The 2010 Tenth Annual UMM Undergraduate Research Symposium (URS) celebrates student scholarly achievement and creative activities. The URS provides an opportunity for students to inform the campus community and visitors of the quality and variety of research that occurs at UMM. Research projects from all disciplines participate in the URS. Types of presentations include posters, oral presentations, and short or abbreviated theatrical, dance or musical performances. Presentations are accompanied by discussions and multimedia presentations.

The University of Minnesota, Morris
- 2010 -

UMM Undergraduate Research Symposium
Featuring student research and scholarship from across campus

Friday, April 23, 2010

12:30 p.m. – 1:15 p.m.  Registration: HFA Recital Hall
1:00 p.m. – 1:30 p.m.  Improv Performance: Unusual Suspects
                      HFA Recital Hall
1:30 p.m. – 1:45 p.m.  Welcome: Dr. Cheryl K. Contant
                      Vice Chancellor for Academic Affairs and Dean
1:50 p.m. – 2:20 p.m.  Featured Presentation: HFA Recital Hall
                      Mitch Grussing - A Prairie Cantata
2:30 p.m. – 4:55 p.m.  Performance and Oral presentations:
                      HFA #170 and
                      John Q. Imholte Hall, Room #s:
                      101, 109, 111, 112, 114, 202, 217
5:00 p.m. – 7:00 p.m.  Posters/Visual Displays and Reception:
                      Science Atrium
ORAL PRESENTATIONS

John Q. Imholte Hall Room #s 101 and 109

Room #101

3:45  Matthew Bombyk (Economics): Does Costly Cooperation in the Lab Predict Similar Behavior on the Job? Evidence from Field Experiments with Truckers (Adviser: Steve Burks), abstract pg. 9

4:10  Michael Zajicek (Economics): Electricity Demand Smoothing: A Case Study at the University of Minnesota, Morris (Adviser: Arne Kiltegaard), abstract pg. 20

4:35  Andrea Lund (Biology/Environmental Science): The Relationship Between Housing Conditions and Respiratory Illness in Migrant Ngöbe Children: A Global Public Health Study (Adviser: Karen Mumford), abstract pg. 15

Room #109

3:45  Katrina Flaig (Art History): Hercules in Early Christian Art (Adviser: Jimmy Schryver), abstract pg. 12


4:35  Laura Sims (Art History): The Photography of Sally Mann: Child Porn vs. A Mother’s Prerogative (Adviser: Julia Dabbs), abstract pg. 17
ORAL PRESENTATIONS
John Q. Imholte Hall Room #s 111 and 112

Room #111


2:55 Alex McGreavey (English): When it’s Not American They’re Writing: Effectively Integrating ESL Students into Peer Group Writing Sessions (Adviser: Tisha Turk), abstract pg. 15

3:20 Dominic Scheck, Katharine Engdahl, and Joshua Johnson (English): Failure and Functionality in Virginia Woolf’s *Natural Orders* (Adviser: Brook Miller), abstract pg. 17


4:10 Kelley Swanlund (French): *Firmaman: A Double Birth* (Adviser: Sarah Buchanan), abstract pg. 18


Room #112


**ORAL PRESENTATIONS**

**John Q. Imholte Hall, Room #s 114 and 202**

**Room #114**

2:30  Mike Beach (Art History): *Greek Life and Art in Central Asia* (Adviser: Jimmy Schryver), abstract pg. 8


3:20  Angela Conners (Art History): *Nan Goldin and Her Critics* (Adviser: Joel Eisinger), abstract pg. 10


**Room #202**

2:30  Gabriel Bruguier (Philosophy): *A Defense of Mathematical Platonism* (Adviser: Pieranna Garavaso), abstract pg. 10

2:55  Jing Li (Statistics): *An Introduction to the Directional Dependence in the Copula Regression Setting* (Adviser: Engin A. Sungur), abstract pg. 14

3:20  Anne Krohmer (Psychology): *Stress, Trauma, and Addiction: The Relationship between Posttraumatic Stress Disorder and Substance Abuse and Dependence* (Adviser: Leslie Meek), abstract pg. 14

**Room #217**

2:30  Katie Barron (Political Science): *The Problem of Bolivarian Socialism: Hugo Chávez and Domestic Policy in Venezuela* (Adviser: Sheri Breen), abstract pg. 8


PERFORMANCE PRESENTATIONS
HFA Choral Room #170

2:30 Eric Gorecki (Music): Gerry Mulligan's All the Things You Are (Adviser: Joe Carucci), abstract pg. 21
2:55 Megan Haman (Music): Three Hundred Years Brings Uncertainty: Musicians Interpreting Baroque Performance Practice Today (Adviser: Denise Odello), abstract pg. 21

POSTER PRESENTATIONS 5:00 – 7:00 p.m.
Science Atrium

#1 Kevin Arhelger and Fernando Trincicente (Computer Science): The Observer Effect of Profilers on Computer Program Running Time (Adviser: Elena Machkasova), abstract pg. 23
#2 Sara Lahr and Justin Mullin (Computer Science): Utilizing Test Case Subsets to Improve Genetic Programming Performance (Adviser: Nic McPhee), abstract pg. 30
#3 Jeff Aday (Biology): White-tailed Deer (Odocoileus virginianus) as Facilitators of a European Buckthorn (Rhamnus cathartica) Invasion into Western Minnesota Forests (Adviser: Peter Wyckoff), abstract pg. 23
#4 Kelle Cable, Yiqing Cheng, Melissa Klock, Levi Simonson, and Julia Welle (Biology): Improving Transformation Efficiencies for Green Fluorescent Protein (Adviser: Christopher T. Cole), abstract pg. 25
#5 Madelyn Gerber (Biology): Bafilomycin-resistant Reovirus Mutants are More Sensitive to Proteolysis (Adviser: Timma Wyckoff), abstract pg. 29
#6 Jackie Hanson and Maddy Gerber (Biology): Surveillance of Antibiogram Susceptibility of Staphylococcus in Milk Samples from a Dairy Herd while Transitioning to Organic Management (Adviser: Timma Wyckoff), abstract pg. 29
#7 Logan Luce (Biology): Use of Terrestrial Organic Matter by Macroinvertebrate Shredders in a West Central Minnesota Lake (Adviser: Tracey M. Anderson), abstract pg. 31
#8 Jonna Maas and Alicia Johnson (Biology): Novel Responses in the Bioluminescent Circadian Rhythms of Neurospora crassa in the Presence of Constant Dim Light (Adviser: Van D. Gooch), abstract pg. 31
#9 Melissa Carnicle (Geology): A Possible Late Paleozoic Novaculite Deposit in the Parana Basin, Witmarsum Parana State, Brazil (Adviser: Lea Gilbertson), abstract pg. 26
#10 Beth Novak (Geology): Sedimentological and Stratigraphic Analysis of Low Relief Ridges near Padua, Stearns County, Minnesota (Adviser: James Cotter), abstract pg. 32
#11 Anne Dillon (Mathematics): What Makes a Search Engine Tick? (Adviser: Peh Ng), abstract pg. 26
POSTER PRESENTATIONS 5:00 – 7:00 p.m.
Science Atrium

