancy of up to 5% among the accelerometers used. Inter and Intra reliability

among the testers differed to cause a 5% discrepancy. An athlete can sustain a concussion from a range of 65g up to 165g of force. Conclusion: The position of the athlete plays a major part in where the athlete receives the impact. The validity and reliability of the accelerometers are questionable. Practical Application: While the data can tell us how much force a player received, there are many modifying factors that can initiate a concussion besides just the force itself and each case should be handled accordingly.

KIRKHOF CENTER GRR 155

The Experiences of Black/African-American Identified Women's Transition into Grand Valley State University, a Predominantly White Educational Institution

Participants attending 12:00 PM - 1:00 PM

Presenter: Emnet Woldemicael

Mentors: Cael Keegan, Leifa Mayers

Methodological approach to this research is interviews of about 8 Black/African-American identified women that are in student organizations exhibiting their missions in empowering and providing inclusiveness, community and sisterhood/sibling-hood. The interviews consist of 15 open-ended questions themed in categories (1) Expectations (2) Transitioning to University Life (3) Lived Experiences (4) Support Systems and (5) Relationship Dynamics. The theoretical approach to analyze data uses intersectionality, Black feminist theory and critical race theory. The analytic approach uses thematic analysis centered on identity categories in a case study format. The importance of this research is looking to address what the organizations the women are in do for their experiences as well as addressing the gap in literature not magnifying the plethora of nuanced complex experiences.

KIRKHOF CENTER GRR 156

Reconnecting Veiled Minds Through Music: A Qualitative Analysis

Participants attending 3:00 PM - 4:00 PM

Presenter: Shelby Gird

Mentor: Cindy Beel-Bates

Purpose: Evaluate the effectiveness of a volunteer training and satisfaction with the volunteer experience with a quality improvement initiative at Allendale Nursing Home and Rehabilitation (ANHR). The training consists of becoming a "dementia friend", a tour of ANHR, and orientation to the volunteer role of using individualized music with residents. Volunteers distribute loaded iPod shuffles and build relationships by sharing memories with residents that the music elicits. Music & Memory Inc. is an evidence-based successful non-pharmacological model that improves the

lives of persons with dementia. The goal of this project is to create a satisfying volunteer training and experience so they will continue in the future, recruit their friends, and facilitate the program's growth and sustainability. Volunteers will be surveyed to determine their satisfaction with the orientation and the experience so improvements can be made.

KIRKHOF CENTER GRR 157

ICU Liberation: Clinical Implications for Nurses

Participants attending 3:00 PM - 4:00 PM

Presenter: Cody Brainard

Mentor: Lori Houghton-Rahrig PhD RN

ICU liberation is a process used to improve health outcomes in ventilated patients who are in critical condition. It helps to decrease hospital length of stay, the incidence of ICU delirium, and pain in patients. The purpose of this literature review was to identify and determine the effectiveness of strategies used for ICU liberation. The CINAHL, PubMed, and Google Scholar databases were used with the search terms "ICU liberation," "ABCDEF bundle," "pain, agitation, delirium," and "ventilator weaning." Two methods of delivery were found: PAD and ABCDEF. The pain, agitation, and delirium (PAD) program assesses these three things routinely in the ICU and has a clinical decision tree to help treat symptoms associated with these issues. The ABCDEF bundle is more comprehensive. It includes pain, agitation, and delirium along with physical activity, family involvement, and ventilator weaning. Preliminary review of the literature has shown that ICU liberation improves health outcomes.

KIRKHOF CENTER GRR 158

A Survey of Positive Behavioral Supports in Juvenile Residential Facilities

Participants attending 11:00 AM - 12:00 PM

Presenter: Erin Veltman

Mentor: Dawn De Vries

This senior project for the Fredrick Meijer Honors College is a survey conducted of juvenile residential/detention facilities. The purpose of this survey is to understand the effects of positive behavioral support systems in juvenile residential/detention facilities. The behavioral management systems each facility uses was surveyed to understand if they utilized a positive behavioral support system, the impact the behavioral management system has had, and areas of improvement needed in each facilities behavioral management system.

KIRKHOF CENTER GRR 159

The Use of Extraction and Luminescence Techniques for the Recovery and

Recycling of Lanthanide and Actinide Metals from Spent Nuclear Fuel

Participants attending 11:00 AM - 12:00 PM

Presenters: Michael Hudson, Hunter Pearson

Mentor: Shannon Biros

Rare earth elements are extremely important in modern technology; end-of-life product recycling using coordination chemistry has proven to be an efficient recycling method for these elements. The goal of this project is to develop a new method for the recovery of lanthanides and actinides from spent nuclear fuel using extraction and luminescence techniques. Our research focuses on enhancing the selectivity for one type of lanthanide or actinide metal cation over another, based on ionic size. Multiple organic compounds will be prepared over the course of this project, and will be tested for their ability to recover Th-232, Eu-151, and $^{235}\text{UO}_2^{2+}$ from acidic water (to mimic the conditions of spent nuclear fuel). We predict that an increase in the percent extraction of Th-232 and $^{235}\text{UO}_2^{2+}$ will be demonstrated in our experiment. Improved methods for the recovery of Th-232 and $^{235}\text{UO}_2^{2+}$ could lead to its reuse as a nuclear energy source in nuclear reactors.

KIRKHOF CENTER GRR 160

Calcaneal Variations in Old World Primates

Participants attending 9:00 AM - 10:00 AM, 1:00 PM - 2:00 PM

Presenter: Tylar Dickson

Mentor: Melissa Tallman

The calcaneus is a bone in the foot that is imperative for the locomotion of humans and primates. From an evolutionary perspective, variation of this bone may be correlated with primate taxonomy and mobility. This research assessed the morphological diversity in old world monkeys using computational analysis techniques, specifically focusing on the calcaneus. With Landmark, a computer program that describes the anatomy of bones with individual landmarks, the shapes of various calcanei were able to be collected from 3-D surface scans of numerous primates. From there, a Procrustes analysis will be run on the entire set to statistically compare their shapes. The completion of this study will help in determining whether monkeys can be sorted taxonomically based on their calcaneus.

KIRKHOF CENTER GRR 161

Geospatial Analyses of Lowell's Page Creek Watershed Stormwater Pollution and Solutions

Participants attending 12:00 PM - 1:00 PM

Presenters: Matthew Allen, Connor Dailey

Mentor: Kin Ma

The Page Creek Watershed drains fifty square miles of land north of the City of Lowell, Michigan within the Flat River Watershed. The sub-watershed is predominantly composed of agriculture, wetlands, and public land, as well commercial and residential real estate. Due to the makeup of the region there is a high risk for nonpoint source pollutants, consisting of waste, sediment, and nutrients, reaching the waterways through stormwater. This project uses ArcGIS and pre-existing datasets to map soils, topography, and land cover in order to determine high risk areas contributing to the polluted stormwater runoff, which is detrimental to the water quality of the region. The final map products will highlight these areas of water pollution concerns using GIS, as well as display the steps for mitigation of stormwater pollutants through Best Management Practices (BMP).

KIRKHOF CENTER GRR 162

Effects of Moderate Intensity Exercise on Reaction Time

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM, 4:00 PM - 5:00 PM

Presenters: Wyatt Mead, Laura Sowatsky

Mentor: Amy Gyorkos

Brisswalter et al. (1995) suggested that a moderate pedaling speed on a cycle ergometer showed significant improvements in reaction time when participants remained within the optimal zone of arousal. However, debate still exists concerning the effects of exercise on reaction time. This current study attempted to determine if moderate intensity aerobic exercise can influence reaction time in moderately active college students. Reaction time was measured using three different tests before and after exercise. Participants were instructed to pedal on a cycle ergometer for 30 minutes at moderate intensity based on heart rate. Results showed that moderate physical activity did have a significant effect on Quickstick reaction time and did not have a significant effect on the reaction time measures of the Encephalapp Stroop Test and Reflex Tester App. Further research needs to be done on various intensities and exercise fitness levels to determine the effects of exercise on reaction time.

KIRKHOF CENTER GRR 163

Neoadjuvant Treatment with BIBR1532 Inhibits Proliferation of Triple-Negative Breast Cancer Cells

Participants attending 9:00 AM - 10:00 AM

Presenter: Luke Pardy

Mentor: Osman Patel

Triple-Negative Breast Cancer (TNBC), the most aggressive form of breast cancer, represents about 15% of all breast cancer cases worldwide. There is no tailored therapy available for

TNBC and prognosis post-metastasis is very poor. Recently, interest in inhibition of the enzyme called telomerase, in the management of TNBC has increased. We evaluated the Adjuvant and Neoadjuvant effects of the anti-telomerase BIBR1532 with the taxane analog, Paclitaxel. In the initial (Neoadjuvant) experiment, MDA-MB-231 (TNBC) cells were supplemented with BIBR1532 (n=4) for 14 days, then exposed to Paclitaxel (n=4) for 7 days. In the second (Adjuvant) experiment, cells were primed with Paclitaxel for 7 days (n=4) prior to 14 days of BIBR1532 (n=4) therapy. Cell densities decreased by 25% ($p < 0.05$) and the number of senescent cells increased ($p < 0.05$) in the neoadjuvant setting. Our result demonstrates that neoadjuvant therapy with BIBR1532 does significantly decrease proliferation of TNBC cells.

KIRKHOF CENTER GRR 164

Reconstructing Deep Sea Calcite Dissolution Patterns Using the Size Normalized Shell Weights of *Neogloboquadrina dutertrei*

Participants attending 9:00 AM - 10:00 AM, 10:00 AM - 11:00 AM

Presenter: Cody Garnsey

Mentor: Figen Mekik

Carbonate ion concentration within the ocean is driven by atmospheric CO_2 concentration and a correlation is demonstrated in sedimentary records. Foraminera carbonate shell densities depend on the concentration of the CO_3^{2-} ion in seawater as forams use this ion to form their shells. Fossilization shells of forams can be used to map calcium carbonate dissolution within the sea which is driven by atmospheric CO_2 concentration. *Neogloboquadrina Dutertrei* shells were collected from various core top sample locations within the Eastern Equatorial Pacific (EEP) from sieving the sediment. Shell densities were calculated and plotted on a map of the EEP and contoured to show dissolution. Our contouring revealed a pattern of not only bottom water carbonate ion concentration, but also of surface ocean productivity. This supports the claim that organic carbon input from the surface ocean drives calcite dissolution in sediments even in regions shallower than the calcite saturation horizon.

KIRKHOF CENTER GRR 165

An Overview of Synthetic Routes and Characterization of Novel Phosphine Compounds for Use in Metal Complexation

Participants attending 9:00 AM - 10:00 AM, 3:00 PM - 4:00 PM

Presenters: Marissa Biesbrock, Trey Pankratz

Mentor: John Bender

Various phosphorus compounds with novel, local chemical environments were researched by CHM 477. They were synthesized and investigated for their potential to selectively bind transition-metals

and lanthanide metals from waste metal mixtures. The mono-phosphine compounds synthesized were *P*-selenido-(2-thienyl)diphenylphosphine and *P*-selenido-bis(2-thienyl)phenylphosphine. The di-phosphine compounds synthesized were *P*-sulfido-*P'*-selenido-bis(diphenylphosphino)methane and *P*-sulfido-*P'*-oxido-bis(diphenylphosphino)methane. The goal of this work is to utilize various synthetic pathways such as NMR tube reactions, solvent-free melt-reactions, catalytic routes and reaction mechanisms to obtain novel phosphine and di-phosphine compounds as well as useful organometallic compounds. Molecular structures are analyzed and confirmed through the GVSU High-Filed NMR facility.

KIRKHOF CENTER GRR 166

Neuroprotection in a 'Mixed' Retinal Culture System: Use of a Drug for Alzheimer's & Effect of Selective Nicotinic Receptor Blockers.

Participants attending 10:00 AM - 11:00 AM

Presenter: Grace Peterson

Mentor: David Linn

Glaucoma is a leading cause of blindness due to pressure-induced death of retinal ganglion cells. We have been examining whether a potential Alzheimer's drug (DMP 543) can increase ACh in the retina to activate acetylcholine (ACh) receptors to induce neuroprotective effects. The addition of DMP 543 was found to have a dose-dependent effect on the survival of ganglion cells in a dissociated, 'mixed' retinal cell culture, indicating the presence of cells induced by DMP 543 to increase the release of ACh and the survival of retinal neurons. We attempted to determine the identity of nicotinic ACh receptor(s) (nAChR) involved in increased survival. Positive allosteric modulators (PAMs) and selective antagonists for the $\alpha 7$ nAChR and the $\alpha 4\beta 2$ nAChR were used as evidence for the role of receptor subtypes activated by DMP 543. These experiments should allow us to determine which nAChR dominates in cell protection after exposure to DMP 543.

KIRKHOF CENTER GRR 168

The Effects of Climate Change on *Eriophorum triste*; an Arctic Graminoid Species

Participants attending 9:00 AM - 10:00 AM

Presenter: Katlyn Betway

Mentor: Robert Hollister

Arctic regions are expected to continue to warm as a result of climate change. This study focuses on the effects climate change will have on Arctic vegetation, specifically the plant species *Eriophorum triste*. A series of measurements taken from both control and experimentally warmed environments reveal that individuals green and flower earlier as well as grow faster in warmed

plots. These trends suggest that graminoid plant species such as *Eriophorum* may perform more favorably in response to climate change and these changes could have important ecological implications.

KIRKHOF CENTER GRR 169

Biorefinery: Biofuel Availability and Cost Efficiency in Muskegon, MI

Participants attending 1:00 PM - 2:00 PM

Presenter: Justin Bruno

Mentors: Erik Nordman, Wanxiao Sun

I am implementing the establishment of a green biorefinery on Muskegon Lake where a power plant has just recently stopped production. I will show the availability of suitable land in the immediate counties that could sustain biofuel sources. I will analyze the routes to areas of biofuel supplies to determine how easily the biorefinery can be accessed by roads. The model and maps will display my results using Geographic Information Systems (GIS). The research data is state and county owned roads, land cover image, imagery maps of Muskegon and Newaygo counties, and a base map respectively. I used a route cost analysis by coding roads as low or high resistance routes. I also used the measuring tool on major routes with a buffer zone around the plant as a reference. My findings will be that Muskegon and Newaygo counties have enough sources of biofuels to supply the refinery, based on available land cover and route analysis getting access to the land.

KIRKHOF CENTER GRR 170

Rising Political Tension in Syria and Turkey Due to Water Crisis

Participants attending 9:00 AM - 10:00 AM

Presenters: Maxwell Moler, Jennie Vereecken

Mentor: Elena Lioubimtseva

This project examines the impact climate change has on natural water sources in Turkey and Syria and the political tension it causes between these nations. This research anticipates how a water shortage could cause a resource war. Our focus is on the Euphrates, Tigris, and Orontes Rivers, as Turkey and Syria are riparians of these water sources. Our research draws upon Turkey's transboundary water policy, news and analysis from Assyrian International News Agency, the projected population, projected temperature. We are looking at access, conservation, and the future options to supply water as our main focus. The Southeastern Anatolia Project is helping Turkey create a more efficient water management system. These two countries will need financial and technical support from developed countries when creating a mitigation plan to keep the water equitable. A holistic approach is necessary to stop a war on water.

KIRKHOF CENTER GRR 171

Arctic Plant Response to Abiotic Factors in Northern Alaska

Participants attending 1:00 PM - 2:00 PM

Presenter: Ellen Audia

Mentor: Robert Hollister

Arctic plants play critical roles in ecological interactions, nutrient cycling, and energy balance. Given the pronounced documented warming in the Arctic it is important to anticipate the effects of climate change on such systems. Therefore the relationship between arctic plant growth and abiotic factors was examined using findings from a long-term warming experiment in Atqasuk, Alaska. We found plant growth responded differently to warming depending on the species. These data suggest that plant communities are dynamic and may respond differently to climate change.

KIRKHOF CENTER GRR 172

Motivation, Sport Commitment and Athletic Identity in Professional Women Football Players

Participants attending 10:00 AM - 11:00 AM

Presenter: Samantha Ellis

Mentor: Christina Beaudoin

Within the context of self-determination theory, this study will examine relationships among sport commitment, motivation, and athletic identity in professional women football players. Players on teams within the Independent Women's Football League and United States Women's Football League will be asked to participate. Teams will be sent an email containing and asked to share a survey link with their players. The survey will consist of demographic items, the Sport Commitment Questionnaire-2 (SCQ-2), the Sport Motivation Scale-II (SMS-II), and the Athletic Identity Measurement Scale (AIMS). The SCQ-2 covers information regarding how much they enjoy their sport, social pressures, and alternatives to the sport. The SMS-II measures amotivation, intrinsic, Integrated, identified, introjected, and external motivation. Results will explore relationships among sport commitment, motivation, and athletic identity in a sample of women professional football players.

KIRKHOF CENTER GRR 173

Examining the Regulatory Function of Different Domains of the *C. albicans* Transcriptional Repressor Tup1p

Participants attending 12:00 PM - 1:00 PM

Presenter: Rebecca Siwicki

Mentors: Ian Cleary, Derek Thomas

The ability to change between budding yeast form growth and filamentous morphologies is an important virulence factor in the opportunistic fungal pathogen *Candida albicans*. A key regulator of this process is the transcriptional repressor Tup1p. A strain lacking this protein grows only as filamentous pseudohyphae and is more sensitive to numerous environmental stresses. Tup1p interacts with one of its corepressors, Nrg1p, through a C-terminal WD-40 domain, but little is known about the contributions of other domains to its function. To address this question, we have attempted to rescue the mutant strain with truncated versions of Tup1p. We have been able to partially restore the response to morphology signals and resistance to some stresses. This highlights the importance of previously uncharacterized N-terminal protein interactions. We are currently constructing strains expressing tagged versions of these proteins to allow purification and identification of Tup1p binding partners.

KIRKHOF CENTER GRR 174

Paleolithic Diet and Exercise Improve Metabolic and Cardiovascular Risk Factors

Participants attending 11:00 AM - 12:00 PM

Presenters: Mark Baker, Alexander Eason

Mentors: Amy Gyorkos, Lauren Miutz

Deadly inflammation has been slowly affecting human populations across the globe, resulting in an emerging pandemic of chronic disease. Chronic systemic inflammation may be a result of significant change in the feeding and activity patterns of the human race over the past 10,000 years. Our late ancestors ate a diet rich in organic foods void of highly processed foods commonly consumed today. In addition, they engaged in frequent exercise due to the hunter-gatherer lifestyle. Although the human genome remains almost identical, diet and activity patterns have changed dramatically since, creating a mismatch that may contribute to inflammation and chronic disease. This study examines the effects of adopting the lifestyle habits of our ancestors on cardiovascular and metabolic health in adults with MeTS. The study uses a crossover design where subjects randomly adopt a Paleolithic diet (4wks) and a Paleolithic diet with HIIT exercise (4wks), separated by a four-week washout period.

KIRKHOF CENTER GRR 175

Analysis of Sinkhole Development in the Floridan Aquifer System

Participants attending 4:00 PM - 5:00 PM

Presenters: Isaac Entz, Neson Nesmith

Mentor: Wanxiao Sun

The Floridian Aquifer System (FAS) is one of the most productive aquifers in the world and underlies a surficial area that occupies more than 100,000 square miles in Florida and Georgia. The primary bedrock within the FAS is composed of carbonate material in the form of limestone and dolomite. Along with having soft material properties, these carbonates are highly susceptible to dissolution by water containing carbonic acid (H_2CO_3). Chemical Dissolution causes the FAS to experience extensive sinkhole development. Genesis of sinkholes within the state of Florida holds significance due to insurance and housing disparities caused by damages. Sinkholes in Florida caused 1.5 billion dollars in property damage between the years 2006 and 2010. Research was performed with the intention to illustrate regions within the FAS and in the state of Florida that may be more susceptible to sinkhole development in the future.

KIRKHOF CENTER GRR 176

Impact of Bark Beetles on the Health of California's Forests

Participants attending 12:00 PM - 1:00 PM

Presenters: Matthew Lyle, Dylan Postma

Mentor: Kin Ma

Bark beetle outbreaks have led to widespread loss of trees, leading to tree mortality events adversely impacting local ecosystem health. Vegetation Health Index (VHI) datasets were analyzed from 2010-2016 to probe impacts of bark beetles on Californian tree health. Beetle data generated point density maps showed concentration levels of Insect Disease Risk Areas (IDRAs) and High Hazard Tree Mortality Areas (HHTMAs). VHI maps were generated for each year. 2010-2013 VHI maps showed small change in vegetation health. However, 2013-2016 VHI change maps showed drastic shifts in vegetation health, likely due to bark beetles. IDRA and HHTMA point density maps showed concentrations in the Sierra Nevada region. Bark beetles adversely impacted the health of California's forests from 2010-2016. Sierra Nevada forests were largely impacted by insect disease/tree mortality, yet other variables like forest fires and drought may have affected the widespread loss/degradation of forests.

KIRKHOF CENTER GRR 177

A Spatial Analysis Using Location Quotients for Violent Crime, Youth, Population Density, and Life Expectancy in Michigan Counties

Participants attending 10:00 AM - 11:00 AM

Presenter: Makayla DeBruyn

Mentor: Jeroen Wagendorp

The focus of this mapping analysis was the occurrence of violent crime as related to people under the age of eighteen, population density, and life expectancy within Michigan at the country level.

Specifically, the spatial correlation, if any, of people under the age of eighteen, population density and the life expectancy as related violent crime rate. The methodology used was the location quotients of the given variables at the county level and their respective comparisons to test the above hypothesis. Statewide results were mixed.

KIRKHOF CENTER GRR 178

Nasal Polyps in an 89-year-old Deceased Male: Antrochoanal Polyps or Ethmoidal Polyps?

Participants attending 10:00 AM - 11:00 AM

Presenter: Taylor McClelland

Mentors: James Reed, Dawn Richiert, Timothy Strickler, Melissa Tallman

Nasal polyps are non-cancerous growths found inside the nasal passage as a result of chronic sinusitis. Chronic sinusitis can be caused by asthma or allergies which are common conditions. Other less common conditions that increase the risk of developing polyps include aspirin sensitivity, cystic fibrosis or Churg-Strauss Syndrome. The dissection of the cadaver of an 89-year-old male who suffered from dementia and suffered a fatal heart attack revealed the presence of nasal polyps. Further dissection determined that the type of nasal polyps found were antrochoanal and not ethmoidal.

KIRKHOF CENTER GRR 179

Differences in Key Performance Indicators for Playoff and Non-Playoff Teams: 2015-16 NHL Season

Participants attending 1:00 PM - 2:00 PM, 2:00 PM - 3:00 PM

Presenter: Joshua Corgan

Mentor: Ross Sherman

Background: The area of performance analysis is a growing field in sports. Key performance indicators (KPIs) have been developed across a wide range of sports, but ice hockey to date lacks this objective analysis. Purpose: The purpose of this study was to determine whether a variety of technical variables related to hockey performance differed between playoff and non-playoff teams. Method: A large variety of team-based performance variables were compiled from all 1,230 regular season games during the 2015-2016 NHL season. An analysis was performed comparing playoff and non-playoff teams to determine significant differences across these variables, which may be indicative of underlying KPIs in ice hockey. Results: Data will be presented at SSD.

