Student Undergraduate Research Festival 2018

April 20, 2018
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Herzliche Glückwünsche! Felicitaciones! おめでとう
(Omedetō)! Toutes nos felicitations! تهانينا (Tahanina)! In other words, Congratulations! Congratulations to the students for arriving at this important point in the research process and for your continued and impressive development as scholars in your fields of inquiry. The presentations and posters that make up this seventh annual SURF event represent the culmination of many months and, in some cases, years of inspired and inspiring dedication.

In much the same manner that different countries and cultures understand, engage, recreate, and analyze the world through diverse languages and in unique yet cognate ways, you have learned to employ with precision and nuance the respective languages of your disciplines. Through the atomic symbols specific to chemistry, the semiotics of algebraic equations, the codes of computer science, the figures of speech so central to diverse literatures, and the graphs and charts of the various social sciences—to name but a few—you help us better understand our shared communities.

I also want to take this opportunity to say thank you to all who made this event possible! Gracias to the faculty mentors for their tireless work on behalf of the college and these many amazing student researchers. Gratias tibi to the members of the SURF Committee—Dr. Eric Sullivan, Dr. Jeanette Fregulia, Dr. Ryan Hallows, and Dr. Brandon Sheafor—whose commitment throughout the year makes this event the true highlight of the academic enterprise. Tusen takk to Ms. Nona Keeler, Director of Campus Events and Conference Services, Karla Hokit and her colleagues on the library staff, and to Ms. Laura Ottoson, whose artistic touch and attention to detail lend this brochure a level of refinement SURF most assuredly deserves. Finally, děkuji mnohokrát (thank you so much!) to Ms. Maria Larson, Executive Assistant for Academic Affairs, who works closely with all of the above to serve our students by supporting our faculty.

DR. COLIN IRVINE, Class of 1991, Senior Vice President for Academic Affairs and Dean of the College
# Carroll College Research Festival Schedule

Field of study is listed under the presenter's name.

**Session 1: Posters, 9 to 10 a.m., CAMPUS CENTER UPPER LEVEL**

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<th>MANION SYMPOSIUM POSTERS</th>
<th>Nicholas Hensley</th>
<th>Evelyn Sowers and Alex Skouls</th>
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<tr>
<td>Dr. Jennifer Glowienka Biology</td>
<td>Landscape Genetics</td>
<td>Molecular Biology</td>
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<tr>
<td>Celebrating 40 years of the Manion Symposium</td>
<td>Landscape Genetics of <em>Dermacentor andersoni</em></td>
<td>The Effect of Alcohol on Feeding and Cellular Metabolism in <em>Tetrahymena thermophila</em></td>
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<tr>
<td>Teal Bullick Biology</td>
<td>Kaitlin McHugh Biology</td>
<td>Rachel Tremaine, Anna Sapone and Katie McHugh Molecular Biology</td>
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<tr>
<td>Modeling <em>Culex tarsalis</em> Habitat Suitability in the Great Plains of Montana</td>
<td>The Influence of Avian Distributions on West Nile Virus Infection Rates</td>
<td>The Effects of Salt Concentration on <em>Tetrahymena thermophila</em> Growth and CRP1 Gene Expression</td>
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<tr>
<td>Teal Bullick and Bryce Green Developmental Biology</td>
<td>Brendan McMahon and Scott Kahle Molecular Biology</td>
<td>Bryce Walker Ecology</td>
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<tr>
<td>Reegan DeBruycker Life and Environmental Sciences</td>
<td>Keenan McNally Biology</td>
<td>Maria Carparelli and Kelsey Ripley Developmental Biology</td>
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<tr>
<td>Growth and Production of Hops (<em>Humulus lupulus</em>) Varieties in the Helena Valley (MT)</td>
<td>Land Association of <em>Culex tarsalis</em> in Western Montana</td>
<td>Effects of everyday toxin, titanium dioxide, on <em>Drosophila melanogaster</em> nervous system development</td>
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<tr>
<td>Emma Esposito and Keenan McNally Developmental Biology</td>
<td>Bob Pearhill Biology</td>
<td>Brandon Adair and Tamra Jones Developmental Biology</td>
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<tr>
<td>The Effects of Sulfur Dioxide Exposure on abd-A gene Expression and Larval Development in <em>Drosophila melanogaster</em></td>
<td>Genetic Identification of <em>Culex tarsalis</em> Host Plants from Extracted Gut Contents</td>
<td>Manganese Toxicity in the Dopamine Synthesis Pathway in <em>Drosophila melanogaster</em></td>
</tr>
<tr>
<td>Anna Sapone and Michael Wilson Developmental Biology</td>
<td>Put Your Phone Down: Effects of Cellular Radiation on <em>Drosophila melanogaster</em></td>
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STUDENT UNDERGRADUATE RESEARCH FESTIVAL POSTERS

Nicole Kraut, Hannah Porch, and Madi Visscher
Oncology Nursing
Health-related quality of life in cancer patients: A systematic review to measure the reported health-related quality of life in cancer patients ages sixty-five and older who use complementary and alternative medicine (CAM) verses chemotherapy

Mackenzie Redman, Brigid Bradshaw, Caroline Carbo, Michaela Dowdy, Kelly Garber, Cassidy Hashley, Jaylin Kenney, David Munding, Joseph Preston, Melissa Renggli, Joshua Seaton, Zachary Waldher
Integrated Reporting
Do Early Adopters Get the Worm?

Hailey Meredith
Chemistry
Electrochemically-Induced Dimerization of 2-methylthiophene

Sawyer Volyn
Honors Scholars Program
Science and the Nature of Human Progress

Roma Seal, Gretchen Farkas, Abigail Frederickson, Brittney Johnson, Mikaela Robinson
Public Health
Using Public Health Coursework to Encourage Teenagers to Avoid Tobacco in Helena, Montana

Lauren Palys
Chemistry
Oxidation of Diphenylmethanol: An Investigation of Kinetics in the Solid State

Jaclyn Urbanec
Chemistry
Ruthenium-Arene Complexes

Pierce Fix
Physical Chemistry
The Thermodynamics of 2-methylthiophene Homocoupling

Ryan Imhoff
Chemistry
Analysis of Metals in Lake Helena Core Samples

Ian Jacobson
Inorganic Chemistry
Metatation of Cyclic NNN-Pyrrole Pincer Ligands

Marc Malek
Chemistry
Retrosynthesis of Furan-Containing Pharmaceutical Precursors

Brandon Raffin
Organo-Metallics
Metatation of a Linear NNN-Pyrrole Ligand

Bethany Lacock
Chemistry
Determination of Alpha Acids in Humulus Japonicas

Megan Moulton
Chemistry
Selective Carbonyl Reduction

Allison Bayer
Environmental Science
Sediment Cores in Lake Helena Show Flood Deposits and Their Mineral Impact on the Lake

Kristina Mills
Environmental Science
Forest Age and Growth Rate of Ponderosa Pines at the Forest–Meadow Boundary; Canyon Creek, MT

Kelly Taft
Honors Scholars Program
Love in the Greek and Roman Context

Natasha Chamberlain, Mary Van Dyke and Akash Sindhu
Gender Studies
The Dynamics of Gender Roles and Marriage/Parenting in the US

Reegan DeBruycker, Kelsie Watkins and Stacey Carrothers
Gender Studies
Sexes Sell

Hailey Vietz, Kaia Roberge and Sydney Harris
Gender Studies
Beyond the Binary: A look at Gender Identity and Sexuality

Brenna Kinsey, Kristina McGee and Kavida Naidu
Gender Studies
Don’t Be So Dramatic, Woman!

Karissa Dykstra, Emma Nylin and Mindy Ogilvie
Gender Studies
Why go to College to Make Less Money?

Peri Dropping, Lauren Vietz and Ali Williams
Gender Studies
Who Gets the Gold?

Logan Taylor
Honors Scholars Program
The Burden of Responsibility Between Man and God

Callie Glenn
Honors Scholars Program
Utopian Bureaucracy: Collective Empowerment or Tyrannical Control?

Mikaela Robinson
Pre-Participation Health Screenings
Sudden Cardiac Death Prevention with Pre-Participation Heart Health Screenings
Session 2: Presentations, 10 to 10:45 a.m.

2A: TRINITY HALL LOUNGE
Entrepreneurship panel
Allyson Cole
Big Sky Brewskis
Blake William
Blake Williams Photography
Henry Hill
Henry Hill Music Production
Casey McInerney
Missouri River Riders
Kyle Jones
Entrepreneurship in our modern world

2B: FLEX THEATRE, CAMPUS CENTER
Victoria Hill
Biology
The Effects of UV Radiation on Metarhizium anisopliae
Kavida Naidu
Philosophy
Correctional Officers, Step Off the Treadmill of Power: The Lack of Moral Authority in U.S. Correctional Officers

2C: SIENA ROOM, CAMPUS CENTER
Sarah Roberts
Anthropology
Paleoclimatic Drought Conditions in the Northern Big Belt Mountains and the Effect on Lithic Materials
Benjamin Kendall
Philosophy
The Soft Power of Deference: Analysis of a Key Pillar of Moral Authority
Jane Reid
Psychology
Meta-Analysis: Examining the use of interventions in changing children’s attitudes about their peers with intellectual disabilities

2D: ROSS ROOM, CAMPUS CENTER
Kerri McInnis
Organic Chemistry
Studies into the Stereochemical Control of Diels-Alder Reactions with η6-Ruthenium Arene Complexes
John Graves and Elly Schmeltzer
Civil/Water Resources Engineering
Santa Maria Irrigation Expansion
John Bartlett
Theology
Spiritual Care in a Healthcare Setting

2E: RICE ROOM, CAMPUS CENTER
Rhiannon Sturgess
Social Psychology
Social Group Membership, Personal Implication, and Reactions to Norm Violations
Forrest Walker and Brenden Borges
Environmental/Energy
Energy Alternatives at the Triple 8 Ranch
Caroline Herzog
Anthrozoology
The Purpose of Animals According to Mark and Athanasius

2F: AVILA/DESMET ROOM, CAMPUS CENTER
Sari Chabot
History
More than just Working Conditions; The Push to Unionize (and Radicalize) Butte, MT 1912-1920
Ben Dulaney
Anthropology
The Vibrancy of Color In Culture
Jacob Souza, Rhiannon Sturgess and Connor Brandon
Psychology
Trouble remembering? Take a walk!
### Session 3: Presentations, 11 to 11:45 a.m.

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<tr>
<th>3A: TRINITY HALL LOUNGE — MANION SYMPOSIUM</th>
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<td>Dr. Jennifer Glowienka</td>
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<td>Analysis of antimicrobial peptide efficacy against chytridiomycosis from skin secretions of Columbia spotted frogs (<em>Lithobates luteiventris</em>)</td>
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<td>Spanish/Healthcare</td>
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<td>Long-term care of elderly citizens: a comparative study</td>
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<th>3B: FLEX THEATRE, CAMPUS CENTER</th>
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<tr>
<td>Connor McGree, McBride</td>
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<td>Galt and Matt McHugh</td>
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<td>Civil Engineering focusing on Hydraulics</td>
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<td>Lauren Castillo</td>
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<tr>
<td>Anthrozoology/Psychology</td>
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<td>Role of Human Personalities in Horse Handling</td>
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<td>English Literature</td>
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<td>Science Fiction and Models of Humanity</td>
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<th>3C: SIENA ROOM, CAMPUS CENTER</th>
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<tr>
<td>Jane Reid</td>
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<td>Sociology</td>
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<td>College Students’ Misperceptions of Rape and Sexual Assault of Female Undergraduate College Students</td>
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<td>English — Literary Studies “Her Story”</td>
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<td>Environmental Science</td>
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<td>Lake Sediment Charcoal and Holocene Fire History in the Helena Valley</td>
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<th>3D: ROSS ROOM, CAMPUS CENTER</th>
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<tr>
<td>Rachel Hopkins</td>
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<td>Wildlife Biology</td>
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<td>Human-Predator Conflict in North America and South/Central America</td>
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<td>Solar Energy</td>
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<td>Solar Rainwater Heating in the Developing World</td>
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<td>Theology</td>
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<th>3E: RICE ROOM, CAMPUS CENTER</th>
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<tr>
<td>Austin Egan and Greg Jones</td>
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<td>Engineering Design</td>
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<td>Lyon’s Creek Underpass Design</td>
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<td>Spanish, Latina American Studies and Health Sciences</td>
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<td>History</td>
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<td>Empires and Nemeses: The Collapse of the Soviet Union</td>
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<td>Sarah Roberts</td>
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<td>Environmental Science</td>
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<td>Assessing Use of Non-Cultural Charcoal for Age Control in Archeological Studies</td>
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<td>Philosophy</td>
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<td>Commitment in Unconventional Relationships: Sartre, de Beauvoir, Mill, and Taylor</td>
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<td>Math/Biology</td>
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<td>Application of Differential Equations in Modeling Cardiac Cells</td>
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### Lunch Speaker—12:05 p.m., FLEX THEATRE, CAMPUS CENTER

The Enduring Role of Values in U.S. Foreign Policy

*By Matthew Eussen ’96, Political/Economic Section Chief, U.S. Embassy in Armenia*

This event is made possible by the support of the Jack Miller Center through a grant from the M.J. Murdock Charitable Trust.
Session 4: Presentations, 1 to 1:45 p.m.

4A: FLEX THEATRE ROOM, CAMPUS CENTER
Layne Ryerson
Anthropology
Impacts of Paleoclimatic Drought on Prehistoric Foraging Decisions in the Big Belt Mountain
Sarah Hayden
History
Baseball in Japanese American Internment Camps
Monica Mendoza
Spanish
Horacio Quiroga: Analysis of Nature’s Ability to Take Away Life as Demonstrated in Various of His Short Stories

4B: SIENA ROOM, CAMPUS CENTER
Daniel Wendel
International Relations
Cell Phones and Conflict Intensity: Overcoming Collective Action Problems
Branan Mull
Philosophy
Nibbling Gadflies

4C: ROSS ROOM, CAMPUS CENTER
Marcellus Randall
Mathematics
Classification of Resistance Distances in Simple Graphs
Jacob MacDuff
Behavioral Finance
The Theory of Planned Behavior in Financial Decision Making
Megan Moulton
Philosophy
Moral Judgment: why should we judge and who has the right to?

4D: RICE ROOM, CAMPUS CENTER
Lizzy Younce
Economics, Political Science, Latin American Studies, Biology, Epidemiology
More People, More Puppies, and Less Latin American Rabies

Session 5: Presentations, 2 to 2:45 p.m.

5A: FLEX THEATRE ROOM, CAMPUS CENTER
Lizzy Younce
Mathematics, Statistics, and Epidemiology
Plots, Puppies, and Deadly Disease

5B: FLEX THEATRE ROOM, CAMPUS CENTER
Daniel Wendell
Latin American Studies
Latin American Development in Brazil

5C: SIENA ROOM, CAMPUS CENTER
Jessica Schmitz, Katherine Anderson, Madison Nesbitt, Sydnee Nowlen, Jackson Richards
Work with Helena Food Share
Carroll Enactus Helping Hungry Helena Kids

5D: ROSS ROOM, CAMPUS CENTER
Kelly Taft
History
Dirty Laundry: Catholics and Protestants in Montana circa 1914

5E: AVILA/DESMET ROOM, CAMPUS CENTER
Kavida Naidu
Philosophy
Re-examining the Notion of Body Image, in Light of Merleau-Ponty
Xavier Johnson
Anthropology
Climate and Conservation: Obsidian Debitage and Climate in the Big Belt Mountains
Kelsey Van Dyken
Moral Theology
Pimps, Payment, and Patriarchy: How the Dignity of Women Dissipated and What We Can Do to Bring It Back
5B: SIENA ROOM, CAMPUS CENTER
Erica Wiens
Mathematics
Building Teams using Graph Theory
Conor Coutts
Philosophy
Power Vs. Authority: An Exploration of Christian Virtues as Moral Authority
Kristina McGee
Gender Studies
Pretty Pretty Princesses: Femininity in Disney Princess Films

5C: ROSS ROOM, CAMPUS CENTER
Natalie Oberding
Neuroscience
Investigating the Role of DNC-2 and DLI-1 on AMPA Receptor Mediated Behaviors in Caenorhabditis elegans
Josiah Osborne
Civil War Curriculums
Inadequacies of History Curriculums
Anna McCarthy
Theology
Living a Eucharistic Church

5D: RICE ROOM, CAMPUS CENTER
Bradley Kelso
History
Shostakovich: Understanding Soviet Russia through the life and music of Dmitri Shostakovich
Cierra Powell
International Relations/Spanish
Foreign Aid as an Influence on Foreign Public Opinion

Session 6: Posters, 2:45 to 3:45 p.m. CAMPUS CENTER UPPER LEVEL
Rachel Miles, Christopher Brayton, Bernardt Di Cino, Marshall Dumas, Meghan Durant, Amanda Harrod, Isazah King, Madeline Klepps, Kaitlin Stromberg, Hannah Sylvester and Cassidy Walter
Public Health
Drugged Driving: An Examination of the Prescription Drug Crisis and Possible Interventions
Jenna Starke
Health Sciences and Anthrozoology
The Effects of Equine-Assisted Interventions on Children with Autism: A Systematic Review
Frank Stumbo
Humanities
A Naturally Disagreeable Discourse
Amy Telck
Honors Scholars Program
The Utopian Family
Terry Cox and Nathan Boone
Mathematics
Gold Medal for Green Energy
Marcellus Randall
Chemistry
Kinetics Studies of the Chromium (II) H2esp Dimer
Allison Gunn and Jordan Scott
Nurse Staffing
Relationship Between Nurse-Patient Ratios and Patient Mortality Rates
Alicia Phan and Madeline Spickard
Nursing
Effects of Sexual Health Education Programs on Teen Pregnancy
Grace Wilkins, Karlee Kent and Hailey Peterson
Maternal-Infant
The Effects of Breastfeeding Versus Formula Feeding on Mother-Infant Attachment
Klarissa Pomajevich and Brianna Denning
Geriatrics
Relationship Between Toileting Programs and Geriatric Falls
Shelby Lassele, Ellery Dixon and Kim Johnson
Nutrition
Relationship between school vegetable gardens and vegetable consumption in elementary school students
Lauren Shoemaker and Lillian Griibbons
Nutrition
A Literary Review of the Effects of a Vegetarian Diet on Secondary Myocardial Infarction Rates
Devan Murfitt, Katie Foster and Madison Robischon
Obsterics
Mother knows best: An analysis of delivery modes after primary cesarean section
Samantha Eby, Madison
Gameon and Solenn Jacobsen
Nursing burnout
Reducing Nursing Burnout
Kelli Clark and Nikki Nicholson
Nursing Interventions
A Deficit in Care: Comparing Insulin Therapy Treatments in Hospitalized Patients with Diabetes Mellitus
Meghan Carter and Emma Combine
Obstetrics
Giving Birth Naturally versus Giving Birth with an Epidural
Charlotte Crary and McKala Wolf
Psychiatric Nursing
Taking a Walk on the Wild Side with ADHD Symptom Management in 6-12 year Olds
Natasha Dutton and Monica Suek
Obstetrics
The Relationship Between Birthing Positions and Perineal Trauma
Reece Quade, Kali Bradford and Margaret Day
Nursing
Should Childbirth be a Laughing Matter
Lee-Anna West and Anna Fischer
Geriatrics
Playing Music in Your Twilight Years to Slow the Progression of Alzheimer’s Disease
Annika Moore, Kendra Lloyd and Andrea Yahvah
Oncology Nursing
The effectiveness of PPE against occupational exposure to chemotherapy agents
Callie Glenn and Ryan Bopp
Nursing
Comparing the Side Effects of Prescription Opioids and Medicinal Marijuana in the Treatment of Chronic Pain
Nichole Thornton
Nursing
High Maternal Dietary Glycemic Index and Sugar Consumption and Their Association with Birth Defects and Pregnancy Complications
Mary Buckley and Kylie Rickman
Obstetrics
Relationship Between Combined Hormonal Contraceptives and Breast Cancer
Kelly Taft
Political Science
Confidence and Trust in a Polarized America
Michaela McNichol
Honors Scholars Program
Ambition in Utopia and The Prince
Brenna Kinsey
Theater/Costuming
Period Costuming Conundrum
Ashley Maes, Bethany Gardner, Thomas Gilboy and Bailey Pasta
Psychology
Three-week analysis of the relationship between general anxiety, stress, and procrastination
Kelli DeFrance and Kally Hacker
Psychology
Correlation of nutrition, exercise and risky behavior in college students
Emma Hoppes, Sarah Gee and Ann Moloney
Psychology
Undergraduate Students and Risk-taking Behavior When Peer Influence is Present on Social Media
Taylor Ehl, Kelly Brotzel, David Dietrich and Izzy Geraghty
Psychology
Attitudes and Perspectives in Young Adults
Skyler Howard and Bridget Bloesch
Anthrozoology
Fuzz Fix: The Physiological Effects of Both Human and Canine Interactions on a College Campus
Sydney Beach
Student Drinking Research
Using Public Health Coursework to Reduce Harms Related to College Student Drinking
Joan Shepherd
Stress
Formed By False Expectations
Cassidy Walter and Courtney Sherick
Health Science
Secondary Analysis of Maternal Education and Decision of Medical Birth Attendant
Maria Carparelli
Mental Illness
Depression and Eating Disorders in Adolescent Females
Taylor Smith
Health Science
Effects of Psychiatric Comorbidities on the Perioperative Outcomes Following a Primary Total Arthroplasty
Abstracts

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Session 1  Posters, 9 to 10 a.m.  CAMPUS CENTER

• MANION SYMPOSIUM POSTERS

Dr. Jennifer Glowienka  
Associate Professor of Biology  
Celebrating 40 years of the Manion Symposium

This year marks the 40th anniversary of the Manion Symposium, which recognizes the dedication and contributions of Professor James J. Manion, a Biology professor at Carroll College from 1956–1987. We who find inspiration in “Doc” Manion’s academic legacy and who benefit from the Chair established in his honor join together in celebration of scientific inquiry and faculty-mentored, student-focused research. I believe Doc would be proud of the scholarly and research activities that currently occur across all disciplines at Carroll College and are celebrated through the Student Undergraduate Research Festival, as Doc concluded a lecture in 1984 by stating: “I am convinced that each [the liberal arts and sciences] must learn from the other, there must be a continuing dialogue between them to achieve the comprehensive knowledge needed to live an intelligent and successful life.”