#12 Lea Awoudi and Olivia Awoudi (Statistics): Factors Related to Survival of Veterans During the Civil War (Adviser: Jon Anderson), abstract pg. 24
#13 Andrew Bowe (Statistics): Vaccination Beliefs and Perspectives at UMM (Advisers: Karen Mumford and Engin Sungur), abstract pg. 25
#14 Tricia Steffen and Chris Thorne (Statistics): Effects of BMI on Accident Risk (Adviser: Jon Anderson), abstract pg. 35
#15 Nick Greime and Jannin Ivers (Economics): The Health Insurance Crisis: Evidence from West Central Minnesota (Adviser: Bart Finzel), abstract pg. 29
#17 Manjari Govada (Statistics): Predictive Factors of Truck Driver Accidents (Adviser: Jon Anderson), abstract pg. 28
#18 Kim Rocha (Economics/Management & Statistics): Comparative Analysis of Cognitive Skills, Personality Traits, and Social/Economic Preferences Among Truckers, UMM Students, and Morris-area Adults (Advisers: Stephen Burks and Jon Anderson), abstract pg. 33
#19 Will Setzer (Physics): Spectroscopic Measurements of Highly Excited Potassium Atoms in an Electric Field under the Influence of Diffuse Krypton Gas (Adviser: Len Keeler), abstract pg. 34
#20 Remi Patriat (Physics): The Lifetime of R Cassiopeia’s SiO Maser Features (Adviser: Gordon McIntosh), abstract pg. 33
#22 Josie Skala (Chemistry): Effects of Temperature and Concentration of Hofmeister Series Ions on Hydrogen Bonding in Liquid Water Measured using $^1$H NMR (Adviser: Jennifer Goodnough), abstract pg. 35
#23 Debbie Schneiderman (Chemistry): Theoretical Investigations of oligo-and poly(3:2-b:2',3'-d) dithienopyrroles (Adviser: Ted Pappenfus), abstract pg. 34
#24 Alex Madsen (Chemistry): pH Sensitive Polymersomes for Cancer Targeting (Adviser: Jennifer Goodnough), abstract pg. 32
#25 Aurora Turgeon (Chemistry): Prediction of $^{13}$C and $^{15}$N Kinetic Isotope Effects for the Aqueous Oxidation of Substituted Anilines (Adviser: Joe Alia), abstract pg. 36
#26 Carly Dukart and Stephanie Ranzau (Chemistry): Ir(ppy)$_2$(cs-acac) and Polyhedral Oligomeric Silsesquioxanes in Oxygen Sensing (Adviser: Ted Pappenfus), abstract pg. 27
#27 Mohammed Farah (Chemistry): Synthesis and Investigation of Platinum (II) and Ruthenium (II) Materials for Sensing Applications (Adviser: Ted Pappenfus), abstract pg. 27

HFA Floor Plan
Registration, Improv Performance, Welcome, Featured Presentation and Performances
Abstract Index (continued)

Kloeck, Melissa - Oral, page #13
Kloeck, Mellissa* - Poster, page #25
Krohmer, Anne - Oral, page #14
Kvam, Molly - Performance, page #22
LaFlinier-Ritchie, Anne – Poster, page #30
Lahr, Sara* - Poster, page #30
Li, Jing – Oral, page #14
Luce, Logan – Poster, page #31
Lund, Andrea – Oral, page #15
Maas, Jenna* - Poster, page #31
Madsen, Alex – Poster, page #32
McGreavey, Alex – Oral, page #15
Mullin, Justin* - Poster, page #30
Nelson, Matt – Oral, page #16
Novak, Beth – Poster, page #32
Patriat, Remi – Poster, page #33
Ranzau, Stephanie* - Poster, page #27
Ranney, Sarah – Oral, page #16
Rocha, Kim – Poster, page #33
Scheck, Dominic* - Oral, page #17
Schniederman, Debbie – Poster, page #34
Setzer, Will – Poster, page #34
Sims, Laura – Oral, page #17
Simonson, Levi* - Oral, page #25
Skala, Josie – Poster, page #35
Steffen, Tricia* - Poster, page #35
Stemper, Colin – Oral, page #18
Swanlund, Kelley – Oral, page #18
Thoma, Elizabeth – Oral, page #19
Thorne, Chris* - Poster, page #35
Trinciante, Fernando* - Poster, page #23
Tripp, Rachel – Oral, page #19
Turgeon, Aurora – Poster, page #36
Welle, Julia* - Poster, page #25
Wood, Eva – Oral, page #20
Zajicek, Michael – Oral, page #20

*denotes co-presenter(s)

Featured Presentation
HFA Recital Hall
1:50 pm

Presenter: Mitch Grussing
Project Adviser: Ken Hodgson (Music)
Title: A Prairie Cantata
Type of Presentation: Performance
HFA Recital Hall, 1:50 p.m.

Abstract:
In collegiate music ensembles, compositions with environmental themes are seldom encountered, especially music and lyrics by local and regional artists. Since UMM has devoted itself to providing a renewable and sustainable education, it now has a stronger connection to the surrounding environment than ever before, and this connection needs to be explored artistically as well as scientifically. In order to unite these concerns, as well as to provide myself an enhanced experience in composition that is not offered through formal classes at UMM, I have crafted A Prairie Cantata. The Cantata is a multi-movement piece for mixed (four-part) choir and wind ensemble. After reading letters and journals by early Morris residents and examining texts by regional poets, I settled on one text each from three Minnesota poets and one South Dakota poet to be used in choral settings. Because I express my artistic feelings through music, and because I have such a deep appreciation for the prairie, this experience has given me an opportunity to unite the two.
Abstract:
This presentation explores the term “petro-socialism”, featured in Manuel Hidalgo’s article, Hugo Chávez’s “Petro Socialism”, within the context of Venezuelan domestic policy. While calling himself a populist, this presentation explains how Hugo Chávez has used the policy of “petro-socialism” to instigate a system of “Bolivarian socialism” in Venezuela by nationalizing its most important resource, oil. “Bolivarian Socialism” or “21st Century Socialism” is defined in part by Chávez as nationalizing oil refineries to fund social programs in Venezuela, therefore instituting a new form of economic socialism. But this presentation argues that, while his economic policies may be socialist, the type of government Chávez has instituted has more in common with an authoritarian regime than a populist administration. This presentation illustrates that Chávez’s domestic policy has more in common with Fidel Castro’s socialist-authoritarian Cuba, rather than pure “Bolivarian Socialism”. And though maintaining his power through populist rhetoric, Chávez has turned to executing his “Bolivarian Socialism” in an authoritarian manner. This presentation shows that, while Chávez claims to be populist, he is executing decisions unilaterally without the consent of his people and uses “Bolivarian Socialism” as a means to distract them from his authoritarian government.

To all my professors, without whose support none of this would be possible.