Oral Presentations, Abstracts & Schedule

Beginning at 9:00 AM

KIRKHOF CENTER 1104

Distribution of Invasive Woody Plants on a Former Golf Course

Presenter: Riley Rouse

Mentor: Carol Griffin

The disturbances involved in the construction of a golf course such as grading, draining, and clearing native vegetation increase the likelihood of invasion by woody invasive plant species. At the Frederik Meijer Gardens & Sculpture Park Natural Environment Area (NEA), which was previously managed as a golf course, *Elaeagnus umbellata*, *Rhamnus spp.*, and *Rosa multiflora* have been identified on the property. Using stratified point sampling, I recorded the species and number of invasive woody plants at the NEA. It was expected that more invasive plants would occur in areas adjacent to roads and in the wetland areas on the property than in fairways or areas adjacent to residential property. Based on the findings, best management practices for removal of the invasive plants are suggested in order to promote and enhance natural succession of the area.

KIRKHOF CENTER 1142

The Global Reach of Therapeutic Recreation

Presenters: Emily Konen, Gretchen Pyscher, Kristy Wilkinson, Hannah Wilson

Mentor: Dawn De Vries

Therapeutic Recreation, or the use of recreation and leisure to improve functional independence for individuals who have any type of disability, can be beneficial in numerous settings. Modalities used include adventure therapy, therapeutic use of dance, therapeutic use of music, horticulture, sports, leisure education, and community reintegration. The profession is relatively young, and is growing exponentially. In the past twenty years, therapeutic recreation has been implemented in numerous countries such as South Korea, Japan, Puerto Rico, Canada, Germany, Australia, and New Zealand. In this presentation, we will discuss the benefits of programs in these countries, how they compare to programs in the United States, and ideas for further growth as a profession.

KIRKHOF CENTER 2201

Biorefinery: Biofuel Availability and Cost Efficiency in Muskegon, MI

Presenter: Justin Bruno

Mentors: Erik Nordman, Wanxiao Sun

I am implementing the establishment of a green biorefinery on Muskegon Lake where a power plant has just recently stopped production. I will show the availability of suitable land in the immediate counties that could sustain biofuel sources. I will analyze the routes to areas of biofuel supplies to determine how easily the biorefinery can be accessed by roads. The model and maps will display my results using Geographic Information Systems (GIS). The research data is state and county owned roads, land cover image, imagery maps of Muskegon and Newaygo counties, and a base map respectively. I used a route cost analysis by coding roads as low or high resistance routes. I also used the measuring tool on major routes with a buffer zone around the plant as a reference. My findings will be that Muskegon and Newaygo buffer zone around the plant as a reference. My findings will be that Muskegon and Newaygo counties have enough sources of biofuels to supply the refinery, based on available land cover and route analysis getting access to the land.

KIRKHOF CENTER 2259

Modification of the LRB Ligase

Presenter: Aron Rottier

Mentor: Matthew Christians

Plants utilize a complex system of light responsive pathways to initiate discrete changes in the plant cell's growth and development. The Light Regulating BTB (LRB) E3 ligase is utilized in the ubiquitin-proteasome system (UPS) to target a group of photoreceptors, the phytochromes, for degradation. The UPS allows for the selective tagging and degradation of proteins in the cell. Evidence suggests the LRBs become activated in red light, forming a complete E3 ligase complex. We propose to investigate how the LRBs become activated and bind to Cul3 in red light in the model plant *Arabidopsis thaliana*. Genetic sequence alignments suggest the LRBs are modified by the RUB protein (a protein used to activate a small group of other proteins in eukaryotes) in response to red light. The results of these experiments will improve the understanding of how LRB E3 ligases function in modifying light responses in plants, and also provide insight into Rubylation and its effect on protein activity.

KIRKHOF CENTER 2266

Handing it to Hospitality: Solutions for Hospitality Housing in Grand Rapids

Presenter: Susan Pete

Mentors: Denise Goerisch, Judy Whipps

This is an innovative approach to resolving a need for hospitality housing for families of hospital patients in Grand Rapids. Hospitality Housing in the area has been sparse since the development

of the “medical mile,” along with the new building and expansion of the Helen DeVos Children’s Hospital. There is not enough hospitality housing to accommodate the patient families of the children’s hospital; the current hospitality houses for the children’s hospital are consistently at capacity with most people placed on waiting lists. Handing it to Hospitality is an app that would help connect a guest of the hospital to a host in the community, similar to AirBNB. By providing families a comfortable place to stay, they have one less thing to worry about while their child is hospitalized. This app will benefit both families in need of easily accessible and affordable temporary housing as well as members that are willing to contribute and give to the community.

KIRKHOF CENTER 2270

Accumulation of the Liver Toxin Microcystin in Big Brown Bats and Various Game Fish Species from Throughout the State of Michigan

Presenter: Kaitlyn Denney

Mentors: Amy Russell, M Woller-Skar

A hepatotoxin produced from harmful algal blooms, microcystin (MC) is of concern for human and animal health. I analyzed MC levels in big brown bats and game fish species. MC levels in bats are a concern because this toxin could pose a threat to an organism already facing conservation pressures, while human consumption of fish containing MC makes monitoring levels valuable for public health reasons. I used ELISA to measure MC levels in 80 fish samples representing 5 species and 20 bat livers from locations in Michigan. Results indicate that MC concentrations are low in bats, with 15 samples testing under the limit of detection (0.05 ppb). MC concentrations in fish ranged from 0.0003 $\mu\text{g/kg}$ ($\pm 1.92 \times 10^{-2}$) to 7.8 $\mu\text{g/kg}$ (± 2.8), below the LD-50 of 20 to 1500 $\mu\text{g MC-LR/kg}$ body weight. Although our measured levels of MC are low, continued exposure to MC could have negative long-term effects on animals and the environment; thus, further work to monitor levels is crucial.

Beginning at 9:30 AM

KIRKHOF CENTER 1104

Dynamic Living: An Assessment of Resource Consumption in Grand Rapids, MI

Presenter: Chloe Ross

Mentor: Carol Griffin

There is current debate on the effectiveness and efficiency of switching from multi to single-stream recycling. Through multi-variable comparison, this study determines the significance of factors associated with switching from multi to single-stream recycling programs. Conclusions are drawn

through interpreting multi and single-stream recycling case studies. The rate of recycling, cost of collection and processing, quality of recycled material and quantity of greenhouse gas emissions are measured and compared for both recycling methods. Additionally, I will personally examine the single-stream recycling centers in Ann Arbor and Grand Rapids, Michigan. I expect that processing costs and the quantity and quality of material recycled will decrease, while collection costs will increase after switching to single-stream recycling. Also, more greenhouse gasses will be emitted from single-stream recycling centers during processing, but less during collection.

KIRKHOF CENTER 1142

Therapeutic Recreation in Schools

Presenters: Olivia Janis, Morgan Payment, Kirsten VanderMeer, Kaitlyn Wolters, Kayla Ybema
Mentor: Dawn De Vries

With over 6 million children requiring special education services, research has shown that there is a growing need for therapeutic recreation in a school setting. Therapeutic recreation can benefit children with disabilities by providing a wide range of activity-based interventions that improve their quality of life, and address behavioral issues that one might display during early school years. This study intends to prove that therapeutic recreation can change the behavior of children (ages 6-12) in a school setting through specific goal-centered interventions. Outcomes are centered around communication skills, social skills, friendship development, emotional regulation, teamwork skills, and many more. A certified therapeutic recreation specialist will individualize each plan based on the child's needs. With therapeutic recreation in the mix with other professionals at school, children with disabilities will be able to learn, grow, and gain control of their lives at an early age.

KIRKHOF CENTER 2201

A Group Theory Version of the Lights Out Game

Presenter: Vasily Zadorozhnyy
Mentor: Darren Parker

The original Lights Out game has a 5×5 grid of buttons/vertices that can be toggled and can either be turned on or off. When a player starts a game, some of the lights are on and some are off. When player toggles a vertex, that vertex changes the state of every adjacent vertex and itself. The goal of the game is to toggle vertices in a way such that all lights are off. We are studying a different version of the Lights Out game. All vertices are labeled with elements of \mathbb{Z}_n and when we toggle a vertex, we add the number that is currently on it to every adjacent vertex and itself. The game gives the set of all possible labelings a digraph structure, where arc of a digraph corresponds to the toggling of a vertex that changes the graph from one labeling to another. In our research we are focusing on connected components of this digraph, and how they are related to some issues of

whether or not the game can be won.

KIRKHOF CENTER 2259

Development of a Protocol for Implementing a Registered Nurse-Led Annual Wellness Visit in a Primary Care Setting

Presenter: Jennifer Campbell

Mentor: Cynthia Coviak

This project was a quality improvement initiative utilizing a new format to deliver the Medicare Annual Wellness Visit (AWV) to Medicare recipients. The purpose of the project was the development of a protocol for implementing a registered nurse (RN)-led AWV in a primary care setting. The pilot project focused on changing the clinic's current AWV structure from a provider-led format to a RN-led format. The objectives of the project were: (a) measuring the acceptability the new RN-led format and (b) assessing the organization's ability to perform an RN-led AWV efficiently. The chronic care model (CCM) was used as a guide to improve chronic illness management among patients in the clinic. Patients who scored high on the screenings were directed to appropriate resources. Based on the weakness identified in the 6-week pilot, a final protocol was developed as a guide for RNs in the clinic to use when completing the comprehensive AWV assessment.

KIRKHOF CENTER 2266

Striving to Create a More Survivor Centered Community

Presenter: Malayna Hasmanis

Mentor: Ashley Schulte

Sexual violence in the community has become a critical topic, and justifiably so. With sorority women being almost 75% more likely to experience victimization opposed to their unaffiliated peers, it is likely someone close to you within your Greek community is a survivor. Since the vast majority of survivors disclose to their closest friends, you need to know how to respond. Are you and your organizations ready? How will you react? How can you avoid re-victimizing and striving to create a community that empowers the survivor and shift our community to hold each other accountable?

KIRKHOF CENTER 2270

Climate Change and California's Almond Agriculture: Impacts, Adaptations and Vulnerabilities

Presenters: Alyssa Schutzenhofer, Mara Spears

Mentor: Elena Lioubimtseva

The intent of this project is to hypothesize future impacts of climate change on almond production in California, vulnerabilities that will occur as a result, and adaptations farmers will adopt in order to continue production. Our study will center on precipitation levels and insect infestation in the region. We will seek out further information from experts in the fields of research pertaining to our topic and create bibliographic annotations of the publications. We will also utilize credible websites such as the USDA, The United States Global Climate Change Research Program, and the Almond Board of California in order to obtain accurate statistics concerning the shifts in climate and almond production. We will also utilize the MAGICC 5.3 climate modeling software to obtain scenarios of precipitation and temperature changes in the region. We expect climate change will negatively impact almond agriculture in California and hypothesize farmers will adapt using short term solutions.

Beginning at 10:00 AM

KIRKHOF CENTER 1104

The Effect of Invasive Glossy Buckthorn (*Frangula alnus*) and Autumn Olive (*Elaeagnus umbellata*) on Native Woody Species Diversity and Abundance in a Michigan Prairie Fen.

Presenter: Logan Ferguson

Mentor: Carol Griffin

Prairie fens are a unique type of wetland habitat that is rare globally, but occurs relatively frequently in glaciated areas of the Midwest. Prairie fens exhibit high biodiversity and often contain endangered or threatened species, making them of great interest to conservationists. Two common invasive shrubs, Glossy Buckthorn (*Frangula alnus*) and Autumn Olive (*Elaeagnus umbellata*), are currently threatening biodiversity in prairie fens by outcompeting native plants. *F. alnus* in particular is known for its tendency to form thick monocultures. Areas invaded by *F. alnus* and *E. umbellata* were compared to uninvaded areas within the same fen using sampling plots. The results showed lower plant diversity, lower mean plant coefficient of conservatism, and less light availability in areas invaded by *F. alnus*, and to a lesser extent in areas invaded by *E. umbellata*. It was concluded that *F. alnus*, but not *E. umbellata*, is a significant threat to prairie fen biodiversity.

KIRKHOF CENTER 1142

The Use of Animal Assisted Therapy in Pediatric Oncology

Presenters: Victoria Cox, Kylie Jager, Morgan Kwekel, Abbey Looker

Mentor: Dawn De Vries

This study looks at the outcomes of using animal assisted therapy as an intervention for children living with cancer.

KIRKHOF CENTER 2201

Learning Style Patterns Of Students Who Possess Numerous Years of Dance Training

Presenter: Hannah Alger

Mentor: Brandi Angelosanto

The purpose of this study is to describe the potential difference of dancer's learning style compared to a non-dancer's learning style through Fleming & Mill's VARK (Verbal, Aural, Read/write, and Kinesthetic sensory) learning style test. The participants in this study will include 40 (20 males and 20 females) full time students at Grand Valley State University. The groups to be investigated are 20 (10 males and 10 female) collegiate-level dancers, ages 18-25 years old, who have participated in 10+ years of dance training in comparison to 20 (10 males and 10 female) average college students within the 18-25 years age range. The objective of the research is to conduct a descriptive research study where data are used to answer questions regarding a dancer's ability to retain an abundance of choreography. The research question of this study is to determine if dancers are kinesthetic learners. It is hypothesized that dancers will possess a kinesthetic learning style compared to a non-dancer.

KIRKHOF CENTER 2259

Rape Culture In Present Society

Presenter: Malayna Hasmanis

Mentor: Ashley Schulte

As our student body has been made more and more aware of recent reporting matters of sexual assault within our Laker community, we have focused largely on the numerical value in said reportings. Reactions centered around anxiety and fear have been the true catalyst behind continuously perpetuating stereotypes and myths too often tied to sexual assault as a whole. In this session, we aim to unpack the meanings of rape culture and how many of our social norms may be feeding into them today.

KIRKHOF CENTER 2266

The Impact of Volunteer Tree Planting on Attitudes Toward Experiential Learning and Knowledge of Agriculture

Presenter: Cullin Flynn

Mentor: Amy McFarland

This research centered on the role of metaphorical language in environmental education, specifically regenerative agriculture, through volunteer tree planting events. Greek Life organizations of Grand Valley State University participated in planting over one hundred fruit and nut trees on the currently degraded southwest field of the Sustainable Agriculture Project. Prior to the tree planting events, which were staged on different days, volunteer groups heard one of two scripts addressing the site issues, e.g. erosion. The scripts contained the same content; yet, one was exceedingly metaphorical (experiment group) and the other technical (control). Each volunteer (n=23) completed a survey before and after the treatment. Qualitative methods in linguistics were used to analyze the potential of metaphor as a creative agent when approaching fundamental concepts in environmental science and sustainable agriculture.

KIRKHOF CENTER 2270

US Relations with China under the Trump Administration: Continuity or Change?

Presenter: Cole VanderVeen

Mentor: Meghan Cai

Given President Trump's lack of an official position on the topic of US relations with China, many are wondering how he will proceed, given its importance both to national security and the economy. By analyzing patterns in US-China relations during Obama's most recent term and more broadly since the end of the Cold War, this project aims to provide historical context upon which statements made by Trump and members of his administration will be used to build a plausible path forward. Specifically, recent key events such as developments in the South China Sea, Chinese currency manipulation, and Obama's 'rebalance to Asia' policy will heavily influence policy introduced under Trump, as they constitute areas of utmost national and international importance. Thus, despite Trump's unorthodox platform, recent rhetoric and policy decisions regarding these subjects point to an overarching continuation of, rather than a break from, the pattern of US-China relations laid down by past presidencies.

Beginning at 10:30 AM

KIRKHOF CENTER 1104

Effect of a Wastewater Treatment Plant on Aquatic Species Richness

Presenter: Hannah French

Mentor: Carol Griffin

Wastewater treatment facilities (WWTF) treat raw influent and release treated effluent back into

a stream system through a discharge point. Although highly regulated, WWTF are permitted to release small amounts of nutrients into stream systems. To understand the impacts of wastewater effluent on benthic macroinvertebrates, upstream and downstream reaches from a WWTF discharge point were sampled and analyzed. Benthic macroinvertebrates were used as indicators of water quality. Following the MDEQ Procedure 51, three habitats per reach were sampled for 20 minutes and invertebrates were sorted and analyzed using the Macroinvertebrate Biotic Index. Water samples were collected from the reaches and analyzed for total phosphorous, nitrates, and conductivity. It is expected that there will be a decrease in the species diversity and richness downstream from the discharge point because of higher nutrients and conductivity released with the effluent.

KIRKHOF CENTER 1142

Bibliotherapy and Older Adults with Dementia

Presenters: Angela Bollin, Karley Brouwer, Alexandra Marion, Hannah Nass, Amanda Pompilius

Mentor: Dawn De Vries

The purpose of this research is to explore the impact of bibliotherapy on the social and emotional skills of older adults with dementia. This systematic review was conducted by searching a variety of databases and selecting research experiments that were relevant to our research questions. It is recommended that further research be conducted in the field of Therapeutic Recreation, studying the effects of Bibliotherapy in older adults with dementia. This systematic review will advocate for our profession, provide insight on the benefits of this intervention, and inspire future research studies.

KIRKHOF CENTER 2201

Presidential Popularity in Authoritarian Regimes: Popular Support and Regime Dynamics in Kazakhstan and Kyrgyzstan

Presenter: Connor Dailey

Mentor: Heather Tafel

After the collapse of the Soviet Union, Central Asia saw the emergence of five new states, all of which completed their transitions as authoritarian systems of varying degrees. Recent research on regime stability in post-Soviet Eurasia has identified the lame-duck presidency and low popular support as central factors explaining why Kyrgyzstan experienced two presidential ousters, one in 2005 and the second in 2010. Conversely, Kazakhstan's president has remained in power by avoiding being perceived as a lame duck and maintaining high popular support. Building on this framework, this paper examines the sources of these differing levels of popular support between

past and present presidents in Kazakhstan and Kyrgyzstan. In doing so, this paper seeks to dispel the commonly held assumption that authoritarian leaders do not need public support to maintain power.

KIRKHOF CENTER 2259

Research Dynamics: A Student's Guide to Collaboration and Professionalism

Presenter: Rachel Wittebols

Mentor: Christine Yalda

Collaborating with criminal justice officials, practitioners, and scholars in a professional setting may seem a daunting task for first-time student researchers. This presentation is a personal account of how students can negotiate power dynamics in a professional research setting to work collaboratively with community stakeholders. Aspiring student researchers will be invited to explore how to establish goals, develop professional communication skills, interact with academics and practitioners in a professional setting, and address and resolve conflicts in a professional manner.

KIRKHOF CENTER 2266

Learning in a Void: How Queer and Trans Individuals Learn Sexual Empowerment in the Absence of Public and Educational Discourse

Presenter: Samantha Breau

Mentor: Leifa Mayers

There is a demonstrated link between feeling sexually empowered and being sexually healthy. Yet, from school-based sexuality education to academic research, discussions of sexual empowerment appear (when they do appear) almost exclusively in the realm of cis-heteronormative experience. In the face of sexual health inequities for queer and trans individuals, there is a need to understand how queer and trans folks move around the silencing and pathologizing that contribute to such inequities. Thus, by collecting life history narratives via semi-structured interviews, this research will contribute to the feminist discussion around how queer and trans folks subvert, reconstruct and modify social messages and establish sexual empowerment, thereby sexual health. Doing so may provide a platform for action that directly confronts sexual health inequities for these communities.

KIRKHOF CENTER 2270

Perfectionism and Procrastination: The Jekyll and *Hide* Paradox

Presenter: Carin Echols

Mentor: Lawrence Burns

Perfectionism and procrastination are often constructed as problematic aspects of one's personality, but can these two seemingly opposite traits co-exist, or even work together and prove beneficial? This study examined nuances of this questionable pairing by way of conscientiousness, fear of negative evaluation, and temporal awareness in college students. The main thrust of this research was to challenge existing uni-dimensional models of procrastination in an effort to determine whether it mirrors current multi-dimensional models of perfectionism. Results minimally supported preliminary hypotheses as they were unable to validate the existence of positive procrastination, but if this were to be confirmed, it may shed new light on the premise of task prioritization and self-regulation.

Beginning at 11:00 AM

KIRKHOF CENTER 1104

Assessing Carbon Sequestration Potential for Three Rare Ecosystems in Allegan State Game Area

Presenter: Joel Ball

Mentor: Carol Griffin

Carbon dioxide levels have consistently risen since the industrial age. Elevated levels of carbon dioxide (CO₂) in the atmosphere have increased global temperatures. Carbon sequestration is an important process in which atmospheric carbon is removed and stored in soil, vegetation and dead organic matter (DOM). This process could ultimately slow or reduce the amount of CO₂ that is present in the atmosphere and possibly slow the rate of global warming. Much of today's research on carbon sequestration has been done on forests. While rare ecosystems do not represent a large quantity of the earth's surface they could act as a significant carbon sink. The goal of this research is to understand if these rare ecosystems (oak-pine barren, coastal plain marsh, and wet-mesic sand prairie) act as a carbon sink. Providing data about these rare ecosystems and their potential to sequester carbon may conserve them on a global scale.

KIRKHOF CENTER 1142

Therapeutic Recreation in Hospice

Presenters: Kristy Beinborn, RoseMary Dahl, Emilio Delgado, Rachel Molenkamp, Lindsay Zimmerman

Mentor: Dawn De Vries

Our research addresses how Therapeutic Recreation (TR) interventions can be used in end of life care. Furthermore, we will discuss outcomes that benefit the needs of those in hospice. We present a literary review of the research related to palliative care, identifying professions currently providing

services, and how TR can be integrated into the hospice interdisciplinary team.

KIRKHOF CENTER 2201

Becoming a Laker: A Statistical Consulting Experience

Presenters: Sidney Hann, Cuyler Huffman

Mentors: Valerie Guzman, Neal Rogness

The Transitions Program for incoming first year students serves four main purposes: building connections with other students, helping students learn strategies for wellness and personal success, helping students understand academic expectations, and becoming a Laker for a Lifetime. Valerie Guzman and colleagues in the Office of Student Life created a survey for first year students to take at the end of Transitions week. Our role as statistical consultants was to analyze the data and focus specifically on how certain demographics, such as race or gender, answered certain questions about the program. Our findings will help make improvements to the program and allow Transitions to offer more of the sessions students have deemed helpful and fewer of the sessions students found less beneficial.

KIRKHOF CENTER 2259

Analyzing Da Vinci's Influence on Caravaggio's *Supper at Emmaus*

Presenter: Leticia Franco-Steele

Mentor: Ellen Adams

Caravaggio is regarded as one of the most influential artists of the Baroque era. Scholarly research was conducted to analyze his relationship with Renaissance art, focusing on how this stylistic era influenced his work. Caravaggio's 1601-02 painting, *Supper at Emmaus*, was analyzed in relation to Leonardo Da Vinci's 1495-96 fresco, *Last Supper*, comparing their technical and thematic approaches. Research provides evidence that Caravaggio utilized Leonardo's piece as a reference, deeming these works justifiably comparable. Caravaggio alludes to Leonardo's style through his choice of subject matter, composition, and lighting, but in all these areas has translated such artistic fundamentals into Baroque style. Thus, Caravaggio commends the classical great, while simultaneously exemplifying his artistic innovation. This research was originally conducted for a Frederick Meijer Honors College sequence course to provide an opportunity for undergraduate research experience.

KIRKHOF CENTER 2266

Metro Health Grand Rapids Marathon

Presenters: Zachary Gaule, Abigail Robichaud, Mikayla Sharp

Mentor: Lisa Sisson

The Metro Health Grand Rapids Marathon, consists of a kids 5K and a Sunday marathon half marathon and marathon relay. The purpose of this community project was to create a marketing strategy timeline over 3 years. This work incorporates the existing logo, yet introduces a new theme or tagline each of the years. Designs will be produced for items including digital media such as the event website, e-mail newsletter, and social media, printed materials including posters, postcards, banners, and the event program; and the race shirt, medal and staff jackets. This project included the production costs for all materials as well as vendor's prices to compare. Our deliverables for the Metro Health Grand Rapids Marathon were a report summarizing each task outlined in the Scope of Work, Marketing design and theme for the products, ordering package for year one theme items, budget for printed and promotional materials.