Teal Bullick (Major: Biology)  
Field of Study: Biology  
Modeling Culex tarsalis Habitat Suitability in the Great Plains of Montana

As the leading cause of arbovirus encephalitis in the United States, West Nile Virus (WNV) poses a public health risk in the state of Montana where infection rates in mosquitoes can be as high as 15%. Spatial modeling can serve as a tool for predicting outbreaks and directing prevention measures. Models for the entire state of Montana currently exist that predict WNV risk and habitat suitability of the predominant vector species Culex tarsalis. After collecting mosquito samples in 2017, I used niche modeling techniques with historic and new presence-only data to build a Cx. tarsalis habitat suitability model covering only the Great Plains region of Eastern Montana. An average area under the curve (AUC) value of 0.815 after replicate cross-validation testing indicated that my model performed better than a random model (AUC = 0.5) in predicting Cx. tarsalis distribution. Jackknife analyses indicated that land cover type, presence of virulent competent birds, early spring mean temperature, and early spring precipitation were the four most influential environmental variables in predicting optimal habitat for Cx. tarsalis. My new data was used to perform validations on the previous model. A single factor analysis of variance (ANOVA) was calculated on the previous model’s predicted levels of Cx. tarsalis habitat suitability, and was found to be significant (p < .001), suggesting that the statewide model was a good predictor of Cx. tarsalis distribution patterns across the state.

Teal Bullick (Major: Biology)  
Bryce Green (Major: Biology)  
Field of Study: Developmental Biology  
Effects of UVB light on p8/TTDA gene expression in developing Drosophila melanogaster

UVB light is known to cause DNA damage that results in gene mutations. Most regions of DNA damage are corrected using Nucleotide Excision Repair mechanisms (NER). In Drosophila melanogaster, the p8/TTDA gene codes for an essential subunit of a protein involved in NER-mediated DNA repair. In this experiment, we attempted to answer the question: will overexpression of the p8/TTDA gene in Drosophila compensate for the damage done to DNA by UVB light exposure? In testing this hypothesis, we exposed our Drosophila larvae cultures to 7-minute periods of UVB light once during each stage of larval development. Our control group grew in conditions without UVB light. Larvae counts in both the experimental and control groups served as our quantitative analysis of survivability. Reverse Transcription Polymerase Chair Reaction (RT-PCR) was performed on the extracted larval RNA to determine the level of expressed p8/TTDA gene in our control and experimental groups. Because our Drosophila larvae were exposed to UVB light early on in
development, we predicted there would be an overexpression of the p8/TTDA gene in the experimental group, along with similar numbers of living larvae in both groups.

Reegan DeBruycker (Major: Biology)
Field of Study: Life and Environmental Sciences
Growth and Production of Hops (Humulus lupulus) Varieties in the Helena Valley (MT)

Humulus lupulus, or hop, is a herbaceous perennial vine from the Cannabaceae family and grows perennally for ten to twenty years. They are most commonly grown in the Yakima Valley in Washington. Hops are used for a variety of reasons, but in beer production they are most well known for being used in the brewing process in which they add bitterness, aromas, and flavor to the beer. As of April 2016, there are fifty-nine members of the Montana Brewery Association and over sixty craft brewers with breweries all across the state. The goal of this experiment was to evaluate the growth yield, potential, and survival of different varieties in Montana as it has a similar climate as the Yakima Valley. Breweries and farmers across the state could then be informed of the data collected so they could contribute to local supply for sustainably minded breweries or develop a cash crop for local markets. This research project evaluated four common varieties of hops over the course of one growing season and their average heights and average dry biomasses.

Emma Esposito (Major: Biology)
Keenan McNally (Major: Biology)
Field of Study: Developmental Biology
The Effects of Sulfur Dioxide Exposure on abd-A gene Expression and Larval Development in Drosophila melanogaster

In this experiment, we tested the effects sulfur dioxide exposure had on abd-A gene expression and larval development in Drosophila melanogaster. Previous studies showed that sulfur dioxide exposure inhibits development of gonads in adult flies and increases development time. We hypothesized that expression of abd-A would decrease in developing Drosophila exposed to sulfur dioxide. The abd-A gene is specific to the abdominal region of the fly, and is also important to the development of gonads and fat bodies. To test our hypothesis, we randomly selected three sets of mating pairs and allowed them to lay eggs in larval culture dishes. The experimental group of larvae was subjected to sulfur dioxide continuously for seven days, while the control group was not exposed to sulfur dioxide, but kept under the exact same conditions. After the exposure, fly larvae were extracted from their culture dishes, sorted by developmental stage, and counted. RNA was then extracted from the larvae after counting. Reverse-Transcription Polymerase Chain Reaction (RT-PCR) was performed to determine abd-A expression in experimental and control groups. Due to sulfur dioxide having detrimental effects on gonad and larval development, it was predicted that, in the presence of sulfur dioxide, abd-A gene expression would decrease, and developmental time course of larval development would be delayed.

Nicholas Hensley (Major: Biology)
Field of Study: Landscape Genetics
Landscape Genetics of Dermacentor andersoni

Dermacentor andersoni (Ixodidae) is one of the most important disease vectors in Montana. Ticks transmit more animal disease agents of all blood-sucking arthropods. Ticks are the second most important vector in public health and the most important in veterinary medicine. Dermacentor andersoni is the vector of Rocky Mountain spotted fever, Colorado tick fever, tularemia, Bovine anaplasmosis, and Powassan encephalitis. According to Tabachnick and Black (1995), “population genetic studies of arthropod disease vectors provide opportunities for understanding their role in arthropod-borne disease, and for developing more effective control strategies.” This study will use inter-simple sequence repeats (ISSRs) to assess genetic variation within and among populations. Using an analysis of molecular variance (AMOVA) and population pairwise fixation index ($F_{st}$) to determine statistical differences in ISSR banding patterns. Banding patterns will then be used along with geographic information systems (GIS) to determine if there are any significant barriers to gene flow and where these barriers arise.
Kaitlin McHugh (Major: Biochemistry/ Molecular Biology)  
Field of Study: Biology  
**The Influence of Avian Distributions on West Nile Virus Infection Rates**

Evidence has shown that human infection rates for West Nile virus are largely dependent on viral amplification that occurs between competent avian host species and mosquito vectors. The threat of West Nile virus to humans is influenced by the diversity and competence of avian host species available to the mosquito vectors. This study used data collected through avian surveys in Montana to analyze the diversity and competence of avian species in those areas. These data were compared to existing GIS model predictions of avian diversity and avian viral competence in Montana to test the accuracy of the model. The GIS model diversity predictions were then compared to the infection rates for avian survey locations, sites that tested positive for West Nile Virus, and sites where the primary vector species *Culex tarsalis* was found. It was hypothesized that areas with low avian diversity and high viral competence of avian species would be associated with increased infection rates, whereas high diversity and low competence would be associated with lower infection rates. In this study, the GIS model appeared to be an accurate indicator of avian diversity, and in all cases an amplification effect was observed in which sites containing greater avian diversity appeared to have an increased risk of West Nile virus. However, it is still unclear how significant the role of avian viral competency is in viral amplification and dilution.

Brendan McMahon (Major: Biochemistry and Molecular Biology)  
Scott Kahle (Major: Biochemistry and Molecular Biology)  
Field of Study: Molecular Biology  
**Investigation of *Tetrahymena thermophila*’s Response to Oxidative Damage**

The purpose of our experiment was to answer the question: Does oxidative damage, induced by potassium bromate (KBrO3), affect the growth rate and the expression of the OXR1 gene in *Tetrahymena thermophila*? It was hypothesized that the expression of OXR1 would increase in *Tetrahymena* that were exposed to potassium bromate and that their growth rate would decrease. The exact mechanism and function of the OXR1 gene is still unknown, however, the literature suggests that it is required for oxidative damage resistance. To test the hypothesis *Tetrahymena* were randomly assigned to either a control group or a test group. A solution of potassium bromate that was pre-determined to be non-lethal to the *Tetrahymena*, was added to the test group’s culture media and both the control and test group groups were cultured under ideal conditions for 72 hours. During the 72-hr time-period, *Tetrahymena* were counted twice a day to determine the growth rate. Following the 72-hour treatment period, RNA was extracted from the control and test groups. Reverse Transcription-Polymerase Chain Reaction (RT-PCR) was performed on the extracted RNA, followed by gel electrophoresis and a semi-quantitative analysis of OXR1 expression. Due to the strong oxidizing capacity of potassium bromate, it was predicted that there would be significant oxidative damage resulting in increased expression of OXR1 in the *Tetrahymena* cultures that were treated with potassium bromate, as well as a decreased growth rate compared to the control culture.

H. Keenan McNally (Major: Biology)  
Field of Study: Biology  
**Land Association of *Culex tarsalis* in Western Montana**

*Culex tarsalis* is the major vector of West Nile Virus (WNV) in Montana, so a higher concentration of *Cx. tarsalis* would most likely correspond to an area of high WNV incidence. Previous studies performed in the U.S. found that wetland land cover had a positive influence on *Cx. tarsalis*, while the studies on Normalized Difference Vegetation Index (NDVI) presented conflicting results. In this experiment I attempted to answer the question: Does land cover type and NDVI affect *Culex tarsalis* distribution in Western Montana? It was hypothesized that both land cover type and a high NDVI value would have a positive effect on *Cx. tarsalis* distribution. In order to test this hypothesis, mosquitoes were trapped in Western Montana and the *Cx. tarsalis* were sorted from other species of mosquitoes. The land cover type and an NDVI value was observed for each trap site. The presence and amount of *Cx. tarsalis* was recorded, and statistical analysis was performed to determine which land cover type and NDVI value had the largest influence on *Cx. tarsalis* distribution. I found that wetland
land cover had the largest positive effect on Cx. tarsalis, while forest land cover had the largest negative effect on Cx. tarsalis. On average, the sites where Cx. tarsalis was present had a larger NDVI value associated to it. These results agree with the findings that other studies have found on Cx. tarsalis and land cover, while adding to Cx. tarsalis and NDVI studies.

Robert Pearhill (Major: Biology)
Field of Study: Biology
Genetic Identification of Culex tarsalis Host Plants from Extracted Gut Contents

Since its introduction to the United States in 1999, West Nile Virus (WNV) has become the most prevalent arthropod borne virus (arbovirus) in the Americas. WNV possesses the potential to manifest encephalitic symptoms in both humans and horses, making it an area of constant concern. The most common vector of WNV in the Western United States is the mosquito Culex tarsalis, which likely derives WNV from migrating bird populations that act as viral reservoirs. C. tarsalis blood feeds specifically for nutrients needed in reproduction, and imbibes floral nectar or other plant sugars for energy. Work with other mosquito species, including members of the genus Culex, suggests that there are definite preferences in the kinds of plants for which mosquitoes forage. Using the contents of extracted mosquito guts, it has been demonstrated that the identity of host plants can be determined through genetic methods. This study uses these methods to identify popular host plants among C. tarsalis females residing in wetlands near Helena, Montana with the hypothesis that C. tarsalis selectively forages for floral nectar in a wetland environment, and does not simply feed on the flowers which are most abundant given vegetative data.

Anna Sapone (Major: Biology)
Michael Wilson (Major: Biology)
Field of Study: Developmental Biology
Put Your Phone Down: Effects of Cellular Radiation on Drosophila melanogaster

In this project, we aimed to answer the question: Does cellular radiation affect offspring production and expression of the Rad51 gene in the organism Drosophila melanogaster? It was hypothesized that if Drosophila larvae were exposed to cellular radiation, the total offspring production would decrease, along with a corresponding increase in Rad51 expression. The Rad51 protein is crucial to the propagation of strand invasion and exchange steps in homologous recombination, resulting in the repair of double stranded DNA breaks. To test our hypothesis, we exposed the experimental group of Drosophila larvae to doses of cellular radiation emitted from an iPhone 6 or 7. Exposure to cellular radiation occurred for 6-minute durations, twice daily, for 3 consecutive days. At the end of the treatment period, RNA extraction from larvae and complimentary Reverse Transcription Polymerase Chain Reaction (RT-PCR) was performed on both control and treatment groups. Further studies were performed to look at the fertility of Drosophila larvae that were exposed to cellular radiation. Due to prior research on cellular radiation exposure and its connection to DNA and sperm damage, it was predicted that expression of the Rad51 gene would show an increase in our treatment groups, along with a corresponding decrease in reproductive ability.

Evelyn Sowers (Major: Biochemistry/Molecular Biology/Philosophy)
Alex Skoulis (Major: Biology/Molecular Biology)
Field of Study: Molecular Biology
The Effect of Alcohol on Feeding and Cellular Metabolism in Tetrahymena thermophila

The purpose of this experiment was to test whether alcohol induces starvation conditions in Tetrahymena thermophila. Prior research has shown that exposure to alcohol results in decreases in both the frequency of feeding and overall growth. For this experiment, it was hypothesized that these effects are due to a lack of energy available in the organism for feeding. This hypothesis was tested by monitoring food vacuole formation and expression of the PFK-1 gene in Tetrahymena that were exposed to alcohol. The PFK-1 gene was chosen because its encoded protein plays an essential role in cellular metabolism. For the experiment, control and experimental cultures of Tetrahymena thermophila maintained in a nutrient rich media with the media of the experimental group being supplemented with 1.75% ethanol. The production of food vacuoles was monitored using India ink over a course of 24 hours following the addition of alcohol. After 24 hours, RNA was extracted.
from the Tetrahymena and Reverse Transcription -Polymerase Chain Reactions (RT-PCR) were performed to determine the expression of the PFK-1 gene. Because alcohol has been shown to have an effect on membrane composition and fluidity, it was predicted that alcohol would cause Tetrahymena thermophila to starve by reducing its ability to produce food vacuoles. Furthermore, it was predicted that the inability of Tetrahymena to produce food vacuoles in the presence of alcohol would lead to a reduction in the expression of PFK-1.

Rachel Tremaine (Major: Biochemistry/Molecular Biology)
Anna Sapone (Major: Biology)
Katie McHugh (Biochemistry/Molecular Biology)
Field of Study: Molecular Biology

The Effects of Salt Concentration on Tetrahymena thermophila Growth and CRP1 Gene Expression

The use of salt to remove ice from roads has resulted in increased salinity in many freshwater lakes in North America. For this project, we wanted to explore how environmental salt concentrations influence the rate of growth of Tetrahymena thermophila and expression of the CRP1 gene. We hypothesized that if the sodium concentration is increased in the media, Tetrahymena growth would decrease and expression of the CRP1 gene would increase. The CRP1 gene encodes a protein that helps regulate calcium concentrations within a cell based on the concentration of sodium ions. The media of the experimental group was treated with sodium concentrations reflective of the increasing salt concentration of freshwater lakes. Cultures were randomly assigned to either the control group, containing no added sodium, or to the experimental group. The course of treatment lasted for 3 days and growth of the Tetrahymena was measured every 24 hours during the treatment period. Immediately following the 72-hour treatment, RNA extraction procedures were followed and gene-specific Reverse Transcription Polymerase Chain Reactions (RT-PCRs) were performed on both the control and experimental groups to measure expression of CRP1. Increased sodium concentration in the media was predicted to decrease Tetrahymena thermophila growth and increase CRP1 expression in order to help regulate ion concentrations within the cell.

Bryce Walker (Major: Biology)
Field of Study: Ecology

Diversity Post-Wildfire of Vegetative Understory in Rocky Mountain Ponderosa Pine Woodland and Montane Sagebrush Steppe

In Montana, big sagebrush steppe, montane sagebrush steppe and rocky mountain ponderosa pine woodland take up over 16% of Montana’s 380,832 km2 (16.45%). Studies have shown that habitats dominated by graminoids depend on species abundance and richness to regulate invasion (Tilman 1997). The invasion process can be facilitated by the removal of native perennial species and the accumulation of seed banks of invasive annual grasses (Melgoza et al. 1990). Wildfire can contribute to these factors. A wildfire near Big Saw-Mill Gulch on September 1st 2016 offers an opportunity to compare diversity and richness in burned areas compared to unburned areas in rocky mountain ponderosa pine and montane sagebrush steppe. It is hypothesized that burned habitats will have lower values of diversity when compared to unburned habitats of the same ecosystem. Habitats with lower diversity are expected to have larger compositions of invasive species compared to habitats with higher diversity.

Maria Carparelli (Major: Health Sciences)
Kelsey Ripley (Major: Biology)
Field of Study: Developmental Biology

Effects of everyday toxin, titanium dioxide, on Drosophila melanogaster nervous system development

Titanium dioxide (TiO2) is a widely used compound found in everything from food packaging to sunscreens. When ingested, TiO2 is readily transported across membranes and efficiently stored within cells. Previous studies showed that exposure to TiO2 results in underdeveloped nervous systems. For our study, we attempted to answer the following question: Will exposing Drosophila melanogaster larvae to TiO2 affect expression of the Neur gene and development of the central nervous system? The Neur gene is crucial during the cell-determination stage of development as its encoded protein helps specify neuroblast development and aids in nervous system and sensory organ development. It was hypothesized that expression of the Neur gene would decrease in Drosophila
larvae exposed to TiO2 and that nervous system
development would be abnormal compared to
control larvae. To test this hypothesis, Drosophila
larvae were randomly assigned to either a
control group, which was cultured under ideal
conditions, or a treatment group, which was
exposed to a non-lethal concentration of TiO2.
Following exposure, RNA extraction and Reverse
Transcription Polymerase Chain Reaction (RT-
PCR) was conducted. To quantify nervous system
development, Drosophila larvae were subjected
to a touch-response assay. Because TiO2
likely damages the Neur gene, it was predicted
that Drosophila larvae would show decreased
expression of Neur and that they would respond
poorly to a mechanical touch-response assay.

Brandon Adair (Major: Biology)
Tamra Jones (Major: Biology)
Field of Study: Developmental Biology

Manganese Toxicity in the
Dopamine Synthesis Pathway
in Drosophila melanogaster

Manganese is prevalent in Montana, and
Manganese toxicity symptomatically resembles
Parkinson’s disease. The goal of this project was to determine whether exposure to high
levels of Manganese affects the Dopamine
synthesis pathway. For our experiment, we
chose to measure the expression of the ple
gene in Drosophila melanogaster that were
exposed to Manganese during development. The ple gene codes for Tyrosine Hydroxylase,
an enzyme that functions in the first rate-limiting
step of Dopamine synthesis. We hypothesized
that an abundance of Manganese would result in
decreased expression of ple in larvae and
observable motor function deficits among adult
flies. In this study, flies were randomly assigned
either to a control group, cultured under ideal
conditions, or a treatment group, cultured in the
presence of 0.1mM Manganese Chloride. The
experimental group was exposed to Manganese
Chloride for 72 hours, after which RNA extraction
and Reverse Transcription Polymerase Chain
Reaction (RT-PCR) was conducted to compare
ple expression. Furthermore, flies were randomly
selected to develop into adulthood, after which
an assay was performed to compare and
quantify motor function in both the control and
experimental groups. Because of the oxidative
stress Manganese places on the Dopamine
synthesis pathway it was predicted that the
expression of ple in the experimental groups
would be reduced and the developed motor
function would be significantly compromised due
to the deficiency of Dopamine.