Presenter: Mike Beach
Project Adviser: Jimmy Schryver (Art History)
Title: Greek Life and Art in Central Asia
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 2:30 p.m.

Abstract:
Following the conquests of Alexander the Great in the late 4th century, Greek or Hellenistic civilization found itself spread all of the way from Turkey to India. In most areas of the Hellenistic world outside of Greece proper, the Greeks tried to recreate the culture of their homeland in their new environments. This recreation met with varying degrees of success. Yet in Bactria, which was roughly concurrent to modern Afghanistan, a more comprehensive cultural exchange took place. I will explore the question of why there was such a marked difference regarding the cultural exchange between the Greeks and the native population in Bactria compared to the rest of the Hellenistic world. To answer this question I shall examine several pieces of art and architecture produced by the Bactrian Greeks that represent a clear cultural exchange. I will then address the issue of why it was only in Bactria that this level of exchange took place. My research leads me to believe that this cultural exchange was a result of both the political environment of this particular region and a process of cultural exchange between non-political actors. The need of Greek rulers to legitimate themselves to both Greek and non-Greek would inspire bold new works of art. The rise of non-Greek powers which would reshape the political landscape and the flow of ideas across the land would influence this unique outpost of Hellenistic civilization.

* denotes co-presenter(s)
Nitroaromatic compounds (NACs) are found in common ground water and soil contaminants such as agrochemicals, explosives, polyurethane foams, unrecovered land mines, dyes, and the products of the incomplete combustion of fossil fuels. Exposure to NACs has been shown to cause serious health problems including methemoglobin, anemia, local irritation, liver damage, and bladder tumors. Measuring the isotope effects, the enrichment or depletion of a particular isotope during specific transformations, can be a useful tool for assessing the environmental impact of this contaminant. Previous research has examined the reduction of NACs to aniline. Recent studies have sought to assess the transformations of the substituted aniline species. Specifically, there is an environmental impact of this contaminant.

Abstract:
Nitroaromatic compounds (NACs) are found in common ground water and soil contaminants such as agrochemicals, explosives, polyurethane foams, unrecovered land mines, dyes, and the products of the incomplete combustion of fossil fuels. Exposure to NACs has been shown to cause serious health problems including methemoglobin, anemia, local irritation, liver damage, and bladder tumors. Measuring the isotope effects, the enrichment or depletion of a particular isotope during specific transformations, can be a useful tool for assessing the environmental impact of this contaminant. Previous research has examined the reduction of NACs to aniline. Recent studies have sought to assess the transformations of the substituted aniline species. Specifically, there is an interest in the nitrogen isotope effects during the oxidation of substituted aniline. Additionally, 15N isotope effects can be associated with the analytical method employed for the extraction of the neutral anilines from the reaction mixture. Small 13C isotope effects may be present during the oxidation and extraction of the aniline species. The kinetic and equilibrium isotope effects were computationally predicted using the Gaussian 03 electronic structure program suite. The isotope effects for the oxidation and extraction of substituted aniline both predict a depletion in the 15N isotope over the 14N isotope. The 13C isotope effects predict enrichment of the 15N isotope over the 13C isotope.
This presentation deals with contemporary metaphysical and epistemological topics in the philosophy of mathematics. Broadly put, I will defend the view that numbers exist, and that we can have knowledge of them. Such a view will be defended in this presentation as mathematical platonism: that numbers exist, which is a contemporary derivation of platonism, the historical position of the ancient Greek philosopher, Plato. For platonism, numbers are defined as abstract entities that exist outside of space and time. However, opponents of platonism argue that since our cognitive capacities, which are commonly assumed as having empirical experience, primarily interact with “concrete” objects, then due to the abstract nature of numbers, we cannot have knowledge of numbers, and therefore platonism is incorrect. The rationale behind this argument will be thoroughly discussed, and a response will be given. Roughly, the response holds that those who argue against platonism have a limited conception of knowledge, which rests on the mistaken assumption that empiricism exhausts possible knowledge. If the concept of knowledge is broadened to allow for rationalistic knowledge, then, knowledge based on reason, a possibility for mathematical knowledge is created. If such knowledge is possible, then the objection to platonism is met, and platonism is a viable position.

Title: A Defense of Mathematical Platonism
Type of Presentation: Oral
John Q. Imholte Hall, Room #202, 2:30 p.m.

Abstract:
This paper is an examination of the strengths and weaknesses of conflicting critical approaches to the photographs of Nan Goldin, in particular her most famous work, The Ballad of Sexual Dependency, which documented her life among a bohemian community of free spirited addicts, musicians, and drag queens on the lower east side of Manhattan from 1978 into the late 1980s. The Ballad provides an intimate and uncensored portrayal of a subculture consumed by drugs and sex of which Goldin herself was a part. Those who praise Goldin’s work view her photographs as more than a celebration of marginal societies but also as commentary on the condition of being human and the indulgent. This critical debate is representative of two major methodologies in contemporary art criticism in which either the formal elements of an artwork are emphasized, or the emphasis is placed on subjective information, such as biography and social situations. My position is that neither approach is entirely valid by itself because critics may ignore important elements of the artwork when they adhere firmly to a particular critical method. In the case of Goldin, her supporters have overlooked several formal weaknesses in favor of subjective information, while her detractors neglect to appreciate the power of the viewer’s identification with Goldin.
Abstract:

Polymers are molecules characterized by long chains of repeating subunits. While many familiar and useful organic polymers, polyvinyl chloride for instance, have insulating properties, some organic polymers can conduct electricity. The physical and electronic properties of these conducting polymers make them attractive materials for a wide variety of industrial applications including transistors, LEDs and solar cells. The energies of oxidation and reduction of these polymers are important and must be considered when examining the suitability of the polymer for real-world applications. This research was a theoretical analysis of the electronic properties of two lesser studied types of conducting polymers namely dithieno[3,2-b:2',3'-d]dihiophene (DTI) and N-functionalized dithieno[3,2- b:2',3'-d]pyrroles (DTPs). The HOMOs (highest occupied molecular orbitals) and LUMOs (lowest unoccupied molecular orbitals) of the molecules were calculated through the use the Gaussian 03 molecular modeling program. These values are of interest because the energy of the LUMO can give a good indication of the energy of reduction of the molecule. Similarly, the HOMO can be used to predict the oxidation energy of the molecule. The difference in energy of these two values is defined as the band gap and is directly related to the conducting ability of the molecule. Gap values were also determined using two other computational methods: time dependent and PBC (periodic boundary condition). The results of these three methods were compared to each other to determine the accuracy of the each of the methods. The effect of different R-groups on the band gap of the DTP molecule was also studied. This work was supported by the Morris Academic Partnership program and the UMM Faculty Research Enhancement Fund.

Abstract:

The optical absorption spectrum associated with the high n-states of atoms in an electric field is fairly well understood. We will present spectroscopic measurements of highly excited potassium atoms in an electric field under the influence of diffuse krypton gas. We will be investigating spectral line shifts and line broadenings as a function of pressure as the inert gas is added to the chamber. We will be observing how the presence of an inert gas will encourage rare atomic transitions to occur. The above effects and other subtle perturbations can ultimately be interpreted in terms of specific scattering mechanisms between the excited potassium electron and the krypton gas atoms. The purpose of this research is to use the experimental technique of recurrence spectroscopy to acquire the absorption spectrum and gain insight into how classically modeled electron orbits are affected by these scattering mechanisms.