KIRKHOF CENTER 2270

The Reformed Church in Amoy China, 1937-1951

Presenter: James Bell

Mentor: Douglas Montagna

The purpose of this research is to analyze how effective the Reformed Church was in accomplishing its goals of evangelism and the establishment of an indigenous Chinese Church throughout the continuous social and political turmoil China experienced from 1937 to 1951. Sources drawn from the Joint Archives of Holland indicate that while major historical events during this time period resulted in the termination of the mission, the Reformed Church was successful in assisting in the creation of an indigenous Chinese church that proved hardy enough to survive persecution by the Communist party, as well as the dangerous days of the Great Leap Forward and the Cultural Revolution. The topic is important because it reveals how a small Christian denomination based in the United States was connected to major events in Chinese history and reveals why Christianity is an extremely relevant factor in China today.

Beginning at 11:30 AM

KIRKHOF CENTER 1104

Cost Analysis of Biomass vs Solar Panel Energy Production

Presenter: Samuel Bender

Mentor: Carol Griffin

The summer of 2016 witnessed the installation of a two-acre biomass plantation and a 13-acre solar farm on Grand Valley State University's Allendale Campus. *Salix* (willow) clones measuring 6 inches were planted at 7" apart in eight 200 foot long rows. Basal area and dry weight were the

measurements used to determine the plant productivity and potential for combustion-based energy production. This data was compared to the energy output of Grand Valley's 13-acre solar farm. Other quantitative variables measured were the cost of maintaining and operating the solar garden and biomass operation. Net cost of solar farm installation and maintenance is expected to be much higher than net cost of biomass planting, harvest, and combustion, resulting in a higher cost/kwh for solar farms. I hypothesize the efficiency of the solar farm will, over time, pay for the operation and installation cost of the solar farm, making the annual investment into biomass energy more expensive per kilowatt hr.

KIRKHOF CENTER 1142

Wilderness Therapy for Families Who Have Experienced Trauma

Presenters: Emily Kwekel, Matthew Parrish, Alesha Reed, Madeline Scott, Jennah Thompson

Mentor: Dawn De Vries

The goal of this session is to answer the question: "Does wilderness therapy improve family dynamics in families who have experienced trauma?" The outcomes of wilderness therapy including increased trust, communication, and coping skills in families who have experienced trauma will be discussed. Families who have experienced trauma may include those with an at-risk youth, adoption, abuse, as well as refugees. Future implications for the field of therapeutic recreation will be examined further.

KIRKHOF CENTER 2201

Do Children Have Their Own Minds? An Intervention Study

Presenter: Bria Atkins

Mentors: Naomi J. Aldrich, Jing Chen

Maternal mind-mindedness (MMM) is a mother's ability to understand her child as an individual with its own mind (Meins, 1998). Recent research has shown that participation in a MMM intervention program improved attachment security between mothers and their babies (Meins et al., 2016). I will discuss a proposal for an intervention study aimed to increase the level of MMM among mothers who enrolled their children in a community-based developmental screening program. The goal of the intervention is to enhance MMM by providing training materials about how to pay attention to children's minds in various mother-child interactions. The training materials will have suggested activities and discussions to promote mind-mindedness, and will be delivered with the existing screening system of the developmental program. Six months to one year after the intervention program, the program will be examined to determine whether it has successfully improved MMM and reduced parental stress.

KIRKHOF CENTER 2266

Violence Against Healthcare Workers in China

Presenter: Ivannovich Ravuth

Mentor: Meghan Cai

Violence in the workplace is making headlines across the United States. Healthcare workers are not immune to violent encounters, and it is reported that healthcare workers will experience workplace violence at least once during their professional careers. This exploratory paper looks at statistical evidence to describe the main challenges facing health care delivery in China while comparing some similar problems in the United States. Some challenges include but are not limited to: gang affiliated violence, shortage of doctors and nurses, inefficiency, and mismanagement of hospital staff. This paper concludes that good governance, training and monitoring, while allowing more non-governmental involvement in informal healthcare service providers is important in ensuring effective health care delivery.

KIRKHOF CENTER 2270

Islam and Islamophobia in the Encyclopédie

Presenter: Amber Sackett

Mentor: David Eick

My research argues that during the French Enlightenment, the existing anti-Islam narrative was used as a platform to further the agendas of the philosophes of the Encyclopédie. I will be citing examples of how 'Enlightenment Philosophy' in France may have made various advancements for society, government and the individual man, but anti-Islam narrative simply lost its religious shell and remained rooted in the medieval. I will explore why des Lumières (Enlightenment Philosophers) did not bother to update and enrich their commentary on Islam/Arabs and why they were not inspired to dig deeper into the existing narrative of Islam. While I wonder about the Lumières, I beg to ask what modern day politics and society can learn from this.

Beginning at 12:00 PM

KIRKHOF CENTER 1142

The Use of Video Game Intervention with Older Adults

Presenters: Rebecca Golub, Samantha Heiler, Lyndsey Poterek, Ashley Schock, Madeline Szarowicz

Mentor: Dawn De Vries

This literature review is an examination of the physical and cognitive benefits for older adults using

video games as a recreational therapy intervention.

KIRKHOF CENTER 2201

Introducing Instruments: A Teacher's Guide to Full Ensemble Teaching of Beginning Band

Presenter: Angela Schmitt

Mentor: Kevin Tutt

This method book for beginning band addresses the best process to introduce each instrument simultaneously, via detailed steps inclusive of all instrument groups (woodwinds, brass, percussion). First, detailed instrument sequences were compiled through analysis of standard method books, consultation with professional musicians, and feedback from methods instructors. Sequences for each instrument group were then formatted and adjusted to introduce the fundamentals of each group in an efficient and effective manner for collective instruction. This holistic approach to teaching beginners instills solid foundational musical technique and understanding before progressing to more advanced sound production.

KIRKHOF CENTER 2259

Riding the Momentum: Political Fluidity and the New York Provincial Congress in the Lead-up to Independence

Presenter: Matthew Grace

Mentor: Gabriele Gottlieb

Popular perception has, more often than not, portrayed the American Revolution as a unified American struggle to overthrow British authority in the colonies. However, this perspective undercuts the complicated internal struggles that had to occur in each colony, before independence could be declared. This complexity is clearly represented in the experience of the extra-legal New York Provincial Congress throughout the first half of 1776. Political actors had to decide how to respond to the momentum of the revolution that progressively pushed the colonies towards independence. Those who did not push the momentum or at a minimum attempt to keep pace risked being left behind and losing their voice in the movement. The moderate elite controlling the New York Provincial Congress, not wanting to risk their sociopolitical position in society, chose strategically to delay and manipulate the revolutionary currents, reacting to the momentum only when absolutely necessary.

KIRKHOF CENTER 2266

High Stakes Examination and the Struggle for Critical Thinking in the Education System of the PRC

Presenter: Kevin Kyser

Mentor: Meghan Cai

In order to perform well in the increasingly globalized marketplace, China may need to implement comprehensive reform of its education system. The Chinese education system is infamous for high-stakes examinations that have been linked to low levels of creativity and innovation in the population of Chinese students, as well as those in the technological sector. The most well-known test is the college entrance exam, the *gaokao*, a bottleneck through which all students who aspire to attend university must pass. Due to its prominent place in the university admissions process, the *gaokao* is believed by many to encourage rote memorization instead of critical thinking in order to pass. This research is an analysis of the different perspectives on the current structure of the *gaokao* exam, exploring the pros and cons of continuing its usage, as well as the possible ways to achieve the desired growth of innovation in the Chinese economy.

Beginning at 12:30 PM

KIRKHOF CENTER 1142

The Benefits of Therapeutic Recreation Interventions on Refugees

Presenters: Kristen Bartnicki, Lauren Clark, Ashley Janowiak, Maira Pizano, Tiara Stagg

Mentor: Dawn De Vries

This presentation will explore the benefits of Therapeutic Recreation treatment on refugees internationally.

KIRKHOF CENTER 2201

Dis2-PP1 Phosphatase Dephosphorylates Mid1 During Cytokinesis in *Schizosaccharomyces pombe*

Presenter: Audrey Arbogast

Mentor: Dawn Hart

Schizosaccharomyces pombe is an organism used to study defects in general cell division. *S. pombe* express a protein called Mid1 that is necessary for the establishment of the actomyosin ring, a key step in cytokinesis. During metaphase, Mid1 becomes hyperphosphorylated and recruits proteins for ring formation. In late anaphase, Mid1 disassociates from the ring and becomes hypophosphorylated. Dis2 is a protein that removes phosphate groups through a hydrolysis reaction. The aims of this research include determining the effect Dis2 has on Mid1 localization. Confocal microscopy was used to visualize Dis2-deficient cells at various cell cycle stages. The data show that Mid1 is normally in the medial region of the cell, but is irregularly dispersed in

phosphatase-dead Dis2 and *dis25* cells. The activity of Dis2 is necessary in localizing Mid1 for proper cytokinesis and ensuring normal growth patterns. This discovery can be applied to human cancers derived from similar malfunctions.

KIRKHOF CENTER 2259

The Effects of Chloroform on Single *Chara* Cells

Presenter: Stefanos Apostle

Mentor: Mark Staves

The effects of anesthetics on animal signal transduction have been well-documented since Claude Bernard's work in the 19th century, but the effects of anesthetics on plant cells are less clear. We are testing whether anesthetics can affect movement and "irritability" in plant cells, specifically investigating the effects of chloroform on the internodal cells of *Chara*. These giant cells exhibit rapid cytoplasmic streaming and when they receive external stimuli, such as an electrical charge or mechanical stimulation, they can undergo an action potential, triggering signal transduction cascade which stops the streaming. By exposing individual *Chara* cells to chloroform gas for different amount of times, then administering a controlled electric charge, we can determine the effects of anesthesia on both the streaming of the cells and their ability to respond to stimuli under different conditions. We find that, similar to animals, plant cells seem to exhibit different stages of anesthesia.

KIRKHOF CENTER 2266

Analysis of the California Winter League Baseball Players

Presenter: Michael Stawinski

Mentor: John Gabrosek

The California Winter League (CWL) is for baseball players that compete at the independent professional level. Players come to this league expecting to be scouted by professional baseball clubs in hopes that their performance will earn them a contract to play baseball. I interned with the CWL as a baseball statistician. As part of the CWL statistical crew, we were responsible for collection and analysis of game data for all the teams and players. We scored each game and then recorded the data into a software program that compiles each player's stats. We also know the highest level the player played and whether or not they played college baseball. In this study, I investigate how a player's performance and experience can get them signed to an independent professional baseball club. Data summaries and logistic regression are used to describe the relationship between signing a baseball contract and a player's performance and previous baseball experience.

KIRKHOF CENTER 2270

Diderot's (Pseudo-/Proto-) Feminist Contrarities

Presenter: Andrew Newton

Mentor: David Eick

Lieselotte Steinbrugge and Mary Trouille, among others, have criticized the male philosophes of the French Enlightenment for focusing exclusively on women's sexuality to determine their nature, relegating them to the position that society assigned. This approach by the men of letters renders them "pseudo-feminists" in Trouille's terminology. They claim to honor and support women, but hold them back from participating in society in new or equal ways. I argue that Diderot does not fit so neatly into this box. Using Walter Rex's concept of contrarities I examine the conversational nature of Diderot's writing that switches back and forth between opposing viewpoints. Informed by this, I argue that Diderot's views on the subject are neither totally in line with contemporary thought, nor final. I propose that, while not a feminist in today's sense of the word, Diderot was asking some of the right questions and should possibly be considered a "proto-feminist" rather than a "pseudo-feminist".

Beginning at 1:00 PM

KIRKHOF CENTER 2270

Why Did the French Army Succeed?

Presenter: Rachel Kalusniak

Mentors: Ellen Adams, David Eick

In my presentation, "Why Did the French Army Succeed?" I examine France's military victories during the French Revolutionary Wars. My topic is important because the political changes during this conflict, including the Polish partition, had lasting impacts on Europe's map. For my argument, I consider France's large military size, the superior French strategy, and the Polish Question's impact on Prussia and Russia. My argument relies primarily on T C W Blanning's book, *The French Revolutionary Wars 1787-1802*. My research reveals that France had a much larger army than the coalition, but its inspired army of misfits lacked training. Aristocratic French officer fled when the revolution seized their land and sharpened the guillotine for their heads. New French strategies compensated for this lack of experience because France could sustain more casualties than its enemy. France maintained its superior numbers because the Poland occupied Russian and Prussian forces.

Beginning at 1:30 PM

KIRKHOF CENTER 2201

Fundamental Regions, Fuchsian Groups and Outer Billiards

Presenter: Stephanie Loewen

Mentor: Filiz Dogru

Outer (Dual) polygonal billiards is a simple plane-based dynamical system on a convex polygon. A discrete subgroup of isometries of the hyperbolic plane is called a Fuchsian group if it consists of orientation-preserving transformations. Any Fuchsian group possesses connected, convex fundamental regions. In this project we would like to explore fundamental regions of the outer billiard map defined with regular tilings and possibly quasiregular tilings in the hyperbolic plane. This research was conducted as part of the 2016 REU program at GVSU.

KIRKHOF CENTER 2266

The Point of View of Depression: Using Literature to Understand a Clinical Disease

Presenter: Kayla Williams

Mentor: Christopher Haven

In attempts to assist writers in portraying the disease, as well as making readers more aware of its effects; this study analyzes vocabulary in clinical, fiction, and creative non-fiction sources in terms of the depiction of depression. Recognizing how each source creates different perceptions of the disease impacts our understanding of depression. The vocabulary surrounding depression can be broken into two main sections: terminology and identity. Terminology, from clinical sources, consists of words or phrases that are assigned to the disease by the medical field. Narrative works, fiction and creative non-fiction, provide identity vocabulary; language based upon how patients see themselves or how society sees depressed patients. Through defining language and point of view, this study has come to understand several key conceptual and technical issues of how literature approaches depression.

KIRKHOF CENTER 2270

A Statistical Consulting Experience: Determining the Effect of Living Environment on Performance of Unaccompanied Refugee Minors

Presenter: Elizabeth Oliver

Mentors: Dawn De Vries, Neal Rogness

“Kick and Cook a Palooza: Welcome to the US!” was cosponsored by Professor Dawn De Vries,

Assistant Professor and Program Chair of Therapeutic Recreation at GVSU. It was a six-week program that offered nutrition and physical activity lessons to unaccompanied refugee minors. The children were divided into groups based on living environment, foster homes or minors. The children were divided into groups based on living environment, foster homes or group homes. The question posed to me, as a statistical consultant, was “Is there a difference in metrics of performance between the children in foster homes and those in group homes?” This presentation will focus on the processes of statistical consulting, as well as findings of analysis, based on the physical activity portion of the program.

Beginning at 2:00 PM

KIRKHOF CENTER 1104

Ungulate Browsing Impacts on Succession Structure of Isle Royale National Park

Presenter: Jeff Wilkinson

Mentor: Carol Griffin

Isle Royale National Park is the location of the longest continuous study of any predator-prey system in the world. The wolf-moose interactions influence local plant community structure. Heavy moose browsing since the early 1900's impacted succession trajectory and regeneration rates of several vegetation types. Shifts in vegetation types have a significant influence on trophic interactions between wolf and moose. Examining aerial photographs to estimate forest canopy cover shows a 15% decrease in the past 50 years resulting in a more open forest savannah ecosystem. Open canopy impacts understory vegetation structures resulting in a shift in vegetation types. Decreases in overstory cover throughout the island showed changes in vegetation of the native mixed forest towards a forest savannah ecosystem. The changes in succession on local plant communities have important trophic consequences on Isle Royale.

KIRKHOF CENTER 1142

Recreational Therapy for Grandparent Caregivers

Presenter: Juliana Barla

Mentor: Dawn De Vries

In communities around the nation, grandparents are acting as primary caregivers to their grandchildren. Coinciding with the reasons for the new informal kinship, there are stressors and role changes that grandparents face. This presentation will look at what it means to be a grandparent caregiver as well as the most popular stressors and how the field of Therapeutic Recreation can benefit this population through the use of interventions to address coping, leisure

education, community resource education, transportation education, and intergenerational conflicts and solutions.

KIRKHOF CENTER 2201

Queering the High School English Classroom Without Being Fired

Presenter: Erica Ruffner

Mentor: Brian White

Radical: relating to or affecting the fundamental nature of something; far-reaching or thorough. By this definition, successful English curricula is radical. English educators are challenged to teach their students to critically think about the world and themselves. But how can this be achieved thoroughly when there are systems in place that are historically immune to critical thought? Systems like heteronormativity subliminally affect the degree students can critically analyze themselves and their society by dictating what is “normal.” Deconstruction of limiting norms can be facilitated with Queer Theory; however, theorists who support the use of Queer Theory in high school have failed to address the stigmatization of the word “queer” and thus fail to address the restrictions that educators face in implementing such curricula. This presentation will explore the ways in which Queer Theory can realistically and reasonably be incorporated into high school English classrooms.

KIRKHOF CENTER 2259

The Role of the Human Gut Microbiome on Antibiotic Resistance

Presenter: Roxana Dumitrache

Mentor: Steven Hecht

Antibiotic resistance is considered one of the greatest challenges of our time since bacteria are becoming increasingly resistant to the only effective treatment we currently have available. Consequently, bacterial infections could again pose a life-threatening risk to individuals worldwide. We will consider different approaches through which bacteria gain resistance to antibiotics, focusing mainly on the human gut microbiome as a reservoir of resistance genes. Ultimately, we will emphasize the need for the development of personalized treatment plans that could help reduce resistance and improve antibiotic effectiveness.

KIRKHOF CENTER 2266

Spain Remembering: The Civil War On Film

Presenter: Sophie DeLaCruz

Mentor: Gabriela Pozzi

After the Spanish Civil War (1936-1939) General Francisco Franco established a dictatorship. He died in power in 1975 and in the transition to democracy, Spain adopted an amnesty law, the Pact of Silence (De Diego 198). The new government did not prosecute or try people who had committed crimes against the opponents of the regime. However, there has recently been an upsurge of films on this war that can be interpreted as a response to the long endured silence by the victims of the fascist regime. The films in this study are *Paper Birds*, *Pan's Labyrinth*, and *The Blind Sunflowers*. The films will be approached through the lens of theory on collective memory, postmemory, and trauma as well as silence and the use of a child protagonist. Since the voices of the victims were silenced after the war and during the transition, the wounds of the war remained open. By telling their story, these films are continuing Spain's healing process and putting the ghosts of their past to rest.

KIRKHOF CENTER 2270

The Many Ways a Writer Can Use a Dash as Demonstrated by George Orwell

Presenter: Melody Sheridan

Mentor: Christopher Haven

In this presentation, I will read and provide context for an essay I wrote which analyzes some of the many ways that the dash punctuation mark can be used to achieve varying stylistic effects in a piece of writing. In my analysis, I examine excerpts from George Orwell's essays "Shooting an Elephant" and "Some Thoughts on the Common Toad." Often, when people consider the dash, they think of it as having two main uses: to surround parenthetical information or to connect two portions of a sentence. My essay argues that from a stylistic standpoint, dashes have the potential to be used for many other purposes. This insight can be helpful to any writers who want to continue to develop their skills.

Beginning at 2:30 PM

KIRKHOF CENTER 1104

Assessing the Need to Stock Chinook Salmon in Lake Michigan

Presenter: Aaron Lewis

Mentor: Carol Griffin

Chinook salmon have been stocked in Lake Michigan since 1967. Since then, a natural population of Chinook has been established in the lake and its tributaries. In this study, the population of wild Chinook salmon found in Lake Michigan was used to determine if that population is large enough to maintain the ecological role of Chinook salmon and withstand pressure from both commercial

and recreational fishing. The purpose of this study is to determine if stocking of Chinook salmon is still needed. The data used was collected from creel surveys as well as historical stocking data provided by the Department of Natural Resources. It is expected that the population of wild Chinook is large enough to fulfill its ecological role as well as support commercial and recreational fishing. This study will help the Department of Natural Resources make a management decision to either continue or stop stocking Chinook salmon in Lake Michigan.

KIRKHOF CENTER 1142

Positive Behavioral Supports in the Juvenile Justice System: A Therapeutic Recreation Perspective

Presenter: Erin Veltman

Mentor: Dawn De Vries

This literature review looks at studies conducted reviewing positive behavioral support systems in the juvenile justice system and how therapeutic recreation can impact a positive behavioral support system. It discusses the benefits and difficulties of implementing this system in juvenile justice facilities, and the improvements that can be made to youth behaviors. This study also analyzes the impact of incorporating a therapeutic recreation perspective into the positive behavioral support systems and if a therapeutic recreation perspective is beneficial to a positive behavioral support system.

KIRKHOF CENTER 2201

Solving Ordinary and Partial Differential Equations Numerically

Presenter: Stephanie Loewen

Mentor: David Austin

Both ordinary and partial derivatives describe the rate of change of a variable. While techniques are available to solve some equations exactly, solutions to many interesting equations can only be approximated. This study examines numerical methods for solving ordinary and partial differential equations. Since these methods provide only approximations of the solutions, other factors are taken into considerations such as error and rate of convergence/stability. This was done in an independent study during winter 2017.

KIRKHOF CENTER 2270

Characterization of Genetic Differentiation to Understand Morphological Variation in *Phidippus audax*

Presenter: Brandon Beltz

Mentor: Michael Henshaw

Gene flow between populations should limit genetic differentiation, and the most prominent models of speciation incorporate geographic isolation which limits the mixing of genes. The bold jumping spider, *Phidippus audax*, is common throughout North America, but is morphologically variable and may constitute distinct forms despite the potential for gene flow. We have characterized the nature of genetic differentiation. We sequenced 672 bp of the mitochondrial *Cytochrome c Oxidase subunit I* (COI) gene. We also genotyped spiders at 7 microsatellite markers found throughout the nuclear genome. Analysis of the mitochondrial sequences found two genetically-distinct clusters, but the nuclear markers did not identify two separate genetic groups. This disagreement between the mitochondrial and nuclear loci might result from male-biased gene flow or from divergent patterns of selection. We plan to investigate this discordance to better understand the process of differentiation in this species.

Beginning at 3:00 PM

KIRKHOF CENTER 1104

Deforestation in Haiti and Efforts by the United States Agency for International Development to Encourage Reforestation

Presenter: Jacob Rumschlag

Mentor: Carol Griffin

Estimates of forest cover in Haiti have been steadily declining in recent decades from over 60% in 1923 to its current state of only 3.5%. There are many factors causing this extreme deforestation such as the clearing of land for agriculture and the use of wood for fuel. In turn, the country has faced issues ranging from ecological degradation to destabilized livelihoods. The United States Agency for International Development has been an active organization in developing large-scale reforestation management plans for Haiti such as The Agroforestry Outreach Project, Productive Land Use Systems, and Agroforestry II. Through a literature analysis, this paper produces a summary and highlights the strengths and weaknesses of each of the three programs. Developing a concrete understanding of the methods and policies leading to previous project successes and failures is necessary for the success of future reforestation efforts in Haiti.