• STUDENT UNDERGRADUATE
RESEARCH FESTIVAL POSTERS

Nicole Kraut (Major: Nursing and Public Health)
Hannah Porch (Major: Nursing)
Madi Visscher (Major: Nursing)
Field of Study: Oncology Nursing

Health-related quality of life in cancer
patients: A systematic review to
measure the reported health-related
quality of life in cancer patients
ages sixty-five and older who use
complementary and alternative
medicine (CAM) versus chemotherapy

According to the Centers for Disease and
Control, in 2014 alone, 1,596,486 new cases of
cancer were diagnosed in the United States. In
that same year, over half a million Americans
died of cancer, deeming the disease the
second leading cause of death, only behind
heart disease (CDC, 2017). The purpose of this
Evidence Based Practice Brief is to research
how treating cancer in patients sixty-five years
and older with chemotherapy as compared to
using complementary and alternative medicine
influences their health-related quality of life.
“Chemotherapy is a systemic treatment based
on chemical compounds that are administered
uninterruptedly or in an interval manner according
to the treatment schedule” (Furtado, Vilela,
Silva, & Freitas, 2017, p. 841). Over 40% of
cancer patients report using complementary and
alternative medicine (CAM) (Horneber, M. et. al,
2012), which includes any therapy intended to
promote health and wellbeing that is considered
outside of the scope of western medicine (Taber’s
Medical Dictionary, 2018). Chemotherapy and
CAM each influence cancer patients’ health-
related quality of life (HRQoL), which is broken
down into the individual’s perception of “having
health [to] the highest level in the four aspects of
life: physical, social, psychological and spiritual”
and “the quality of life in situations of disease
or treatment” (Francielle Toneti, B. et. al, 2014,
p.1031).

By looking at the research regarding patients
HRQoL while undergoing cancer treatment,
nurses will be able to better educate and offer the
benefits of CAM.
Do Early Adopters Get the Worm?

Corporate leaders in environmental, social, and governance (ESG) reporting use GRI reports, Integrated Reports, and SASB metrics to communicate value creation to stakeholders. Sustainable organizations recognize changes in value for financial, human, manufactured, natural, intellectual, and social capital. Studies have shown that a positive relationship exists between financial performance and emphasis on ESG issues (Bekefi and Epstein, 2016). On an annual basis, several organizations recognize companies for their ESG efforts. This study used a purposeful sample of 10 companies, known to be early adopters of ESG reporting, to explore whether or not early adopters were also recognized as ethical or sustainable entities. Results of the study provide insight into best practices for ESG reporting.

Electrochemically-Induced Dimerization of 2-methylthiophene

Currently, the reagents in most solar panel chemical reactions are materials like water that are readily available on earth’s surface. But what if less obvious, but potentially more efficient reagents, existed? The objective of this research was to demonstrate the possibility of electrochemically inducing dimerization of 2-methylthiophene to generate 5,5'-dimethyl-2,2'-bithiophene (i.e. the 2-methylthiophene dimer). Through the formation of this bond, energy can be stored and released for use in a solar panel.

The dimerization of 2-methylthiophene in the presence of a Pd2+ catalyst and atmospheric molecular oxygen was confirmed; in the absence of molecular oxygen, no dimerization product was observed. The data suggests the possibility of an ionic strength dependence for the yield of 5,5'-dimethyl-2,2'-bithiophene. The formation of 5,5'-dimethyl-2,2'-bithiophene was not observed during the electrochemical oxidation of 2-methylthiophene under any conditions studied. Further research is necessary to determine under what deoxygenated conditions 2-methylthiophene will dimerize.

Using Public Health Coursework to Encourage Teenagers to Avoid Tobacco in Helena, Montana

The CDC reports that tobacco addiction starts early with first use of a tobacco product occurring during a child’s teen years. This addiction leads to increased risk of lung cancer, stroke,
COPD, and cardiovascular diseases. Students in Carroll’s Public Health Theories and Practice course (PH333) chose to partner with the Lewis and Clark County Health Department’s Tobacco Prevention Program to address this problem. Carroll students completed a literature review to gain knowledge to the problem and possible solutions. They then completed twenty interviews, a focus group of area teenagers, and twenty environmental scans of possible locations where teenagers might purchase tobacco products. With this information, students developed marketing campaigns and community events (meetings, presentations, awareness activities) to help educate area residents of this significant problem.

Lauren Palys (Major: Chemistry)
Field of Study: Chemistry
Oxidation of Diphenylmethanol: An Investigation of Kinetics in the Solid State
Solvent-less reactions make way for the elimination of hazardous waste generated in many chemical syntheses. Disposal of chemical solvents is difficult because they are often hazardous to the environments, toxic, flammable, and even carcinogenic. In addition, disposal of hazardous waste is expensive. To reduce the number of bottles of chemical waste produced each year by scientists, solvent-less reactions must be studied. Furthermore, there is limited research on solid state reaction kinetics which could hold promise for new types of chemical syntheses. This research investigates the oxidation of diphenyl methanol to benzophenone in the solid state. Oxidation of diphenyl methanol has been measured at room temperature in traditional solvent conditions and in the solid-state using infrared spectroscopy. This study aims to measure the rate of reaction in the solid state at varying temperatures and compare it to the rate of reaction in traditional solvent based reaction conditions. Solid state kinetics will likely differ from solvent based reactions partially due to the phase the reaction is happening in. This data will allow for determination of the reaction rate law, rate constant, and activation energy for each system and allow insight into solid state kinetics.

Jaclyn Urbanec (Major: Chemistry)
Field of Study: Ruthenium-Arene Complexes
Ruthenium-Arene Complexes
Stereoselective metal complexation reactions to form ruthenium-arene complexes are frequently used in organic synthesis; however, these reactions can be extremely expensive to perform. In prior research, there has been success in the stereoselective synthesis of [Cp*Ru(n−-arene)]X and [CpRu(n−-arene)]X complexes (Cp*=pentamethyl-cyclopentadienyl, Cp=cyclopentadienyl). For example, research done by Uemura et al. showed the formation of [CpRu(n−-arene)]PF$_6$ complexes with high diastereoselectivity (>95:<5, 1H NMR) from chiral ortho-substituted benzylic alcohols.

X-ray crystallography was used to verify relative stereochemistry of the Ru complexes allowing these researchers to propose a binding model that correctly predicts the relative stereochemistry. The major limitation in this research was the use of Cp[Ru(NCMe)$_3$]PF$_6$, which comes with a commercially high cost (approximately $400/g) and requires several synthetic steps to prepare. In this study, a one-pot binding procedure published by Lindel et al. was used to see if the Cp*Ru complexes could be formed with comparable stereoselectivities and yields to the complexes formed by Uemura using identical substrates, which drastically reduces the expense of preparation. In this vein, 2′-methylacetophenone was reduced to 1-(2-methylphenyl)ethanol via sodium borohydride to use as a model substrate for binding. The [Cp*Ru(n−-arene)]PF$_6$ complex of 1-(2-methylphenyl)ethanol was then formed using the one-pot procedure. The 1H NMR spectrum of the crude reaction mixture suggests that one diastereomer is forming with unknown relative stereochemistry, which was subsequently isolated pure after chromatography. Moving forward, attempts will be made to verify the relative stereochemistry of this complex by X-ray crystallography to determine if it is consistent with Uemura’s model.

Pierce Fix (Major: Chemistry)
Field of Study: Physical Chemistry
The Thermodynamics of 2-methylthiophene Homocoupling
The homocoupling of 2-methylthiophene to yield 5,5′-dimethyl-2,2′-bithiophene was observed
with the following chemical oxidants: hydrogen peroxide (H$_2$O$_2$), cerium (Ce$^{4+}$), dichromate (Cr$_2$O$_7^{2-}$), and persulfate (S$_2$O$_8^{2-}$). The reaction kinetics and equilibrated system concentration for the homocoupling of 2-methylthiophene was quantified using 1H-NMR spectroscopy. Under the conditions studied the system equilibrated in under 48 hours. Using the oxidant hydrogen peroxide the equilibrium concentrations of 2-methylthiophene and 5,5’-dimethyl-2,2’-bithiophene were 0.0994M, and 7.398 x 10^{-4} M. The equilibrium constant for the homocoupling in the presence of hydrogen peroxide was calculated to be 0.146 at 25 °C. Using this equilibrium constant, the reduction potential of 5,5’-dimethyl-2,2’-bithiophene to 2-methylthiophene was calculated to be 1.80 V.

Ryan Imhoff (Major: Chemistry)  
Field of Study: Chemistry  
**Analysis of Metals in Lake Helena Core Samples**

Core samples from Lake Helena at depths ranging from 20 - 200cm have been digested, filtered, and analyzed for heavy metals via Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). ICP-AES allows for analysis of a wide range of metals of interest because each metal emits radiation at a characteristic wavelength. This study investigates the correlation between metal concentration and events such as a flood or mining. Using an internal standard of rhodium, metals such as lead, iron, manganese and zinc have been detected in varying concentrations through the range of depths.

Ian Jacobson (Major: Chemistry)  
Field of Study: Inorganic Chemistry  
**Metalation of Cyclic NNN-Pyrrole Pincer Ligands**

Tridentate nitrogen pincer ligands can play an important role in coordination chemistry with transition metals as they are thermally stable and can be used to synthesize useful transition metal catalysts. These have many organic and inorganic applications such as the study of the stability of these ligand-transition metal complexes as well as their flexibility in accepting different metals. In this module, the NNN-pyrrole ligand, 2,5-Bis(1-pyrrolidinylmethyl)-1H-pyrole has been synthesized from a reported procedure and is being studied. Metalation is being attempted with group 10 metal precursors, such as PdCl$_2$ and NiCl$_2$, to form the square planar complexes Pd(NNN)Cl and Ni(NNN)Cl, respectively. The success of these reactions will be confirmed via 1H-NMR, though tridentate coordination has not yet been confirmed due to a pyrrole NH peak. Reaction Metalation reactions are now being attempted under changing conditions, with variables such as oxygen content, temperature, and solvent systems in order to better understand the reactivity of these complexes. Upon complete characterization of these complexes via, 1H and 13 NMR spectroscopy and single crystal X-ray diffraction, catalytic reactions such as the amidation of aldehydes with amines will be investigated.

Marc Malek (Major: Chemistry)  
Field of Study: Chemistry  
**Retrosynthesis of Furan-Containing Pharmaceutical Precursors**

Herein we report on the retrosynthetic production of 3-iodo-2-(2-methoxyphenyl)-benzofuran in 4 synthetic steps. Benzofuran compounds are found in anti-anxiolytic medications, such as vilazodone, which interact with the brain to counteract symptoms of anxiety and depression. The target molecule was selected as a pharmaceutical precursor, featuring a benzofuran derivative coupled to a synthetic handle that will allow for further functionalization. This planned synthesis utilized starting materials of 2-iodoanisole and ethynyltrimethylsilane under Sonogashira conditions, a deprotection reaction, and a cyclization reaction. The highest synthetic step achieved was the production of bis(2-methoxyphenyl)acetylene in 99% yield. Cyclization of this compound is currently underway.

Brandon Raffin (Major: Chemistry)  
Field of Study: Organo-Metallics  
**Metalation of a Linear NNN-Pyrrole Ligand**

Tri-dentate “pincer” ligands with three nitrogen donor sites play an important role in coordination of metal centers to form metal complexes. The ligands’ high thermal stability and formation of robust complexes often afford highly efficient catalysts for a variety of chemical reactions. A NNN-pyrrole pincer ligand containing dimethylamine donors, 2,5-bis(dimethylamino)
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methylpyrrole, (NNN), was synthesized. Ligation with PdCl2 is underway in attempt to isolate the square planar complex Pd(NNN)Cl. A variety of reaction conditions have been employed, and reaction products are being analyzed via 1H NMR spectroscopy. Upon evidence of metalation, such as the disappearance of the pyrrole N-H resonance, purification via recrystallization will follow in attempt to grow a crystal suitable for single crystal X-ray diffraction.

Bethany Lacock (Major: Chemistry)  
Field of Study: Chemistry  

Determination of Alpha Acids in *Humulus japonicas*

*Humulus lupus* (hops) is a plant used by the brewing industry to produce alpha acids; organic acids which contribute to the bitter taste of beer. This project sought to extract and quantify the types and amounts of alpha acids present in the invasive species *Humulus japonicas* (Japanese hops) to determine whether *Humulus japonicas* is a practical source of alpha acids. To accomplish this goal, an HPLC method was designed to separate the alpha acids present in *Humulus lupus*. Alpha acids were extracted from ICE-3, a calibrated hops standard, and HPLC was used to isolate 6 compounds. These compounds were quantified and characterized using 1H NMR, UV-VIS, and GC-MS. Then alpha acids were extracted from *Humulus japonicas*, separated via HPLC, and the isolated compounds were identified using 1H NMR, UV-VIS, and GC-MS. The alpha acids isolated from *Humulus japonicas* were quantified and compared to standard values to determine if *Humulus japonicas* is a viable source of alpha acids. The use of *Humulus japonicas* in beer brewing would allow the brewing industry to utilize an invasive species that is hardy in a wide variety of environments.

Megan Moulton (Major: Chemistry and Philosophy)  
Field of Study: Chemistry  

Selective Carbonyl Reduction

This paper reports studies directed toward the chemoselective reduction of ketones via an η6 ruthenium—arene activating substituent. Due to the electron-donating aryl ring in phenyl ketones, the carbonyl has a lower partial charge; resulting in reduced electrophilicity compared to other non-conjugated carbonyls in the structure. However, when the arene portion is bound to a cationic 6-ruthenium complex, the electron density is inductively pulled away from the phenyl ketone moiety causing the partial charge to become greater. Due to the increased partial charge, chemoselective nucleophilic attack on this carbonyl should occur more readily compared to other non-conjugated carbonyls in the structure. In order to test this, benzoyl acetone was chosen as a model arene substrate due to the presence of a phenyl ketone and non-conjugated ketone. The η6 ruthenium—arene complex was successfully synthesized by reacting benzoyl acetone with tris(acetonitrile)cyclopentadienylruthenium(II) hexafluorophosphate, and characterized by 1H NMR. The complex, once purified will be tested for selective reduction of the phenyl ketone moiety as mentioned above. If successful, this research could prove useful in small molecule organic synthesis (e.g. pharmaceuticals) where chemoselective reduction of compounds containing multiple ketone functional groups is often necessary.

Allison Bayer (Major: Environmental Science)  
Field of Study: Environmental Science  

Sediment Cores in Lake Helena Show Flood Deposits and Their Mineral Impact on the Lake

The Helena Valley has experienced major floods in 1938, 1975, 1981, and 2011. Satellite imagery of the Tenmile/Prickly Pear Creek delta, at the west end of Lake Helena, shows a distinct area of fresh sediment deposited after the 2011 flood. The sediments transported in just this one event advanced the delta front more than 100 ft into Lake Helena. Observation of this large volume of flood transported sediment in 2011 led to the hypothesis that historic flood events likely caused similar sediment mobilization and deposition into the lake. We expect that sediment cores obtained from the bottom of Lake Helena will provide a record of the 2011 and earlier flood events, evidenced as distinct and traceable sediment layers delivered across the lake bottom. Two cores, one obtained near the delta and another further to the east, may allow us to quantify the extent and volume of flood transported material across the lake bottom. Historical mining in both Tenmile and Prickly Pear Creek watersheds has led to arsenic and other metal contamination in
the creeks and runoff into Lake Helena. Analyzing the cores for grain size, magnetic susceptibility, and organic content will allow us to determine if major flood events transport significant amounts of sediment to the lake and how much. Additionally, analysis for metals may tell us if these flood pulses cause increased contaminant transport into Lake Helena from source areas considered ‘stabilized’ during normal stream flow.

Kristina Mills (Major: Environmental Science)
Field of Study: Environmental Science

Forest Age and Growth Rate of Ponderosa Pines at the Forest–Meadow Boundary; Canyon Creek, MT

The forest–meadow boundary is an ecotone where the encroachment of trees is typically restricted by some limiting environmental factor (soil moisture, grazing, fire frequency). The Triple 8 Ranch field station in Canyon Creek, Montana provides an opportunity to study this boundary where grazing has been relatively limited since settlement. This study is a baseline investigation of Ponderosa pines along a transect encompassing slopes of different aspect (north vs south facing). Tree cores will be collected along the transect, along with data on stand type, tree size, forest-meadow boundary conditions, surface slope and aspect. Annual rings counted from cores will be used to determine germination dates and growth rate of trees in closed stands, ‘edge’ trees, and individual ‘pioneer’ trees advancing from forest edge into meadow. Measurement of ring widths will allow comparison of growth rates at different physical settings, and also of tree growth response to seasonal/annual climatic variations recorded over the last century. This study will provide a reconnaissance level forest history, will help inform forest management practice at the Triple 8, and also improve our understanding of climatic influences on growth response of Ponderosa pines at lower elevation tree line.

Kelly Taft (Major: Political Science and History)
Field of Study: Honors Scholars Program

Love in the Greek and Roman Context

Dante’s Divine Comedy and Plato’s Symposium explore the connections between love and the divine. While the authors lived in different countries, time periods, and cultures, Dante and Socrates agree that love elevates humans from things on earth to things of divine qualities. However, Dante and Socrates disagree on the mechanisms by which love directs humans to the otherworldly realm. For Dante, love is the bridge between human wisdom and divine wisdom. For Socrates, love is a ladder, on which one first loves the body and then one loves the soul. The differences between the ladder and the bridge analogy present complicated issues for understanding the divine, particularly in terms of the human relation to the divine. For Dante, the divine is a supreme being, and a human should desire to be in the presence of the divine. Socrates, however, demonstrates that humans’ desire for beauty is linked ultimately to their desire for immortality, which they seek to satisfy in many ways. This presentation examines these tensions of understanding love in relation to the divine from the Judeo-Christian tradition and the Greek tradition.

Natasha Chamberlain (Major: Gender Studies)
Mary Van Dyke (Major: Nursing)
Akash Sindhu (Major: Non-degree)
Field of Study: Gender Studies

The Dynamics of Gender Roles and Marriage/Parenting in the US

The purpose of our project is to inform and identify different ways that gender roles are present in marriages and parenting styles (i.e. dominant and submissive spouse, working and stay-at-home parent, etc.) in the United States. First, in our study, we research the typical existing gender norms in heterosexual marriages and examine how these norms fit into the gender stereotypes in the US. We also discuss maternal and paternal leave policies in the United States and how that contributes to the gender roles expressed in our society. After discussing the societal baseline of gender roles present in marriages and parenting, we discuss the ways in which many people are not adhering to these stereotypes. We explore topics that break out of normative gender roles including stay-at-home dads, working mothers and the dynamic of same-sex couples and same-sex parents.
Sexes Sell

This research project fixated on the disparities between items marketed for men and women. It focused on the price difference for identical products and how they were marketed to appeal to consumers. Varying age groups were analyzed as well as different product types, ranging from children’s toys to personal hygiene products. Other points of interest included evaluating tactics other than advertisement content such as fonts, color schemes, and people used to sell the products. The purpose of the project was to raise awareness about gender influences on marketing strategies and to delve into the tactics used to appeal to the respective sexes the items are advertised to.

Beyond the Binary: A Look at Gender Identity and Sexuality

Individuals’ expressions of self are not binary, yet our society thinks of two opposite and complementary categories of humans—male and female. In reality, the expression of gender is fluid and varied. Further, a societal norm of compulsory heterosexuality veils the diversity in sexual attraction found in humans. We explore what makes up a person’s identity and how gender expression can be linked to sexuality. By doing so we hope to show people that gender and sexuality are fluid and that there is no “proper” combination of the two. Researchers have created charts and spectrums to represent the fluidity of gender and sexuality. These visuals help us better understand the many variations beyond the binaries, however, they are not comprehensive of all expressions of gender and sexuality. It is also important to note that gender and sexuality are dynamic, and they may change throughout an individual’s lifetime. By recognizing this, people can better understand and accept their nonconforming identities.

Don’t Be So Dramatic, Woman!

The history of theatre displays a long lineage of male produced plays. Dramaturgy, itself was shaped by men and has ever since been focused on men, and men’s perspectives and interpretations of the world. Playwriting, acting and directing, for example remain to this day specifically male domains, and female playwrights and directors who have managed to challenge this end up facing significant backlash or simply do not receive the recognition they deserve at all. Women in the theatrical world today continue to be suppressed to find inclusivity and acceptance in theatre. Our project therefore, explores the role of women in today’s American theatre. Why is it important to have women’s work represented in theatre? Additionally, we will discuss the harm on the American cultural thought in having theatre produced by American men only. We contend that a representation of women’s work in American theatre allows for better women empowerment, and that the experiences of female theatre artists are as valuable as their male counterparts.