Abstract:

In the present day, we are assaulted with sexualized images of women smoking, whether it is in magazines, films, or billboard advertising. However, this undercurrent of sensuality was not always the case at the beginning of the cigarette's history. Research into late 19th/early 20th century images of women smoking has been practically untouched by art historians. In doing this research, I want to expose this subject matter to others and help explain why men during this time would negatively portray women doing "masculine activities." In my presentation, I will visually analyze various cartoons from the highly influential and popular American magazine, Puck; starting in 1890 and ending in 1918. These cartoons illustrate differing portrayals of women smoking, which tended towards a masculinization of the woman. Also, I will be researching when the shift occurred from negative to positive imagery. I believe this shift is related to the time when tobacco companies started to target women more aggressively in their advertising campaigns. This research has been supported by the UROP.

Abstract:

Throughout history, the Berber people have been underrepresented in academic research. After being colonized by at least seven waves of invaders, including the Romans, the Arabs, and the French, the Berbers (the indigenous tribes of North Africa) have long had cultures mostly unchanged by the dominant and invading cultures. In fact, they remained isolated for the most part, until quite recently when a new movement took hold in the region. Arabization, the push to expel any non-Muslim culture, led to a shift in Berber beliefs and traditions. In Arabian Nights by Tahir Shah (2008), I have compiled literary depictions of Berbers, and contrasted them with the actuality of the Berbers. In Arabian Nights by Tahir Shah (2008), I have compiled literary depictions of Berbers, and contrasted them with the actuality of the Berbers. In the present day, we are assaulted with sexualized images of women smoking, whether it is in magazines, films, or billboard advertising. However, this undercurrent of sensuality was not always the case at the beginning of the cigarette's history. Research into late 19th/early 20th century images of women smoking has been practically untouched by art historians. In doing this research, I want to expose this subject matter to others and help explain why men during this time would negatively portray women doing "masculine activities." In my presentation, I will visually analyze various cartoons from the highly influential and popular American magazine, Puck; starting in 1890 and ending in 1918. These cartoons illustrate differing portrayals of women smoking, which tended towards a masculinization of the woman. Also, I will be researching when the shift occurred from negative to positive imagery. I believe this shift is related to the time when tobacco companies started to target women more aggressively in their advertising campaigns. This research has been supported by the UROP.

Abstract:

In the present day, we are assaulted with sexualized images of women smoking, whether it is in magazines, films, or billboard advertising. However, this undercurrent of sensuality was not always the case at the beginning of the cigarette's history. Research into late 19th/early 20th century images of women smoking has been practically untouched by art historians. In doing this research, I want to expose this subject matter to others and help explain why men during this time would negatively portray women doing "masculine activities." In my presentation, I will visually analyze various cartoons from the highly influential and popular American magazine, Puck; starting in 1890 and ending in 1918. These cartoons illustrate differing portrayals of women smoking, which tended towards a masculinization of the woman. Also, I will be researching when the shift occurred from negative to positive imagery. I believe this shift is related to the time when tobacco companies started to target women more aggressively in their advertising campaigns. This research has been supported by the UROP.
The incredible architectural innovation in the construction techniques of Tholos tombs is evidence of a much more sophisticated civilization than would normally be associated with Bronze Age cultures. This presentation explores the innovations of Tholos tomb construction and demonstrates their significance in a larger cultural context, creating a view into the Mycenaean mind of more than 3000 years ago and providing insight into the importance of development and human innovation during the Mycenaean period.

Monumental architecture during the Late Mycenaean period (1600-1100 B.C.E.) included innovations that made it the most advanced architecture in early Greece, and the Tholos tombs of Mycenaean represent the peak of innovation and engineering of this period. These tombs were domed circular catacomb walls. Though Hercules was a popular symbol for heroism and morality, the inclusion of his image in Early Christian Art reflects, to some degree, the traditional Roman compositional elements of charity, piety, wisdom, and nature. Hidden within these popular themes are examples of Judeo-Christian iconography that, if viewed by a non-initiate, would continue to remain unseen. Was the illustration of Hercules in Early Christian Art recognition of popular culture? Or was it instead used as a tool to hide the true message of the art? By answering these questions, a comprehensive cultural model for the Late Roman Empire would emerge, thereby allowing for an in-depth analysis of popular symbolism within the artistic representations of Hercules during the transformation of pagan Rome to Christian Rome.
Abstract:
Cancer is the second leading cause of death in the United States. Of the 1.5 million new cases every year, 150,000 of those people are diagnosed with colorectal cancer, making it the third most common cancer. Conventional chemotherapy is currently being used to fight cancer, but it can have detrimental side effects to the patient. A recent approach to treatment is self-assembled, nanoscale polymeric vesicles. Also known as polymersomes, these are drug delivery vehicles that can accumulate in tumor tissue and release drugs directly into cancer cells. The use of specific targeting ligands promises to enhance the specificity and efficacy of this process, reducing the side effects to the patient. My summer research included the synthesis of diblock copolymers made of vinyl sulfone terminated poly(ethylene glycol) and poly(γ-methyl-ε-caprolactone) through multistep syntheses. These diblock copolymers will be dispersed in water to form degradable polymersomes. The degradation of these polymersomes will later be studied at multiple values of pH to better predict degradation inside the acidic environment of a cancer cell. The goal of this research is to synthesize polymersomes that degrade between a pH of 6.5 and 5 in a matter of minutes to release drugs and destroy the colorectal cancer cells.

This research has been supported by the NSF, MRSEC, and REU programs under Award Numbers DMR-0754792 and DMR-0819885.

2010 Undergraduate Research Symposium

Presenter: Alex Madsen
Project Adviser: Jennifer Goodnough (Chemistry)
Title: pH Sensitive Polymersomes for Cancer Targeting
Type of Presentation: Poster #24

Abstract:
The "vanishing Indian" is one of the central ideas of 19th century "savagism," and it has since been highly prevalent in American popular culture. Louise Erdrich’s Tracks, one of the most popular novels in modern Native Literature studies, contains certain images that appear to conform to the idea of "vanishing," yet its hopeful conclusion refutes the stereotype. To reconcile these seemingly conflicting ideas, I consulted materials concerning the tradition of the "vanishing Indian" in dominant American culture, considered historical sources about the Anishinabe at the turn of the century, read critical articles about Tracks from critics both inside and outside the Anishinabe community, and engaged closely with Gerald Vizenor’s narrative theory, especially his concept of worldview. I concluded that reconciling the question of "vanishing" in Tracks depends on the worldview one brings to the novel. A comic worldview is based in community and flexibility and is often associated with Native cultures, whereas a tragic worldview is based in conflict and stasis and is more common to Western dominant culture. Approaching Tracks from a tragic worldview would confirm the images of "vanishing," but considering it from a comic viewpoint opens the possibility that images of "vanishing" are being used in order to achieve comic goals, such as rebuilding the Anishinabe community. Taking the comic worldview into consideration may help a reader from the dominant culture to better understand the world and the characters in Tracks, and may prevent the spread of the damaging notions of "savagism."