KIRKHOF CENTER 2270

Effects of Unhealthy Diet on Sensitivity to Social Defeat Stress

Presenter: Deseree Eudave

Mentor: Elizabeth Flandreau

Although many people experience severe stress or trauma, only a subset will develop symptoms of

psychiatric disorders. Identifying factors that mediate or moderate stress-induced psychopathology is important to better understand underlying causes of stress-related psychiatric disorders and identify protective mechanisms. One factor that may influence risk of stress-induced psychopathology is diet. The present study tests the hypothesis that unhealthy diets high in fat (HFD) or sucrose (HSD) will increase sensitivity to social stress as measured by acute and long-term behavioral outcomes. To test this hypothesis, mice are exposed to an ethologically relevant social stress–social defeat stress–with concurrent exposure to either standard chow, HFD, or HSD for the duration of the 10-day stress exposure.

Beginning at 3:30 PM

KIRKHOF CENTER 1104

Increasing Habitat Diversity of a Mesick Hardwood Forest in Southern Michigan

Presenter: James Jensen

Mentor: Carol Griffin

I examined a mesick hardwood forest on the Klug Farm using forestry assessment methods. The assessment looked at the overstory and understory trees, exotic plant species, age structures, and soils. The objective of this study was to develop a management plan which would increase native habitat diversity. Two species of trees were identified within the stand; the age structure of this stand was even aged. Thinning of the forest will allow for a higher number of age classes, this will create uneven stand which allows for higher native habitat diversity. Five exotic plant species were also identified within the forest, removal of exotics and planting of native species will increase native habitat diversity. Within the final management plan, I also suggest planting native trees and shrubs to increase the native plant diversity.

KIRKHOF CENTER 2201

A New Triangle Generation of Generalized Genocchi Numbers using Rook Placements on Genocchi Boards

Presenters: Stephanie Loewen, Vasily Zadorozhnyy

Mentor: Feryal Alayont

The two-dimensional rook theory can be generalized to three and higher dimensions by assuming that rooks attack along hyperplanes. Using this generalization, Alayont and Krzywonos defined two families of boards in any dimension generalizing the triangular boards of two dimensions whose rook numbers correspond to Stirling numbers of the second kind. One of these families of boards is the family of Genocchi boards whose rook numbers are the Genocchi numbers. This combinatorial

interpretation of the Genocchi numbers provides a new triangle generation of the Genocchi numbers. In our project, we investigate whether such a similar triangle generation exists for the generalized Genocchi numbers in four and five dimensions.

KIRKHOF CENTER 2266

Structure-function Analysis of Boronic Acid Transition State Inhibitors of *Acinetobacter*-derived Cephalosporinase (ADC-7)

Presenter: Kali Smolen

Mentor: Bradley Wallar

Antibiotic resistance is an important problem in medicine. Of particular concern is resistance to β -lactam antibiotics, such as penicillins and cephalosporins. Pathogenic bacteria become resistant by expressing β -lactamase enzymes, which hydrolyze the antibiotic and render it ineffective. A specific β -lactamase, *Acinetobacter*-derived cephalosporinase-7 (ADC-7), has been shown to be inhibited by boronic acid transition state inhibitors (BATSI). In this project, four novel BATSI were characterized for their binding affinity and inhibition of ADC-7. The X-ray crystal structures revealed key interactions of the inhibitors with amino acid residues in the active site. Furthermore, steady state kinetics demonstrated that the BATSI bind with high affinity to ADC-7. These ADC-7/BATSI complexes provide insight into the recognition of inhibitors of ADC enzymes and develop a path for optimization of a novel series of inhibitors against a clinically relevant resistance target.

Beginning at 4:00 PM

KIRKHOF CENTER 1104

The Impact of Soil Properties on the Mortality Rate of *Terrapene carolina carolina* (Eastern Box Turtles) Nests in the Manistee National Forest

Presenter: Kendyl Wilcox

Mentor: Carol Griffin

Eastern box turtle (*Terrapene carolina Carolina*) (EBT) populations have declined in Michigan due to habitat loss, causing their listing as a threatened species. This designation places regulations on their trade and protects their habitat. Success of this species depends on the mortality rate of the young. This study analyzes the soil that EBT eggs are buried to assess how soil properties impact the mortality rate of the nest. Soil samples were taken from 60 turtle nests and 60 random corresponding points for comparison. Soil moisture content, percentage clay, and texture were measured to determine if there is a relationship between these variables and mortality rates. The analyses showed nests built in soils that are unsaturated and have lower clay content produced a greater number of hatched eggs and living hatchlings. Nests built in saturated, high organic matter,

and clay dominant soils had a higher mortality rate than the previous soil type.

KIRKHOF CENTER 2201

From Ancient Honey to Modern Medicine

Presenters: Megan Kruskie, Clayton Latham, Tabitha Sherk

Mentor: Melissa Morison

Throughout history, honey has been used to treat various medical conditions both internal and external. There are many attested applications for honey as a healing agent in ancient societies such as Egypt, Greece, Rome, and Mesopotamia. To determine if these honey-based treatments were sound according to modern scientific understanding, we compared modern-day research with the material and literary evidence for the ancient medical applications. We found that the medical uses of honey in antiquity were likely to have been effective options for promotion of healthy immune and gastrointestinal systems, stimulation of surface healing, and treatment of surface infections. Given this, we argue that it would benefit the general public, as well as medical professionals, to be aware and to take advantage of medicinal honey and incorporate it into modern treatments.

KIRKHOF CENTER 2259

The Disproportional Experiences of Middle School Students in Studying Ratio and Proportions Based on Their Textbooks

Presenter: Nick Schweitzer

Mentor: Lisa Kasmer

Textbooks are used as a source for instruction in mathematics classrooms, including middle grades mathematics classrooms. The adoption of the Common Core State Standards for Mathematics (CCSSM) across most of the nation caused a rush to create new textbooks aligned to these standards. Since a textbook can be at least a launching point, textbook companies created resources to support teachers and their students shifting to the CCSSM. Using an established coding framework, this research provides educators with results on the worth of the examined textbooks as well as demonstrating a possible method for evaluating textbooks. Analysis of the data provides an argument that textbooks are not fully aligned to the CCSSM in numerous capacities. The claimed alignment to the CCSSM must be examined critically for its true alignment to both the content and practice standards so that students can benefit from the best education possible.

KIRKHOF CENTER 2270

College Students' Challenges with Type 1 Diabetes

Presenter: Sara Bickel

Mentor: Melodee VandenBosch

The purpose of this Honors Senior Project is to survey freshman and senior students at Grand Valley State University about their challenges in self-management of Type 1 diabetes. The researchers also seek to answer the question of whether there are differences between freshman and senior level students in the challenges they face in managing Type 1 diabetes. This descriptive pilot study includes a literature review completed in Fall 2016 and an 8-question survey distributed in Winter 2017 through Survey Monkey. Participants are freshman and senior students at GVSU with Type 1 diabetes. Because the prevalence of having Type 1 diabetes in the general population is 5% and survey response rates are about 10%, emails will be sent to at least 2000 students at GVSU. The target sample size is 10 students. Potential findings will inform college administrators more about how to assist students with Type 1 diabetes self-management.

Beginning at 4:30 PM

KIRKHOF CENTER 1104

The Effectiveness of Environmental Education on Grade School Children's Behavior

Presenter: Emily Davidson

Mentor: Carol Griffin

The term environmental education was coined in the mid-1960s during a conference held in Keele University of Britain. Since then, educational programs that focus on the value of natural resources have been expanding all over the world in an attempt to change the behaviors of children from 5 to 10 years of age. In this study, I compare the different types of environmental education programs that are offered and the techniques they use to create a successful program. It is expected that programs that focus on outdoor engagement (e.g., field trips to national parks) and programs that last over a longer period of time are most likely to be effective on positively influencing behaviors towards environmentalism for grade school children.

KIRKHOF CENTER 2266

Within and Beyond the Page: American Women's Changing Image and Role in the Media During the Progressive Era

Presenter: Allison Ribick

Mentor: Nora Salas

During the Progressive Era (1890s - 1920s), the American media reflected women's transition

from the private to public sphere as they grew more educated and financially independent. Both advertisers and reporters began recognizing women as a separate audience from men and started creating content that was deemed “women’s news” in magazines and newspapers. Although “women’s news” played into gender stereotypes at first, it began to blend the “fluff” pieces of fashion and homemaking with more hard-hitting content like crime, poverty, and politics. With many female writers at the forefront of this shift, women’s news tested gender roles and positively contributed to movements like women’s suffrage and Progressive reforms.

KIRKHOF CENTER 2270

Business Informatics Made Simple: A Statistical Consulting Experience

Presenters: Jacob Trumpie, Franco Vallazza

Mentors: Maclear Kindel, Neal Rogness

The Small Business Development Center (SBDC) of Grand Rapids, located in the Seidman College of Business, works with several businesses and other SBDC offices in the development and growth of private firms across the state of Michigan. An employee satisfaction survey is administered among many participating firms to assess the quality of the workplace; the survey provides useful information to management for enacting potential positive changes in work environments. Our jobs as statistical consultants were to analyze the survey data and display the findings in a practical and friendly interface. The results will be used to aid small businesses in the state of Michigan by revealing employment strengths and weaknesses.

Panel Presentations, Abstracts & Schedule

Beginning at 1:00 PM

KIRKHOF CENTER 2263

Learning Beyonce, Baudelaire, and Bohr: Feedforward, Recurrent, and Convolutional Neural Networks

Presenters: Austin Doolittle, Adam Terwilliger, Frank Wanye

Mentor: Gregory Wolffe

Austin Doolittle

GeNNre: Automated Music Classification

The separation of music into genres based on the various audio characteristics of songs is a classification task performed both by those who study music and those who listen to and enjoy music. Songs that sound similar, use the same instruments, and have the same musical roots are generally grouped together into a shared genre. Today, large music-streaming services such as Spotify have millions of songs available in their online catalogs, making it impractical to manually classify by genre. Neural networks, a form of artificial intelligence inspired by the learning processes of the human brain, excel at finding patterns and organizing data into groups based on features of the data. This research project created and refined a neural network that is capable of identifying a song's genre based on specific audio features.

Adam Terwilliger

Deep Learning and Particle Physics

Deep learning offers new tools to improve our understanding of important scientific problems. The most successful and widely used deep learning models are Convolutional Neural Networks (CNNs). CNNs utilize shared weights and pooling to gain invariance to shifts of features within images. Neutrinos are the most abundant particles in the universe and are hypothesized to explain the Big Bang. In collaboration with Fermi National Accelerator Laboratory, this research applied deep learning to neutrino image processing problems. Previous work focused on vertex reconstruction – the classification of the origin of neutrino interactions. Based on inherent geometric properties of the neutrino detector, new CNN architectures were developed and investigated to address other computer vision tasks such as localization and detection. Utilizing these new deep learning models, domain scientists gain the ability to explore more complex neutrino interactions.

Frank Wanye
Terry: the Digital Writer

This project pursued the creation of an artificially intelligent machine – a computer program capable of writing short essays. It was named after the fantasy author Sir Terry Pratchett, who observed that the repeated random combination of words from the English language would eventually produce a Shakespearean play. Obviously, most of those word combinations would be nonsense. The goal of this research was to address that problem by developing a Recurrent Neural Network (RNN) that “learns” the rules of language grammar solely by exposure to written texts, and then uses that knowledge to generate short stories. At this time RNNs do not actually understand the text they are producing. Therefore, the objective is not publishable writing (or even college-level essays), but rather syntactically correct writing that sometimes makes sense.

Exhibition of Art

9:00 AM - 6:30 PM

Artist Reception 5:30 PM

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 01

Fuse

Presenter: Rachel Britton

Mentor: Stafford Smith

Fuse illustrates the relationship between the photographer and model, and how that collaboration is a balance between logic and creativity. The photographer previsualizes the image and directs the model to create organic shapes with an LED hula hoop. The model moves about the environment several times until the most appealing image is recorded. The final product demonstrates the relationship between technicality and the imagination.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 02

Acro Iris

Presenter: Jordan Barnett

Mentor: Victoria Veenstra

This is a series of photographs displaying color without being associated or attached to objects. Acro Iris is the spanish term for rainbow, thus these photographs depict the spectral hues which we are most familiar with: red, orange, yellow, green, blue, violet, and pink. These images are abstract in nature because the focus is to be placed on the hue itself and not an object associated with the color.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 03

Contrast and Composition

Presenter: Devin Gordon

Mentor: Vinicius Rebello Lima

Changes simply grab our attention. Strikingly different changes in shape, size and value translate a degree of energy. Variation helps to establish, not only a clear focal point but also an overall dynamic composition. The goal of this project was to create a visually optimal contrast between two different letterforms, from two different type families. Contrast was created through altering the letter, through size, rotation, and individual placement of the letterform.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 04

Collapse of Rana Plaza

Presenter: Alyssa Roach

Mentor: Dellas Henke

My work focuses on the relationship that exists between bodies, consumption, and society. Through my work I specifically address garment factories and the utilization of sweatshop labor. The objects made in sweatshops, in particular our clothing, operate as devices that perpetuate oppression. Through the endorsement and utilization of sweatshop labor, we privilege our consumption and ourselves over people. The U.S. Department of Labor defines a sweatshop as a factory that violates two or more labor laws, this could be extremely low wages, unsafe working conditions, or utilizing child labor, to name a few. The reality of sweatshop labor is the April 24th 2013 collapse of Rana Plaza, an eight-story commercial building in Savar, a sub-district in the Greater Dhaka Area, the capital of Bangladesh. The collapse is considered the deadliest garment factory accident in history, killing 1,129 people and injuring 2,500. The people that worked for the garment factory that operated inside of Rana Plaza were making clothing for U.S. and European companies. The collapse of Rana Plaza is a direct result of privileging our consumption over people. It is my hope that through my work I can facilitate learning and mobilize a movement towards equality, making steps towards a society in which one does not have to perpetuate oppression or be oppressed in order to participate.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 05

Postage Stamp Design: April Greiman

Presenter: Matthew Ellis

Mentor: Vinicius Rebello Lima

This project required me to design a postage stamp celebrating a graphic designer. My chosen designer was one of the first to embrace computer technology as a design tool, April Greiman. The intent here was to emulate Greiman's work while not creating an exact replica of her previous designs. The key challenge was imitating a design that incorporated an early 90s exploration without the work feeling outdated.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 06

Pertinence

Presenter: Dan Schrager

Mentor: Victoria Veenstra

What you see today is a set of photographs that are very personal to me; they depict the most important people in my life. Displayed as triptychs, I focused on the characteristics that best represent who they are to me. These photographs created memories, like when my mother didn't put her glove on completely while grabbing onto the dust pan to joke with me. I changed the distance between the camera and person to adjust the scale of their bodies, forcing the viewer to see only what I want them to. The inclusion of color in each set of photographs allowed me to put emphasis on that object. The large format draws out the features of each person's body, which forces the viewer to confront each of them face to face. Looking at my family and partner in individual parts changed my perspective. Before they were an important person in my life, but now each part of them holds value and further defines who they are to me.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 08

YOUx

Presenters: Kendall Hart, Nathan Spangenberg

Mentor: Vinicius Rebello Lima

With the internet becoming more and more prevalent in today's society, it is important that designers learn the necessary skills for creating an interactive and engaging website. This project challenged us to create two different websites that focused on separate target audiences. The first was Rosewood Mayakoba, a luxurious resort offering high-end all-inclusive vacations. The second, Go Gelato, was an edgy and stylish gelato parlor. While using design principles and sticking to a detailed brief we were able to design an experience specific to each market.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 09

Indelible

Presenter: Mallory Wolfgram

Mentor: Emily Rogers

Tattooing has been practiced as art for centuries; it has been used for tribalism, to indicate status, for religious and spiritual practices, as decoration, and for identification. As the practice has evolved, tattoo artists still emulate the history through styles such as Traditional American and Japanese, and processes like machine-free tattooing. Tattoos were photographed using a narrow depth of field, soft lighting, and highlighting organic shapes of the body to display the tattoo artistically. The use of a bed as a background reflects the softness of the skin and the intimacy of the art on the body. The tattoo needle is represented through the stitching in the bed. *Indelible* informs the viewer that the tattoo should be recognized as art. The tattoo artist treats the skin as their canvas. Thus the inked body should be treated as such, and approached with consideration.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 10

Contrast and Composition

Presenter: Rebecca Oppman

Mentor: Vinicius Rebello Lima

In this piece done for an introductory Graphic Design course, I explored the dynamic figure-ground relationships of a space using two contrasting letterforms. In my compositions, I was aware of creating strong contrast, a consistent unity, and interesting movement between the two different letterforms. In this process, I explored the letterforms as unique shapes, rather than characters used to compose words.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 12

GVSU Ceramics Forum

Presenters: Andrea Burns, Virginia Pisto, Betsy Vollmar, Kelsey Wittenbach

Mentor: Hoon Lee

Ceramics Forum is an event hosted by GVSU intended to foster exchange between students studying ceramics at different institutions and education levels, and to create a public platform for contemporary ceramic discussion. This event is an opportunity for graduates and undergraduates to be involved in organizing a community event to address topics in the ceramic arts. In the past, the forum has included panel discussions, artist lectures, critiques, gallery talks, and a group exhibition. The goal is to stage a mutually beneficial event for both graduate and undergraduate students. For the graduate students, the forum provides a visiting artist atmosphere, a chance for professional development, as well as building connections with fellow graduates. For the undergraduates, this is a chance to have critical interactions with advanced makers, discuss post-undergraduate options, and exhibit their work. The works featured were made in response to the 8th Annual GVSU Ceramics Forum.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 14

Heartside Neighborhood Brochure

Presenters: Ashley Beeker, Courteney Schulke

Mentor: Vinicius Rebello Lima

This brochure was created to inform those looking to reside in the Heartside community by giving a brief overview of what it has to offer. This brochure has information including a brief history of the community, current photos of Heartside, and different activities to engage in. We wanted to reflect the personality of Heartside through the layout and design of the brochure. We were able to achieve this by traveling to Heartside and experiencing the community ourselves. Certain

characteristics that we gathered on our adventures led us to make it a fun interactive layout, and to include colors that reflect the art in Heartside and illustrations to emphasize how artistic and unique Heartside is. There is also a map included to show where Heartside is located in the Grand Rapids area. This brochure was created using the Adobe suite and in addition it consists of photos that were taken by us using a Nikon D3200.

MARY IDEMA PEW LIBRARY EXHIBITION SPACE 19

Art is a Drag

Presenters: Kaylee Britton, Rachel Britton

Mentors: Jill Eggers, Stafford Smith

Art is a Drag is a body of work produced through the collaboration of twins Kaylee and Rachel Britton. Kaylee painted each piece onto her own face, and Rachel photographed and helped style the looks. While this work utilizes makeup to create illusions, the entire collection incorporates multiple disciplines—illustration, fine art and photography—with drag queens. We created each look with the words “transformation,” “illusion,” and “art” in mind. While some looks were more difficult to come up with, they all explored the ideas of makeup and transformation of the physical body. The face, which is the staple of drag culture, is dressed up in each piece to shift Kaylee’s face into her drag character, Salem Massacre, and then it is further shifted to explore ideas of femininity, makeup artistry and the recognition of characters and queer personas within art. Rachel then photographs each face and edits the photo, with both artists critiquing the edits.

Film / Video

Beginning at 2:00 PM

MARY IDEMA PEW LIBRARY MAIN FLOOR VIDEO DISPLAY

Trans-Inclusive Classrooms: A Necessity For Safety And Mental Health

Presenters: Skylar Wolfe, James Zerka

Mentors: Lawrence Burns, Cael Keegan

While research documents the disproportionate rates of discrimination, depression, anxiety, and self-harm common among trans individuals, there is a paucity of research documenting the unique and influential experiences of trans university students. Differentiating between cisgender LGBTQ+ (lesbian, gay, bisexual, and queer) and trans participants, a survey was circulated assessing various indices of psychological wellbeing and asking open-ended questions about students' experiences at GVSU. The survey demonstrated that even at a liberal arts institution with a strong commitment to inclusion and equity, trans students confront unique difficulties that need to be addressed at an institutional level. In particular, classroom environments were identified as an area of considerable concern and difficulty for trans students, as well as a key area for potential improvement. In response, an educational video on improving classroom environments for trans students was produced.