Why go to College to Make Less Money?

In this evaluation of research, we look at how women make less than men, but get the same amount of education. We will look at the degrees that women get versus how much they make compared to men with a similar education. Specifically, we will look at women and men who have earned in certain fields. We will look at the average annual income of these two genders, and the percentage of women vs. men in that work force. As well as the average education for men and women in that career. We will also discuss the advantages that men have over women when it comes to their annual income and the jobs they acquire, and how this advantage begins while getting a college education.
Peri Dropping (Major: Gender Studies)
Lauren Vietz (Major: Sociology)
Ali Williams (Major: Biology)
Field of Study: Gender Studies

Who Gets the Gold?

During our presentation we are going to focus on the gender differences between male and female athletes during both the summer and winter Olympics. Specifically, we will discuss the variance between the air time on television and radio stations, the endorsements and sponsorships each athlete receives, and the gender bias and perceptions presented about each gender. Much they make.

Logan Taylor (Major: Health Sciences)
Field of Study: Honors Scholars Program

The Burden of Responsibility Between Man and God

In, The Iliad, Homer provides insights into the way the Greeks and Trojans interacted with their deities. The way ancient heroes were guided and propelled by their gods, and the resulting reputations they earned illustrates how the society of the time was influenced by their beliefs. In the same fashion Gregory of Nyssa in The Life of Moses, describes very clearly how God influenced mankind. How Moses came to exemplify the perfect man, this portrait of a perfect man shows what values created by belief in God. In both situations the Divine influence on Mankind is questionable. If Man stopped comparing himself to something that creates an immediate alienation between different groups “The victory of true religion is the death and destruction of idolatry. Injustice is killed by righteousness and arrogance is slain by humility” (Nyssa pg 57), would progress not be easier to achieve? If monarchs in ancient Greece did not believe that they were divinely endowed “And Jove himself shall guard a monarch’s right. Of all the kings (the god’s distinguish’d care)” (Homer pg 14), would they not have felt more accountable to their fellow man? It may be argued that one’s religious beliefs hold the individual to a moral code, and without that code how could one know what was right and wrong. However, for man to progress, accountability for one’s actions must fall on the individual, not on the divine power he has chosen to worship.

Callie Glenn (Major: Nursing)
Field of Study: Honors Scholars Program

Utopian Bureaucracy: Collective Empowerment or Tyrannical Control?

The evolution of social structures has led to the development of many styles of government, one of them being bureaucracy. One might think that assigning a larger number of people to more specific tasks allows for increased involvement with the governance of your own society, and therefore a decreased chance of corruption or tyranny. While this may be true, these potential benefits come with a dark disfiguration of the individuals within this system, altering the development of their own humanity. This danger to humanity has been identified by a number of influential figures, including Thomas More and Hannah Arendt. More’s description of a fictional society in Utopia offers a frightening picture of bureaucracy implemented in the most extreme sense, with every emphasis and priority focused on the commonwealth and no real value placed in the individual. Arendt’s powerful essay On Violence offers definitions of violence, power, and components of human nature that exemplify why a society such as Utopia could never exist in reality. While the bureaucratisation of public life can insure that citizens are held accountable to equal standards and performance of roles, if left unchecked by the need for human individuality it can become unapologetically structured to the point that laws are molding the people rather than being molded by the people.

Mikaela Robinson (Major: Health Sciences and Public Health)
Field of Study: Pre-Participation Health Screenings

Sudden Cardiac Death Prevention with Pre-Participation Heart Health Screenings

The NCAA is known for their young student-athletes that push themselves physically to try and be the best at their sport. They spend countless hours in the gym, competing and pushing their bodies to be in the best shape possible for their sport. Furthermore, the NCAA cares for the health of their student athletes. Prior to being able to compete in practice or competition, the athletes are required to have a pre-participation physical, by a medical doctor, to make sure their body is healthy enough to compete at such a high level. The physician
looks for any abnormalities that may be present in the athlete’s health during the physical and either clears them for competition or requests further medical testing. The physical consists of checking the athlete’s height, weight, blood pressure, iron levels, medical history, heart rhythm and rate, vision, and evaluate the athlete’s posture, flexibility, joint health, and strength. Even with the physician looking at the athlete’s heart rhythm and rate, it still leaves a gap in the heart health of the athlete. The physician’s examination of the athlete’s heart is not sufficient in identifying abnormalities in the athlete’s heart and keeping them protected from sudden cardiac death. But, with the implementation of a 12-Lead ECG in the athlete’s physical, the gap of the athlete’s heart health will be closed, giving the athlete knowledge of their heart health and the opportunity to seek further medical attention if needed.

Session 2 Presentations, 10 to 10:45 a.m.

- **2A: TRINITY HALL LOUNGE, ENTREPRENEURSHIP PANEL**

  **Allyson Cole (Major: Business Administration)**
  Field of Study: Entrepreneurship
  **Big Sky Brewskis**
  I will be presenting my business plan for an online based company called Big Sky Brewskis. This business will offer a monthly delivery service to its customers. The service provides customers with a personalized beer sampling selection. The beers featured in the monthly service are uniquely crafted beers brewed entirely in Montana. The packaging and shipping of Big Sky Brewski boxes will be done in Helena, Montana. This business is designed to showcase the great brews Montana has to offer and provide a convenient service for all residents under the big sky.

  The mission statement of Big Sky Brewskis is to deliver an excellent experience to all customers. The goal is to assist customers in discovering their favorite craft beers. BSB strives to enlighten individuals on the wonderful beers brewed here under the big sky. This business focuses on meeting the desires of customers along with promoting the talented individuals conducting business here in Montana. Within my presentation I will highlight in detail how the business will operate as well as how the business will generate revenue and cover start up costs.

  **Blake Williams (Major: Business Administration Management)**
  Field of Study: Entrepreneurship
  **Blake Williams Photography**
  I started my business a couple years ago out of a growing passion of photography and videography. I have done a variety of jobs already and continue to photograph and film in my personal life. Through research and producing a business plan, I am looking to grow my business and focus on a number of niche markets, which include weddings, real estate, and business media production. I want to create content that is not just appealing to the eye but inspires people as well.

  **Henry Hill (Major: Business Marketing and Management)**
  Field of Study: Entrepreneurship
  **Henry Hill Music Production**
  This presentation will show the process of researching the desire and needs for consumers to spend money for the service of music recording, developing the skills necessary to produce a professional song, and implementing a business plan by recording with actual clients. It will describe if implementing a recording studio is even possible in Helena, and how to effectively market and decide on business decisions in order to gain customers.
Casey McInerney (Major: Finance)
Field of Study: Entrepreneurship

Missouri River Riders
Missouri River Riders will be a river rental service along the Missouri River in Great Falls, Montana. The presentation will include the business plan, and process of becoming a small business owner.

Kyle Jones (Major: Finance)
Field of Study: Entrepreneurship

Entrepreneurship in our modern world
This presentation will cover topics in the ever-changing realm of entrepreneurship. The term “entrepreneur” is one that is tossed around quite loosely in our modern world. What is an entrepreneur? As a third year Finance student in Carroll’s Entrepreneurship Program, I have begun to develop the skills necessary to run and launch a profitable product-based business with little to no capital investment. Throughout this semester, I’ve worked on launching my third business startup to date. In my first two ventures, I ran product-based businesses. However, this startup is different. I will discuss the challenges and difficulties that arose with launching a service-based company including a constant need for cash.

• 2B: FLEX THEATRE, CAMPUS CENTER

Victoria Hill (Major: Biology)
Field of Study: Biology

The Effects of UV Radiation on Metarhizium anisopliae
The development of fungal insecticides as biological control agents provides a safer, more natural approach to pest control than chemical insecticides. Metarhizium anisopliae, one of the most widely used mycoinsecticides, is one fungal species of high economic potential in current use. However, a rapid decrease in pathogen activity in the field due to ultraviolet radiation presents a problem for further production. The present study seeks to determine if certain strains of M. anisopliae are more tolerant of UV radiation, thus providing the potential for higher effectiveness in the field. Utilizing a novel method for examining fungal persistence that is more conducive to real-world scenarios of fungicide application to crops, fungi were applied on leaf disks rather than agar plates. Leaf disks were then exposed to UV-A and UV-B from an artificial source at UV intensity equivalent to mid-day June or July. After being exposed to UV irradiation, the conidia were removed and subjected to a germination test as a measure of the lethality of the UV exposure. This study examined 15 strains of M. anisopliae obtained from the Sidney, Montana, USDA-ARS collection of entomopathogenic fungal cultures.

Kavida Naidu (Major: Philosophy and Political Science)
Field of Study: Philosophy

Correctional Officers, Step Off the Treadmill of Power: The Lack of Moral Authority in U.S. Correctional Officers
Prisons are not immune to the overuse of authority and power. Correctional officers exercise their authority on inmates in ways that result in a prison culture, which is filled with violence and dehumanization. Correctional officers often consider inmates as morally inferior beings, who deserve to be punished beyond sentence, for the crimes that they have committed are inexcusable. However, the abrasive environment of prisons places correctional officers in a situation where they eventually adopt the prison identity and find themselves trapped in this brutish incarcerated culture. This paper argues that the coercive working condition in U.S. prisons leads correctional officers to, not only behave in a coercive manner toward inmates, but also to dehumanize inmates in atrocious ways which violate fundamental human rights, authority and morality. This paper proceeds to draw upon an important distinction between authority and power, and legitimate authority and moral authority, in order to understand better which one is lacking in U.S. prisons, in addition to an analysis of correctional officer–inmate relationship. Finally, this paper concludes that it is the structure of prisons that causes a significant lack of moral authority, but also, instigates not only an abuse of authority, but also a flawed understanding of authority itself.
Sarah Roberts (Major: Anthropology)  
Field of Study: Anthropology  
**Paleoclimatic Drought Conditions in the Northern Big Belt Mountains and the Effect on Lithic Materials**

This paper will be answering the question of how paleoclimatic drought conditions in the Northern Big Belt Mountains affects, or does not affect, the distribution of lithic materials. The hypothesis states that during times of environmental stress, there will be a decrease in “expensive” materials such as obsidian and dacite. Additionally, the archaeological record will show a constant amount of “cheap” materials, such as Oregon chert, throughout time. Data was collected at 24LC2289- also known as the Sundog site- an archaeological site excavated in the northern Big Belt Mountains outside of Helena, Montana in the summer of 2017. A primary analysis of flakes as completed, followed by secondary analysis in which the Kolmogorov-Smirnov test was used to determine the statistical significance of the materials throughout the layers of the pit. Charcoal and soil samples were taken from each pit level in order to complete pollen analysis and radiocarbon dating. Obsidian flakes and lithics larger than 10mm were removed to be sourced. As suggested by the hypothesis, obsidian and dacite were non-randomly significantly distributed, and Oregon chert was not. Other cultural factors and radiocarbon dates showed that obsidian and dacite are found more in times of environmental stability and less during times of stress, while Oregon chert use remains the same through time.

Benjamin Kendall (Major: Biochemistry and Molecular Biology)  
Field of Study: Philosophy  
**The Soft Power of Deference: Analysis of a Key Pillar of Moral Authority**

When faced with the issue of leadership, we are tasked with finding when it is appropriate to follow. In following, we are deferring our own authority in favor of another’s. The sliding scale of authority teeters between complacency and anarchy, providing a challenge as to where we can find the effective middle ground for a functioning society. This paper breaks down the key facets of authority and discusses the necessity of community deference, namely with respect to the rise of a counter-cultural moral authority that seeks to better humanity. Moral authorities rely on a loyal following, from Nelson Mandela’s fight against apartheid or MLK Jr.’s battle for civil rights, and while we pride ourselves in critiquing authority I argue that there is a time and place to order one’s beliefs behind those of a moral authority in order to further the movement.

Jane Reid (Major: Psychology, Sociology)  
Field of Study: Psychology  
**Meta-Analysis: Examining the use of interventions in changing children’s attitudes about their peers with intellectual disabilities**

The Education for All Handicapped Children Act, enacted in 1975, entitled all children with disabilities equal access to public education. As more children with disabilities were integrated into classrooms, new challenges like peer acceptance presented themselves. Researchers developed interventions aimed to improve children’s attitudes toward their peers with disabilities (Siperstein, Norins, & Mohler, 2007). We conducted a meta-analysis to examine intervention effectiveness. Keyword searches for literature were conducted using databases and 80 articles were utilized. A subset of the identified research articles were coded for moderators and these 10 articles produced 30 effect sizes. Results suggest that the interventions were successful in improving children’s attitudes toward their peers and that several moderators impacted intervention successfulness. Specifically, interventions were more successful when participants were in elementary school compared to high school; when they involved media presentations or multiple intervention strategies compared to cooperative groups; and when participants had a active role in the intervention. Additionally, interventions were more successful in changing children’s perceptions of the warmth, but not competence, of their peers with intellectual disabilities; thus, following the intervention, children saw their peers with disabilities as more friendly but not more intelligent or independent.
Kerri McInnis (Major: Biochemistry/Molecular Biology and Spanish)
Field of Study: Organic Chemistry

Studies into the Stereochemical Control of Diels-Alder Reactions with $\eta^6$-Ruthenium Arene Complexes

In this study, we examined the effect of $\eta^6$-ruthenium arene complexes on the stereocontrol of Diels-Alder (DA) reactions. In organic chemistry, $\eta^6$-ruthenium arene complexes can act as potent electron-withdrawing groups, thereby facilitating the nucleophilic aromatic substitution and deprotonation of benzylic and aromatic positions. Additionally, having the metal complex bound to a non-symmetrical arene provides a source of chirality, enabling stereoselective chemistry. It is well known that DA reactions with an electron-rich diene can be accelerated by electron-withdrawing substituents on the dienophile. Given that the $\eta^6$-ruthenium arene complexes are extremely electron-withdrawing, it follows that these moieties may be able to accelerate DA reactions when bound to the dienophile component. Indeed, previous studies by the Hitt research group has suggested that they can accelerate Diels-Alder reactions involving adjacent alkenes. However, the effect of using a chiral ruthenium arene substituent on the dienophile as a stereocontrol element has not been analyzed. In this vein, we have successfully synthesized a model dienophile substrate, $[\text{CpRu}(\eta^6-(\text{ethyl 2-chlorocinnamate}))]\text{PF}_6$, to be used in the DA reaction. The cis- and trans- isomers of this dienophile were separated by column chromatography. The trans- enriched dienophile substrate was then combined with 2,3-dimethyl-1,3-butadiene and the stereochemistry of the Diels-Alder product was examined via $^1H$ NMR spectroscopy.

John Bartlett (Major: Biology and Theology)
Field of Study: Theology

Spiritual Care in a Healthcare Setting

Health is often seen as the lack of illness or disease within a person. Often in the hospital it is these that are treated as well as emotional problems that may arise. Often spirituality and spiritual health is not seen as a part of healthcare. There have been increasing studies that spiritual health has a positive correlation with overall health. With the toxicity of treatment within a medical setting it is important to include the spirituality of the patient. In order to adequately care for the patient the spiritual side needs to be addressed. However it is important to realize that the spirituality of the patient depends on the maturity of the patient. Each demographic from childhood to elderly is examined in the context of developmental stage and spiritual issues that accompany the stage and how a healthcare professional ought to treat the spirituality of the patient as well as the physical ailments within the medical setting.

John Graves (Major: Civil Engineering)
Elly Schmeltzer (Major: Civil Engineering)
Field of Study: Civil/Water Resources Engineering

Santa Maria Irrigation Expansion

Santa Maria is an orphanage and refuge for elderly located in Queretaro, Mexico. The community operates a farm as a source of food, income, and education for their students who are tasked with running daily operations. Unfortunately, limited water resources have stifled the growth of farming operations and limited opportunities for agricultural advancement. An infiltration gallery will allow the community to access more of the water by tapping into the groundwater reserves behind of one of three dams on the site. An infiltration gallery consists of a series of horizontally oriented perforated pipes that access water trapped within sediment impounded behind a dam. These perforated pipes will drain into a centralized wet well which houses a pump that will force the infiltrated water up the bank and into the existing irrigation distribution system. The added volume of water will maximize crop yield in the existing fields and allow the operations managers to utilize more land. Several locations for the infiltration gallery were considered based on their accessibility, potential recharge rates, and anticipated dewatering efforts. The location selected for the infiltration gallery is above the Middle Dam. This location was selected due to its high potential for dependable water recharge despite limited accessibility and significant anticipated dewatering efforts. Additionally, a photovoltaic energy system will be implemented as the primary power source for operating the pump.
Rhiannon Sturgess (Major: Psychology)
Field of Study: Social Psychology

Social Group Membership, Personal Implication, and Reactions to Norm Violations

To better understand the role of social group membership and personal implication (i.e., the amount of personal impact resulting from a norm violation) in reactions to and perceptions of norm violators, we conducted a study in which participants watched a video clip of a fictitious norm violation. Participants were shown a picture of the norm violator depicting him as White, Black, Asian or an individual with an intellectual disability and were told that the norm violation happened either at Carroll (high personal implication) or Grinnell (low personal implication). Questionnaire items aimed to measure participants’ perceptions of the norm violator and the extent to which they agreed with suggested punishments (e.g., he should receive a warning, he should be expelled). Consistent with the Stereotype Content Model (Cuddy, Glick, & Xu, 2002), our results suggested that when the norm violation happened at Grinnell, Asian norm violators were more likely to be perceived as having “bad characters” and deserving of harsher punishments when compared to norm violators with intellectual disabilities. Norm violators were not treated or perceived differently at Carroll, opposing norm violation literature findings that high personal implication norms receive greater punishment than low personal implication norms (e.g., Brauer & Chaurand, 2010). The results of this study could benefit our society as we strive to understand differential treatment of people based on social group membership.

Forrest Walker (Major: Civil Engineering)
Brenden Borges (Major: Civil Engineering)
Field of Study: Environmental/Energy

Energy Alternatives at the Triple 8 Ranch

The Triple 8 Ranch is currently using grid power for all electric appliances on the property. This has resulted in a massive annual power bill, and the new property owner has approached us to develop a solution. We focused mainly on solar power, as the restrictions at the site led to a number of interesting design decisions. The end result is a reduction in the power consumption on site while lessening the carbon footprint, investing in long term power infrastructure, and using green energy as opposed to fossil fuel sourced power.

Caroline Herzog (Major: Anthrozoology, Pre-Vet)
Field of Study: Anthrozoology

The Purpose of Animals According to Mark and Athanasius

Religion affects how groups of people view animals, and these views can vary between writers within the same religion. Both the author of the Gospel of Mark and the author of “The Incarnation of the Word of God” present animals as subordinate to humans, revealing hierarchies within the cultures of their original audiences. The Gospel of Mark offers a more inclusive view of animals than “The Incarnation of the Word of God” by inferring that the purpose of animals is for human use and to reveal God, whereas Athanasius believes their purpose is solely to offer a foil to the immortality of humankind.
Sari Chabot (Major: Secondary Education for History and Political Science)
Field of Study: History
More than just Working Conditions; The Push to Unionize (and Radicalize) Butte, MT 1912-1920

Radicalization changed Butte from a conservative coalition of miners to a “Gibraltar of Unionism” between 1912-1920. This presentation will examine how attitudes and societal factors forced the Anaconda Mining Company to Unionize. The evidence shows that fear of government intervention, consolidation of the Anaconda Company and fear of socialism led to the labor resurgence in Butte in 1917. The labor resurgence continued to affect Butte into the 1950’s and still has a major impact on the town.

Ben Dulaney (Major: Biology, presenting on Anthropology minor)
Field of Study: Anthropology
The Vibrancy of Color In Culture

This thesis examines the relationship between latitude and the influence it can have on the presence of color within a culture. To generate data points that would accurately determine the presence of color within a culture the larger website known as Instagram was used to gather photos taken in cities located within the selected latitudes. Photos were selected based on their popularity (number of likes) within each city and were run through Adobe Photoshop to generate a histogram of the color distribution within each photo. The standard deviation of these generated histograms was used to determine the vibrancy of the color in the photos and thus associate it with the presence of color within the cultures at separate latitudes of the 46th, 23rd and 0th parallel. The results were run through a series of T-tests (α=.05) comparing each latitude’s values to the next, but no significant differences were. An additional, Kolmogorv-Smirnov test was run to determine if measuring the data points as ordinal rather than nominal created significant results. Calculations at the .05 significance found that higher latitudes had less vibrant colors in their photos. One possible explanation for this relationship is the fewer number of hours and lower intensity of the sunlight at higher latitudes, this might have a direct influence on the color preferences in each culture.