This research project, funded by the Undergraduate Research Opportunities Program, focused on the awareness, accessibility, and availability of assistive technology in Stevens County, Minnesota. Assistive technology is defined as an item, piece of equipment and/or service that may be used by any individual to increase, maintain or improve their functional capabilities and independence. This definition is used by Minnesota’s Assistive Technology Act program, which served as the basis for this study. The purpose of the study was to determine if citizens living in outstate Minnesota have the same access to assistive technologies as individuals residing in metropolitan areas. Interviews were conducted with individuals representing public and private school systems, physical and occupational therapy providers, personal care service organizations, and service cooperatives. Services and devices provided by these organizations were assessed to determine if the assistive technology needs of people with disabilities residing in the area were being met. Outcomes were measured based on resources available throughout Minnesota compared to those actually being provided by area organizations. Findings suggest that the main barrier faced by providers is lack of awareness of the most current technology and of funding resources offered by state and regional agencies. This research provides a unique look at resources available for people with disabilities in outstate Minnesota. Research participants will be provided with a copy of the final report and will be invited to a public presentation of findings in an effort to draw attention to the advantages and disadvantages faced by outstate Minnesota residents in having equal access to assistive technology as metropolitan residents.
function that has the similar features as the smoothed distribution function of each variable in the data set, as well as how to search for a copula with the regression and provide a clear look at dependence structure. In the research we developed how to define and create facts to transfer marginal distributions into uniform on the interval (0, 1). They eliminate the influence of marginal behavior between two variables is defined as the form of the regression functions being different. By doing so, applications, such as financial risk assessment and actuarial analysis. Directional dependence in joint behavior distributions. The directional dependence model is critical because it by using copulas. Copulas are multivariate distribution functions that connect marginal distributions and joint environmental factors, and the role of genetics in an attempt explain why PTSD and substance abuse so frequently co-occur. In addition, findings in regard to gender differences as they relate to PTSD and substance abuse will be examined. Finally, this presentation will shed light on the implications of current research on the PTSD/Substance Abuse relationship in terms of effective treatment options and areas of further study.

Abstract:
Most people in the United States have experienced exposure to an extreme traumatic stressor, such as physical assault, military violence, or another event that is outside the normal range of human experience. However, only a small percentage of people who experience this kind of trauma go on to develop Posttraumatic Stress Disorder (PTSD). Research has shown that among individuals who abuse or depend on substances, the rates of PTSD are significantly higher than in the general population. Those who suffer from both PTSD and substance abuse at the same time show more severe symptoms of PTSD, have decreased levels of health and well-being, and demonstrate poorer substance abuse treatment outcomes. This presentation reviews the current literature on the relationship between drug abuse, trauma, and PTSD, and examines support for possible causal relationships, common environmental factors, and the role of genetics in an attempt explain why PTSD and substance abuse so frequently co-occur. In addition, findings in regard to gender differences as they relate to PTSD and substance abuse will be examined. Finally, this presentation will shed light on the implications of current research on the PTSD/Substance Abuse relationship in terms of effective treatment options and areas of further study.

Abstract:
Much of the food in aquatic ecosystems is derived from plant matter that has fallen into the water from the terrestrial ecosystem. This organic matter is broken down by a group of macroinvertebrates called shredders. Use of leaf material by shredders has been more extensively studied in streams than in lake ecosystems. We investigated the use of leaf material by shredders that occur in lakes in West Central Minnesota. In the lab, consumption of four kinds of leaves (ash, cottonwood, willow and cattails) by the common shredder Hyalella azteca was assessed. Survivability of H. azteca did not differ significantly between the four treatments, indicating that this shredder is a generalist feeder and can exploit many different food resources. We further investigated the use of leaf material by macroinvertebrates by placing mesh cages containing the same four plant species in Cottonwood Lake (Grant Co. MN). After six weeks, cages were recovered and all macroinvertebrates within them were preserved. Cages contained a diverse assemblage of macroinvertebrates in addition to shredders suggesting that leaves provide habitat, as well as food for macroinvertebrates in lakes. Further analysis of the shredder community will help clarify the role of terrestrially derived organic matter in lake ecosystems.

Abstract:
Circadian rhythms are daily oscillations in biological organisms, which typically continue in the absence of environmental cues. Neurospora crassa, a fungus, is a model system often used for studying rhythms. The study of the cellular and molecular components of the Neurospora circadian rhythm has been recently improved through the placement of an optimized firefly luciferase gene into the genome. The emission of light caused by this “reporter gene” shows when a targeted natural gene is turned on or off. The frequency (frq) gene has been shown to be an important component of the Neurospora circadian mechanism. Previous studies have also revealed that the frq promoter, the segment of DNA that turns on and off the frq gene, plays an important role in the light detection pathway by binding proteins to induce transcription. We are particularly interested in the responses of the frequency gene products following exposure to external light. Given the methods of previous studies, experiments have failed to observe the presence of Neurospora’s circadian rhythm during exposure to constant bright light. We present here experiments in which circadian oscillations were observed in the presence of constant dim light. These oscillations occurred when Neurospora were pre-treated with at least fifteen minutes of bright light. In the absence of this bright light pre-treatment, oscillations were not observed. By using various segments of the frq promoter, these experiments continue to give us a greater understanding of the mechanism of light interaction with this gene segment as it regulates Neurospora’s circadian rhythm.

This research has been supported by the UROP and MAP programs.
Poster: Andrea Lund  
Project Adviser: Karen Mumford (Biology/Environmental Science)  
Title: The Relationship Between Housing Conditions and Respiratory Illness in Migrant Ngöbe Children: A Global Public Health Study  
Type of Presentation: Oral  
John Q. Imholte Hall, Room #101, 4:35 p.m. 

Abstract:  
The indigenous Ngöbe population migrates annually from northern Panama to work on coffee plantations in southern Costa Rica. There have been concerns that the poverty and poor living conditions of this group render them vulnerable to many health problems. In particular, smoke-producing activities in poorly ventilated houses were hypothesized to predispose Ngöbe people to respiratory illnesses. To examine the relationship between respiratory health and plantation housing among Ngöbe children, survey data were collected by staff from Finca Sana, a local health organization. Individual interviews of Ngöbe mothers were conducted in Ngöbe in the indigenous language, and responses were recorded in Spanish. Data from 120 surveys were analyzed using descriptive statistics, Chi-square analysis, and logistic regression. Over 50% of mothers reported respiratory symptoms among their children. Analyses suggested that crowding in houses (p = 0.0032), trash burning (p = 0.0207) and wood burning (p = 0.0256) increased the likelihood of respiratory symptoms such as cough, runny nose and shortness of breath. The significance of these factors and the high prevalence of recent respiratory symptoms in Ngöbe children are alarming and warrant further investigation. In order for local public health authorities to be able to effectively address the needs of this vulnerable population, more thorough empirical examination of the factors that may be contributing to their health status is necessary. 