Index of Presenters and Mentors

(Sorted by Last Name)

A

Aboufadel, Edward	Mentor	9:00 a.m.	Henry Hall Atrium 095
Adams, Ellen	Mentor	11:00 a.m.	Kirkhof Center 2259
Adams, Ellen	Mentor	1:00 p.m.	Kirkhof Center 2270
Ahmad, Sabrina	Student	10:00 a.m.	Henry Hall Atrium 015
Alayont, Feryal	Mentor	3:30 p.m.	Kirkhof Center 2201
Albert, Rae	Student	9:00 a.m.	Kirkhof Center GRR 004
Albert, Robert	Student	9:00 a.m.	Henry Hall Atrium 100
Alder, Andrew	Student	10:00 a.m.	Kirkhof Center GRR 096
Aldrich, Naomi J.	Mentor	9:00 a.m.	Kirkhof Center GRR 074
Aldrich, Naomi J.	Mentor	11:30 a.m.	Kirkhof Center 2201
Alger, Hannah	Student	10:00 a.m.	Kirkhof Center 2201
Allen, Matthew	Student	12:00 p.m.	Kirkhof Center GRR 161
Allen, Nathan	Student	3:00 p.m.	Kirkhof Center GRR 121
Allen, Nathan	Student	10:00 a.m.	Henry Hall Atrium 073
Anderson, Donovan	Mentor	9:00 a.m.	Henry Hall Atrium 059
Andrews, Eva	Student	10:00 a.m.	Kirkhof Center GRR 036
Angelosanto, Brandi	Mentor	10:00 a.m.	Kirkhof Center 2201
Apostle, Stefanos	Student	12:30 p.m.	Kirkhof Center 2259
Arbogast, Audrey	Student	12:30 p.m.	Kirkhof Center 2201
Armistead, Brooke	Student	3:00 p.m.	Henry Hall Atrium 045
Armistead, Brooke	Student	9:00 a.m.	Henry Hall Atrium 025
Ash, Zachary	Student	4:00 p.m.	Henry Hall Atrium 095
Atkins, Bria	Student	11:30 a.m.	Kirkhof Center 2201
Audia, Ellen	Student	1:00 p.m.	Kirkhof Center GRR 171
Austin, David	Mentor	2:30 p.m.	Kirkhof Center 2201
Awdziejczyk, Alexis	Student	1:00 p.m.	Henry Hall Atrium 104
Awdziejczyk, Alexis	Student	12:00 p.m.	Henry Hall Atrium 101

B

Bak, Jin	Student	2:00 p.m.	Henry Hall Atrium 035
Baker, Mark	Student	11:00 a.m.	Kirkhof Center GRR 174
Balcom, Gavin	Student	10:00 a.m.	Henry Hall Atrium 073
Ball, Joel	Student	11:00 a.m.	Kirkhof Center 1104
Barajas, Gabriella	Student	10:00 a.m.	Kirkhof Center GRR 109

Barla, Juliana	Student	2:00 p.m.	Kirkhof Center 1142
Barlow, Sara	Student	11:00 a.m.	Henry Hall Atrium 004
Barnes, Hannah	Student	11:00 a.m.	Henry Hall Atrium 031
Barnes, Kyle	Mentor	9:00 a.m.	Kirkhof Center GRR 119
Barnett, Jordan	Student	9:00 a.m.	MIP Library Exhibition Space 02
Barry, Andrew	Student	2:00 p.m.	Henry Hall Atrium 063
Bartnicki, Kristen	Student	12:30 p.m.	Kirkhof Center 1142
Bateman, Jacquelyn	Student	4:00 p.m.	Henry Hall Atrium 023
Baxter, M. Aaron	Mentor	9:00 a.m.	Kirkhof Center GRR 111
Baxter, M. Aaron	Mentor	9:00 a.m.	Kirkhof Center GRR 151
Baxter, M. Aaron	Mentor	9:00 a.m.	Kirkhof Center GRR 084
Beachnau, Daniel	Student	3:00 p.m.	Henry Hall Atrium 110
Beaudoin, Christina	Mentor	9:00 a.m.	Kirkhof Center GRR 172
Beaudry, Garrett	Student	11:00 a.m.	Henry Hall Atrium 099
Beck, Kelcie	Student	12:00 p.m.	Kirkhof Center GRR 145
Beeby, Mary Jo	Student	9:00 a.m.	Henry Hall Atrium 021
Beeker, Ashley	Student	9:00 a.m.	MIP Library Exhibition Space 14
Beel-Bates, Cindy	Mentor	9:00 a.m.	Kirkhof Center GRR 156
Beel-Bates, Cindy	Mentor	9:00 a.m.	Kirkhof Center GRR 110
Begaliyeva, Kanykey	Student	10:00 a.m.	Henry Hall Atrium 052
Beinborn, Kristy	Student	11:00 a.m.	Kirkhof Center 1142
Bell, James	Student	11:00 a.m.	Kirkhof Center 2270
Below, Mckenna	Student	11:00 a.m.	Kirkhof Center GRR 007
Beltz, Brandon	Student	2:30 p.m.	Kirkhof Center 2270
Bender, John	Mentor	9:00 a.m.	Kirkhof Center GRR 165
Bender, John	Mentor	9:00 a.m.	Kirkhof Center GRR 030
Bender, John	Mentor	9:00 a.m.	Kirkhof Center GRR 085
Bender, John	Mentor	9:00 a.m.	Henry Hall Atrium 081
Bender, John	Mentor	9:00 a.m.	Kirkhof Center GRR 032
Bender, Samuel	Student	11:30 a.m.	Kirkhof Center 1104
Benn, Alyssa	Student	11:00 a.m.	Henry Hall Atrium 084
Berends, Allie	Student	10:00 a.m.	Kirkhof Center GRR 072
Bergman, Daniel	Mentor	9:00 a.m.	Kirkhof Center GRR 086
Bernier, Samuel	Student	11:00 a.m.	Kirkhof Center GRR 088
Betway, Katlyn	Student	9:00 a.m.	Kirkhof Center GRR 168
Bickel, Sara	Student	4:00 p.m.	Kirkhof Center 2270
Biddanda, Bopaiah	Mentor	9:00 a.m.	Henry Hall Atrium 011
Biesbrock, Marissa	Student	9:00 a.m.	Kirkhof Center GRR 165

Biros, Shannon	Mentor	9:00 a.m.	Kirkhof Center GRR 030
Biros, Shannon	Mentor	9:00 a.m.	Kirkhof Center GRR 090
Biros, Shannon	Mentor	9:00 a.m.	Kirkhof Center GRR 023
Biros, Shannon	Mentor	9:00 a.m.	Kirkhof Center GRR 159
Bis, Nick	Student	11:00 a.m.	Henry Hall Atrium 007
Bischer, Bailey	Student	9:00 a.m.	Kirkhof Center GRR 081
Blackman, Sheila	Mentor	9:00 a.m.	Kirkhof Center GRR 115
Blanck, Lauren	Student	12:00 p.m.	Henry Hall Atrium 092
Boetsma, Kylyn	Student	10:00 a.m.	Henry Hall Atrium 086
Boitos, Jordyn	Student	11:00 a.m.	Kirkhof Center GRR 020
Bollin, Angela	Student	10:30 a.m.	Kirkhof Center 1142
Bongiorno, Dominic	Student	10:00 a.m.	Kirkhof Center GRR 072
Bonilla, Joel	Student	9:00 a.m.	Henry Hall Atrium 078
Boonenberg, Joshua	Student	11:00 a.m.	Kirkhof Center GRR 059
Borders, Stephen	Mentor	9:00 a.m.	Henry Hall Atrium 021
Born, Gabriella	Student	9:00 a.m.	Henry Hall Atrium 005
Bos, Kayleigh	Student	9:00 a.m.	Kirkhof Center GRR 038
Bozman, Felicia	Student	9:00 a.m.	Henry Hall Atrium 005
Brainard, Cody	Student	3:00 p.m.	Kirkhof Center GRR 157
Breaux, Samantha	Student	10:30 a.m.	Kirkhof Center 2266
Britton, Kaylee	Student	9:00 a.m.	MIP Library Exhibition Space 19
Britton, Rachel	Student	9:00 a.m.	MIP Library Exhibition Space 19
Britton, Rachel	Student	9:00 a.m.	MIP Library Exhibition Space 01
Brouwer, Karley	Student	10:30 a.m.	Kirkhof Center 1142
Brower, Spencer	Student	2:00 p.m.	Kirkhof Center GRR 045
Brown, David	Student	11:00 a.m.	Henry Hall Atrium 007
Brown, Nicholas	Student	10:00 a.m.	Kirkhof Center GRR 147
Bruno, Justin	Student	9:00 a.m.	Kirkhof Center 2201
Bruno, Justin	Student	1:00 p.m.	Kirkhof Center GRR 169
Buchan, Darin	Student	12:00 p.m.	Kirkhof Center GRR 094
Bump, Paul	Student	1:00 p.m.	Henry Hall Atrium 104
Bunker, Cameron	Student	2:00 p.m.	Henry Hall Atrium 089
Bunker, Cameron	Student	11:00 a.m.	Henry Hall Atrium 090
Burfiend, Loren	Student	11:00 a.m.	Kirkhof Center GRR 059
Burg, Martin	Mentor	9:00 a.m.	Henry Hall Atrium 078
Burg, Martin	Mentor	9:00 a.m.	Henry Hall Atrium 110
Burg, Martin	Mentor	9:00 a.m.	Henry Hall Atrium 005
Burg, Martin	Mentor	9:00 a.m.	Henry Hall Atrium 016

Burg, Martin	Mentor	9:00 a.m.	Kirkhof Center GRR 138
Burger, Benjamin	Student	9:00 a.m.	Kirkhof Center GRR 039
Burns, Andrea	Student	9:00 a.m.	MIP Library Exhibition Space 12
Burns, Andrea	Student	10:00 a.m.	Henry Hall Atrium 098
Burns, Lawrence	Mentor	10:30 a.m.	Kirkhof Center 2270
Burns, Lawrence	Mentor	2:00 p.m.	MIP LIB Main Floor Video Display
Burrill, Abriana	Student	2:00 p.m.	Kirkhof Center GRR 005
Butler, Rachel	Student	4:00 p.m.	Henry Hall Atrium 013
Butler, Tiara	Student	2:00 p.m.	Kirkhof Center GRR 005
Buyers, Jacie	Student	9:00 a.m.	Henry Hall Atrium 005
Byl, Christina	Student	10:00 a.m.	Kirkhof Center GRR 109
C			
Cai, Meghan	Mentor	10:00 a.m.	Kirkhof Center 2270
Cai, Meghan	Mentor	11:30 a.m.	Kirkhof Center 2266
Cai, Meghan	Mentor	12:00 p.m.	Kirkhof Center 2266
Cain, Connor	Student	10:00 a.m.	Kirkhof Center GRR 141
Cain, Connor	Student	12:00 p.m.	Kirkhof Center GRR 044
Campbell, Jennifer	Student	9:30 a.m.	Kirkhof Center 2259
Candela, Alexandra	Student	1:00 p.m.	Henry Hall Atrium 069
Cannon, Lindsay	Student	2:00 p.m.	Henry Hall Atrium 064
Canute, Adam	Student	10:00 a.m.	Kirkhof Center GRR 147
Canute, Adam	Student	10:00 a.m.	Kirkhof Center GRR 137
Capodilupo, John	Mentor	9:00 a.m.	Kirkhof Center GRR 067
Capodilupo, John	Mentor	9:00 a.m.	Henry Hall Atrium 019
Capodilupo, John	Mentor	9:00 a.m.	Henry Hall Atrium 062
Capps, Aaron	Student	11:00 a.m.	Kirkhof Center GRR 076
Carey, Caitlin	Student	12:00 p.m.	Kirkhof Center GRR 145
Carroll, Christian	Student	3:00 p.m.	Kirkhof Center GRR 003
Case, Kaylee	Student	10:00 a.m.	Henry Hall Atrium 068
Catalano, Joshua	Student	9:00 a.m.	Kirkhof Center GRR 140
Cauzillo, Sarah	Student	2:00 p.m.	Kirkhof Center GRR 114
Chang, Sophia	Student	9:00 a.m.	Kirkhof Center GRR 081
Chapman, Alice	Mentor	9:00 a.m.	Henry Hall Atrium 024
Chasnick, Ilissa	Student	10:00 a.m.	Kirkhof Center GRR 109
Chauv, Kaitlin	Student	3:00 p.m.	Kirkhof Center GRR 002
Chen, Jing	Mentor	9:00 a.m.	Kirkhof Center GRR 074
Chen, Jing	Mentor	11:30 a.m.	Kirkhof Center 2201
Christians, Matthew	Mentor	9:00 a.m.	Kirkhof Center 2259

Christians, Matthew	Mentor	9:00 a.m.	Kirkhof Center GRR 134
Christians, Matthew	Mentor	9:00 a.m.	Henry Hall Atrium 096
Christoffersen, Evan	Student	9:00 a.m.	Henry Hall Atrium 079
Christoffersen, Evan	Student	9:00 a.m.	Henry Hall Atrium 081
Chung, Janet	Student	9:00 a.m.	Henry Hall Atrium 035
Clark, David	Mentor	9:00 a.m.	Kirkhof Center GRR 087
Clark, Lauren	Student	12:30 p.m.	Kirkhof Center 1142
Cleary, Ian	Mentor	9:00 a.m.	Kirkhof Center GRR 091
Cleary, Ian	Mentor	9:00 a.m.	Kirkhof Center GRR 049
Cleary, Ian	Mentor	9:00 a.m.	Kirkhof Center GRR 173
Cleve, Michael	Student	10:00 a.m.	Kirkhof Center GRR 141
Clover, Nicole	Student	2:00 p.m.	Henry Hall Atrium 001
Coates, Brandon	Student	9:00 a.m.	Kirkhof Center GRR 079
Coleman, Casey	Student	2:00 p.m.	Henry Hall Atrium 102
Coles, Christopher	Student	10:00 a.m.	Kirkhof Center GRR 135
Colgan, Patrick	Mentor	9:00 a.m.	Henry Hall Atrium 032
Colgan, Patrick	Mentor	9:00 a.m.	Kirkhof Center GRR 104
Collins, Kristen	Student	4:00 p.m.	Henry Hall Atrium 111
Collins, Matthew	Student	10:00 a.m.	Kirkhof Center GRR 021
Colter, Genevieve	Student	9:00 a.m.	Kirkhof Center GRR 049
Colter, Genevieve	Student	12:00 p.m.	Kirkhof Center GRR 091
Confer, Sarah	Student	3:00 p.m.	Kirkhof Center GRR 063
Connell, Marisa	Student	10:00 a.m.	Henry Hall Atrium 082
Conover, Catrice	Student	10:00 a.m.	Kirkhof Center GRR 144
Conrad, Dianne	Mentor	9:00 a.m.	Kirkhof Center GRR 100
Conrad, Dianne	Mentor	9:00 a.m.	Henry Hall Atrium 108
Cook, Paul	Mentor	9:00 a.m.	Kirkhof Center GRR 064
Cook, Paul	Mentor	9:00 a.m.	Kirkhof Center GRR 099
Cook, Paul	Mentor	9:00 a.m.	Kirkhof Center GRR 148
Corgan, Joshua	Student	1:00 p.m.	Kirkhof Center GRR 179
Courtney, Kylie	Student	11:00 a.m.	Kirkhof Center GRR 059
Couturier, Mitchell	Student	12:00 p.m.	Kirkhof Center GRR 034
Coviak, Cynthia	Mentor	9:00 a.m.	Kirkhof Center GRR 112
Coviak, Cynthia	Mentor	9:30 a.m.	Kirkhof Center 2259
Cox, David	Mentor	9:00 a.m.	Kirkhof Center GRR 128
Cox, Victoria	Student	10:00 a.m.	Kirkhof Center 1142
Crawford, Jessica	Student	12:00 p.m.	Kirkhof Center GRR 078
Crocenzi, Alexandra	Student	1:00 p.m.	Henry Hall Atrium 057

Cummings, Cassandra	Student	12:00 p.m.	Kirkhof Center GRR 120
Cutler, Brian	Student	9:00 a.m.	Kirkhof Center GRR 149
D			
Dahl, RoseMary	Student	11:00 a.m.	Kirkhof Center 1142
Dailey, Connor	Student	12:00 p.m.	Kirkhof Center GRR 161
Dailey, Connor	Student	10:30 a.m.	Kirkhof Center 2201
Damico, Megan	Student	9:00 a.m.	Kirkhof Center GRR 031
Damstra, Kelli	Mentor	9:00 a.m.	Henry Hall Atrium 044
Damstra, Kelli	Mentor	9:00 a.m.	Kirkhof Center GRR 068
Daniels, Sarah	Student	3:00 p.m.	Henry Hall Atrium 049
Darrow, Mary	Mentor	9:00 a.m.	Kirkhof Center GRR 035
David, Emily	Student	11:00 a.m.	Kirkhof Center GRR 064
David, Kenneth	Student	9:00 a.m.	Kirkhof Center GRR 039
Davidson, Emily	Student	4:30 p.m.	Kirkhof Center 1104
Davis, Rebecca	Mentor	9:00 a.m.	Kirkhof Center GRR 103
De Vries, Dawn	Mentor	9:00 a.m.	Kirkhof Center GRR 122
De Vries, Dawn	Mentor	9:00 a.m.	Kirkhof Center GRR 158
De Vries, Dawn	Mentor	9:00 a.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	9:30 a.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	10:00 a.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	10:30 a.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	11:00 a.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	11:30 a.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	12:00 p.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	12:30 p.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	1:30 p.m.	Kirkhof Center 2270
De Vries, Dawn	Mentor	2:00 p.m.	Kirkhof Center 1142
De Vries, Dawn	Mentor	2:30 p.m.	Kirkhof Center 1142
DeBruyn, Makayla	Student	10:00 a.m.	Kirkhof Center GRR 177
DeGraaf, Nathaniel	Student	1:00 p.m.	Kirkhof Center GRR 035
DeLaCruz, Sophie	Student	2:00 p.m.	Kirkhof Center 2266
DeMaagd, Kaitlin	Student	12:00 p.m.	Henry Hall Atrium 108
DeMoss, Emily	Student	12:00 p.m.	Henry Hall Atrium 103
DeSana, Courtney	Student	3:00 p.m.	Kirkhof Center GRR 017
DeWitt, Deanna	Student	10:00 a.m.	Henry Hall Atrium 053
DeYoung, Samuel	Student	9:00 a.m.	Kirkhof Center GRR 048
DeYoung, Samuel	Student	10:00 a.m.	Kirkhof Center GRR 137
Deaner, Robert	Mentor	9:00 a.m.	Kirkhof Center GRR 065

Decker, Kayla	Student	9:00 a.m.	Kirkhof Center GRR 004
Delgado, Emilio	Student	11:00 a.m.	Kirkhof Center 1142
Della Mora, Matthew	Student	9:00 a.m.	Kirkhof Center GRR 140
Della Mora, Matthew	Student	11:00 a.m.	Henry Hall Atrium 056
Denney, Kaitlyn	Student	9:00 a.m.	Kirkhof Center 2270
Depew, Jeffrey	Student	11:00 a.m.	Henry Hall Atrium 099
Dickson, Tylar	Student	9:00 a.m.	Kirkhof Center GRR 160
Dietrich, Margaret	Mentor	9:00 a.m.	Kirkhof Center GRR 152
Dietz, DaiLynn	Student	10:00 a.m.	Kirkhof Center GRR 153
Dietz, Phillip	Student	1:00 p.m.	Henry Hall Atrium 043
Doezema, Olivia	Student	3:00 p.m.	Kirkhof Center GRR 017
Dogru, Filiz	Mentor	1:30 p.m.	Kirkhof Center 2201
Doherty, Morgan	Student	12:00 p.m.	Kirkhof Center GRR 006
Donatelli, Dominique	Student	1:00 p.m.	Kirkhof Center GRR 025
Dondzila, Christopher	Mentor	9:00 a.m.	Henry Hall Atrium 028
Doolittle, Austin	Student	1:00 p.m.	Kirkhof Center 2263
Dosenberry, Kira	Student	12:00 p.m.	Henry Hall Atrium 101
Douglas, Anna	Student	9:00 a.m.	Henry Hall Atrium 058
Drelles, Jacob	Student	11:00 a.m.	Henry Hall Atrium 105
Dubisky, Allysen	Student	9:00 a.m.	Kirkhof Center GRR 081
Duda, Matthew	Student	2:00 p.m.	Henry Hall Atrium 028
Dumitrache, Roxana	Student	2:00 p.m.	Kirkhof Center 2259
Dunham, Trevor	Student	1:00 p.m.	Kirkhof Center GRR 035
Dupon, Spencer	Student	1:00 p.m.	Henry Hall Atrium 002
Duthinh, David	Student	2:00 p.m.	Kirkhof Center GRR 005
E			
Eason, Alexander	Student	11:00 a.m.	Kirkhof Center GRR 174
Eaton, Rachel	Student	12:00 p.m.	Kirkhof Center GRR 069
Ebbitt, Jordyn	Student	12:00 p.m.	Kirkhof Center GRR 120
Echols, Carin	Student	10:30 a.m.	Kirkhof Center 2270
Edwards, Melanie	Student	12:00 p.m.	Kirkhof Center GRR 152
Eggers, Jill	Mentor	9:00 a.m.	MIP Library Exhibition Space 19
Eick, David	Mentor	9:00 a.m.	Kirkhof Center GRR 143
Eick, David	Mentor	11:30 a.m.	Kirkhof Center 2270
Eick, David	Mentor	12:30 p.m.	Kirkhof Center 2270
Eick, David	Mentor	1:00 p.m.	Kirkhof Center 2270
Elam, Kristopher	Student	10:00 a.m.	Kirkhof Center GRR 144
Ellis, Matthew	Student	9:00 a.m.	MIP Library Exhibition Space 05

Ellis, Samantha	Student	10:00 a.m.	Kirkhof Center GRR 172
Elwartowski, Cassandra	Student	2:00 p.m.	Henry Hall Atrium 064
Endres, Kristina	Student	4:00 p.m.	Kirkhof Center GRR 095
Engelsma, Jonathan	Mentor	9:00 a.m.	Kirkhof Center GRR 054
Entz, Isaac	Student	3:00 p.m.	Kirkhof Center GRR 121
Entz, Isaac	Student	4:00 p.m.	Kirkhof Center GRR 175
Entz, Isaac	Student	10:00 a.m.	Henry Hall Atrium 073
Entz, Isaac	Student	9:00 a.m.	Kirkhof Center GRR 029
Eudave, Deseree	Student	3:00 p.m.	Kirkhof Center 2270

F

Fancher, Ronald	Student	9:00 a.m.	Henry Hall Atrium 100
Farran, Joni	Student	9:00 a.m.	Henry Hall Atrium 109
Fauvel, Anne Marie	Mentor	9:00 a.m.	Kirkhof Center GRR 054
Fauvel, Anne Marie	Mentor	9:00 a.m.	Kirkhof Center GRR 131
Ferguson, Logan	Student	10:00 a.m.	Kirkhof Center 1104
Ferris, Blake	Student	9:00 a.m.	Henry Hall Atrium 021
Ferris, Daniel	Student	2:00 p.m.	Henry Hall Atrium 028
Fiebing, Kaelyn	Student	10:00 a.m.	Kirkhof Center GRR 089
Fific, Mario	Mentor	9:00 a.m.	Henry Hall Atrium 089
Finley, Elizabeth	Student	9:00 a.m.	Kirkhof Center GRR 126
Fischer, Adelina	Student	2:00 p.m.	Henry Hall Atrium 063
Fischer, Erica	Student	10:00 a.m.	Kirkhof Center GRR 009
Fischer, Micaela	Student	10:00 a.m.	Henry Hall Atrium 073
Fischer, Svetlana	Student	10:00 a.m.	Henry Hall Atrium 109
Fisette, Bailey	Student	10:00 a.m.	Kirkhof Center GRR 136
Fish, Kyle	Student	9:00 a.m.	Kirkhof Center GRR 081
Flandreau, Elizabeth	Mentor	9:00 a.m.	Kirkhof Center GRR 007
Flandreau, Elizabeth	Mentor	3:00 p.m.	Kirkhof Center 2270
Fleming, Brandi	Student	3:00 p.m.	Henry Hall Atrium 038
Flynn, Cullin	Student	10:00 a.m.	Kirkhof Center 2266
Flynn, Mia	Student	9:00 a.m.	Henry Hall Atrium 076
Folsom, Anna	Student	10:00 a.m.	Kirkhof Center GRR 109
Forbes, Jonika	Student	1:00 p.m.	Kirkhof Center GRR 032
Forest, Meghan	Student	11:00 a.m.	Henry Hall Atrium 024
Fowler, Craig	Student	9:00 a.m.	Henry Hall Atrium 065
Franco-Steele, Leticia	Student	11:00 a.m.	Kirkhof Center 2259
French, Hannah	Student	10:30 a.m.	Kirkhof Center 1104
Frost-Stretten, Darian	Student	9:00 a.m.	Henry Hall Atrium 005

G

Gabrosek, John	Mentor	12:30 p.m.	Kirkhof Center 2266
Galen, Luke	Mentor	9:00 a.m.	Henry Hall Atrium 076
Galer, Kylee	Student	2:00 p.m.	Kirkhof Center GRR 142
Galey, Jacob	Student	10:00 a.m.	Henry Hall Atrium 098
Gallagher, Kayla	Student	9:00 a.m.	Henry Hall Atrium 005
Galovich, Tara	Student	9:00 a.m.	Henry Hall Atrium 100
Ganton, Breana	Student	10:00 a.m.	Kirkhof Center GRR 144
Gard, Ryan	Student	3:00 p.m.	Kirkhof Center GRR 136
Gardette, Allen	Student	3:00 p.m.	Kirkhof Center GRR 022
Garnsey, Cody	Student	9:00 a.m.	Kirkhof Center GRR 164
Garofalo, Lorenza	Student	9:00 a.m.	Henry Hall Atrium 100
Garvin, Travis	Student	10:00 a.m.	Henry Hall Atrium 036
Gaska, Virgilia	Student	9:00 a.m.	Kirkhof Center GRR 060
Gaule, Zachary	Student	9:00 a.m.	Henry Hall Atrium 058
Gaule, Zachary	Student	11:00 a.m.	Kirkhof Center 2266
Gilbert, Taylor	Student	10:00 a.m.	Henry Hall Atrium 098
Giles, Samantha	Student	2:00 p.m.	Henry Hall Atrium 001
Gillman, Alissa	Student	2:00 p.m.	Henry Hall Atrium 093
Gipson, Karen	Mentor	9:00 a.m.	Henry Hall Atrium 022
Gird, Shelby	Student	3:00 p.m.	Kirkhof Center GRR 156
Glashower, Tessa	Student	10:00 a.m.	Henry Hall Atrium 097
Glass, Stephen	Mentor	9:00 a.m.	Henry Hall Atrium 015
Glonek, Samantha	Student	9:00 a.m.	Kirkhof Center GRR 011
Goebel, Stacey	Student	9:00 a.m.	Kirkhof Center GRR 019
Goerisch, Denise	Mentor	9:00 a.m.	Kirkhof Center 2266
Golub, Rebecca	Student	12:00 p.m.	Kirkhof Center 1142
Gorden, Austin	Student	12:00 p.m.	Henry Hall Atrium 101
Gordon, Devin	Student	9:00 a.m.	MIP Library Exhibition Space 03
Gordon, Rebecca	Student	9:00 a.m.	Kirkhof Center GRR 111
Gottlieb, Gabriele	Mentor	12:00 p.m.	Kirkhof Center 2259
Goward, Nicole	Student	11:00 a.m.	Henry Hall Atrium 029
Grace, Matthew	Student	12:00 p.m.	Kirkhof Center 2259
Graham, Douglas	Mentor	9:00 a.m.	Kirkhof Center GRR 151
Green, Jillian	Student	2:00 p.m.	Kirkhof Center GRR 151
Gregory, Kyle	Student	11:00 a.m.	Kirkhof Center GRR 042
Griffin, Carol	Mentor	9:00 a.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	9:30 a.m.	Kirkhof Center 1104