Jacob Souza (Major: Psychology)
Rhiannon Sturgess (Major: Psychology)
Connor Brandon (Major: Psychology)
Field of Study: Psychology
Trouble remembering? Take a walk!

Previous research suggests that physical activity has an effect on neuroplasticity, cognitive functioning, and memory recall on both humans and animals (Hotting & Roder, 2013; Schmidt-Kassow et al., 2014). Furthermore, exercise performed before consolidation has been shown to increase memory involving word recall (Labban & Etnier, 2011; Salas, Minkata, & Keleman, 2011). We investigated the hypothesis of exercise improving memory recall. Participants were randomly allocated to one of two conditions: an exercise group, in which they performed a scavenger hunt on campus, or a stationary group, in which they performed a word-matching task. Our results showed the exercise group (n=20) had an increased number of recalled words in comparison to the control group (N=16; t(34) = 1.719, p=0.095). These results suggest that exercise can improve memory recall function, which has broad applications in daily activities.
Session 3 Presentations, 11 to 11:45 a.m.

• 3A: TRINITY HALL LOUNGE, MANION SYMPOSIUM

Dr. Jennifer Glowienka
Associate Professor of Biology

Celebrating 40 years of the Manion Symposium

This year marks the 40th anniversary of the Manion Symposium, which recognizes the dedication and contributions of Professor James J. Manion, a Biology professor at Carroll College from 1956–1987. We who find inspiration in “Doc” Manion’s academic legacy and who benefit from the Chair established in his honor join together in celebration of scientific inquiry and faculty-mentored, student-focused research. I believe Doc would be proud of the scholarly and research activities that currently occur across all disciplines at Carroll College and are celebrated through the Student Undergraduate Research Festival, as Doc concluded a lecture in 1984 by stating: “I am convinced that each [the liberal arts and sciences] must learn from the other, there must be a continuing dialogue between them to achieve the comprehensive knowledge needed to live an intelligent and successful life.”

Emma Esposito (Major: Biology)
Field of Study: Biology

Analysis of antimicrobial peptide efficacy against chytridiomycosis from skin secretions of Columbia spotted frogs (Lithobates luteiventris)

Amphibian populations have been declining in size in recent years. A major contributing factor to this decline is the fungal disease chytridiomycosis. Chytridiomycosis occurs when the zoospores of the fungus Batrachochytrium dendrobatidis (Bd) imbed into amphibian skin and disrupt the homeostatic functions the skin provides, leading to death in most amphibians. Amphibian skin can produce antimicrobial peptides (AMPs) that inhibit Bd infection. The goal of this experiment was to determine whether or not the amount and type of AMPs a frog produces affects its ability to defend against chytridiomycosis. Columbia spotted frogs were chosen as a model organism because they vary in susceptibility to the disease, yet their populations have not been drastically affected by the fungus. AMP samples were collected from ten Columbia spotted frogs at four different locations in western Montana (40 samples total). The protein concentration for each sample was determined using a micro BCS assay. The minimal inhibitory concentrations (MICs) were determined using 96 well plate growth inhibition assays. In the assay, a set of ten AMP dilutions from each frog (ranging from 100-1000 μg/mL) were used. The Bd was grown in each dilution and growth was measured after four days as change in absorbance measured at 492 nm. Infection load of frogs was determined using Quantitative PCR analysis. It is predicted that frogs with lower MICs will correlate with lower infection loads.

Kerri McInnis (Major: Biochemistry/Molecular Biology and Spanish)
Field of Study: Spanish/Healthcare

Long-Term Care of Elderly Citizens: A Comparative Study

Recently, countries around the world have experienced an exponential increase in the number of senior citizens. This unfathomable demographic change is only expected to intensify in the coming years. Countries in the western hemisphere have implemented very different strategies in an effort to cope with the new demands presented by the aging population and demographic shift. The norm in the United States is providing institutional care in either assisted living or nursing homes, whereas the norm in Latin American countries is offering familial care and multigenerational coresidence. The aim of this study is to compare the benefits and shortcomings of the distinct care frameworks and offer a best-practices recommendation for implementation of new models based on the comparison. In terms of social well-being, Latin American senior citizens are more actively engaged in their community, but co-residence often undermines the social well-being of the family caregiver. This is similar to the economic well-being comparison; the elderly experience
greater direct costs in the institutional setting, but the family and caregivers experience greater economic burdens in the familial caregiving setting. Lastly, the overall health and life expectancy of the elderly is greater in the United States. This study concluded that the best care for the elderly could be provided by combining a multitude of strategies from the United States, Latin America, and other countries around the world.

**3B: FLEX THEATRE, CAMPUS CENTER**

Connor McGree (Major: Civil Engineering Broadfield)
McBride Galt (Major: Civil Engineering Broadfield)
Matt McHugh (Major: Civil Engineering Broadfield)
Field of Study: Civil Engineering focusing on Hydraulics

**Poplar, MT Splash Park**

This presentation focuses on our four years of studying Civil Engineering while at Carroll College. The town of Poplar, MT needs a safe and enjoyable recreation option for their children. They came to our team with this issue, and this presentation encompasses one full year of designs to meet the criteria set fourth by the community of Poplar.

Lauren Castillo (Major: Anthrozoology)
Field of Study: Anthrozoology, Psychology

**Role of Human Personalities in Horse Handling**

How do people with different personalities interact with horses? The researchers designed this study to determine if introverts have an easier time handling an unfamiliar horse when compared to extroverts. Volunteers with little to no horse experience completed the Myers Briggs Personality Type Indicator. The researcher assigned a horse at random to volunteers to lead over a 12-foot platform in an indoor arena. All horses were familiar with this obstacle. The researcher videotaped every participant. The dependent variables included the fluid motion of the horse, horse facial expressions, and horse body language along with horse-human interactions. The hypothesis is that introverts will experience an easier time when compared to extroverts in completing this task with the horse. Results are pending.

Emily Holland (Major: English Literature and Psychology)
Field of Study: English Literature

**Science Fiction and Models of Humanity**

Science Fiction as a literary genre offers a unique platform for social commentary. It presents plausible scientific advancements as a reality, and then uses this possible future to enter the discussion on society’s current model of humanity. One of the first works of Science Fiction, Mary Shelley’s *Frankenstein; or The Modern Prometheus*, published in 1818, was written in a time overflowing with new scientific theories and advancements. Two such sciences, galvanism and vitalism, aimed to identify the principle of life in the human body. At the same time, pseudo-psychological theories discussed the psychological aspects of what we call humanity, specifically emotional connection and sympathy. Shelley drew on galvanic, vitalist, and pseudo-psychological theories. Her model defines humanity by emotional expression, a capability for sympathy, and a basic desire to connect. Her novel has since driven more Science Fiction works to define humanity on innovative psychological levels. One example is Kate Wilhelm’s *Where Late the Sweet Birds Sang*, published in 1976. In the 1970s, the ethics of cloning and genetic control were highly debated. Wilhelm’s novel creates a world where cloning is the preferred means of human generation, instead of sexual reproduction. Her model defines humanity less by biology, and more by individuality and a capability for original thought. Kate Wilhelm and Mary Shelley both use Science Fiction to present psychologically focused models of humanity. This research presentation will compare and contrast how these two authors use science and psychological theory in representing life and drawing models of humanity.

**3C: SIENA ROOM, CAMPUS CENTER**

Jane Reid (Major: Sociology, Psychology)
Field of Study: Sociology

**College Students’ Misperceptions of Rape and Sexual Assault of Female Undergraduate College Students**

This study examined undergraduate college students’ perceptions on the subject of rape and sexual assault of female undergraduate college students. Through semi-structured
interviews, participants were asked to describe their perceptions of three different types of sexual assault and rape scenarios that involved a female undergraduate college student victim and rate the three scenarios from the most common scenario to the least common. The results of this study are significant as they provide insight about the average types of perceptions that college students hold about sexual assault and rape of undergraduate female college students. The results of the study can be utilized in educating college students about inaccurate perceptions of sexual assault and rape.

Abigail Dolan (Major: English Broadfield)
Karen Hoffman (Major: Biology)
Field of Study: English—Literary Studies

“Her Story”

In the Fall of 2017 our literary studies class compounded a critical edition of “Her Story,” a short story written by Harriet Elizabeth Prescott Spofford in the late 19th century. We were tasked with reading the original text and dissecting it through several views. Each group was assigned a different section to research including, the author, contemporaneous literature, contemporaneous criticism, historical contexts, and modern criticism. Through literary and internet research of this text, it was discovered that Prescott was an early advocate for women’s equality, expression of sexuality, art, and one of the first female detective story authors. Despite her accomplishments and progressive attitude expressed in her literary works, she is not as widely known today as other contemporaneous authors like, Mark Twain and Emily Dickinson. Therefore, it took some digging to find all the information necessary for putting together a proper critical edition. In this presentation we will show the highlights of the critical edition. The critical edition includes the text itself with footnote explanations of important words and events, as well as compilations of information from the five main topics of focus. In the end we were left with a complete anthology of “Her Story” and all things Spofford in one accessible digital format open to all.

Layne Ryerson (Major: Environmental Science)
Allison Bayer (Major: Environmental Science)
Field of Study: Environmental Science

Lake Sediment Charcoal and Holocene Fire History in the Helena Valley

Positioned on the outskirts of the Big Belt Mountains of Central Montana, Lake Helena is a man-made waterbody whose sediment can unlock secrets about the past. This region occupies the lowest areas of Helena Valley, and was formed when the Hauser dam was built across the Missouri River in the early 1900s. Prior to the flooding, the lowest areas in the basin contained wetlands and some small, lakes fed by springs. We targeted these lowest areas of the basin (as they appear in a pre-flood era 1899 map) and have obtained several cores providing a continuous sediment record spanning into the early Holocene. We obtained a 210 cm core in March of 2017, and another 210 cm sediment core in Feb 2018. Preliminary analyses show the presence of what is likely the Mazama ash (~8000) years and observable changes in sediment type, organic content and charcoal from early Holocene, through prehistoric and post settlement time to the present. Detailed analysis of charcoal from the newest core will include charcoal size, abundance and type (grass or wood), and will provide a record of fire history (frequency, intensity) for the Helena valley. This data will be compared with a fire history record obtained from a lake on the east side of the Big Belts (K. Gildner) and with climate records from archeological sites in the Big Belt mountains.

Rachel Hopkins (Major: Environmental Science, and Spanish)
Field of Study: Wildlife biology

Human-Predator Conflict in North America and South/Central America

Many large carnivores across the world are experiencing steep declines in population size due mainly to conflict with humans. Large carnivores are important for their role in the trophic cascade, and regulate the rest of the ecosystem through top-down control. Removing, or significantly decreasing, the populations of
large carnivores from their natural ecosystem can have very harmful effects. Despite the importance of these animals, human perception is often very negative, which can be attributed to seeing them as dangerous, or threatening to one’s livelihood. It is important to examine human-predator conflict in order to better understand how to conserve these large predators. I chose to research human conflict, with Gray Wolves (*Canis lupus*) in North America, and the Jaguar (*Panthera onca*) in Central and South America, and compare and contrast the two. I examined research on public perception of each species, identifying the main issues humans saw with each predator. Using these main themes, I looked into research on the true impact of these predators on humans in order to discover if it matched public perception. Next, I looked at research on management strategies, and analyzed which strategies seemed to be the most effective for reducing human-predator conflict, and which ones best addressed, and reduced, negative impacts of each species on humans. By examining these conflicts and solutions, it can be better understood how to optimize management of these species.

Raymond Gomez (Major: Civil Engineering with Environmental Emphasis)
Kellen Miller (Major: Engineering Science: Mechanics Emphasis)
Field of Study: Solar Energy

**Solar Rainwater Heating in the Developing World**

We designed a solar heating system for an elderly home in Saint Lucia. St. Lucia is a Caribbean island-country with abundant rainfall. We worked with EWB to design a system that provides sufficient hot rainwater to the laundry facility. Free hot water is a great resource.

Jacqueline Pyle (Major: Finance)
Field of Study: Theology


Both the Gospel of Luke and the noncanonical Gospel of Thomas depict Jesus teaching about children/infants entering the kingdom. My paper compares Luke 18:15-17 to logion 22 from the Gospel of Thomas. While the language in both of the texts appears to express the same ideas, my analysis demonstrates that the historical context of these passages reveal two very different meanings. I argue that the Gospel of Thomas is meant to show that people need to be transformed into a “single one,” whereas the Gospel of Luke is aimed at teaching people how to act so that they can be in communion with God and enter the kingdom.

**3E: RICE ROOM, CAMPUS CENTER**

Austin Egan (Major: Civil Engineering, Environmental Emphasis)
Greg Jones (Major: Civil Engineering, Environmental Emphasis)
Field of Study: Engineering Design

**Lyon’s Creek Underpass Design**

This project involves a site on Lyon’s Creek Road along Little Prickly Pear Creek in Lewis and Clark County, MT, in which the rural road runs underneath a low-clearance railroad trestle bridge. The site is located just south of Wolf Creek, MT, at the junction of Little Prickly Pear Creek and Lyon’s Creek. This area often experiences moderate to high runoff events causing the creek to overflow its banks and flood the road. Along with flooding events, the low-clearance under the railroad bridge forces large trucks to either detour many miles around the site, or excavate and replace the road underneath the bridge after navigating the crossing. This restricts access to many necessary utilities for a sizable number of residents that live west of the crossing. The Lewis and Clark County Public Works Department and County Engineer Dan Karlin desire a sustainable solution that will allow high clearance vehicles to navigate the trestle during the flooding season, and enhance the safety of the existing site. Our task is to work with Mr. Karlin to design a solution that will enhance the safety and sustainability of the site, while simultaneously creating enough clearance underneath the railroad bridge to safely maneuver a large utility truck through. To complete the project, we must take the necessary steps essential to Engineering Design to ensure that our solution will meet all criteria and constraints, enhance public safety and access, and maintain healthy environmental conditions.
Dylan Young Vazquez (Major: Health Sciences and Spanish)
Field of Study: Spanish, Latin American Studies and Health Sciences
Evaluative comparison of Physical Therapy models between the United States and selected South American nations.

The research for this presentation will explore the differences in the field of physical therapy between the United States and various countries in South America to compare and evaluate methods of care, quality of care, and access to care, to formulate recommendations for possible improvements and pursue further research. The United States and selected South American countries have starkly different economic, social, and political backgrounds which impact the way in which physical therapy is administered and received. This allows for comparisons to be made between each respective model of physical therapy, creating a running dialog on how these programs can improve and if imitation or collaboration are worthy future endeavors.

The United States is at the forefront of research development in the field of physical therapy, while a large majority of South American countries are underdeveloped and progressing at a slower rate. Accordingly, it is expected to find that South American countries struggle in regards to technology and financial allotment in comparison to the US. But what can be done to reduce the gap? How can there be improvement? Are there components of the South American Model which the United States can learn from? Through the evaluation of published scholarly articles and first hand experiences, contrasts and comparisons will be drawn between these two models to better understand their methods and distinguish where both can improve.

Marija Nicksic (Major: History)
Field of Study: History
Empires and Nemeses: The Collapse of the Soviet Union

Numerous components contributed to the collapse of the USSR, but this paper argues that Mikhail Gorbachev’s policies and decisions were the deciding factor in the death of the empire. First, he created a reformist faction within his own government to support his plans for liberalizing the USSR, but he lacked either the power or the will to rid his government of its conservative members. This formed a divided governing body in a country where the Communist Party previously maintained a homogenous façade. His relatively liberal policies lost him the confidence of the conservative faction of his government. At the same time, Gorbachev was not liberal enough to please the reform faction. Gorbachev vacillated between the two camps so that neither side believed that he should be trusted to run the government. The conservative faction eventually tried to replace Gorbachev with the August Coup, while the reform faction withdrew their support from Gorbachev and instead championed Boris Yeltsin. By December of 1991, the conservative faction had lost their political power, and the reform faction succeeded in replacing Gorbachev with Yeltsin by way of formally ending the Soviet Union.

3F: AVILA/DESMET ROOM, CAMPUS CENTER

Sarah Roberts (Major: Environmental Science)
Field of Study: Environmental Science
Assessing Use of Non-Cultural Charcoal for Age Control in Archaeological Studies

Archeological studies at the Sundog site in the Big Belt mountains, suggest that lithic artifacts are non-randomly distributed and in stratochronologic order (older artifacts on bottom, younger on top) reaching back to the McKean Complex ~8,000 BP. In contrast, distinct sediment layers at Sundog were absent or potentially disturbed. Non-cultural charcoal (sampled every 10 cm in one 150 cm pit) gave thirteen radiocarbon ages that did not come out entirely as hoped. The upper 100 cm gave a jumble of dates ranging from 3,800-400 years ago, many were reversed suggesting mixing. More promising, the lower 50 cm of the site had four dates ranging from 10,100-9,300 yrs BP. Despite some reversals, these dates suggest the lower strata are consistently and significantly older and have a higher sedimentation rate than the upper unit. The significant age gap at 100 cm suggests a depositional break or erosion between 9000 and 4000 BP. Grainsize analysis shows a general
fining upward trend, with little stratigraphic variation in the upper 60 cm, and weak variation in the small pebble fraction of the bottom 80 centimeters. This study explores several potential hypotheses explaining the mixed radiocarbon ages and lack of stratigraphy. Detailed examination of charcoal fragment characteristics (size, preservation, clay coatings) along with sediments may help determine if materials have been mixed or disturbed, transported from nearby slopes, or perhaps created in situ through root burn after fire. This study may help inform future collection methods of non-cultural charcoal used as age control in archaeological sites.

Sarah Hayden (Major: History)  
Field of Study: Philosophy  
Commitment in Unconventional Relationships: Sartre, de Beauvoir, Mill, and Taylor

This research is the study and comparison of two philosopher couples: Jean-Paul Sartre and Simone de Beauvoir, and John Stuart Mill and Harriet Taylor. Both partnerships exhibit characteristics of an unconventional relationship. Sartre and de Beauvoir had an open relationship, in which both partners were free to commit unlimited adultery. Mill and Taylor were emotionally committed to each other, while Taylor was legally bound to another man. This research examines the individual decisions and consequences of challenging the institution of marriage set by societal norms. With the current growth of unconventional relationships, whether open, homosexual, or interracial, it is especially important for us to examine these kinds of relationships and how they are viewed in the traditional mold of society.

Daniel Olszewski (Major: Math and Computer Science)  
Field of Study: Math/Biology  
Application of Differential Equations in Modeling Cardiac Cells

Ordinary differential equations allow us to model the behavior of single cardiac cells in response to stimuli. Extending these equations into a cable of cells, we get a set of partial differential equations that describe the flux of voltage and ions across the cable. We study a specific dynamic exhibited by these systems called alternans. Electrical alternans, the beat-to-beat alternations of cellular action potential duration (APD) and/or intracellular calcium concentration amplitude (peak ci), is a dynamical state that often precedes life-threatening arrhythmia, which is characterized by the irregular propagation of electrical waves and is the leading cause of sudden cardiac death. Studies have shown that alternans can arise from instabilities in voltage, intracellular calcium cycling, or both. Previous efforts aimed at controlling alternans have utilized mathematical models that primarily exhibit voltage-driven alternans; here, we consider the impact of intracellular calcium mechanisms.

Lunch Speaker 12:05 p.m.

FLEX THEATRE, CAMPUS CENTER

The Enduring Role of Values in U.S. Foreign Policy

By Matthew Eussen ’96, Political/Economic Section Chief, U.S. Embassy in Armenia

This event is made possible by the support of the Jack Miller Center through a grant from the M.J. Murdock Charitable Trust.
Session 4 Presentations, 1 to 1:45 p.m.

• 4A: FLEX THEATRE, CAMPUS CENTER

Layne Ryerson (Major: Environmental Science)
Field of Study: Anthropology
Impacts of Paleoclimatic Drought on Prehistoric Foraging Decisions in the Big Belt Mountains.

Over 2,000 years ago, the indigenous people of the Big Belt Mountains appear to have been influenced by a substantial drought which dramatically altered their diet. Faunal records obtained through Carroll College’s archeological excavations indicate a shift in foraging decisions during this drought period; most notably a decreased consumption of Rocky Mountain Elk. The rationale for this change in fauna is investigated through the Diet Breadth Model (D.B.M), a logic based equation that examines past foraging activity through cost-benefit analysis. It is speculated that elk were absent during the water-stressed period, and that their admission from the faunal record meant that the only available game was smaller, R-selected species. In order to assess the validity of these assumptions, my research inspected the influences of drought on modern elk herds, specifically those with similar environmental conditions to the Big Belts. This process focused on the elk populations dynamics exhibited by Grand Tetons National Park, W.Y, and Wind Caves National Park, S.D. These regions were examined based upon their drought-induced fluctuations in herd size, cow/calf ratio, and carrying capacity. Analysis of these variables exposed a direct link between increased aridity and decreased elk availability. Moreover, these findings bolstered our hypothesis by indicating that indigenous peoples of the Big Belt did most likely adhere to the DBM during times of drought induced resource scarcity.