This research was part of the curriculum for the Global Health Semester in Costa Rica through Duke University and the Organization for Tropical Studies.

Poster: Alex McGreavey  
Project Adviser: Tisha Turk (English)  
Title: When it's Not American They're Writing: Effectively Integrating ESL Students into Peer Group Writing Sessions  
Type of Presentation: Oral  
John Q. Imholte Hall, Room #111, 2:55 p.m. 

Abstract:  
Current topics in the field of education include discussions focused on working with English as a second language (ESL) students as well as discussions focused on peer group writing sessions; however, little research has been done to combine these two discussions. My presentation will outline the necessary steps needed in a classroom with ESL students in order for peer group writing sessions to be successful. My project consists of proposals based on the research of success stories from the two discussions in education. I have composed a seven step method in which to conduct a peer group writing workshop inside of a classroom in order to successfully include the needs of all students. The most important aspect of my proposal is the inclusion of two teacher-led demonstrations. These include an initial demonstration in which students participate as a class in assessing an example of a written work focusing on content alone, and a second in which the students proof-read and edit for grammar. Demonstrating and elaborating on these seven steps, my presentation will illustrate the importance of integrating the needs of ESL students. Through doing so, ESL students will benefit by having writing anxiety alleviated, grammar strengthened, and practice with the written English language. Although this proposal is designed with ESL students’ needs in mind, Native English speaking students will also benefit in much the same way, as well as gaining the skills needed to properly assess an ESL classmate’s written work.
Abstract:
The Michif language, spoken by the descendants of French traders and indigenous peoples of North America, is a combination of French and Algonquian languages. It has been argued that, because Michel takes its nouns from French and its verbs from Algonquian, Michif is a naturally occurring "mixed language," unable to be classified into either the Indo-European or the Algonquian language families. In my research project, I investigated the claim that Michif defies classification within the current framework and should be classified in a new mixed-language category. To explore this assertion, I examined the Michif language itself. Through the use of primary and secondary-source materials including dictionaries and audio recordings of the spoken language, I analyzed the language’s structure and the way that it combines French and Algonquian. I then compared Michif’s structure to mainstream conceptions of the processes of language contact and combination. Finally, I looked at other languages described as mixed, with a focus on the Light Warlpiri language of Australia, to determine whether they are structurally similar enough to be classified together in a new mixed-language category.

This research has been supported by a UROP grant.
Abstract: Viral vectors can be used to selectively infect cancer cells and deliver therapeutic agents to targeted tumor growths. These oncolytic, or 'cancer-killing', viruses can be engineered to enter and destroy specific cancer cell types. Reovirus is one of several viruses being developed as an oncolytic therapeutic agent. Because proteolytic degradation of the reovirus outer capsid protein s3 is a critical step in cell entry, reovirus may preferentially infect cancer cells and tumors in which proteases are overexpressed. In this study, reovirus mutants were selected for growth in the presence of the entry inhibitor bafilomycin A1. By inhibiting vacuolar H+–ATPase, bafilomycin A1 raises the pH of endosomes and lysosomes, which contain internalized viruses and acid-dependent proteases. The increase in vacuolar pH inhibits these acid-dependent proteases, thus hindering their ability to cleave s3. Without degradation of s3, reovirus cannot escape from the vacuole and initiate infection. However, three bafilomycin-resistant viruses were determined to have mutant entry phenotypes that enable better replication in the presence of various entry inhibitors compared to their wild type parental virus. Furthermore, the mutant entry phenotypes conferred enhanced sensitivity to proteolysis by the ubiquitous lysosomal aspartyl protease cathepsin D. Sequencing of s3, the gene encoding s3, revealed that these mutations map to residue 354 of the s3 protein. The tyrosine→histidine mutation observed at residue 354 has been previously associated with more rapid proteolytic degradation of s3. With further research, the administration of reovirus mutants with enhanced sensitivity to proteases unique to, or overexpressed by, tumor cells could become a less invasive alternative to traditional cancer therapies.

Previous analyses have found that age, driver experience, marital status, miles driven, and the number of trip segments are associated with accident risk. In this study, reovirus mutants were selected for growth in the presence of the entry inhibitor bafilomycin A1. By inhibiting vacuolar H+–ATPase, bafilomycin A1 raises the pH of endosomes and lysosomes, which contain internalized viruses and acid-dependent proteases. The increase in vacuolar pH inhibits these acid-dependent proteases, thus hindering their ability to cleave s3. Without degradation of s3, reovirus cannot escape from the vacuole and initiate infection. However, three bafilomycin-resistant viruses were determined to have mutant entry phenotypes that enable better replication in the presence of various entry inhibitors compared to their wild type parental virus. Furthermore, the mutant entry phenotypes conferred enhanced sensitivity to proteolysis by the ubiquitous lysosomal aspartyl protease cathepsin D. Sequencing of s3, the gene encoding s3, revealed that these mutations map to residue 354 of the s3 protein. The tyrosine→histidine mutation observed at residue 354 has been previously associated with more rapid proteolytic degradation of s3. With further research, the administration of reovirus mutants with enhanced sensitivity to proteases unique to, or overexpressed by, tumor cells could become a less invasive alternative to traditional cancer therapies.

Abstract: Over a two-year period, The T&T Project studied a panel consisting of 1065 new drivers at a cooperating trucking firm to identify factors associated with driver safety. Previous analyses have found that age, driver experience, marital status, miles driven, and the number of trip segments are associated with accident risk. Using a Cox proportional hazards multivariate survival model to control for these known risk factors, we estimate the effects of the following explanatory factors: past accidents of any severity, backward induction ability, a driver impatience measure, and credit score. One finding shows statistical evidence that past accidents predict higher risk for future accidents by the same driver, after adjusting for other control variables. This finding could play an important role in driver continuing education or training programs, and provide ideas for operational policy changes in the trucking industry.
**Title: Downfall of the CPRF: What Went Wrong?**

**Type of Presentation:** Oral

**Abstract:**
The years following the break-up of the Soviet Union were a time of great change in Russia, including an explosion in the number of political parties vying for seats in the State Duma. The post-Soviet legislature was dominated by the Communist Party. However, the past decade saw the Communists lose control of the government to a party that appeared around the turn of the millennium, United Russia. Scholars have provided a number of theories as to why the Communists would lose power upon the emergence of United Russia. Those theories rely too strongly on institutional factors and roadblocks while completely ignoring the nature of Russia’s political culture. This work fills the gap that is left by ignoring culture. Using qualitative patterns found in other research, but not addressed in it, I argue the Communist Party of the Russian Federation fell from power for two principal reasons. First, the party lost its main core of support in the regions, a resource that sustained it throughout its success in the decade before. Second, United Russia and the other main parties co-opted the CPRF’s highly nationalistic message that had played well with the electorate. Additionally, I will argue that the Communists’ days are numbered. The decline will be slow, but the next several elections will see the CPRF devolve into insignificance. Ultimately, the power previously enjoyed by this party has increasingly transferred to the hands of others.