Griffin, Carol	Mentor	10:00 a.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	10:30 a.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	11:00 a.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	11:30 a.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	2:00 p.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	2:30 p.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	3:00 p.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	3:30 p.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	4:00 p.m.	Kirkhof Center 1104
Griffin, Carol	Mentor	4:30 p.m.	Kirkhof Center 1104
Grochola, Jordan	Student	1:00 p.m.	Henry Hall Atrium 048
Groendyke, Bailey	Student	1:00 p.m.	Henry Hall Atrium 022
Guzman, Valerie	Mentor	11:00 a.m.	Kirkhof Center 2201
Gyorkos, Amy	Mentor	9:00 a.m.	Henry Hall Atrium 013
Gyorkos, Amy	Mentor	9:00 a.m.	Kirkhof Center GRR 162
Gyorkos, Amy	Mentor	9:00 a.m.	Kirkhof Center GRR 174
Gyorkos, Amy	Mentor	9:00 a.m.	Kirkhof Center GRR 040
Gyorkos, Amy	Mentor	9:00 a.m.	Henry Hall Atrium 083
Gyorkos, Amy	Mentor	9:00 a.m.	Kirkhof Center GRR 059
Gyorkos, Amy	Mentor	9:00 a.m.	Henry Hall Atrium 082
Gyorkos, Amy	Mentor	9:00 a.m.	Henry Hall Atrium 086
H			
Haas, Hannah	Student	10:00 a.m.	Henry Hall Atrium 083
Haessly, Megan	Student	9:00 a.m.	Henry Hall Atrium 066
Haahs, Emma	Student	2:00 p.m.	Kirkhof Center GRR 130
Haahs, Emma	Student	3:00 p.m.	Henry Hall Atrium 045
Hall, Johnathan	Student	9:00 a.m.	Henry Hall Atrium 087
Hamel, Emily	Student	10:00 a.m.	Kirkhof Center GRR 102
Hammond, Christina	Student	10:00 a.m.	Henry Hall Atrium 082
Hann, Sidney	Student	11:00 a.m.	Kirkhof Center 2201
Hansen, Loren	Student	2:00 p.m.	Henry Hall Atrium 064
Hanson, Connor	Student	10:00 a.m.	Kirkhof Center GRR 109
Harper, Zachary	Student	1:00 p.m.	Henry Hall Atrium 062
Hart, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 008
Hart, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 010
Hart, Dawn	Mentor	12:30 p.m.	Kirkhof Center 2201
Hart, Kendall	Student	9:00 a.m.	MIP Library Exhibition Space 08
Hart, Matthew	Mentor	9:00 a.m.	Henry Hall Atrium 043

Hart, Matthew	Mentor	9:00 a.m.	Kirkhof Center GRR 013
Hartung, Laura	Student	10:00 a.m.	Kirkhof Center GRR 109
Hasmanis, Malayna	Student	9:30 a.m.	Kirkhof Center 2266
Hasmanis, Malayna	Student	10:00 a.m.	Kirkhof Center 2259
Hatzel, Brian	Mentor	9:00 a.m.	Kirkhof Center GRR 154
Hatzel, Brian	Mentor	9:00 a.m.	Kirkhof Center GRR 088
Hausig, Evan	Student	12:00 p.m.	Kirkhof Center GRR 034
Haven, Christopher	Mentor	1:30 p.m.	Kirkhof Center 2266
Haven, Christopher	Mentor	2:00 p.m.	Kirkhof Center 2270
Haynes, Mitchell	Student	1:00 p.m.	Kirkhof Center GRR 062
Hazel, Kristin	Student	12:00 p.m.	Kirkhof Center GRR 018
Heath, Megan	Student	9:00 a.m.	Henry Hall Atrium 066
Hecht, Steven	Mentor	9:00 a.m.	Kirkhof Center GRR 031
Hecht, Steven	Mentor	2:00 p.m.	Kirkhof Center 2259
Hefferan, Tara	Mentor	9:00 a.m.	Henry Hall Atrium 071
Heiler, Samantha	Student	12:00 p.m.	Kirkhof Center 1142
Heine, Chloe	Student	10:00 a.m.	Henry Hall Atrium 083
Hendershot, Carly	Student	12:00 p.m.	Kirkhof Center GRR 046
Henderson, Nicole	Student	1:00 p.m.	Henry Hall Atrium 069
Hendriksma, Kaitlin	Student	2:00 p.m.	Kirkhof Center GRR 100
Henke, Dellas	Mentor	9:00 a.m.	MIP Library Exhibition Space 04
Henshaw, Michael	Mentor	9:00 a.m.	Kirkhof Center GRR 102
Henshaw, Michael	Mentor	9:00 a.m.	Kirkhof Center GRR 053
Henshaw, Michael	Mentor	2:30 p.m.	Kirkhof Center 2270
Herring, Marissa	Student	10:00 a.m.	Kirkhof Center GRR 144
Hicks, Jason	Student	11:00 a.m.	Henry Hall Atrium 046
Highway, Cory	Student	2:00 p.m.	Kirkhof Center GRR 071
Highway, Cory	Student	9:00 a.m.	Henry Hall Atrium 085
Hincka, Korynn	Student	11:00 a.m.	Kirkhof Center GRR 020
Hodges, Michael	Student	2:00 p.m.	Henry Hall Atrium 091
Holder, Benjamin	Mentor	9:00 a.m.	Kirkhof Center GRR 153
Hollister, Robert	Mentor	9:00 a.m.	Kirkhof Center GRR 171
Hollister, Robert	Mentor	9:00 a.m.	Kirkhof Center GRR 083
Hollister, Robert	Mentor	9:00 a.m.	Kirkhof Center GRR 168
Holloway, Timothy	Student	10:00 a.m.	Kirkhof Center GRR 089
Hope, Haley	Student	10:00 a.m.	Kirkhof Center GRR 109
Hoppe, Allison	Student	2:00 p.m.	Kirkhof Center GRR 016
Horvath, Cassidy	Student	1:00 p.m.	Kirkhof Center GRR 145

Houghton-Rahrig, Lori	Mentor	9:00 a.m.	Kirkhof Center GRR 132
Houghton-Rahrig, Lori	Mentor	9:00 a.m.	Kirkhof Center GRR 157
Howard, Rebecca	Student	2:00 p.m.	Henry Hall Atrium 063
Hren, Cameran	Student	9:00 a.m.	Henry Hall Atrium 047
Hrit, Rebecca	Student	2:00 p.m.	Henry Hall Atrium 088
Hudson, Michael	Student	12:00 p.m.	Kirkhof Center GRR 067
Hudson, Michael	Student	11:00 a.m.	Kirkhof Center GRR 159
Huff, Hannah	Student	10:00 a.m.	Henry Hall Atrium 086
Huffman, Cuyler	Student	11:00 a.m.	Kirkhof Center 2201
Huizenga, Caleb	Student	2:00 p.m.	Henry Hall Atrium 072
Huizinga, Grace	Mentor	9:00 a.m.	Kirkhof Center GRR 120
Hungerford, Morgan	Student	12:00 p.m.	Kirkhof Center GRR 145

I

Ingles, Courtney	Student	2:00 p.m.	Kirkhof Center GRR 005
Izrailov, Marisa	Student	9:00 a.m.	Henry Hall Atrium 005

J

Jackson, Destiny	Student	9:00 a.m.	Henry Hall Atrium 005
Jager, Kylie	Student	10:00 a.m.	Kirkhof Center 1142
Jamrose, Olivia	Student	9:00 a.m.	Kirkhof Center GRR 043
Janis, Olivia	Student	9:30 a.m.	Kirkhof Center 1142
Janowiak, Ashley	Student	12:30 p.m.	Kirkhof Center 1142
Jend, W.	Student	2:00 p.m.	Henry Hall Atrium 026
Jensen, James	Student	3:30 p.m.	Kirkhof Center 1104
Johnson, Andrew	Student	4:00 p.m.	Kirkhof Center GRR 053
Johnson, Brielle	Student	3:00 p.m.	Kirkhof Center GRR 063
Johnson, Travis	Student	9:00 a.m.	Kirkhof Center GRR 129
Jones, Jessie	Student	11:00 a.m.	Henry Hall Atrium 084
Jones, Michael	Student	9:00 a.m.	Kirkhof Center GRR 033
Jordan, Tessa	Mentor	9:00 a.m.	Henry Hall Atrium 030
Jose, Laurence	Mentor	9:00 a.m.	Kirkhof Center GRR 114

K

Kaliniak, Kayleigh	Student	10:00 a.m.	Henry Hall Atrium 015
Kalusniak, Rachel	Student	1:00 p.m.	Kirkhof Center 2270
Kamsickas, Megan	Student	9:00 a.m.	Kirkhof Center GRR 004
Karczewski, Ashley	Student	4:00 p.m.	Kirkhof Center GRR 112
Karpen, Mary	Mentor	9:00 a.m.	Henry Hall Atrium 014
Kasmer, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 033
Kasmer, Lisa	Mentor	4:00 p.m.	Kirkhof Center 2259

Keck, Nicole	Student	10:00 a.m.	Kirkhof Center GRR 097
Keck, Nicole	Student	1:00 p.m.	Henry Hall Atrium 107
Keck, Nicole	Student	3:00 p.m.	Kirkhof Center GRR 101
Keegan, Cael	Mentor	9:00 a.m.	Kirkhof Center GRR 126
Keegan, Cael	Mentor	9:00 a.m.	Henry Hall Atrium 040
Keegan, Cael	Mentor	9:00 a.m.	Kirkhof Center GRR 055
Keegan, Cael	Mentor	9:00 a.m.	Kirkhof Center GRR 155
Keegan, Cael	Mentor	9:00 a.m.	Kirkhof Center GRR 150
Keegan, Cael	Mentor	9:00 a.m.	Kirkhof Center GRR 105
Keegan, Cael	Mentor	2:00 p.m.	MIP LIB Main Floor Video Display
Keenlance, Paul	Mentor	9:00 a.m.	Henry Hall Atrium 085
Keough, Lauren	Mentor	9:00 a.m.	Kirkhof Center GRR 087
Keydel, Stacy	Student	10:00 a.m.	Kirkhof Center GRR 097
Keydel, Stacy	Student	1:00 p.m.	Henry Hall Atrium 107
Keydel, Stacy	Student	3:00 p.m.	Kirkhof Center GRR 101
Khoo, Sok Kean	Mentor	9:00 a.m.	Kirkhof Center GRR 130
Khoo, Sok Kean	Mentor	9:00 a.m.	Henry Hall Atrium 045
Khoo, Sok Kean	Mentor	9:00 a.m.	Henry Hall Atrium 025
Kibler, Kayleigh	Student	11:00 a.m.	Kirkhof Center GRR 068
Kienitz, Matthew	Student	9:00 a.m.	Kirkhof Center GRR 092
Killeen, Thomas	Student	10:00 a.m.	Kirkhof Center GRR 061
Kimble, Kyle	Student	9:00 a.m.	Henry Hall Atrium 005
Kindel, Maclear	Mentor	4:30 p.m.	Kirkhof Center 2270
King, Kendra	Student	4:00 p.m.	Kirkhof Center GRR 001
Klein, Haley	Student	1:00 p.m.	Kirkhof Center GRR 118
Klempay, Alexandra	Student	2:00 p.m.	Henry Hall Atrium 064
Kloosterman, Melinda	Student	10:00 a.m.	Henry Hall Atrium 055
Kloska, Alexander	Student	4:00 p.m.	Kirkhof Center GRR 053
Koelsch, Jenna	Student	1:00 p.m.	Henry Hall Atrium 051
Koenes, Ashley	Student	9:00 a.m.	Henry Hall Atrium 109
Kohler, Mackenzie	Student	1:00 p.m.	Kirkhof Center GRR 103
Konen, Emily	Student	9:00 a.m.	Kirkhof Center 1142
Konen, Emily	Student	10:00 a.m.	Henry Hall Atrium 074
Kong, Haiying	Mentor	9:00 a.m.	Henry Hall Atrium 094
Kopperl, Sheldon	Mentor	9:00 a.m.	Kirkhof Center GRR 015
Kopperl, Sheldon	Mentor	9:00 a.m.	Kirkhof Center GRR 069
Kopperl, Sheldon	Mentor	9:00 a.m.	Kirkhof Center GRR 106
Korndorfer, Max	Student	11:00 a.m.	Henry Hall Atrium 056

Koth, Madison	Student	11:00 a.m.	Henry Hall Atrium 056
Kovacs, Dalila	Mentor	9:00 a.m.	Henry Hall Atrium 079
Kovacs, Dalila	Mentor	9:00 a.m.	Kirkhof Center GRR 056
Kovacs, Dalila	Mentor	9:00 a.m.	Henry Hall Atrium 067
Kralik, Rebecca	Student	10:00 a.m.	Kirkhof Center GRR 109
Kress, Andrea	Student	12:00 p.m.	Kirkhof Center GRR 054
Kruskie, Megan	Student	4:00 p.m.	Kirkhof Center 2201
Kurjiaka, David	Mentor	9:00 a.m.	Kirkhof Center GRR 089
Kurjiaka, David	Mentor	9:00 a.m.	Henry Hall Atrium 050
Kurza, Meghan	Student	10:00 a.m.	Henry Hall Atrium 052
Kwekel, Emily	Student	11:30 a.m.	Kirkhof Center 1142
Kwekel, Morgan	Student	10:00 a.m.	Kirkhof Center 1142
Kyser, Kevin	Student	12:00 p.m.	Kirkhof Center 2266
L			
LaDuca, Andrew	Student	1:00 p.m.	Kirkhof Center GRR 030
LaFayette, Gabrielle	Student	2:00 p.m.	Kirkhof Center GRR 045
Labioda, Gabrielle	Student	3:00 p.m.	Henry Hall Atrium 057
Lake, Danielle	Mentor	9:00 a.m.	Henry Hall Atrium 080
Lambert, Elizabeth	Mentor	9:00 a.m.	Henry Hall Atrium 074
Lambert, Kayleigh	Student	3:00 p.m.	Kirkhof Center GRR 063
Lambert, Kayleigh	Student	11:00 a.m.	Henry Hall Atrium 090
Lamoreaux, Royce	Student	11:00 a.m.	Henry Hall Atrium 099
Lamoreaux, Royce	Student	12:00 p.m.	Kirkhof Center GRR 006
Lantz, Andrew	Mentor	9:00 a.m.	Henry Hall Atrium 041
Larabee, Dexter	Student	11:00 a.m.	Kirkhof Center GRR 077
Larson, Madison	Student	10:00 a.m.	Henry Hall Atrium 055
Latham, Clayton	Student	4:00 p.m.	Kirkhof Center 2201
Lauzon, Kyr	Student	12:00 p.m.	Henry Hall Atrium 103
Law, Samantha	Student	10:00 a.m.	Kirkhof Center GRR 087
Leahy, Katelin	Student	9:00 a.m.	Henry Hall Atrium 076
Lee, Hoon	Mentor	9:00 a.m.	MIP Library Exhibition Space 12
Leimbach-Maus, Hailee	Student	9:00 a.m.	Kirkhof Center GRR 092
Lenz, Kourtney	Student	9:00 a.m.	Kirkhof Center GRR 095
Leonard, David	Mentor	9:00 a.m.	Kirkhof Center GRR 062
Levenburg, Nancy	Mentor	9:00 a.m.	Henry Hall Atrium 048
Lewis, Aaron	Student	2:30 p.m.	Kirkhof Center 1104
Lindale, Jacob	Student	12:00 p.m.	Kirkhof Center GRR 146
Lindale, Jacob	Student	9:00 a.m.	Henry Hall Atrium 067

Linn, David	Mentor	9:00 a.m.	Kirkhof Center GRR 166
Lioubimtseva, Elena	Mentor	9:00 a.m.	Kirkhof Center GRR 140
Lioubimtseva, Elena	Mentor	9:00 a.m.	Henry Hall Atrium 049
Lioubimtseva, Elena	Mentor	9:00 a.m.	Henry Hall Atrium 026
Lioubimtseva, Elena	Mentor	9:00 a.m.	Kirkhof Center GRR 072
Lioubimtseva, Elena	Mentor	9:00 a.m.	Kirkhof Center GRR 170
Lioubimtseva, Elena	Mentor	9:00 a.m.	Kirkhof Center GRR 075
Lioubimtseva, Elena	Mentor	9:30 a.m.	Kirkhof Center 2270
Loewen, Stephanie	Student	1:30 p.m.	Kirkhof Center 2201
Loewen, Stephanie	Student	2:30 p.m.	Kirkhof Center 2201
Loewen, Stephanie	Student	3:30 p.m.	Kirkhof Center 2201
Loftis, Jessica	Student	11:00 a.m.	Kirkhof Center GRR 059
Lombardo, Michael	Mentor	9:00 a.m.	Kirkhof Center GRR 097
Lombardo, Michael	Mentor	9:00 a.m.	Henry Hall Atrium 107
Lombardo, Michael	Mentor	9:00 a.m.	Kirkhof Center GRR 101
Looker, Abbey	Student	10:00 a.m.	Kirkhof Center 1142
Lord, Richard	Mentor	9:00 a.m.	Henry Hall Atrium 072
Lord, Richard	Mentor	9:00 a.m.	Henry Hall Atrium 060
Loudermilk, Blake	Student	11:00 a.m.	Kirkhof Center GRR 020
Lown, Deborah	Mentor	9:00 a.m.	Kirkhof Center GRR 033
Lown, Deborah	Mentor	9:00 a.m.	Kirkhof Center GRR 008
Lucenti, Samantha	Student	1:00 p.m.	Henry Hall Atrium 069
Ludge, Allison	Student	12:00 p.m.	Kirkhof Center GRR 119
Lussier, Andrea	Student	9:00 a.m.	Kirkhof Center GRR 080
Lyle, Matthew	Student	12:00 p.m.	Kirkhof Center GRR 176

M

Ma, Kin	Mentor	9:00 a.m.	Kirkhof Center GRR 071
Ma, Kin	Mentor	9:00 a.m.	Kirkhof Center GRR 161
Ma, Kin	Mentor	9:00 a.m.	Kirkhof Center GRR 176
MacDonald, Erica	Student	9:00 a.m.	Henry Hall Atrium 005
MacKay, Samantha	Student	10:00 a.m.	Kirkhof Center GRR 086
Madsen, Troy	Student	3:00 p.m.	Kirkhof Center GRR 133
Maitland, Amanda	Student	11:00 a.m.	Henry Hall Atrium 031
Malburg, Casey	Student	10:00 a.m.	Kirkhof Center GRR 109
Malear, Elizabeth	Student	10:00 a.m.	Henry Hall Atrium 015
Maley, Morgan	Student	1:00 p.m.	Kirkhof Center GRR 052
Maloney, Jerrica	Student	10:00 a.m.	Henry Hall Atrium 015
Maloney, Mikayla	Student	12:00 p.m.	Kirkhof Center GRR 094

Mamassian, Hripsime	Student	11:00 a.m.	Henry Hall Atrium 046
Mannard, Kelsey	Student	9:00 a.m.	Kirkhof Center GRR 083
Marchi, Heidi	Student	10:00 a.m.	Kirkhof Center GRR 116
Marion, Alexandra	Student	10:30 a.m.	Kirkhof Center 1142
Marlatt, Molly	Student	1:00 p.m.	Kirkhof Center GRR 145
Marshall, Ashley	Student	11:00 a.m.	Henry Hall Atrium 031
Marshall, Ryan	Student	11:00 a.m.	Kirkhof Center GRR 059
Martin, Samantha	Student	12:00 p.m.	Kirkhof Center GRR 018
Martinez, Sofia	Student	9:00 a.m.	Kirkhof Center GRR 124
Martino, Gabrielle	Student	1:00 p.m.	Kirkhof Center GRR 028
Matchett, Stephen	Mentor	9:00 a.m.	Kirkhof Center GRR 037
Matthews, Morgan	Student	10:00 a.m.	Kirkhof Center GRR 144
Mattson, Abigail	Student	12:00 p.m.	Kirkhof Center GRR 094
Maurer, Kimberly	Student	12:00 p.m.	Kirkhof Center GRR 055
Mayers, Leifa	Mentor	9:00 a.m.	Kirkhof Center GRR 155
Mayers, Leifa	Mentor	10:30 a.m.	Kirkhof Center 2266
McCartney, Joseph	Student	2:00 p.m.	Henry Hall Atrium 020
McClelland, Taylor	Student	10:00 a.m.	Kirkhof Center GRR 178
McCloughan, Jacob	Student	10:00 a.m.	Henry Hall Atrium 018
McCloughan, Jacob	Student	9:00 a.m.	Kirkhof Center GRR 051
McCoy, Tracey	Student	2:00 p.m.	Henry Hall Atrium 026
McDaniel, Leigha	Student	9:00 a.m.	Kirkhof Center GRR 004
McElroy, Margaret	Student	10:00 a.m.	Henry Hall Atrium 076
McElroy, Ryan	Student	3:00 p.m.	Kirkhof Center GRR 136
McFarland, Amy	Mentor	10:00 a.m.	Kirkhof Center 2266
McKee, Kimberly	Mentor	9:00 a.m.	Henry Hall Atrium 046
McKenna, Emily	Student	10:00 a.m.	Henry Hall Atrium 097
McKenzie, Emily	Student	10:00 a.m.	Henry Hall Atrium 053
McKenzie, Shelby	Student	3:00 p.m.	Kirkhof Center GRR 012
McKenzie, Steven	Student	11:00 a.m.	Henry Hall Atrium 096
McLaughlin, Jacob	Student	12:00 p.m.	Kirkhof Center GRR 078
McLaughlin, Marta	Student	2:00 p.m.	Kirkhof Center GRR 005
McNair, James	Mentor	9:00 a.m.	Kirkhof Center GRR 010
McNamee, Casey	Student	10:00 a.m.	Henry Hall Atrium 055
Mccarthy, Matthew	Student	4:00 p.m.	Henry Hall Atrium 013
Mead, Wyatt	Student	9:00 a.m.	Kirkhof Center GRR 162
Meier, Emily	Student	11:00 a.m.	Kirkhof Center GRR 017
Mekik, Figen	Mentor	9:00 a.m.	Kirkhof Center GRR 164