Sarah Hayden (Major: History)
Field of Study: History
Baseball in Japanese American Internment Camps

My research examines the lasting effect of baseball played by Japanese internees in the internment camps during World War II. During their internment, many Japanese men, women, and children played baseball not only to pass the time, but also to send an important message to free Americans: they were just as American as anyone else. In this paper, I argue that although it does not appear that this effort immediately affected American perception of the Japanese, it did have a lasting effect. Despite the racism that Asian-Americans still feel today, the effect is present in the scholarship as well as literature of Japanese-Americans. Most scholars agree that the internment was an injustice that has often been overlooked. In addition to the scholarship, adult and children’s authors have taken to literature to argue for the humanity of the internees. These books, especially the one aimed at the younger audience, describe the internees with sympathy, and encourage the reader to put themselves in the characters’ shoes.

Monica Mendoza (Major: Spanish and Biology)
Field of Study: Spanish
Horacio Quiroga: Analysis of Nature’s Ability to Take Away Life as Demonstrated in Various of His Short Stories

Horacio Quiroga has often been labeled the Edgar Allan Poe of Latin America. He experienced many tragedies in his life that tremendously impacted his literary works. In 1879, Quiroga’s father accidentally shot and killed himself. In 1901, while he was cleaning his friend’s gun, he accidentally fired a shot that immediately resulted in the death of his friend. In 1915, his wife committed suicide due to a long and debilitating depression. These are only a few of the tragedies that plagued the life of Horacio Quiroga. His experiences
influenced the way he saw the world and they were often mirrored in his short stories. In many of his stories, Quiroga displayed his lifelong struggle with trying to come to terms with death. Although, death is inevitable for all people, it seemed to come suddenly for so many of those in his life. For Quiroga, death and nature seemed to be continually intertwined. Often, the jungle sets the stage for his short stories that consistently end in tragedy. Surrounded by so much life and color in the jungle, many of his characters often meet a dark and unexpected end.

Daniel Wendel (Major: International Relations)
Field of Study: International Relations
Cell Phones and Conflict Intensity: Overcoming Collective Action Problems

Violence is pervasive. So, now, are cell phones. This study investigates the possible relation between the two. Social scientists have long argued that new technologies, such as cell phones, can make it easier for people to coordinate their activities. So cell phones may make conflicts worse by making it easier for people to fight. I use country-level data on cell phones and compare that with data on deaths from within-country conflicts. Specifically, I focus on the time periods when cell phones became prevalent in each country and test whether the this change in communication technology was associated with more or less people dying. I present the results from several comparisons. The findings are mixed: there are some countries where increases in violence happened at the same time that cell phones were becoming popular, but also others where there was no pattern or even a negative relationship. I discuss the limitations of the data and some of the things that I learned and that other scholars could build on to better understand the connections between technology and violence.

Branan Mull (Major: Philosophy)
Field of Study: Philosophy
Nibbling Gadflies

In this paper I examine issues related to public and private “moral authority”, and how this public moral authority interferes with the exercise of private moral authority. This paper explores what public authority is, and why that while in other field it can properly exist, in terms of morality it by its very existence is problematic because 1) it interferes with the exercise of reason in determining ethical action and 2) because it treats the public moral authority as something other than a human being. I then look to several ethical dilemmas as presented by several philosophers and show how this public moral authority interacts with these dilemmas as well as how this exercise of public moral authority is distinct from ethical reasoning that roots itself in a particular ethical theory.

Jessica Lewis (Major: Secondary Education for English Broadfield)
Katie Perrigot (Major: Secondary Education for English Broadfield)
Field of Study: English
From “The Blacker the Berry” and “Fight the Power” to “Y’all Act Like You Never Seen a White Person” Before: Double Consciousness in Race through Hip-Hop and Rap Music

“It is a peculiar sensation, this double-consciousness, this sense of always looking at one’s self through the eyes of others, of measuring one’s soul by the tape of a world that looks in on amused contempt and pity...One ever feels his twoness,—an American, a Negro; two souls, two thoughts, two unreconciled strivings; two warring ideals in one dark body, whose dogged strength alone keeps it from being torn asunder” -W. E. B. DuBois. This presentation explores the world revolving around hip-hop and rap music and the politics that drive them, through the lens of W. E. B. DuBois’ concept of double consciousness. Using the African American rappers Public Enemy, Tupac, and Kendrick Lamar, we will be evaluating their understanding of this “twoness” from the late 80’s to today. The additional use of Eminem, a Caucasian rapper, is how we will prove that
double consciousness has evolved to not only take a prominent role in African American rap, but also in rap of different racial groups as well. Along with this, we will take a deeper look into how violence, politics, and poverty have affected the music of each rapper and influenced their addition to the progression of the hip-hop movement. As each rapper handles race differently, they have the ability to take a unique role and power position in the hip-hop culture. In conclusion, this presentation is important because it will examine how racism affects individual's image of themselves and how they go forth with expressing that.

• 4C: ROSS ROOM, CAMPUS CENTER

Marcellus Randall (Major: Mathematics, Chemistry)  
Field of Study: Mathematics  
Classification of Resistance Distances in Simple Graphs

Within graph theory, there are multiple distance metrics which can describe the concept of “distance” between nodes on a simple graph, which are of particular interest to researchers studying link prediction and network evolution. This talk will focus on the relationship between measures of distance in simple graphs and various features of these graphs. I will discuss classifying graphs in which any edge resistance is greater than any non-edge resistance, using Katz centrality scores and classical graph theoretical features.

Jacob MacDuff (Major: Multi-Disciplinary Major Behavioral Finance)  
Field of Study: Behavioral Finance  
The Theory of Planned Behavior in Financial Decision Making

The Theory of Planned Behavior examines how people's goals and intentions are shaped by their pre-existing attitudes towards behaviors which accomplish those goals, the individual and social norms that influence goals and behavior, and the (perception of) forces that limit an individual's ability to work towards their goals.

I will be looking at various studies that apply this model to financial decision making, and will consider how these three factors influence individuals' financial goals, and the actions they take in order to achieve them. The ultimate objective is to develop an investment planning model which accounts for the factors which shape our goals and actions, so that people can make decisions that maximize their subjective utility, after considering how their decisions are shaped by factors they might not have considered.

Megan Moulton (Major: Philosophy and Chemistry)  
Field of Study: Philosophy  
Moral Judgment: why should we judge and who has the right to?

In this paper, I explore the origin of the moral authority to judge another person’s wrong actions through the relationships to those involved in the situation. I also argue that moral authority has an aspect grounded in past experience with similar situations and the ability to understand what it means to be held and to hold another morally responsible. The purpose of defining moral authority and its application is determined to be for the moral growth of the perpetrator, until further development is denied, in which case the possible occurrence of manipulation to stay in relation with the unchanging person is considered.

• 4D: RICE ROOM, CAMPUS CENTER

Lizzy Younce (Major: Mathematics)  
Field of Study: Economics, Political Science, Latin American Studies, Biology, Epidemiology  
More People, More Puppies, and Less Latin American Rabies

Since 1983 the countries of Latin America have come together as one to eliminate the fatal disease of rabies within the region. Through their international collaboration they have reduced human rabies case incidence by over 95%. There are political, economic, social, environmental and biological factors which contribute to this successful international
public health campaign. With the oversight and collaboration of researchers at Washington State University (WSU) and the Pan American Health Organization (PAHO), last summer I examined the various factors and their impact on post-exposure vaccine usage. In this talk I will present our current findings, how we found them, and what can be done with them. I will elaborate on the background of the biological and the political situation of the REDIPRA cooperation of countries. I will also explain the supply and demand theory behind the econometric models, as well as describe the various types of modeling used in analysis. Finally, I will explore epidemiological implications of our models on the global scale.

Kelly Taft (Major: History and Political Science)
Field of Study: History

Dirty Laundry: Catholics and Protestants in Montana circa 1914

Catholics and Protestants have been at odds with each other since 1517. In Montana, the debate manifested in the Mabel Rail affair at the House of the Good Shepherd, a home for “fallen women” in 1914. Mabel Rail was sent to the House of the Good Shepherd at age fourteen, and after six months she was asked by the Mother Superior to leave. Little is known about her time at the House of the Good Shepherd, but after six months after she left an anti-Catholic newspaper from Aurora, Missouri published Mabel's accusations of abuse by the nuns, especially claims of child labor in the laundry facility. However, an investigation by Montana’s Child and Animal Welfare bureau revealed that a Kalispell man might have written the testimony, made Mabel Rail sign it, and sent it to the known anti-Catholic newspaper. Did Mabel Rail really write the letter? Was Mabel Rail or Clyde Jordan accusing the House of the Good Shepherd for some gain, or was he or she trying to shed light on the abuses of the Catholic Church’s social institutions in Montana? And what really happened to Mabel Rail? While many of these questions cannot be answered, this paper conducts a historical investigation into the Mabel Rail affair. Using letters, newspaper articles, and government reports, this paper argues that The Menace and Mabel Rail affair exemplified the Protestant and Catholic divide in the United States in the Progressive Era.

Jesica Bauer (Major: Mathematics and Computer Science)
Field of Study: Computational Mathematics

Math Behind Computer Graphics: Piecewise Smooth Interpolation

Modern computers are able to create complex imagery with only a small set of information. For example, the fonts on your computer are saved as a set of points and the computer is told how to connect them. Many 3D animations start the same way, where the animation starts as a grid before the rest of the shape is systematically filled in. But how does the computer know how to connect the dots into a mesh? Or know how to create the smooth surface so that it doesn’t look blocky? To solve these problems, we implement mathematical algorithms to generate computer graphics. In this talk, we will discuss 1D and 2D interpolation techniques which tell the computer how to algorithmically connect points to follow certain criteria. We can create smooth lines which connect all our points using high order polynomials like Lagrange or Newton forms. We could also define a function between each pair of points so that the final image appears smooth. If we introduce additional points, then we can utilize Bezier curves. This is how your computer creates fonts. We can also combine methods, such as our new “quadrubic” technique which combines quadratic and cubic splines. These methods can then be adapted to create 3D surfaces.

Kavida Naidu (Major: Philosophy and Political Science)
Field of Study: Philosophy

Re-examining the Notion of Body Image, in Light of Merleau-Ponty

Body image is not simply how we physically look in the mirror. By exploring the work of French phenomenologist, Maurice Merleau-Ponty, we understand that indeed, the notion of body image is much more complex and meaningful. In this article, I contend that the media have distorted the notion of body image and instead have reinforced the objectification of the body. From this, I explain why it is important to know and understand that the body should not be reduced
to an object because according to Merleau-Ponty, the body is what allows us to experience and connect to the environment that surrounds us. Merleau-Ponty primarily opposes the empiricists and rationalists such as Descartes who hold the view that the body is simply an object and is separate from the mind. The body’s relation to the world and the mind is much more complex and intimate than what the empiricists and rationalists argue. This paper briefly introduces Merleau-Ponty’s phenomenological concept of the lived body as presented in his work, The Phenomenology of Perception, explains the relation between the body and perception and finally, addresses the problem of the mind–body dualism.

Xavier Johnson (Major: Sociology)
Field of Study: Anthropology

Climate and Conservation: Obsidian Debitage and Climate in the Big Belt Mountains

The Sundog Site in the Northern Big Belt Mountains of Montana is a site of particular interest due to its artifact abundance and preservation of paleoclimate indicators. It has been utilized to examine aspects of behavioral ecology in humans regarding climate change and paleoclimatic drought. The goal of this research paper is to analyze the data collected from the Carroll College 2017 Summer Archaeology field school in which seven valiant undergraduate students braved unpredictable weather, dangerous wildlife, and the possibility of haunting dreams. The specific purpose of this research paper is to uncover evidence for the hypothesis that Native Americans at this location conserved their obsidian lithic material during times of drought. In this research a literature review is presented to establish a precedent that humans use lithic material in an efficient and deliberate manner, a methods section pertaining to the process of this examination, and a section that presents the findings. This is an important topic of investigation because it could expand the knowledge on behavior of the people that inhabited this location and how they were able to adapt to a dramatically changing environment though behavioral change.

Kelsey van Dyken (Major: Theology)
Field of Study: Moral Theology

Pimps, Payment, and Patriarchy: How the Dignity of Women Dissipated and What We Can Do to Bring It Back

Whether people acknowledge it or not, sex trafficking is a reality, even here in Montana. Children and adults alike get tangled in its deathly grasp. This presentation argues that misplaced desire drives the sex trafficking world, reducing people to a disposable product. In short, sex trafficking denies the inherent dignity all human beings share. Using the methodologies and insights of Catholic theologians, including those of feminist origin, this presentation exposes the reality of sex trafficking and makes practical suggestions on what can be done to counter human trafficking through implementation of critical virtues needed in our society.
Session 5  Presentations, 2 to 2:45 p.m.

- 5A: FLEX THEATRE, CAMPUS CENTER

Lizzy Younce (Major: Mathematics)
Field of Study: Mathematics, Statistics, and Epidemiology
Plots, Puppies, and Deadly Disease

The Serengeti Health Initiative began in 2003 as a collaboration of the Lincoln Park Zoo and various universities around the world in which a team of veterinarians and researchers have been running a campaign to eliminate rabies from the Serengeti Region of Tanzania. To track the impact of the program, survey data has been collected in sixteen villages over thirteen years of the campaign. In this talk I will explain the dynamics of dog populations within the Serengeti from the unusual perspective of evolving shape versus traditional differential equation-based models. Fluctuations in the survey populations and specific villages surveyed over time created challenges in data organization and in applying traditional time series and population analyses. In this talk I will explain the results obtained via traditional exploratory and regression data analytics, as well alternative statistical methods to discover data patterns and shapes and observe their evolution over time. Finally, I will connect these data discoveries back to their original purpose, the campaign to eliminate rabies in the Serengeti.

Daniel Wendel (Major: International Relations and Spanish)
Field of Study: Latin American Studies
Latin American Development in Brazil

This study investigates the web of complexities that is Brazil's development in the modern world. In 2003, one-fifth of the population was between the ages of 15 and 24, which emphasizes the incredible gravity that each decision may have for Brazil's near future. Though a country plagued by economic mis-governance and misfortune, it is also teeming with large tracts of arable land, a burgeoning agribusiness sector capable of interceding in international crises, and a store of underutilized assets waiting to be capitalized upon through international diplomacy. Brazil can be a strong global power in regional affairs, carrying the weight of a world power, but only through development. The road to development through economic success is paved with the good intentions of many a developing economy mired in corruption and dependency, and in order for Brazil to be different it must achieve three main objectives. Greater domestic equality, increased global participation, and sustainable governance that bolsters the spirit of the country instead of squandering it.

Jessica Schmitz (Major: Accounting)
Katherine Anderson (Major: International Relations)
Madison Nesbitt (Major: Business/Accounting)
Sydnee Nowlen (Major: Business/Accounting)
Jackson Richards (Major: Business/Accounting)
Field of Study: Enactus Regional project presentation - work with Helena Food Share

Carroll Enactus Helping Hungry Helena Kids

Carroll Enactus has partnered with Helena Food Share, Capital High School, C R Anderson Middle School and NO Kid Hungry to develop a sustainable plan for hungry kids in Helena. Using business skills and key stakeholders in the Helena community, Carroll Enactus has developed an action plan for teaching middle schoolers to prepare healthy meals, providing snacks in the high school pantry and compiling weekend backpacks for the elementary aged students in Helena. This presentation will be a capstone of a years worth of work with the stakeholders mentioned and an Enactus Regional competition that will take place the week before SURF.
Erica Wiens (Major: Mathematics)  
Field of Study: Mathematics  
**Building Teams using Graph Theory**  
Building the correct team for a job or project is a difficult task. By organizing potential team members and their characteristics into a weighted graph, we are capable of posing optimal team creation as a graph theory optimization problem. There are several interesting ways of approaching this optimization problem. One way to organize the problem is to use maximum flow algorithms to determine the maximum flow through a flow network. Another way to organize this problem is to use trees and pruning algorithms to determine the best people to keep on your team. Through a real world example, we will show the strengths and weaknesses of both approaches to team building.

Conor Coutts (Major: Political Science)  
Field of Study: Philosophy  
**Power Vs. Authority: An Exploration of Christian Virtues as Moral Authority**  
We live in an age that is both desperate for moral authority while simultaneously not knowing what genuine moral authority is. Authority from merely a standard of wealth and political office is not morally legitimate but instead merely powerful. I seek to differentiate between power and authority, asserting that it is through a sense of sacrifice and a disregard for popularity that moral authority is attained. Looking to the Abrahamic faiths that assert such a sacrifice and humility, the life of Christ and subsequent Christian tradition serve as an ideal practice of this. Such a practice of authority and how it is interpreted is significantly influenced by art and mass media, therefore I will analyze two films that display the struggle between power and authority and described by what means the authoritative figure has to go through to triumph. Through engagement with the experiences in film, a necessity of community arises, and how communities choose power over authority largely comes from the decision to either serve the self or serve the other.

Kristina McGee (Major: Secondary Education English Broadfield)  
Field of Study: Gender Studies  
**Pretty Pretty Princesses: Femininity in Disney Princess Films**  
This presentation will examine ideas and defaults of gender norms such as female passivity in Disney films. The main focus of this presentation will be on three Disney Princess films spanning through Disney's Golden, Renaissance, and Modern film eras. I will be focusing on the following films: Snow White and the Seven Dwarfs (1937), Aladdin (1992), and Brave (2012). A Disney Princess film is classified as a film in which a primary role in a Disney animated film is held by a woman. Each film era is classified by what the collection of films from that era brought forward to animation. The Odyssey, a news website, notes the defining characteristics of the three film eras. The Golden Era brought forward the use of fairy tales and literature in films while the Renaissance period is classified by the return of such films. Finally, the Modern era is marked by purchases that expanded Disney such as Pixar and Lucas Films. This presentation is inspired by the desire to break boundaries in gender norms and a love for Disney. The Princesses in these films evolve from having a traditional role to an independent and modern role. For example in Snow White the Princess is focused on finding her prince and marrying. In Brave Princess Merida hates the idea of being married and fights against tradition. It is important to evaluate these films for more modern views of femininity to make sure that their influences on culture and society continue to move forward.

Natalie Oberding (Major: Biology)  
Field of Study: Neuroscience  
**Investigating the Role of DNC-2 and DLI-1 on AMPA Receptor Mediated Behaviors in Caenorhabditis elegans**  
γ-amino-3-hydroxy-5-methylisoxazole-4-propionic acid (AMPA) receptors (AMPARs) are protein complexes involved in excitatory neurotransmission. AMPARs are tetrameric structures consisting of the pairings of GluA1, GluA2, GluA3, and GluA4 subunits. Dctn2 and Dynclli1 were found to interact with GluA2 in an immunoprecipitation screen that was performed on postnatal day 14 rat brains. DNC-2 and DLI-1 were
identified as the *Caenorhabditis elegans* homologs of Dctn2 and Dyncl11, respectively, and are components of motor proteins that transport cargo throughout the cell. The goal of this project was to determine whether knocking down DNC-2 and DLI-1 by RNAi affects AMPA Receptor-mediated behaviors, including mechanosensation and chemosensation, in *C. elegans*.

Josiah Osborne (Major: Secondary Education: History, Political Science and Social Studies)  
Field of Study: Civil War Curriculums  
**Inadequacies of History Curriculums**

The era of common curriculum standards has yet to fix the discrepancies amongst curriculums in history. This presentation is a case study identifying the inadequacies of Civil War curriculums and identifying an injustice to students.

Anna McCarthy (Major: Theology and Psychology)  
Field of Study: Theology  
**Living a Eucharistic Church**

The Eucharist is the source and summit of the Roman Catholic Church, it is the center of life for the parish and the parishioners. Every action of a parish should point to the reality of The Eucharist. This causes the parish to push beyond the understanding of transubstantiation and into an understanding of what the action of the Eucharist means for the daily lives of the parishioners. If parishes were participating in the fullness of what it means to be a Eucharistic Church, there would not be the number of adults leaving as there currently are. This research explores the relationship between The Eucharist and The Church and discusses how individual parishes can better become a Eucharistic parish in the 21st century.

• 5D: RICE ROOM, CAMPUS CENTER

Bradley Kelso (Major: Secondary Education: History/ Political Science/ Social Studies)  
Field of Study: History  
**Shostakovitch: Understanding Soviet Russia through the life and music of Dmitri Shostakovitch**

This project provides a look into Soviet Russia during the years of 1917 to 1937 through the life and works of composer Dmitri Shostakovitch.