**Presenter:** Mohammed Farah

**Project Adviser:** Ted Pappenfus (Chemistry)

**Title:** Synthesis and Investigation of Platinum (II) and Ruthenium (II) Materials for Sensing Applications

**Type of Presentation:** Poster #27

**Abstract:**
Inorganic materials have a wealth of practical applications including those related to energy production and the environment. This research focused on two types of inorganic compounds containing platinum and ruthenium centers for use as environmental sensors. Current methods in making these compounds are poor so this research also focused on improved synthetic methods. The first part of the research focused on a novel platinum (II) compound which was successfully prepared. Platinum-platinum double salt compounds can be vapochromic and are useful as chemical and biological probes. The second part of the research focused on a ruthenium (II) compound. Ruthenium [Ru(bpy)3]2+ was used as a cation to fill in the space between clay layers and make a luminescent material. X-ray diffraction was used in detecting the shift in the spacing between the clay layers. After the determination that there was a shift in the clay spacing, the material was tested for oxygen sensing. The data collected suggest that the ruthenium (II) compound senses oxygen and the platinum (II) compounds are capable of sensing volatile organic compounds.

**Poster #26**

**Title:** Synthesis and Investigation of Platinum (II) and Ruthenium (II) Materials for Sensing Applications

**Project Adviser:** Ted Pappenfus (Chemistry)

**Abstract:**
Oxygen sensors have many uses in medical, industrial, and agricultural fields. The purpose of this research was to design suitable materials for molecular oxygen sensing. Previous research of oxygen sensing materials uses ruthenium as the transition metal in the synthesized compounds. This research explores an alternate metal system involving iridium and is focused on the luminescent properties of the compound. The main iridium (III) complex synthesized was Ir(ppy)2(cs-acac), where ppy indicates phenyl pyridine and cs-acac indicates non-8-ene-2,4-dione. This complex was then polyed with a polyhedral oligomeric silsesquioxane (POSS). All eight POSS-silyl protons were substituted via the terminal alkene on the cs-acac to form the final product, Ir(ppy)2(cs-acac)8POSS. Complexes in the experiment were characterized using 1H NMR, infrared spectroscopy, Gas Chromatography-Mass Spectrometry, and absorption and emission spectra. Both iridium-containing materials proved to be efficient oxygen sensors by their emission characteristics under nitrogen and oxygen.

**Presenter:** Carly Dukart and Stephanie Ranza

**Project Adviser:** Ted Pappenfus (Chemistry)

**Title:** Phytohormones of Phaseolus vulgaris L. (Cowpea) and Some of Its Crosses

**Abstract:**
Phytohormones play a significant role in determining the growth and development of plant species. The study includes the isolation and identification of some of the phytohormones of Phaseolus vulgaris L. (Cowpea) and some of its crosses. The phytohormones were isolated from the leaves and nodules of the plants. The isolated phytohormones were identified by paper chromatography, gas chromatography, and mass spectrometry. The results of the study showed that the phytohormones of Phaseolus vulgaris L. (Cowpea) and some of its crosses were mainly auxins and cytokinins. The study also showed that the phytohormones of the crosses were different from those of the parental species.

**Presenter:** Sarah Buchanan (French)

**Project Adviser:** Seung-Ho Joo (Political Science)

**Title:** Firmaman: A Double Birth

**Type of Presentation:** Oral

**Abstract:**
This paper uses Julia Kristeva’s theory of the Chora (1984) to analyze the message that Vanessa Paradis conveys through “Firmaman,” a ballad written for and dedicated to her newborn daughter. Vanessa Paradis, a French pop singer commonly known in the United States solely as Johnny Depp’s long-time partner, boldly asserts her own identity, that of songwriter and performer, thus putting herself in the role of song mother, publicly for the first time in 2000 with the release of her C.D. of popular music entitled Bliss. After more than a decade of interpreting the work of others, notably that of Serge Gainsbourg and Lenny Kravitz, Paradis decided to mobilize the poetic and musical elements of the Chora by recording her infant’s voice, and by using a rather repetitive melody, endless metaphors, and a pulsating heartbeat. In this newfound role, Paradis liberally exercised her creativity through the artistic and aesthetic choices she made during the production of Bliss. In particular, Paradis decided to mobilize the poetic and musical elements of the Chora by recording her infant’s voice, and by using a rather repetitive melody, endless metaphors, and a pulsating heartbeat. My project is import
Abstract:
Novaculite is a specific type of cryptocrystalline quartz found in the Ouachita Mountains of Arkansas and Oklahoma and in the Marathon Uplift of Texas. Novaculite probably formed as a siliceous ooze in the Devonian Period and was metamorphosed into chert during the Ouachita Orogeny. Native Americans mined Novaculite for sharpening stones, arrowheads and spear points and it is used commercially today as a whetstone. A cryptocrystalline siliceous unit that resembles Novaculite was first found in Late Paleozoic glacial units in the southeastern Parana Basin, Brazil. The goal of this study was to determine if the Brazilian deposit is Novaculite sensu stricto. Fieldwork for this study consisted of detailed mapping of Paleozoic units, description of possible Novaculite outcrops and sample collection. Lab work consisted of making thin sections and thin section analysis, X-Ray Diffraction analysis and sample preparation for X-Ray Fluorescence analysis. Field evidence suggested that the Brazil deposit was not Novaculite sensu stricto. At the time of deposition, the southern Parana basin was characterized by a high influx of terrestrial glacial and glacio-fluvial sediments. A siliceous ooze, in contrast, only forms in sediment starved environments. Additionally, bedding and contact features indicate a rapid, contemporaneous accumulation of the siliceous unit and glacial units. Both U.S.P. research and this study indicate that an alternative model for the origin of the Parana Basin siliceous unit may be volcanic tephra. However, a specific volcanic source is difficult to identify even though tephra are known throughout the Parana Basin.

Research for this study was funded by a grant from the N.S.F. - S.T.E.P. Program (NSF-DUE-0653063).

Abstract:
Search engines are of inestimable value for navigating the World Wide Web. They allow us to quickly sort through a network of billions of pages, handle millions of searches per day, and have enormous influence on how the Web has evolved. One of our goals is to make more people aware of the mathematics behind search engines, as search engines are used daily but many people are completely unaware of how they operate. We will explore the PageRank algorithm, which is used by Google to rank the pages returned in a search. In its most basic form, PageRank assigns an importance score (xk) to each page (k) in a web, which depends on the importance scores of all of the pages which link to page k. In this way, pages "vote" for one another through links. This forms a system of linear equations which can be written in matrix form as Ax = x, where x is the importance score vector to be solved for. We will explain the mathematics (linear algebra and graph theory in particular) behind the algorithm as used by Google. We will then introduce our research, namely testing a few possible variations to the existing methods. We will show the computational and numerical results of implementing these variations in terms of the time-efficiency of convergence and integrity of the resulting importance score vector.