Mencotti, Alexis	Student	10:00 a.m.	Henry Hall Atrium 086
Michalski, Michael	Student	12:00 p.m.	Kirkhof Center GRR 115
Mikolowski, Kaylor	Student	3:00 p.m.	Kirkhof Center GRR 002
Milano, Samantha	Student	10:00 a.m.	Henry Hall Atrium 027
Mileva, Gloria	Student	1:00 p.m.	Henry Hall Atrium 080
Millard, Kourtney	Student	12:00 p.m.	Kirkhof Center GRR 055
Miller, Anderson	Student	11:00 a.m.	Kirkhof Center GRR 059
Miller, Austin	Student	10:00 a.m.	Kirkhof Center GRR 136
Miller, C'arra	Student	9:00 a.m.	Kirkhof Center GRR 085
Miller, C'arra	Student	9:00 a.m.	Kirkhof Center GRR 090
Miller, Jaren	Student	10:00 a.m.	Kirkhof Center GRR 137
Miller, Josephine	Student	2:00 p.m.	Kirkhof Center GRR 040
Miller, Kalie	Student	1:00 p.m.	Kirkhof Center GRR 105
Miller, Madison	Student	9:00 a.m.	Henry Hall Atrium 035
Miller, Mallory	Student	2:00 p.m.	Henry Hall Atrium 063
Mittner, Kevin	Student	2:00 p.m.	Henry Hall Atrium 039
Miutz, Lauren	Mentor	9:00 a.m.	Kirkhof Center GRR 174
Moldenhauer, Madeline	Student	9:00 a.m.	Kirkhof Center GRR 113
Molenkamp, Rachel	Student	11:00 a.m.	Kirkhof Center 1142
Moler, Maxwell	Student	9:00 a.m.	Kirkhof Center GRR 170
Moll, Sarah	Student	1:00 p.m.	Kirkhof Center GRR 103
Molla, Azizur	Mentor	9:00 a.m.	Henry Hall Atrium 009
Montagna, Douglas	Mentor	11:00 a.m.	Kirkhof Center 2270
Montemayor, Hailey	Student	4:00 p.m.	Kirkhof Center GRR 095
Montgomery, Connor	Student	1:00 p.m.	Henry Hall Atrium 104
Montgomery, Connor	Student	12:00 p.m.	Henry Hall Atrium 101
Montgomery, Daniel	Student	1:00 p.m.	Henry Hall Atrium 104
Moore, Jared	Mentor	9:00 a.m.	Kirkhof Center GRR 133
Moore, Jared	Mentor	9:00 a.m.	Henry Hall Atrium 034
Moran, Kyle	Student	11:00 a.m.	Henry Hall Atrium 105
Morgan, Roderick	Mentor	9:00 a.m.	Kirkhof Center GRR 117
Morgan, Roderick	Mentor	9:00 a.m.	Kirkhof Center GRR 152
Morison, Melissa	Mentor	4:00 p.m.	Kirkhof Center 2201
Morris, James	Student	10:00 a.m.	Henry Hall Atrium 015
Morris, Victoria	Student	9:00 a.m.	Kirkhof Center GRR 129
Moulton, Haley	Student	1:00 p.m.	Henry Hall Atrium 002
Mupepi, Sylvia	Mentor	9:00 a.m.	Henry Hall Atrium 068
Murray, Ryan	Student	9:00 a.m.	Kirkhof Center GRR 057

Myers, Kayla	Student	10:00 a.m.	Henry Hall Atrium 055
N			
Nakano, Sierra	Student	10:00 a.m.	Kirkhof Center GRR 141
Nass, Hannah	Student	10:30 a.m.	Kirkhof Center 1142
Navetta, Katlyn	Student	1:00 p.m.	Henry Hall Atrium 069
Neils, Thomas	Mentor	9:00 a.m.	Kirkhof Center GRR 030
Nesmith, Neson	Student	4:00 p.m.	Kirkhof Center GRR 175
Newton, Andrew	Student	12:30 p.m.	Kirkhof Center 2270
Nichols, Joseph	Student	10:00 a.m.	Kirkhof Center GRR 058
Nichols, Joseph	Student	12:00 p.m.	Kirkhof Center GRR 044
Nishek, Kyle	Student	2:00 p.m.	Kirkhof Center GRR 142
Noordyke, Emily	Student	11:00 a.m.	Kirkhof Center GRR 131
Nordman, Erik	Mentor	9:00 a.m.	Kirkhof Center 2201
Nordman, Erik	Mentor	9:00 a.m.	Kirkhof Center GRR 169
Nordman, Erik	Mentor	9:00 a.m.	Kirkhof Center GRR 078
Noteboom, Rachael	Student	2:00 p.m.	Kirkhof Center GRR 071
Novotny, Karen	Mentor	9:00 a.m.	Kirkhof Center GRR 014
Noworolnik, Mitchell	Student	3:00 p.m.	Henry Hall Atrium 049
Nystrom, Samuel	Student	9:00 a.m.	Kirkhof Center GRR 081
O			
O'Brien, Zakry	Student	9:00 a.m.	Henry Hall Atrium 011
O'Hara, Melody	Student	9:00 a.m.	Henry Hall Atrium 019
Oberts, Katelyn	Student	1:00 p.m.	Kirkhof Center GRR 028
Oliver, Elizabeth	Student	1:30 p.m.	Kirkhof Center 2270
Olson, Joshua	Student	10:00 a.m.	Henry Hall Atrium 015
Olson, Joshua	Student	1:00 p.m.	Henry Hall Atrium 057
Ondayko, Kortney	Student	11:00 a.m.	Henry Hall Atrium 040
Ondayko, Kortney	Student	1:00 p.m.	Henry Hall Atrium 070
Oneka, Morgan	Student	10:00 a.m.	Kirkhof Center GRR 087
Oppman, Rebecca	Student	9:00 a.m.	MIP Library Exhibition Space 10
Orellana, Aaron	Student	9:00 a.m.	Kirkhof Center GRR 134
Orndorf, Nathaniel	Student	9:00 a.m.	Kirkhof Center GRR 066
Orndorf, Nathaniel	Student	10:00 a.m.	Kirkhof Center GRR 073
Ortiz, Chelsea	Student	11:00 a.m.	Kirkhof Center GRR 150
Osipstov, Philipp	Student	9:00 a.m.	Kirkhof Center GRR 081
Ostrow, Bruce	Mentor	9:00 a.m.	Kirkhof Center GRR 109
Ouellette, John	Student	9:00 a.m.	Henry Hall Atrium 066

P

Palka, Jacqueline	Student	10:00 a.m.	Kirkhof Center 2215
Paez, Savannah	Student	10:00 a.m.	Henry Hall Atrium 053
Pageau, Spencer	Student	9:00 a.m.	Henry Hall Atrium 077
Pankratz, Trey	Student	9:00 a.m.	Kirkhof Center GRR 165
Pankratz, Trey	Student	12:00 p.m.	Henry Hall Atrium 060
Paquette, Danielle	Student	9:00 a.m.	Kirkhof Center GRR 015
Pardy, Luke	Student	9:00 a.m.	Kirkhof Center GRR 163
Parker, Darren	Mentor	9:30 a.m.	Kirkhof Center 2201
Parrish, Matthew	Student	11:30 a.m.	Kirkhof Center 1142
Partridge, Charlyn	Mentor	9:00 a.m.	Kirkhof Center GRR 092
Patel, Osman	Mentor	9:00 a.m.	Kirkhof Center GRR 034
Patel, Osman	Mentor	9:00 a.m.	Kirkhof Center GRR 039
Patel, Osman	Mentor	9:00 a.m.	Kirkhof Center GRR 038
Patel, Osman	Mentor	9:00 a.m.	Kirkhof Center GRR 163
Patel, Osman	Mentor	9:00 a.m.	Kirkhof Center GRR 051
Pavey, Alexander	Student	9:00 a.m.	Kirkhof Center GRR 051
Payment, Morgan	Student	9:30 a.m.	Kirkhof Center 1142
Pearson, Hunter	Student	11:00 a.m.	Kirkhof Center GRR 159
Pedelty, Matthew	Student	11:00 a.m.	Henry Hall Atrium 017
Pell, Grant	Student	12:00 p.m.	Kirkhof Center GRR 024
Pellathy, Daniel	Mentor	9:00 a.m.	Henry Hall Atrium 007
Pellegrom, Hailey	Student	10:00 a.m.	Henry Hall Atrium 082
Penn, James	Mentor	9:00 a.m.	Kirkhof Center GRR 113
Pennepacker, Stevie	Student	2:00 p.m.	Kirkhof Center GRR 040
Perry, Jane	Student	1:00 p.m.	Kirkhof Center GRR 028
Peruzzi, Christopher	Student	9:00 a.m.	Kirkhof Center GRR 085
Peruzzi, Christopher	Student	9:00 a.m.	Kirkhof Center GRR 037
Pete, Susan	Student	9:00 a.m.	Kirkhof Center 2266
Peterson, Denise	Student	3:00 p.m.	Kirkhof Center GRR 070
Peterson, Grace	Student	10:00 a.m.	Kirkhof Center GRR 166
Peterson, Virginia	Mentor	9:00 a.m.	Kirkhof Center GRR 048
Petrenko, Anton	Student	9:00 a.m.	Kirkhof Center GRR 081
Pfost, Cody	Student	2:00 p.m.	Henry Hall Atrium 102
Pham, Nguyen	Student	9:00 a.m.	Kirkhof Center GRR 074
Pham, Tuyetnhi	Student	10:00 a.m.	Henry Hall Atrium 097
Pham, Uyen	Student	3:00 p.m.	Henry Hall Atrium 075
Pichette, Benjamin	Student	11:00 a.m.	Henry Hall Atrium 054

Pisto, Virginia	Student	9:00 a.m.	MIP Library Exhibition Space 12
Pizano, Maira	Student	12:30 p.m.	Kirkhof Center 1142
Platt, Jamie	Student	11:00 a.m.	Henry Hall Atrium 044
Platz, Faith	Student	1:00 p.m.	Henry Hall Atrium 048
Plekker, Megan	Student	2:00 p.m.	Kirkhof Center GRR 107
Poirier, Caroline	Student	1:00 p.m.	Kirkhof Center GRR 138
Pompilius, Amanda	Student	10:30 a.m.	Kirkhof Center 1142
Ponke, Megan	Student	11:00 a.m.	Kirkhof Center GRR 008
Postma, Dylan	Student	12:00 p.m.	Kirkhof Center GRR 176
Poterek, Lyndsey	Student	12:00 p.m.	Kirkhof Center 1142
Powers, Rachel	Mentor	9:00 a.m.	Henry Hall Atrium 075
Pozzi, Gabriela	Mentor	2:00 p.m.	Kirkhof Center 2266
Pretto, Jordan	Student	4:00 p.m.	Kirkhof Center GRR 106
Pretzer, Emilie	Student	2:00 p.m.	Kirkhof Center GRR 108
Preville, Nicholas	Student	9:00 a.m.	Henry Hall Atrium 106
Pryson, Paige	Student	9:00 a.m.	Kirkhof Center GRR 004
Pummell, Benjamin	Student	11:00 a.m.	Henry Hall Atrium 056
Putman, Jason	Student	9:00 a.m.	Kirkhof Center GRR 051
Putnam, Katie	Student	2:00 p.m.	Kirkhof Center GRR 154
Pyscher, Gretchen	Student	9:00 a.m.	Kirkhof Center 1142

Q

Quinn, Joshua	Student	11:00 a.m.	Henry Hall Atrium 037
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R

Ramsson, Eric	Mentor	9:00 a.m.	Henry Hall Atrium 012
Ramsson, Eric	Mentor	9:00 a.m.	Henry Hall Atrium 112
Ravuth, Ivannovich	Student	11:30 a.m.	Kirkhof Center 2266
Raymond, Taylor	Student	10:00 a.m.	Henry Hall Atrium 052
Rebello Lima, Vinicius	Mentor	9:00 a.m.	MIP Library Exhibition Space 10
Rebello Lima, Vinicius	Mentor	9:00 a.m.	MIP Library Exhibition Space 03
Rebello Lima, Vinicius	Mentor	9:00 a.m.	MIP Library Exhibition Space 05
Rebello Lima, Vinicius	Mentor	9:00 a.m.	MIP Library Exhibition Space 08
Rebello Lima, Vinicius	Mentor	9:00 a.m.	MIP Library Exhibition Space 14
Rebello Lima, Vinicius	Mentor	9:00 a.m.	Kirkhof Center GRR 060
Rebello Lima, Vinicius	Mentor	9:00 a.m.	Henry Hall Atrium 093
Reed, Alesha	Student	11:30 a.m.	Kirkhof Center 1142
Reed, James	Student	2:00 p.m.	Kirkhof Center GRR 142
Reed, James	Mentor	9:00 a.m.	Kirkhof Center GRR 036
Reed, James	Mentor	9:00 a.m.	Henry Hall Atrium 037

Reed, James	Mentor	9:00 a.m.	Kirkhof Center GRR 050
Reed, James	Mentor	9:00 a.m.	Henry Hall Atrium 029
Reed, James	Mentor	9:00 a.m.	Henry Hall Atrium 077
Reed, James	Mentor	9:00 a.m.	Kirkhof Center GRR 178
Reed, James	Mentor	9:00 a.m.	Henry Hall Atrium 039
Reed, James	Mentor	9:00 a.m.	Henry Hall Atrium 054
Reed, James	Mentor	9:00 a.m.	Henry Hall Atrium 061
Reed, James	Mentor	9:00 a.m.	Kirkhof Center GRR 149
Reid, Jordan	Student	11:00 a.m.	Henry Hall Atrium 099
Reynaert, Darby	Student	1:00 p.m.	Henry Hall Atrium 069
Reynolds, Chase	Student	12:00 p.m.	Kirkhof Center GRR 034
Reynolds, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 017
Ribick, Allison	Student	4:30 p.m.	Kirkhof Center 2266
Ricco, Michael	Mentor	9:00 a.m.	Kirkhof Center GRR 052
Rice, Emma	Student	9:00 a.m.	Kirkhof Center GRR 010
Richards, Jonathon	Student	3:00 p.m.	Kirkhof Center GRR 139
Richiert, Dawn	Mentor	9:00 a.m.	Kirkhof Center GRR 036
Richiert, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 037
Richiert, Dawn	Mentor	9:00 a.m.	Kirkhof Center GRR 050
Richiert, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 029
Richiert, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 077
Richiert, Dawn	Mentor	9:00 a.m.	Kirkhof Center GRR 178
Richiert, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 039
Richiert, Dawn	Mentor	9:00 a.m.	Henry Hall Atrium 054
Richiert, Dawn	Mentor	9:00 a.m.	Kirkhof Center GRR 149
Riemersma, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 043
Riemersma, Peter	Mentor	9:00 a.m.	Henry Hall Atrium 066
Riemersma, Peter	Mentor	9:00 a.m.	Henry Hall Atrium 056
Riemersma, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 147
Riemersma, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 042
Riemersma, Peter	Mentor	9:00 a.m.	Henry Hall Atrium 073
Riemersma, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 141
Riemersma, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 029
Risher, Jaimee	Student	10:00 a.m.	Henry Hall Atrium 053
Risko, Olivia	Student	10:00 a.m.	Henry Hall Atrium 015
Ritchie, Mackenzie	Student	9:00 a.m.	Kirkhof Center GRR 123
Rivera-Salas, Claudia	Student	4:00 p.m.	Kirkhof Center GRR 132

Roach, Alyssa	Student	9:00 a.m.	MIP Library Exhibition Space 04
Robbins, Jacob	Student	3:00 p.m.	Kirkhof Center GRR 063
Robertson, Joseph	Student	12:00 p.m.	Kirkhof Center GRR 041
Robichaud, Abigail	Student	9:00 a.m.	Henry Hall Atrium 058
Robichaud, Abigail	Student	11:00 a.m.	Kirkhof Center 2266
Rogers, Emily	Mentor	9:00 a.m.	MIP Library Exhibition Space 09
Rogers, Kelsey	Student	10:00 a.m.	Henry Hall Atrium 050
Rogers, Marisa	Student	2:00 p.m.	Kirkhof Center GRR 108
Rogness, Neal	Mentor	9:00 a.m.	Kirkhof Center GRR 052
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 028
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 047
Rogness, Neal	Mentor	9:00 a.m.	Kirkhof Center GRR 053
Rogness, Neal	Mentor	9:00 a.m.	Kirkhof Center GRR 122
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 046
Rogness, Neal	Mentor	9:00 a.m.	Kirkhof Center GRR 035
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 048
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 027
Rogness, Neal	Mentor	9:00 a.m.	Kirkhof Center GRR 128
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 007
Rogness, Neal	Mentor	9:00 a.m.	Henry Hall Atrium 020
Rogness, Neal	Mentor	11:00 a.m.	Kirkhof Center 2201
Rogness, Neal	Mentor	1:30 p.m.	Kirkhof Center 2270
Rogness, Neal	Mentor	4:30 p.m.	Kirkhof Center 2270
Rohn, Amy	Mentor	9:00 a.m.	Henry Hall Atrium 023
Rollins, Shannon	Student	12:00 p.m.	Kirkhof Center GRR 006
Ronspees, Austin	Student	9:00 a.m.	Henry Hall Atrium 081
Rosekrans, Makayla	Student	1:00 p.m.	Henry Hall Atrium 009
Rosenberg, Aaron	Student	10:00 a.m.	Kirkhof Center GRR 148
Ross, Chloe	Student	9:30 a.m.	Kirkhof Center 1104
Rottier, Aron	Student	9:00 a.m.	Kirkhof Center 2259
Rouse, Riley	Student	9:00 a.m.	Kirkhof Center 1104
Royer, Christopher	Student	1:00 p.m.	Kirkhof Center GRR 099
Rubambiza, Gloire	Student	1:00 p.m.	Henry Hall Atrium 003
Ruffner, Erica	Student	2:00 p.m.	Kirkhof Center 2201
Rumschlag, Jacob	Student	3:00 p.m.	Kirkhof Center 1104
Russell, Amy	Mentor	9:00 a.m.	Kirkhof Center 2270
Russell, Amy	Mentor	9:00 a.m.	Kirkhof Center GRR 027

S

Sackett, Amber	Student	11:30 a.m.	Kirkhof Center 2270
Salas, Nora	Mentor	4:30 p.m.	Kirkhof Center 2266
Sanchez, Marselina	Student	2:00 p.m.	Henry Hall Atrium 064
Sanchez, Vanessa	Student	9:00 a.m.	Kirkhof Center GRR 019
Sass, Georgette	Mentor	9:00 a.m.	Kirkhof Center GRR 139
Saunders, Bryan	Student	9:00 a.m.	Kirkhof Center GRR 075
Schaertel, Stephanie	Mentor	9:00 a.m.	Kirkhof Center GRR 146
Schaner, Haley	Student	12:00 p.m.	Kirkhof Center GRR 125
Scharf, Carolyn	Student	3:00 p.m.	Kirkhof Center GRR 110
Schmidt, Sarah	Student	4:00 p.m.	Henry Hall Atrium 094
Schmidtmann, Madison	Student	10:00 a.m.	Henry Hall Atrium 010
Schmitt, Angela	Student	12:00 p.m.	Kirkhof Center 2201
Schnyders, Harold	Mentor	9:00 a.m.	Kirkhof Center GRR 079
Schock, Ashley	Student	12:00 p.m.	Kirkhof Center 1142
Schoel, Marisa	Student	10:00 a.m.	Henry Hall Atrium 030
Schrager, Dan	Student	9:00 a.m.	MIP Library Exhibition Space 06
Schram, Hayley	Student	12:00 p.m.	Kirkhof Center GRR 047
Schrauben, Kristen	Mentor	9:00 a.m.	Kirkhof Center GRR 098
Schulke, Courteney	Student	9:00 a.m.	MIP Library Exhibition Space 14
Schulte, Ashley	Mentor	9:00 a.m.	Henry Hall Atrium 070
Schulte, Ashley	Mentor	9:30 a.m.	Kirkhof Center 2266
Schulte, Ashley	Mentor	10:00 a.m.	Kirkhof Center 2259
Schurkamp, Zachary	Student	10:00 a.m.	Henry Hall Atrium 082
Schutzenhofer, Alyssa	Student	9:00 a.m.	Kirkhof Center GRR 081
Schutzenhofer, Alyssa	Student	9:30 a.m.	Kirkhof Center 2270
Schweitzer, Nick	Student	4:00 p.m.	Kirkhof Center 2259
Scott, Bethany	Student	12:00 p.m.	Henry Hall Atrium 103
Scott, Kelsey	Student	3:00 p.m.	Kirkhof Center GRR 014
Scott, Madeline	Student	11:30 a.m.	Kirkhof Center 1142
Scripps, Jerry	Mentor	9:00 a.m.	Henry Hall Atrium 003
Seath, Ashley	Student	9:00 a.m.	Kirkhof Center GRR 026
Seeger, Bailey	Student	12:00 p.m.	Henry Hall Atrium 103
Shaffer, Elise	Student	1:00 p.m.	Kirkhof Center GRR 028
Shapiro Shapin, Carolyn	Mentor	9:00 a.m.	Kirkhof Center GRR 009
Sharp, Mikayla	Student	9:00 a.m.	Henry Hall Atrium 058
Sharp, Mikayla	Student	11:00 a.m.	Kirkhof Center 2266
Shavalier, Sydney	Student	10:00 a.m.	Henry Hall Atrium 041

Sheffield, Eric	Student	9:00 a.m.	Henry Hall Atrium 061
Sheridan, Melody	Student	2:00 p.m.	Kirkhof Center 2270
Sherk, Tabitha	Student	4:00 p.m.	Kirkhof Center 2201
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 001
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 100
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 109
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 179
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 099
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 005
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 022
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 104
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 103
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 019
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 102
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 101
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 004
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 028
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 105
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 018
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 006
Sherman, Ross	Mentor	9:00 a.m.	Henry Hall Atrium 002
Sherman, Ross	Mentor	9:00 a.m.	Kirkhof Center GRR 020
Shippy, Rachel	Student	1:00 p.m.	Henry Hall Atrium 057
Simons-Scalise, Abigail	Student	2:00 p.m.	Kirkhof Center GRR 151
Sincox, Brittany	Student	2:00 p.m.	Henry Hall Atrium 012
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 063
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 055
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 064
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 053
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 052
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 069
Sisson, Lisa	Mentor	9:00 a.m.	Kirkhof Center GRR 142
Sisson, Lisa	Mentor	9:00 a.m.	Henry Hall Atrium 058
Sisson, Lisa	Mentor	9:00 a.m.	Kirkhof Center GRR 144
Sisson, Lisa	Mentor	11:00 a.m.	Kirkhof Center 2266
Siwicki, Rebecca	Student	12:00 p.m.	Kirkhof Center GRR 173
Skinner, Cassandra	Student	1:00 p.m.	Kirkhof Center GRR 052
Smith, Stafford	Mentor	9:00 a.m.	MIP Library Exhibition Space 01