Through this approach it can be seen how the Soviet government used the arts as a tool of propaganda and kept control over what the masses were allowed to hear and see. Due to the nature of the topic, much of the research is through secondary sources and where able to validate the authenticity of primary sources were used. Throughout the various memoirs, correspondence, and music, the reach of soviet control can be demonstrated by the life of Shostakovitch, and seen among all the Soviet artists.

Cierra Powell (Major: Spanish and International Relations)  
Field of Study: International Relations/Spanish  
**Foreign Aid as an Influence on Foreign Public Opinion**

Countries have some ability to make other countries more likely to cooperate. Strategically, one way that this can be done is through building up a resource of what Joseph Nye calls “soft power.” In the summer of 2017, I conducted interviews around these topics in Ecuador, and came to the conclusion that monetary flows—remittances, inflows of monetary aid, imports—can help to build up a resource of soft power that can influence the attitudes that foreign publics have about donor countries, possibly despite a detrimental colonial experience. In this paper I build upon this idea, that monetary flows can build up a resource of soft power, by using public opinion data. I study whether foreign aid is associated with variation in foreign public opinion of a donor country. Using Vanderbilt’s Latin American Public Opinion Poll (LAPOP) data, I study public attitude towards a donor country, the United States, and see how foreign public attitude varies with the most common measure of foreign aid, the Official Development Assistance (ODA) presented by the Organisation for Economic Co-operation and Development (OECD). I expect to find that despite a history of unwelcomed military incursions, the U.S. is able to influence foreign public attitudes based on foreign aid disbursement.
Session 6 Posters, 2:45 to 3:45 p.m. CAMPUS CENTER

Rachel Miles (Major: Health Sciences)
Christopher Brayton (Major: Health Sciences)
Bernardt Di Cino (Major: Health Sciences)
Marshall Dumas (Major: Health Sciences)
Meghan Durant (Major: Health Sciences)
Amanda Harrod (Major: Health Sciences)
Isazah King (Major: Health Sciences)
Madeline Klepps (Major: Health Sciences)
Kaitlin Stromberg (Major: Health Sciences)
Hannah Sylvester (Major: Health Sciences)
Cassidy Walter (Major: Health Sciences)
Field of Study: Public Health

**Drugged Driving: An Examination of the Prescription Drug Crisis and Possible Interventions**

Prescription drug misuse is becoming one of the fastest growing problems the U.S. faces. “Researchers estimate that in 2007, approximately 27,000 unintentional drug overdose deaths occurred in the United States, one death every 19 minutes”[i]. Many of these drugs are obtained because they were neither stored nor disposed of properly. In January 2018, Youth Connections and Helena's Drugged Driving Prevention Task Force asked Carroll’s Public Health Theories and Practice course (PH333) to assess the problem of prescription drug abuse in our area and then to create, implement, and evaluate a program for area residents. Through the course, students completed a literature review, ten interviews, twelve environmental scans, and one focus group of parents to determine the extent of the problem. The students then created programs that included posters and community meetings to help educate area residents of this significant problem.


Jenna Starke (Major: Health Sciences and Anthrozoology)
Field of Study: Health Sciences and Anthrozoology

**The Effects of Equine-Assisted Interventions on Children with Autism: A Systematic Review**

Objective: This systematic review was conducted to determine the effects of equine-assisted interventions (EAI) on children aged 3 to 16 years of age with autism in order to further increase knowledge about EAI as an intervention for children with autism.

Methods: Articles were screened on PubMed and CINAHL databases for relationships between equine-assisted interventions and effects of autistic behavior or autistic severity in children with autism.

Results: Studies showed that children receiving EAI improved in social functioning, social skills, motor skills, attention and focus, empathizing, irritability, maladaptive behavior, motivation, executive functioning, quality of life, length of gait cycle, mood and tone towards parents, and overall autistic severity. However, one study which measured a variety of autistic behaviors found no change in communication or social skills, and another which also measured autistic behavior found no change in fine motor skills, social cognition, and social awareness. Finally, one study found that during intermittent 6 week breaks from therapeutic riding, the decrease in autistic severity observed immediately following therapy returned to baseline.

Conclusions: EAI seem to decrease autistic severity and improve autistic behaviors in children with autism. Current practice for treating autism should not change, but EAI should be more strongly considered when trying to find the most effective treatment option for children with autism.
Frank Stumbo (Major: International Relations)  
Field of Study: Humanities  
**A Naturally Disagreeable Discourse**  
Jean-Jacques Rousseau’s references to Thomas Hobbes are a scathing critique of Hobbes’s conceptions of man. These differences underlay a fundamental disagreement about the natural man and how he would act independent of the exertions of the state. Hobbes finds man as alone and primarily motivated by competition, fear, and glory. This is contested by Rousseau who instead holds that men are fearful of the new but are indifferent to the competition brought about by scarcity and are ambivalent to glory’s charm. This contradiction leads the two political theorists down different paths toward disparate conceptions about the nature and value of government. This paper traces these contrasting notions of the independent man asking which author best relates the path of socialization to the freedoms that will be enjoyed by said man.

Amy Telck (Major: Mathematics)  
Field of Study: Honors Scholars Program  
**The Utopian Family**  
Thinkers such Thomas More and Jonathan Swift expressed their disenchantments with human society through the creation of fictional utopias. To the characters of More and Swift’s fictional travel narratives, the utopian societies are good and just. However, individuals of these utopian societies sacrifice the characteristics of liberal familial relations most valued today. Utopia by Thomas More and the Houyhnhnm society in Gulliver’s Travels by Jonathan Swift may seem perfect, but under the visage of perfection lies the relinquishment of the foundational virtues freedom of family size, upbringing of children, and familial love from which families maintain strength and connectedness. In both works, the sacrifice of modern liberal familial characteristics are predominantly seen in the regulation of household size, upbringing of children, and marriage.

Terry Cox (Major: Mathematics  
and Computer Science)  
Nathan Boone (Major: Mathematics)  
Field of Study: Mathematics  
**Gold Medal for Green Energy**  
In the 1960s, technological advancements and social awareness increased the demand for production and consumption of energy to be clean and renewable. In order to take advantage of varying resources, governments will form interstate energy compacts. Arizona, California, New Mexico, and Texas wish to form a realistic new energy compact which focuses on increased usage of cleaner, renewable energy sources. We identified the state of California to have the “best” energy profile, since it has the highest positive trend in renewable energy consumption. Texas ranks second in our energy profile and is accelerating in their applications of renewable energy, however is still lagging in their high usage of oil and natural gas. Arizona ranks third in our model, as they have actually decreased in renewable energy recently and has stayed steady in their use of coal, oil and natural gas. Finally, New Mexico ranks last in our model as it is overwhelmingly reliant on coal, oil and natural gas and has only seen a minimal increase in their application of renewable energy. Using linear and multiple regression, we use the data from 1960 to 2009 on total consumption in order to predict each state’s energy profiles in 2025 and 2050. We analyzed energy consumption as a function of population, energy usage per capita, and the passage of time. We also provide states with more general actions to take to help them continue to grow to be more focused on clean and renewable energy.
Marcellus Randall (Major: Mathematics, Chemistry)
Field of Study: Chemistry
**Kinetics Studies of the Chromium (II) H2esp Dimer**

This poster focuses on the kinetics of oxidation reactions involving the chromium (II) α,α,α′,α′-Tetramethyl-1,3-benzenedipropionic acid dimer, Cr₂(H₂esp)₂. After synthesizing the dimer and verifying its structure with ¹H NMR spectroscopy, Cr₂(H₂esp)₂ oxidation reactions with organic peroxide oxidants are completed within a UV-Vis spectrometer to generate data regarding the reaction progress. This data is then used to calculate kinetics information, such as the rate constant, for each reaction. The kinetics of these Cr₂(H₂esp)₂ oxidation reactions can then be utilized to study the dimer’s efficacy as a component for energy storage.

Allison Gunn (Major: Nursing)
Jordan Scott (Major: Nursing)
Field of Study: Nurse Staffing
**Relationship Between Nurse-Patient Ratios and Patient Mortality Rates**

Nursing staff to patient ratios in acute care hospitals is a significant factor affecting patient mortality rates. In many states, a static ratio is required; however, “pinning down a specific number is hard to do, given the legal vagaries from state to state” (Lippincott Nursing Education, 2018). Nurse-to-patient ratio refers to the concern of the “gap between patient need and the nursing care available to meet patient needs” (Welton, 2007). A mandated nurse staffing ratio is a “formal order by Superior Court” regarding a defined number of patients that a nurse is caring for that is specific to the facility (Merriam-Webster, 2018). In contrast, facilities that do not mandate nurse staffing can have fluctuations in the nurse-to-patient ratios. The purpose of this Evidence Based Practice Brief is to investigate how a specific number of patients that a nurse is caring for affects the patient mortality rate. It is evident that lower nurse-patient ratios reduce nursing errors resulting in higher chance of patient survival (Hill, 2017). With this research, nurses will have the ability to advocate for themselves and their patients for a mandated nurse-patient ratio. This information will be utilized by nurses in the planning and intervention phase in the nursing plan of care to provide optimal treatment for each patient.

Alicia Phan (Major: Nursing)
Madeline Spickard (Major: Nursing)
Field of Study: Nursing
**Effects of Sexual Health Education Programs On Teen Pregnancy**

Teen pregnancy is an issue that continues to threaten and be discussed within our nation’s educational, political, and public health institutions. Compared to other modern nations in the world, the United States has the highest rates of teen pregnancy (Centers for Disease Control and Prevention, 2015). Adolescents spend much of their time in the school setting, making sexual health education integration into the school health curriculum a natural way to help combat this problem (Tyler, Warner, Gavin, & Barfield, 2014). This brings up the question of what type of sexual health education is most effective in preventing teen pregnancy: abstinence only or comprehensive sexual health education programs. Abstinence only programs consist of teaching abstinence as the only significant method of preventing teen pregnancy and sexually transmitted disease (STDs) (Kohler, Manhart, & Lafferty, 2008). Comprehensive sexual health programs still focus on abstinence, but also offer education and prevention options on STDs and pregnancy, as well as the importance of safe sexual practices (Kohler et al., 2008). The purpose of this Evidence Based Practice Brief is to explore how effective these types of sexual health education are on pregnancy outcomes. The results of this brief may provide insight to which type of sexual health education program would be most effective when taught in schools. Nurses caring for adolescent patients can use this information to identify sexual health problems, risks, and education gaps that may be present, and provide awareness to potential interventions.
Grace Wilkins (Major: Nursing)
Karlee Kent (Major: Nursing)
Hailey Peterson (Major: Nursing)
Field of Study: Maternal-Infant

The Effects of Breastfeeding Versus Formula Feeding on Mother-Infant Attachment

According to John Bowlby, infants are born with an innate need to maintain a close proximity to a primary caregiver “to protect an individual against physical and psychological threats and alleviate distress” (Bowlby, 2008, as cited in Amani, 2016, p. 510). Bowlby defines attachment as “the emotional bond between infant and caregiver, who is typically the mother” (Bowlby, 2008, as cited in Amani, 2016, p. 506). One way infants foster attachment to their caregiver is through their feeding process, such as breastfeeding or formula feeding. According to Hockenberry and Wilson (2015), “the most outstanding psychological benefit of breastfeeding is the close maternal-child relationship” (p. 277). Whereas, formula feeding “denies the infant the important component of close human contact” (Hockenberry & Wilson, 2015, p. 280). The purpose of this Evidence-Based Practice Brief is to compare mother-infant bonding when exclusively breastfeeding as compared to formula feeding. With information gathered, nurses will be able to effectively educate patients on breastfeeding and formula feeding as related to mother-infant bonding through the assessment and implementation phase of the nursing process.

Klarissa Pomajevich (Major: Nursing)
Brianna Denning (Major: Nursing)
Field of Study: Geriatrics

Relationship Between Toileting Programs and Geriatric Falls

Toileting programs, such as two hour continence checks and toileting, have become a standard in most nursing home facilities. Nursing Homes and Assisted Living Facilities are defined as institutions that offer medical, personal, and supportive care for individuals who are unable to care for themselves in the community (United States Department of Health and Human Services, 2016). Falls are a common cause of injury, hospitalization, and even death in the Geriatric population, which is defined as an adult 65 years of age and older. At least one-third of persons 65 years of age and over experience a fall annually (Al-Aama, 2011). The purpose of this Evidence Based Practice Brief is to explore a relationship between two hour toileting programs and continence checks and the frequency of geriatric falls in nursing homes. Nurses will be able to utilize this information to provide optimal care in nursing homes and assisted living facilities to decrease the number of falls that occur within the facility related to toileting and continence. This information will be used in both the planning and implementation phase of the nursing process.

Shelby Lasselle (Major: Nursing)
Ellery Dixon (Major: Nursing)
Kim Johnson (Major: Nursing)
Field of Study: Nutrition

Relationship between school vegetable gardens and vegetable consumption in elementary school students

The purpose of this Evidence Based Practice Brief is to explore if a relationship exists between the presence of a school vegetable garden and the total amount of vegetables consumed by the students. Current literature highlights the clinical relevance of exposing elementary school children to a school vegetable garden. Childhood obesity in the United States has more than tripled in the last three decades (Gray, Byrd, Fountain, Rader & Fruge, 2015). Of children ages 6-11 years, 17.7 percent are considered obese, greater than or equal to the 95th percentile, for their age and gender using the children’s BMI (body mass index) of kg/m2 (Ogden, Carroll, Kit, & Flegal, 2014). A strong preference for junk food among children and the prevalence of junk foods in elementary schools are cited as barriers to healthy eating (Gray et al, 2015). Despite the nutritional value of vegetables, children do not eat them at optimal levels (Lederer, King, Seo & Kim, 2016). The aim of this report is to evaluate the findings of current literature regarding school-based vegetable gardens and consumption behavior in elementary school children. The findings of this study will be used by nurses to educate patients and school personnel regarding possible methods to increase vegetable consumption in elementary school students. In addition, nurses may use the findings of this research to guide the nutritional assessment of pediatric patients in the elementary school age range.
Lauren Shoemaker (Major: Nursing)  
Lillian Gribbons (Major: Nursing)  
Field of Study: Nutrition  

A Literary Review of the Effects of a Vegetarian Diet on Secondary Myocardial Infarction Rates  

Each year, approximately 790,000 people in the United States will suffer from a myocardial infarction (MI), and 210,000 of those cases will not be for the first time (Centers for Disease Control and Prevention, 2017). The World Health Organization defines a myocardial infarction as “myocardial cell necrosis due to significant and sustained ischaemia” (Mendis et al., 2010). A major risk factor for MI is consuming a diet high in saturated fat, and trans fat which are all commonly found in processed foods and animal fats (Centers for Disease Control and Prevention, 2017). The purpose of this Evidence-Based Practice Brief is to compare rates of MI in patients with a history of MI that consume a vegetarian diet versus those with a history of MI that do not consume a vegetarian diet. These findings will be used to educate patients on non-pharmaceutical ways to reduce their risk of a recurrent myocardial infarction from occurring. The information obtained from this review will be used in the planning and intervention phases of the nursing process.

Devan Murfitt (Major: Nursing)  
Katie Foster (Major: Nursing)  
Madison Robischon (Major: Nursing)  
Field of Study: Obstetrics  

Mother knows best: An analysis of delivery modes after primary cesarean section  

Women who become pregnant after an initial cesarean section (C/S) must decide between undergoing a repeat C/S or pursuing a trial of labor after cesarean (TOLAC). The American College of Obstetricians and Gynecologists (ACOG) (2017) reported, “Despite a 23 percent increase in VBACs from 1985 to 1996, that number has since plummeted as the cesarean delivery rate has continued to trend upwards.” While many providers recommend a repeat C/S some women want to attempt a TOLAC. Those women have a 60 to 80 percent success rate of achieving a vaginal birth (ACOG, 2017). According to ACOG (2014), a VBAC can be defined as “a vaginal birth in a woman with one or more previous cesarean births” (p. 2). A repeat C/S can be defined as “. . . birth of the fetus from the uterus through an abdominal incision in a woman who had a cesarean birth in a previous pregnancy” (ACOG, 2014, p. 1). The purpose of this Evidence-Based Practice Brief is to evaluate the risk of postpartum hemorrhage based on delivery mode: VBAC as compared to a repeat C/S. Postpartum hemorrhage is defined as “cumulative blood loss > 1000 mL or bleeding associated with signs/symptoms of hypovolemia within 24 hours of the birth process regardless of delivery route” (Belfort, 2018). The information collected can be used in the nursing process for implementation, as nurses educate patients on all options of delivery (TOLAC versus repeat C/S) and advocate for patient preference.

Samantha Eby (Major: Nursing)  
Madison Gameon (Major: Nursing)  
Solenn Jacobsen (Major: Nursing)  
Field of Study: Nursing burnout  

Reducing Nursing Burnout  

Nursing burnout is a major problem faced by healthcare systems in the United States and all over the world. Ondriova (2017) reported, “the rate of prevalence of burnout in the profession of nursing is significant” (p. 18). Mannangi, Dupiton, Boutin and Angus (2018) define nursing burnout as, “high emotional exhaustion, depersonalization, and a sense of reduced personal accomplishment in professionals who provide direct care to others” (p. 4). The purpose of this evidence-based practice brief is to examine the effectiveness of burnout prevention strategies within the workplaces of registered nurses. For registered nurses (RN) between the ages of 20 and 65, are mindfulness-based burnout prevention strategies compared to incentive-based burnout prevention strategies more effective at reducing self-reported rates of burnout? By identifying and implementing nursing burnout prevention strategies within healthcare facilities, the rates of self-reported nursing burnout may be reduced. Implementing nursing burnout prevention strategies may improve nurse job satisfaction, indirectly increasing patient satisfaction. Job satisfaction will positively reflect on all phases of the nursing process [assessment, diagnosis, planning, intervention, evaluation] to improve the overall care given to patients.
A Deficit in Care: Comparing Insulin Therapy Treatments in Hospitalized Patients with Diabetes Mellitus

In 2015, 7.2% of the U.S. population had been diagnosed with diabetes mellitus (Centers for Disease Control, 2017). Diabetes mellitus can be classified as type one or type two. Type one diabetes is an autoimmune disease and type two diabetes is a chronic metabolic disorder. There has been an increase in the number of insulin dependent diabetics of both types seen in hospital settings. Person with diabetes have individualized insulin therapy treatments adjusted specifically to their daily needs. Hyperglycemia, which is a high amount of glucose (sugar) within the blood stream that can be measured by taking a blood glucose level, is a common side effect of diabetes that is often seen in the hospital setting. Hyperglycemia damages blood vessels leading to many health problems including blindness, kidney and liver failure, and neuropathy (Hoffman & Sullivan, 2017). To treat hyperglycemia, hospitals have established a basic treatment protocol called Sliding Scale Insulin Therapy, which predetermines the amount of insulin given to a patient according to their blood glucose level. The alternative treatment in this study would be Basal Bolus therapy, which controls blood sugar levels through a combination of long-acting or basal insulin and fast-acting or bolus insulin. The purpose of this Evidence Based Practice Brief is to compare Sliding Scale Insulin Therapy to its counterpart Basal Bolus Insulin Therapy to provide evidence on which protocol could support patient’s overall health.

Giving Birth Naturally versus Giving Birth with an Epidural

Whether to give birth naturally or to do so with the help of an epidural is a commonly asked question among women in the United States. Giving birth naturally is defined as “a woman choosing to embrace the labor process using the power of her body and mind without the use of medical interventions” (Windmiller, 2017, p. 42). The main concern for women preparing for their births is whether or not they will be able to deliver vaginally successfully with one method over the other. Being pregnant is full of different, difficult choices for a woman, so it is the job of the nurse to know both the positive and negative aspects of both choices and how it will effect the woman’s ability to successfully deliver vaginally. This Evidence Based Practice Brief explores the different aspects of giving birth naturally or with the use of an epidural and how each method may affect the ability to deliver vaginally successfully.

Taking a Walk on the Wild Side with ADHD Symptom Management in 6-12 year Olds

Attention Deficit Hyperactivity Disorder (ADHD) has been deemed by literature to be the most prevalent neurobehavioral disorder in children. ADHD is associated with enduring patterns of inattention and/or hyperactivity-impulsivity that intrudes on activities of daily living and development (CDC,2016). 6.1 million U.S. children had received an ADHD diagnosis by 2016, that is 9.4% of people age 2-17 (Danielson et al., 2018). Treatment for the symptoms of ADHD predominantly involves the use of medications such as stimulants that have unwanted side effects and sometimes limited relief of symptoms. However, current research by the Centers for Disease Control and Prevention (CDC) recommends behavior therapy as the first step in treatment of ADHD in children (CDC, 2016). The purpose of this Evidence Based Practice Brief is to take a closer look at the effects of outdoor activity on symptoms of ADHD in school-age children ages 6-12 years. Nurses can use the knowledge from this project in the intervention phase of the nursing process to educate patients, parents and teachers regarding the most effective treatment of ADHD in school-age children. There will be focus on providing ways to close the know-do gap by providing attainable, effective, long-term plans involving outdoor time for ADHD symptom management that nurses and parents alike can put into action.
Natasha Dutton (Major: Nursing)  
Monica Suek (Major: Nursing)  
Field of Study: Obstetrics  

The Relationship Between Birthing Positions and Perineal Trauma

Perineal trauma is a prevalent problem during childbirth with around 53% to 79% of vaginal deliveries resulting in perineal trauma (The American College of Obstetricians and Gynecologists, 2016). Perineal trauma is damage to the genitalia during childbirth. According to the Mayo Clinic, “perineal lacerations or tears occur when the baby’s head is coming through the vaginal opening and is too large for the vagina to stretch around” (2015). Perineal trauma can make recovery from labor longer and may make it difficult for new mothers to take care of their newborns. During the birthing process, women can be in various positions. Flexible birthing positions are “positions that take the weight off the sacrum” which include: “kneeling, standing, all fours, squatting,” use of the birthing seat, and the “lateral position” (Edqvist et al., 2016). Non-flexible birthing positions are positions that apply weight to the sacrum which include: “semi-recumbent, lithotomy, and supine positions” (Edqvist et al., 2016). The purpose of this Evidence Based Practice Brief is to assess whether women of childbearing age, during vaginal birth, who give birth in non-flexible positions compared with those who give birth in flexible positions are at an increased risk for perineal trauma. According to the Centers for Disease Control and Prevention (2006), childbearing age is 15 to 44 years of age. This research is looking for the best positions during vaginal labor to prevent perineal trauma. Nurses can use this brief for patient education and to intervene during the labor process.

Reece Quade (Major: Nursing)  
Kali Bradford (Major: Nursing)  
Margaret Day (Major: Nursing)  
Field of Study: Nursing  

Should Childbirth be a Laughing Matter

The purpose of this Evidence Based Practice Brief is to compare the difference between the efficacy of nitrous oxide, an anesthetic analgesic gas, to an epidural, an injection of anesthesia into the epidural space of the spinal cord (Nursing Central, 2018). According to the Centers for Disease Control, 2,703,504 vaginal deliveries occurred in the hospital setting in the year 2015; showing the emphasis of quality pain management to enhance the individual birthing experience (Martin, Hamilton, Osterman, Driscoll, & Matthews, 2017). The efficacies of an epidural versus nitrous oxide will be determined by the self reported vaginal birthing experience. These two distinct approaches for pain management are already established in European countries, and research and familiarity with nitrous oxide will offer more options in treatment for pain for women in the United States. These findings will be used to offer a better labor and delivery experience for the patients and will be used during the implementation phase of the nursing process.

Lee-Anna West (Major: Nursing)  
Anna Fischer (Major: Nursing)  
Field of Study: Geriatrics  

Playing Music in Your Twilight Years to Slow the Progression of Alzheimer's Disease

Alzheimer’s disease is defined as “an irreversible, progressive brain disorder that slowly destroys memory and thinking skills” by creating amyloid plaques and neurofibrillary tangles in the brain (National Institute of Health, 2017, p. 1). Eventually, this damage on the brain takes away patients' abilities to perform activities of daily living, or ADLs, and severely lowers their quality of life. As of 2017, it was suggested that over five million people have this disease, most of them being diagnosed in their mid-60s (National Institute of Health, 2017). Currently, there are five drugs available to decrease symptoms and slow the progression of the disease (Traynor,
However, recent studies have shown that non-pharmacological interventions, or NPIs, such as playing a musical instrument, can also help slow the progression of Alzheimer’s disease by changing behaviors and improving patients’ quality of life (Backhouse, Killett, Penhale, & Gray, 2016). The purpose of this evidence-based practice brief is to compare how playing a musical instrument, including singing, once a week or more versus not playing a musical instrument affects the progression of Alzheimer’s disease in adults over the age of 65. The findings of this study can be recommended by nurses and applied by patients as an intervention to promote neural plasticity and preserve memory and cognition in older adult populations.

Annika Moore (Major: Nursing)
Kendra Lloyd (Major: Nursing)
Andrea Yahvah (Major: Nursing)
Field of Study: Oncology Nursing

The effectiveness of PPE against occupational exposure to chemotherapy agents

Hazardous drugs like chemotherapy agents can be absorbed through the skin, which is “the primary rationale for wearing personal protective equipment (PPE) during all stages of hazardous drug handling” (Eisenberg, 2016, p. 378). Occupational exposure to chemotherapy agents has been linked to “increased cancer occurrence; adverse reproductive outcomes, including infertility and miscarriage; fetal defects when exposed during pregnancy; chromosomal damage; and symptoms such as nausea, allergic reactions and contact dermatitis” (Bouraoui et al., 2011; Dranitsaris et al., 2005; Durrieu, Rigal, Bugat, & Lapeyre-Mestre, 2004; El-Ebiary, Abuefali, & Sarhan, 2011; Fransman et al., 2007; Hemminki, Kyyrönen, & Lindbohm, 1985; Mader, Kokaj, Kratochvil, Pilger, & Rüdiger, 2009; McDiarmid, Rogers, & Oliver, 2014). In one study performed by Colvin, C., Karius, D., and Albert, N. (2016), it was observed that the rate of oncology nurses that followed the recommended guidelines for safe application of PPE when administering parenteral chemotherapy agents were “lower than expected” (p. 621). The purpose of this evidenced-based practice brief is to examine the amount of occupational exposure to chemotherapy agents in oncology nurses who follow PPE protocol in comparison to those who do not. Safety guidelines, such as double-gloving and proper disposal of chemotherapy agents and its associated equipment, provide nurses with the necessary expertise to safely and effectively administer hazardous drugs (Colvin, C., et al., 2016, p. 621).

Callie Glenn (Major: Nursing)
Ryan Bopp (Major: Nursing)
Field of Study: Nursing

Comparing the Side Effects of Prescription Opioids and Medicinal Marijuana in the Treatment of Chronic Pain

Opioids are medications that interact with receptors in the central nervous system to provide pain relief, and have been a standard foundation for treatment of chronic pain since their discovery. But advancements in medical technology have led to the discovery of several alternatives to narcotics, one being medical marijuana. Cannabis has become increasingly pertinent in the medical field due to the medicinal and recreational legalization of the substance in several states. The purpose of this Evidence Based Practice Brief is to determine how the side effects of medical marijuana compared to those of opioid treatment affect quality of life for individuals with chronic pain treated in a time span greater than three months. Per the Centers For Disease Control (2016), “chronic pain has been variably defined but is defined within this guideline as pain that typically lasts >3 months or past the time of normal tissue healing.” According to the National Institutes of Health (2012), a staggering 25.3 million people or 11.2% of the United States population suffer from daily pain lasting over 3 months. Nurses may use this evidence in the planning and implementation phases of the nursing process in order to identify the benefits and drawbacks of both forms of pain management. This study will allow nurses to educate clients on a broader spectrum of treatment options for their individualized experiences of pain.
Nichole Thornton (Major: Health Sciences)  
Field of Study: Nursing  
High Maternal Dietary Glycemc Index and Sugar Consumption and Their Association with Birth Defects and Pregnancy Complications

Objective: The purpose of this systematic review was to look at existing peer reviewed articles regarding high maternal dietary glycemic index (DGI) and/or sugar consumption (including glucose, fructose, and sucrose) and the risk for birth defects or pregnancy complications.  
Methods: PubMed was the primary database used to search for relevant articles. Other related articles were found in the reference sections of the articles screened in the original search.  
Results: Nine case-control and cohort studies were used in this review. Five of the six case-control studies found a significant risk between high maternal DGI and/or sugar intake and birth defects, mainly neural tube defects. The three cohort studies found a link between high sugar intake and pregnancy complications, including preeclampsia (2) and pre-term delivery (1).  
Conclusion: Women who are pregnant or planning to become pregnant are encouraged to limit their sugar intake to reduce the risk for birth defects and pregnancy complications.

Mary Buckley (Major: Nursing)  
Kylie Rickman (Major: Nursing)  
Field of Study: Obstetrics  
Relationship Between Combined Hormonal Contraceptives and Breast Cancer

In the most recent data collected, the Centers for Disease Control and Prevention (CDC) states that breast cancer is the most common cancer in women. In 2014, 236,968 women were diagnosed with breast cancer and 41,211 died from breast cancer (CDC - Breast Cancer Statistics," 2017). Combined hormonal contraceptives (CHC) contain two hormones, estrogen and progestin ("CDC - Combined Hormonal Contraceptives - US SPR - Reproductive Health," 2017). According to the CDC, the use of CHC is a risk factor for developing breast cancer ("CDC - What Are the Risk Factors for Breast Cancer?,” 2017). The purpose of this Evidence Based Practice Brief is to examine the relationship between women of reproductive age taking CHC and their risk for breast cancer in development later in life. In planning a patient’s care, the nurse can apply this information through understanding the potential risks and complications associated with CHC and brainstorm interventions accordingly. In the intervention phase of the nursing process, the nurse will be able to provide evidence-based education regarding the risks to patient health and assist patients in making an informed decision about which form of contraception (CHC or non-hormonal contraceptives) they would prefer to use. For a patient using CHC, the nurse will be able to provide education regarding screenings for breast cancer and interventions to lower her risks through lifestyle factors.

Kelly Taft (Major: Political Science)  
Field of Study: Political Science  
Confidence and Trust in a Polarized America

Trust, confidence in the American people, and confidence in the vote count are in peril in the context of a surprising 2016 general election and increasingly polarized society. In an America divided along party lines, having confidence in other people’s political decisions is a rare phenomenon. The backbone of democracy depends upon the people’s ability to have confidence in other people and confidence in the institutions which run the country. However, little is known about what influences confidence in the American people and confidence in the vote count. Does a person’s worldview, that other people can be trusted in general, influence whether someone has confidence in other Americans? Or does the winning an election influence people’s confidence in others? In this paper, I analyze three important concepts related to the health of American democracy: confidence in other Americans in making decisions about the country, confidence in the vote count, and general trust. In understanding these three concepts in the context of a highly polarized America, scholars can assess the health of the American democracy.
Michaela McNichol (Major: Political Science)  
Field of Study: Honors  
Ambition in Utopia and The Prince

Machiavelli’s *The Prince* is a lesson book for princes seeking to gain or to maintain power, and its cut throat advice in books IX, XV and XVIII paints society in a cynical light: the world is a battle between the great and the many, both only having one goal: to oppress or to avoid oppression (*The Prince, IX*). This stark observation coupled with the ruthless advice Machiavelli gives to princes illustrates that ambition is, in fact, the cornerstone of human nature. An imagined city, Utopia portrays what perfect human communialism would look like - a society of equality, where the ambitious are not allowed to rule (*Utopia, 81*). The sameness and oneness contrast with the way the world actually functions, and acts as a caricature to illustrate that such a way of life is impossible as it goes directly against human nature. Even in Utopia, there are laws which prohibit public officials from tyranny and from limiting the freedoms of the people; it logically follows that these laws are necessary because tyranny and the desire for power come naturally to man. Therefore, Utopia’s caricature of humanity proves that ambition is, in fact, the cornerstone of human nature (*Utopia, 136*). Both *The Prince* and *Utopia* clearly demonstrate that political life is a reflection of human nature, and that ambition is the key to understanding humanity.

Brenna Kinsey (Major: Fine Arts: Theater)  
Field of Study: Theater/Costuming  
Period Costuming Conundrum

This research analyses costume design using the examples of The Crucible by Arthur Miller, Emilie La Marquise du Chatlet Defends Her Life Tonight by Lauren Gunderson, and Nell Gwynn by Jessica Swale. These three plays were chosen because they are set around the same era (1650-1750) and span across England, France, and America. This research addresses the fact that costume designers must design costumes specific for the country as well as the era and how they recreate historical looks in their own work. This presentation focuses on the social and historical differences between the three shows in terms of costumes and what makes each period costume unique despite being from the same time.

Ashley Maes (Major: Psychology)  
Bethany Gardner (Major: Anthrozoology)  
Thomas Gilboy (Major: Psychology)  
Bailey Pasta (Major: Psychology)  
Field of Study: Psychology  
Three-week analysis of the relationship between general anxiety, stress, and procrastination

Previous research examined the correlation of procrastination and different types of anxiety, such as state anxiety, test anxiety, and academic anxiety. One longitudinal study (Yerdelen, McCaffrey,& Klassen, 2016) looked specifically at academic anxiety. This study showed that there is actually an inverse relationship between procrastination and anxiety over time. We explored the relationship between high and low general anxiety levels, high and low stress levels, and high and low procrastination levels using the Depression, Anxiety, Stress Scale-21 (DASS 21) and The Lay Procrastination Scale (1986) in college students over a mid-semester three-week long period. We hypothesized that, based on previous research; high general anxiety and high stress levels will be largely correlated to high procrastination levels. The participants were 30 Carroll College students. The results showed that stress and anxiety were correlated, stress and procrastination were correlated, but anxiety did not correlate directly with procrastination.
Kelli DeFrance (Major: Psychology)  
Kally Hacker (Major: Psychology)  
Field of Study: psychology  
**Correlation of nutrition, exercise and risky behavior in college students**

Food habits, exercise and impulsivity affect college students on a daily basis. By making poor food and exercise habits impulsive behavior tends to increase. The current study compares food and exercise habits to impulsive behavior in 22 undergrad psychology students. It was hypothesized that those with poor food and exercise habits would be more impulsive. To study the correlation between these, participants received a questionnaire on food habits, a questionnaire on exercise, and a Balloon Analog Risk Task (BART). In accordance with our hypothesis, those who exercised more often earned more points on the hard balloon condition than those who did not exercise as often. This can be assimilated as a correlation between exercise and impulsivity. The results suggest a trend in those with poor food habits having a faster response time compared to those that rated higher in healthier food habits.

Emma Hoppes (Major: Psychology)  
Sarah Gee (Major: Psychology)  
Ann Moloney (Major: Psychology)  
Field of Study: Psychology  
**Undergraduate Students and Risk-taking Behavior When Peer Influence is Present on Social Media**

This study researched peer influence’s presence on risk taking using social media. Undergraduate students completed the Iowa Gambling Task after being told their photo and task score would be posted to the school’s Facebook page. Results concluded females who felt influenced by their photo had significantly faster response times (p=0.048).

Taylor Ehl (Major: Psychology)  
Kelly Brotzel (Major: Psychology)  
David Dietrich (Major: Psychology)  
Izzy Geraghty (Major: Psychology)  
Field of Study: Psychology  
**Attitudes and Perspectives in Young Adults**

This study aimed to observe and analyze the prevalence of ageist tendencies in the millennial population. Prejudices based on age are known as ageism. Ageism is not as well studied as race-based or religious prejudices. We hypothesized that those who scored high on the Fraboni Scale of Ageism would rate older individuals as less intelligent on the Author Intelligence Questionnaire (AIQ). We observed the different judgements millennials unconsciously made towards the competency of an individual based on his or her age. Participants read four essays, each essay included a picture of an individual—a young male, young female, old male, old female, and completed the Fraboni Scale of Ageism which is a self-assessment on ageist tendencies. After analysis, our results demonstrated a significantly negative correlation between scoring high on the Fraboni Scale of Ageism and rating an older female lower in Author Intelligence.

Skyler Howard (Major: Psychology)  
Bridget Bloesch (Major: Anthrozoology)  
Field of Study: Anthrozoology  
**Fuzz Fix: The Physiological Effects of Both Human and Canine Interactions on a College Campus**

The implementation of Animal Assisted Activities (AAA’s) on college campuses during finals week has grown in popularity in recent years. The belief is that AAA’s help reduce student stress levels during a week of difficult exams. However, there is limited research on the effects of these programs on both the students and the dogs. This study looked at the effects that interaction with a dog prior to taking a test had on student’s heart rate and blood pressure. Participants in the experimental group had their heart rate and blood pressure measured before and after interacting with a dog, while participants in the control group had their heart rate and blood pressure measured before and after a coloring activity. Additionally, the heart rates and blood pressures of the dogs participating in the study were measured at baseline and after interacting with a human.
Sydney Beach (Major: Public Health)
Field of Study: Student Drinking Research

**Using Public Health Coursework to Reduce Harms Related to College Student Drinking**

Harm related to alcohol consumption is widespread on college campuses. It can lead to increased sexual violence, dropout rates, car accidents, and many other issues. Drunk driving is a prevalent issue to millions of college students. Countless efforts have been made to reduce drunk driving in this population, with limited success. Through the Public Health Theories and Practice class at Carroll College (PH333), research was conducted to reduce drinking and driving. Students also completed a readiness assessment, 20 interviews, focus groups, 20 environmental scans, and an outlet density scan. With this input, they then created marketing campaigns and community educational events. Not only are the students in the course more knowledgeable of the harms related to alcohol abuse, but because of their hard work, their peers also show increased harm reduction behaviors.

Joan Shepherd (Major: Public Relations and Theology)
Field of Study: Stress

**Formed By False Expectations**

High Expectations often harm students because of stress and the unhealthy goals of perfection. A person’s most formative years are when they are in school, yet the stress they feel during that period will go on to affect them for the rest of their life. Parents, coaches, and influential adults have such high expectations for those they care about, but often lead to the unhealthy extent of teaching their children success instead of character.

Cassidy Walter (Major: Health Science/Public Health)
Courtney Sherick (Major: Health Science)
Field of Study: Health Science

**Secondary Analysis of Maternal Education and Decision of Medical Birth Attendant**

OB-GYN doctors are more medically trained and capable in high risk or emergency births than most certified midwives, but they do not offer personalized care like midwives. Multiple previous studies have shown that midwives are equally qualified in most situations. Both have their strengths and weaknesses. Nevertheless, it is up to each individual family to choose what kind of care they would like to receive during the pregnancy and labor. The purpose of this study was to find any correlations between maternal education and what medical professional (OB-GYN doctor or certified midwife) mothers choose to deliver their baby, and make inferences as to what accounts for any correlations. Specifically, it is hypothesized that people with a higher education will be more likely to use a midwife because of easier access to educational materials, and because they typically have children later in life and have therefore gathered more information. The results of this study could reveal a need for further research about access to medical care and whether or not people are correctly informed about their choice of medical birth attendant.

Maria Carparelli (Major: Health Sciences)
Field of Study: Mental Illness

**Depression and Eating Disorders in Adolescent Females**

This systematic review collected peer reviewed articles examining the relationship between depression and eating disorders, to determine if females aged 10-25 who have depressive disorder or depression are at risk for also having an eating disorder(s). Articles were screened on PubMed and CINAHL, and other articles were added from the related articles panel or bibliographies of studies included. Nine articles were reviewed. All found a significant relationship between depression and eating disorders. About half of the studies examined
sequence of the disorders and found a reciprocal chronological relationship. Because of the significant relationship, clinicians should screen for both disorders simultaneously to prevent the onset of either disease in young females. If either disorder is present, it should be treated with the assumption that the other will develop. More research is needed on this topic to determine chronology and underlying causes.

MESH keywords: 10-25 year old females; depressive disorder; depression; eating disorder

*Taylor Smith (Major: Health Sciences)*
Field of Study: Health Sciences

**Effects of Psychiatric Comorbidities on the Perioperative Outcomes Following a Primary Total Arthroplasty**

This review was conducted to compare the perioperative outcomes following a total primary arthroplasty among patients with a psychiatric comorbidity versus those without a psychiatric comorbidity. Literature was reviewed from the database Pubmed. Seven cohort and case-control studies were reviewed, with the largest sample size of 8.4 million patients. Psychiatric comorbidities resulted in increased negative perioperative outcomes compared to patients without psychiatric comorbidities in six articles. These studies observed higher rates of revision, blood transfusion, mortality, non-traditional discharge, and increased length and cost of stay for patients with a diagnosed psychiatric condition. Therefore, it was concluded from most studies that patients with psychiatric comorbidities experience more negative perioperative outcomes following a total primary joint arthroplasty than those without. Based on the findings of this review, psychiatric comorbidities should be considered a risk factor when planning a primary arthroplasty. The broader impact of this study is to raise awareness about the impact of psychiatric comorbidities on perioperative outcomes, in an effort to inform practice, quantify the given issue, demonstrate its impact, and suggest ways to move forward in which we can maximize the positive perioperative outcomes of the targeted group.