Smith, Stafford	Mentor	9:00 a.m.	MIP Library Exhibition Space 19
Smolen, Kali	Student	3:30 p.m.	Kirkhof Center 2266
Snyder, Eric	Mentor	9:00 a.m.	Henry Hall Atrium 106
Solis, Jessica	Student	4:00 p.m.	Henry Hall Atrium 013
Sowatsky, Laura	Student	9:00 a.m.	Kirkhof Center GRR 162
Sowles, Andrea	Student	2:00 p.m.	Henry Hall Atrium 001
Spangenberg, Nathan	Student	9:00 a.m.	MIP Library Exhibition Space 08
Spears, Mara	Student	9:30 a.m.	Kirkhof Center 2270
Spratt, Madison	Student	2:00 p.m.	Henry Hall Atrium 008
Squires, Johanna	Student	3:00 p.m.	Kirkhof Center GRR 127
Stagg, Tiara	Student	12:30 p.m.	Kirkhof Center 1142
Stark-Norton, Arianna	Student	2:00 p.m.	Kirkhof Center GRR 040
Staves, Mark	Mentor	9:00 a.m.	Kirkhof Center GRR 046
Staves, Mark	Mentor	12:30 p.m.	Kirkhof Center 2259
Stawinski, Michael	Student	12:30 p.m.	Kirkhof Center 2266
Steible, Joshua	Student	11:00 a.m.	Henry Hall Atrium 105
Stein, Alexandra	Student	3:00 p.m.	Henry Hall Atrium 057
Stewart, Jennifer	Mentor	9:00 a.m.	Henry Hall Atrium 018
Stewart, Jennifer	Mentor	9:00 a.m.	Kirkhof Center GRR 116
Steyn, Jody-Leigh	Student	9:00 a.m.	Kirkhof Center GRR 127
Stojanovski, Vanessa	Student	11:00 a.m.	Kirkhof Center GRR 059
Strautz, Brandon	Student	11:00 a.m.	Henry Hall Atrium 099
Strautz, Brandon	Student	9:00 a.m.	Kirkhof Center GRR 093
Strickler, Timothy	Mentor	9:00 a.m.	Kirkhof Center GRR 036
Strickler, Timothy	Mentor	9:00 a.m.	Henry Hall Atrium 037
Strickler, Timothy	Mentor	9:00 a.m.	Kirkhof Center GRR 050
Strickler, Timothy	Mentor	9:00 a.m.	Henry Hall Atrium 029
Strickler, Timothy	Mentor	9:00 a.m.	Henry Hall Atrium 077
Strickler, Timothy	Mentor	9:00 a.m.	Kirkhof Center GRR 178
Strickler, Timothy	Mentor	9:00 a.m.	Henry Hall Atrium 039
Strickler, Timothy	Mentor	9:00 a.m.	Henry Hall Atrium 054
Strickler, Timothy	Mentor	9:00 a.m.	Kirkhof Center GRR 149
Stroik, Laura	Mentor	9:00 a.m.	Kirkhof Center GRR 025
Stroik, Laura	Mentor	9:00 a.m.	Kirkhof Center GRR 060
Stroik, Laura	Mentor	9:00 a.m.	Kirkhof Center GRR 135
Stroik, Laura	Mentor	9:00 a.m.	Kirkhof Center GRR 011
Strouse, Susan	Mentor	9:00 a.m.	Henry Hall Atrium 042
Stuart, Zachary	Student	9:00 a.m.	Henry Hall Atrium 066

Suckow, Jacob	Student	12:00 p.m.	Henry Hall Atrium 109
Sun, Wanxiao	Mentor	9:00 a.m.	Kirkhof Center 2201
Sun, Wanxiao	Mentor	9:00 a.m.	Kirkhof Center GRR 175
Sun, Wanxiao	Mentor	9:00 a.m.	Kirkhof Center GRR 169
Sun, Wanxiao	Mentor	9:00 a.m.	Kirkhof Center GRR 070
Sunden, Susan	Mentor	9:00 a.m.	Kirkhof Center GRR 122
Sweet, Jared	Student	12:00 p.m.	Kirkhof Center GRR 117
Sylvester, Francis	Mentor	9:00 a.m.	Henry Hall Atrium 035
Sylvester, Francis	Mentor	9:00 a.m.	Kirkhof Center GRR 127
Sylvester, Francis	Mentor	9:00 a.m.	Kirkhof Center GRR 081
Szarecka, Agnieszka	Mentor	9:00 a.m.	Henry Hall Atrium 084
Szarecka, Agnieszka	Mentor	9:00 a.m.	Henry Hall Atrium 087
Szarowicz, Madeline	Student	12:00 p.m.	Kirkhof Center 1142

T

Tafel, Heather	Mentor	10:30 a.m.	Kirkhof Center 2201
Tallman, Melissa	Mentor	9:00 a.m.	Kirkhof Center GRR 036
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 038
Tallman, Melissa	Mentor	9:00 a.m.	Kirkhof Center GRR 125
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 037
Tallman, Melissa	Mentor	9:00 a.m.	Kirkhof Center GRR 160
Tallman, Melissa	Mentor	9:00 a.m.	Kirkhof Center GRR 050
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 029
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 077
Tallman, Melissa	Mentor	9:00 a.m.	Kirkhof Center GRR 178
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 039
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 054
Tallman, Melissa	Mentor	9:00 a.m.	Henry Hall Atrium 036
Tallman, Melissa	Mentor	9:00 a.m.	Kirkhof Center GRR 149
Tanis, Stephanie	Student	12:00 p.m.	Henry Hall Atrium 059
Tarbutton, Audrey	Student	11:00 a.m.	Henry Hall Atrium 090
Taylor, Merritt	Mentor	9:00 a.m.	Henry Hall Atrium 051
Tekiela, Kelly	Student	9:00 a.m.	Henry Hall Atrium 078
Terwilliger, Adam	Student	1:00 p.m.	Kirkhof Center 2263
Thiel, Bryce	Student	9:00 a.m.	Kirkhof Center GRR 043
Thiele, Chelsea	Student	3:00 p.m.	Kirkhof Center GRR 017
Thom, David	Student	9:00 a.m.	Kirkhof Center GRR 091
Thom, David	Student	1:00 p.m.	Kirkhof Center GRR 049
Thomas, Derek	Mentor	9:00 a.m.	Kirkhof Center GRR 091

Thomas, Derek	Mentor	9:00 a.m.	Kirkhof Center GRR 049
Thomas, Derek	Mentor	9:00 a.m.	Kirkhof Center GRR 173
Thomas, Derek	Mentor	9:00 a.m.	Kirkhof Center GRR 016
Thompson, Cynthia	Mentor	9:00 a.m.	Henry Hall Atrium 088
Thompson, Cynthia	Mentor	9:00 a.m.	Henry Hall Atrium 092
Thompson, Jennah	Student	11:30 a.m.	Kirkhof Center 1142
Thompson, Sarah	Student	11:00 a.m.	Henry Hall Atrium 112
Thorgaard, Scott	Mentor	9:00 a.m.	Kirkhof Center GRR 076
Thurkettle, Sara	Student	10:00 a.m.	Kirkhof Center GRR 104
Thursam, Bobbi	Student	9:00 a.m.	Henry Hall Atrium 005
Tiemeyer, Amy	Student	10:00 a.m.	Kirkhof Center GRR 141
Tjapkes, Daniel	Student	9:00 a.m.	Kirkhof Center GRR 140
Tjapkes, Daniel	Student	9:00 a.m.	Kirkhof Center GRR 043
Tolar, Courtney	Student	11:00 a.m.	Kirkhof Center GRR 017
Toth, Zachary	Student	3:00 p.m.	Kirkhof Center GRR 122
Trinklein, Betsy	Student	1:00 p.m.	Kirkhof Center GRR 032
Trumpie, Jacob	Student	4:30 p.m.	Kirkhof Center 2270
Tucker, Austin	Student	2:00 p.m.	Kirkhof Center GRR 142
Tuma, Lorie	Mentor	9:00 a.m.	Kirkhof Center GRR 124
Tutt, Kevin	Mentor	12:00 p.m.	Kirkhof Center 2201

U

Ureel, Faith	Student	9:00 a.m.	Kirkhof Center GRR 027
Urena-Gonzalez, Kenny	Student	10:00 a.m.	Henry Hall Atrium 071

V

Vail, Janet	Mentor	9:00 a.m.	Henry Hall Atrium 047
Valachovics, Thomas	Student	1:00 p.m.	Henry Hall Atrium 032
Vallazza, Franco	Student	4:30 p.m.	Kirkhof Center 2270
Vallery, Richard	Mentor	9:00 a.m.	Kirkhof Center GRR 066
Vallery, Richard	Mentor	9:00 a.m.	Kirkhof Center GRR 073
Vallery, Richard	Mentor	9:00 a.m.	Kirkhof Center GRR 061
Van Timmeren, Lauren	Student	2:00 p.m.	Henry Hall Atrium 063
VanEss, Jory	Student	10:00 a.m.	Kirkhof Center GRR 147
VanPelt, Alexxis	Student	2:00 p.m.	Henry Hall Atrium 102
VanVelsen, Austin	Student	10:00 a.m.	Henry Hall Atrium 016
VanVelsen, Tyler	Student	10:00 a.m.	Henry Hall Atrium 016
Vance, Savannah	Student	3:00 p.m.	Kirkhof Center GRR 002
VandenBosch, Melodee	Mentor	9:00 a.m.	Henry Hall Atrium 042
VandenBosch, Melodee	Mentor	4:00 p.m.	Kirkhof Center 2270

VandenPlas, Jessica	Mentor	9:00 a.m.	Kirkhof Center GRR 107
Vander Clay, Gage	Student	9:00 a.m.	Henry Hall Atrium 034
VanderMeer, Kirsten	Student	9:30 a.m.	Kirkhof Center 1142
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 118
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 123
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 002
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 129
VanderMolen, Julia	Mentor	9:00 a.m.	Henry Hall Atrium 091
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 095
VanderMolen, Julia	Mentor	9:00 a.m.	Henry Hall Atrium 031
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 108
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 026
VanderMolen, Julia	Mentor	9:00 a.m.	Kirkhof Center GRR 094
VanderVeen, Cole	Student	10:00 a.m.	Kirkhof Center 2270
Vargas, Hector	Student	11:00 a.m.	Kirkhof Center GRR 020
Veenstra, Victoria	Mentor	9:00 a.m.	MIP Library Exhibition Space 02
Veenstra, Victoria	Mentor	9:00 a.m.	MIP Library Exhibition Space 06
Veltman, Erin	Student	11:00 a.m.	Kirkhof Center GRR 158
Veltman, Erin	Student	2:30 p.m.	Kirkhof Center 1142
Vereecken, Jennie	Student	9:00 a.m.	Kirkhof Center GRR 170
Voisin, Valerie	Student	12:00 p.m.	Kirkhof Center GRR 047
Vollmar, Betsy	Student	9:00 a.m.	MIP Library Exhibition Space 12

W

Wackerle, Brandon	Student	1:00 p.m.	Kirkhof Center GRR 023
Wadaga, Amy	Student	1:00 p.m.	Henry Hall Atrium 009
Wagendorp, Jeroen	Mentor	9:00 a.m.	Kirkhof Center GRR 177
Wagendorp, Jeroen	Mentor	9:00 a.m.	Kirkhof Center GRR 080
Wagendorp, Jeroen	Mentor	9:00 a.m.	Kirkhof Center GRR 057
Wagendorp, Jeroen	Mentor	9:00 a.m.	Kirkhof Center GRR 003
Wagendorp, Jeroen	Mentor	9:00 a.m.	Kirkhof Center GRR 024
Wagendorp, Jeroen	Mentor	9:00 a.m.	Kirkhof Center GRR 077
Walch, Randy	Student	2:00 p.m.	Henry Hall Atrium 102
Walch, Randy	Student	11:00 a.m.	Henry Hall Atrium 105
Walker, Adam	Student	9:00 a.m.	Henry Hall Atrium 106
Walker, Darius	Student	10:00 a.m.	Henry Hall Atrium 083
Wallar, Bradley	Mentor	9:00 a.m.	Henry Hall Atrium 004
Wallar, Bradley	Mentor	3:30 p.m.	Kirkhof Center 2266
Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 121

Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 152
Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 021
Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 044
Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 047
Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 137
Wampler, Peter	Mentor	9:00 a.m.	Kirkhof Center GRR 045
Wanye, Frank	Student	1:00 p.m.	Kirkhof Center 2263
Warda, Steven	Student	9:00 a.m.	Kirkhof Center GRR 128
Warner, Alexander	Student	12:00 p.m.	Kirkhof Center GRR 006
Washburn, Joy	Mentor	9:00 a.m.	Kirkhof Center GRR 012
Washnock-Schmid, Elizabeth	Student	3:00 p.m.	Kirkhof Center GRR 098
Washnock-Schmid, Elizabeth	Student	4:00 p.m.	Henry Hall Atrium 072
Waypa, Emily	Student	9:00 a.m.	Kirkhof Center GRR 019
Weber, John	Mentor	9:00 a.m.	Kirkhof Center GRR 096
Weber, John	Mentor	9:00 a.m.	Kirkhof Center GRR 058
Wejrowski, Spencer	Student	9:00 a.m.	Henry Hall Atrium 047
Welch, Mary	Student	2:00 p.m.	Kirkhof Center GRR 040
Wentzlof, Chloe	Student	10:00 a.m.	Henry Hall Atrium 027
Wesley, Elizabeth	Student	9:00 a.m.	Henry Hall Atrium 042
Wesley, John	Student	9:00 a.m.	Kirkhof Center GRR 127
Westoby, Rebekah	Student	10:00 a.m.	Kirkhof Center GRR 136
Wetherholt, Caleb	Student	9:00 a.m.	Kirkhof Center GRR 039
Whipps, Judy	Mentor	9:00 a.m.	Kirkhof Center 2266
White, Brian	Mentor	2:00 p.m.	Kirkhof Center 2201
White, Connor	Student	9:00 a.m.	Kirkhof Center GRR 056
White, Justyne	Student	10:00 a.m.	Henry Hall Atrium 052
Whitling, Taylor	Student	2:00 p.m.	Henry Hall Atrium 001
Wicks, Brian	Student	12:00 p.m.	Kirkhof Center GRR 018
Wilber, Courtney	Student	10:00 a.m.	Kirkhof Center GRR 072
Wilcox, Chad	Student	12:00 p.m.	Kirkhof Center GRR 078
Wilcox, Kendyl	Student	4:00 p.m.	Kirkhof Center 1104
Wiley, Lindsey	Student	9:00 a.m.	Kirkhof Center GRR 043
Wilkinson, Jeff	Student	2:00 p.m.	Kirkhof Center 1104
Wilkinson, Kristy	Student	9:00 a.m.	Kirkhof Center 1142
Williams, Alexandra	Student	10:00 a.m.	Kirkhof Center GRR 082
Williams, Kayla	Student	1:30 p.m.	Kirkhof Center 2266
Williams, Sabrina	Student	10:00 a.m.	Kirkhof Center GRR 089
Williams, Sherie	Mentor	9:00 a.m.	Henry Hall Atrium 027

Williams, Todd	Mentor	9:00 a.m.	Kirkhof Center GRR 063
Williams, Todd	Mentor	9:00 a.m.	Henry Hall Atrium 090
Wilson, Brianna	Student	10:00 a.m.	Kirkhof Center GRR 097
Wilson, Brianna	Student	1:00 p.m.	Henry Hall Atrium 107
Wilson, Brianna	Student	3:00 p.m.	Kirkhof Center GRR 101
Wilson, Carl	Student	3:00 p.m.	Kirkhof Center GRR 065
Wilson, Hannah	Student	9:00 a.m.	Kirkhof Center 1142
Wilson, Ryleigh	Student	10:00 a.m.	Henry Hall Atrium 098
Winchester, Randy	Mentor	9:00 a.m.	Kirkhof Center GRR 082
Winchester, Randy	Mentor	9:00 a.m.	Kirkhof Center GRR 041
Winchester, Randy	Mentor	9:00 a.m.	Henry Hall Atrium 065
Winter, Janet	Mentor	9:00 a.m.	Henry Hall Atrium 111
Winther, Jennifer	Mentor	9:00 a.m.	Kirkhof Center GRR 115
Wittebols, Rachel	Student	10:30 a.m.	Kirkhof Center 2259
Wittenbach, Kelsey	Student	9:00 a.m.	MIP Library Exhibition Space 12
Woldemicael, Emnet	Student	12:00 p.m.	Kirkhof Center GRR 155
Wolfe, Michael	Mentor	9:00 a.m.	Kirkhof Center GRR 063
Wolfe, Skylar	Student	2:00 p.m.	MIP LIB Main Floor Video Display
Wolffe, Gregory	Mentor	1:00 p.m.	Kirkhof Center 2263
Wolfgram, Mallory	Student	9:00 a.m.	MIP Library Exhibition Space 09
Wolgamood, William	Student	10:00 a.m.	Henry Hall Atrium 083
Woller-Skar, M	Mentor	9:00 a.m.	Kirkhof Center 2270
Wolters, Kaitlyn	Student	9:30 a.m.	Kirkhof Center 1142
Wong, Alexander	Student	10:00 a.m.	Henry Hall Atrium 015
Wong, Alexander	Student	2:00 p.m.	Kirkhof Center GRR 013
Wright, Lydia	Student	2:00 p.m.	Henry Hall Atrium 033
Wyatt, Mikaela	Student	10:00 a.m.	Kirkhof Center GRR 087
X			
Xu, Shaowen	Student	9:00 a.m.	Kirkhof Center GRR 084
Y			
Yalda, Christine	Mentor	10:30 a.m.	Kirkhof Center 2259
Yancy, Julia	Student	10:00 a.m.	Henry Hall Atrium 086
Ybema, Kayla	Student	9:30 a.m.	Kirkhof Center 1142
Yee, Kimbo	Mentor	9:00 a.m.	Kirkhof Center GRR 136
Yee, Kimbo	Mentor	9:00 a.m.	Kirkhof Center GRR 093
Yee, Kimbo	Mentor	9:00 a.m.	Kirkhof Center GRR 017
Yee, Kimbo	Mentor	9:00 a.m.	Kirkhof Center GRR 145
Yee, Kimbo	Mentor	9:00 a.m.	Henry Hall Atrium 057

Youker, Brandon	Mentor	9:00 a.m.	Kirkhof Center GRR 001
Z			
Zadorozhnyy, Vasily	Student	9:30 a.m.	Kirkhof Center 2201
Zadorozhnyy, Vasily	Student	3:30 p.m.	Kirkhof Center 2201
Zahran, Ryan	Student	10:00 a.m.	Henry Hall Atrium 014
Zaroukian, Kaylin	Student	9:00 a.m.	Kirkhof Center GRR 038
Zaszlavik, Katalin	Mentor	9:00 a.m.	Henry Hall Atrium 098
Zaszlavik, Katalin	Mentor	9:00 a.m.	Henry Hall Atrium 097
Zerka, James	Student	2:00 p.m.	MIP LIB Main Floor Video Display
Zheng, Jun	Student	3:00 p.m.	Kirkhof Center GRR 122
Zielesch, Rebekah	Student	9:00 a.m.	Kirkhof Center GRR 081
Zimmerman, Callie	Student	1:00 p.m.	Henry Hall Atrium 002
Zimmerman, Carly	Student	10:00 a.m.	Kirkhof Center GRR 050
Zimmerman, Lindsay	Student	11:00 a.m.	Kirkhof Center 1142
Zomer, Nicholaas	Student	11:00 a.m.	Kirkhof Center GRR 143
Zuelch, Dominic	Student	9:00 a.m.	Kirkhof Center GRR 128
Zuwala, Claire	Student	10:00 a.m.	Henry Hall Atrium 006
Zwart, David	Mentor	9:00 a.m.	Henry Hall Atrium 006

Online Schedule Builder

Updated Presentation Information in lieu of Printed Addendum

This book is printed with information current as of mid-February. Changes often occur after the print date, and are reflected online on the Schedule Builder.

To access the Schedule Builder:

1. Go to gvsu.edu/ours/ssd
2. Click on the “Schedule Builder” link
3. Login and follow instructions

We are here to help. Please let any SSD committee member or SSD volunteer know if you have any questions. You may also contact the Office of Undergraduate Research and Scholarship at ours@gvsu.edu and/or 616-331-8100.

Office of Undergraduate Research and Scholarship

230 Mary Idema Pew Library

1 Campus Drive

Allendale, MI 49401

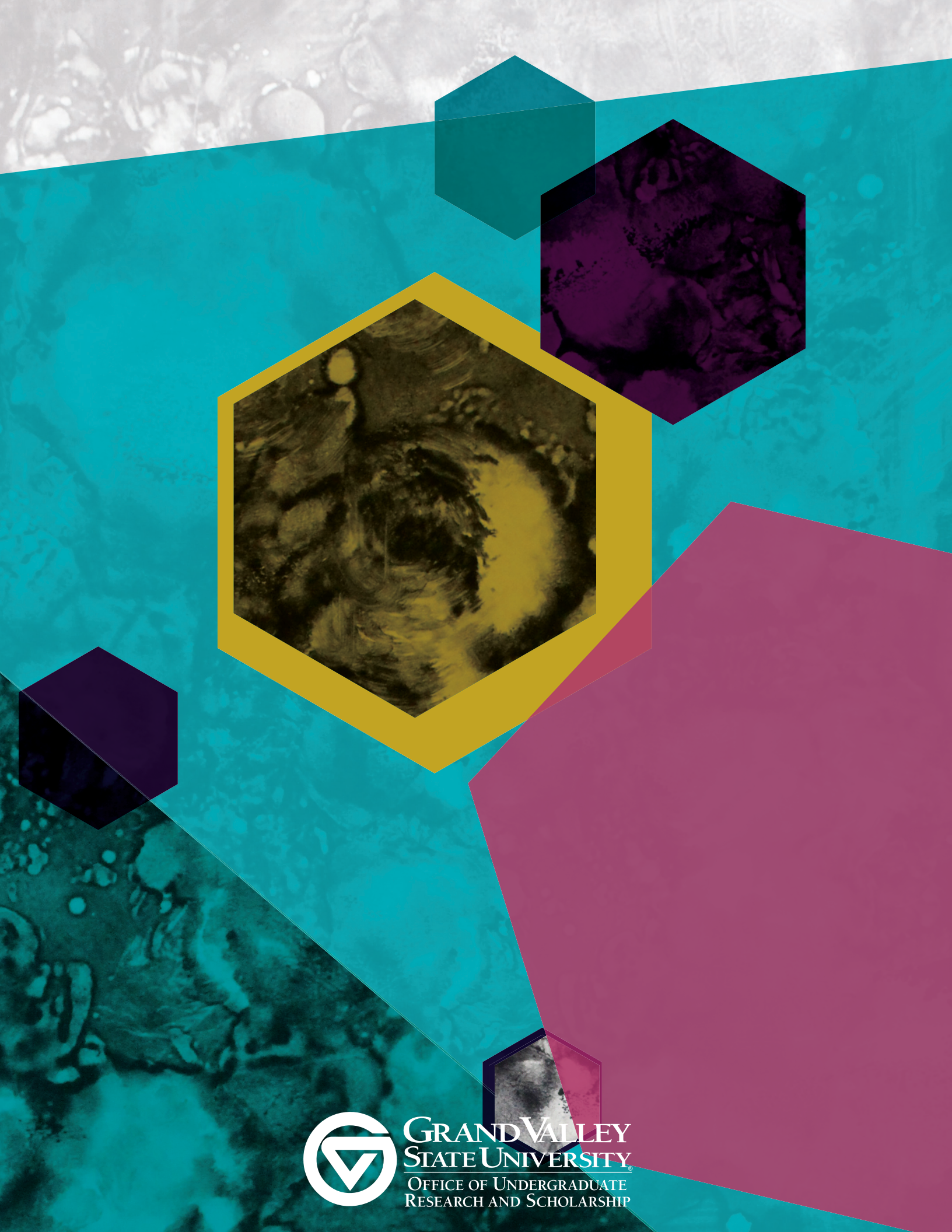
E-mail: ours@gvsu.edu

Phone: 616-331-8100

Business Hours: Monday-Friday, 8:00 AM - 5:00 PM

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