This research has been funded by UROP.
Electricity Demand Smoothing: A Case Study at the University of Minnesota, Morris

Abstract:
This research explores the history, content and precedent set by court decisions involving the Americans with Disabilities Act (ADA). The ADA was designed to prohibit ableist practices and actions in the public sector. Ableism is analogous to racism or sexism, and is thus defined as discriminatory practices, actions, and thoughts based on perceptions of ability or disability. This study reviews the original legislation and portions of the law that have mitigated against the plaintiff. Study reveals a judicial system that interpreted the ADA most often in the interests of businesses, undermining the rights of the very people it was drafted to protect. These decisions prompted Congress to more clearly define the ADA with several amendments in 2008. These amendments revised some of the loopholes relating to "undue hardship" and "reasonable accommodation," while resolving the fundamental problems with the Supreme Court’s definition of disability. The impact of these amendments remains to be seen. I will analyze Sutton v United Airlines, one of two precedents overturned by Congress, to examine a history of what Ruth Colker has called "judicial backlash," and to gauge how the amendments might shape future decisions that better reflect the spirit of the original legislation.

Poster:
Presentation: Oral
Presenter: Michael Zajicek
Project Adviser: Arne Kildegard (Economics)

Title: Electricity Demand Smoothing: A Case Study at the University of Minnesota, Morris
Type of Presentation: Oral
John Q. Imholte Hall, Room #101, 4:10 p.m.

Abstract:
The University of Minnesota, Morris, pays an average of $33,000 per month for electricity. In 2009 almost 26% of this bill, or approximately $8580 per month, came in the form of a “peak demand charge” which is charged based on the single highest point of electricity usage during a 15-minute period for industrial scale users of electricity. These peak electricity demand periods are very short in nature, and thus if we could reduce these peaks the University of Minnesota could potentially save a significant amount of money. Through the use of a smart grid system to monitor electricity usage it is possible to automate systems to respond to rising electricity demand by either slowing down or shutting off entirely. This allows us to lower our peak demand by effectively spreading out these peaks over longer periods of time, thus lowering our peak demand charge. This project researched the possibility of implementing such a system on the UMM campus. Extensive background research on the electricity industry coupled with an exploration of UMM’s electricity infrastructure and electricity billing data led to a model for how we could succeed in the creation of such a system. This could potentially save the University money, create a model that other large users of electricity could follow, and if implemented on a large scale could create a more efficient electricity industry.

This research has been supported by UROP funding.

Poster:
Presentation: Oral
Presenter: Eva Wood
Project Adviser: Tammy Berberi (French)

Title: Impaired Justice: Ableism in Court Decisions
Type of Presentation: Oral
John Q. Imholte Hall, Room #114, 4:35 p.m.

Abstract:
This research explores the history, content and precedent set by court decisions involving the Americans with Disabilities Act (ADA). The ADA was designed to prohibit ableist practices and actions in the public sector. Ableism is analogous to racism or sexism, and is thus defined as discriminatory practices, actions, and thoughts based on perceptions of ability or disability. This study reviews the original legislation and portions of the law that have mitigated against the plaintiff. Study reveals a judicial system that interpreted the ADA most often in the interests of businesses, undermining the rights of the very people it was drafted to protect. These decisions prompted Congress to more clearly define the ADA with several amendments in 2008. These amendments revised some of the loopholes relating to "undue hardship" and "reasonable accommodation," while resolving the fundamental problems with the Supreme Court’s definition of disability. The impact of these amendments remains to be seen. I will analyze Sutton v United Airlines, one of two precedents overturned by Congress, to examine a history of what Ruth Colker has called "judicial backlash," and to gauge how the amendments might shape future decisions that better reflect the spirit of the original legislation.

Poster:
Presentation: Oral
Presenter: Andrew Bowe
Project Advisers: Karen Mumford (Biology) and Engin Sungur (Statistics)

Title: Vaccination Beliefs and Perspectives at UMM
Type of Presentation: Poster #13

Abstract:
College campuses are ideal settings for the spread of contagious disease due to the close living and working arrangements of students, faculty, and staff. Vaccinations are an important public health intervention designed to slow the spread of disease and prevent additional infections. Despite the evidence that indicates the importance of vaccinations, rates of compliance can be relatively low. Low vaccination compliance is due to many factors such as concerns about vaccine safety, lack of information about vaccinations, and apathy. The emergence of the 2009 H1N1 influenza reignited the vaccination debate since the vaccine was rapidly developed to combat a potential pandemic. To determine the factors that may be associated with vaccine compliance, I designed the "UMM (University of Minnesota Morris ) Seasonal and H1N1 Influenza Vaccination Survey." Specifically, the survey was designed to understand vaccination behaviors, beliefs, and attitudes among a college-based population. The survey asked vaccination behavior and attitude questions associated with seasonal influenza vaccines and the H1N1 influenza vaccine. In addition, demographic information was collected. The survey was disseminated electronically to all members of the UMM campus in December of 2009. The 183 completed surveys will be analyzed using multivariate statistical analysis to see if significant trends in the thoughts, beliefs, and actions exist among members of the campus community. This information may be very useful in the development of strategies to increase vaccination rates among campus community members.

Poster:
Presentation: Poster #4

Abstract:
This study initiated development of a new lab project for Molecular Biology (BIOL 3121) using the green fluorescent protein (GFP) gene, originally isolated from jellyfish. We examined the efficiency of two methods, heat shock and electroporation used to insert the plasmid (pGlo), on which GFP is located, into E. coli. The study helped determine which method was superior for use by lab students. Heat shock used salts and rapid changes in temperature to attach the plasmid to a weakened bacterial membrane and then induce its uptake. Alternatively, electroporation shocked young bacterial cells to create pores in the bacterial cell membrane that allowed for the uptake of the plasmid. Our results revealed the transformation efficiency for electroporation was about three times higher than for heat shock.
Our research focused on a dataset of Civil War veterans from the Union Army. The data were obtained from the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan. The purpose of the research was to identify factors that contributed to risk of death during the war. We used cumulative hazard curves to display differences between groups. These curves measure the accumulated risk of death over time. We also estimated a multivariate Cox regression survival model that adjusts for several predicting factors simultaneously. We discovered that veterans of rank corporal, private, and other enlisted men were at a higher risk of death than officers, or musicians. After adjusting for other control variables in our Cox survival model, we discovered that survival varied depending upon the state where the soldier enlisted. We also found the occupation of the soldier before the war was an important predictive factor, even after adjusting for other characteristics of the soldier.

Olivia Awoudi and Lea Awoudi would like to thank the LSAMP (North Star Alliance) Program, Professor Jon Anderson and all the faculty that helped make this research opportunity possible.
Robert Schumann contributed significantly to piano repertoire of the Romantic period, writing almost exclusively for the instrument from 1830-1840. His work Papillons (Butterflies) is a set of dances that can also be considered a character piece. Through its title, a character piece suggests a certain mood or scene. The poetry and literature of Romantic German writers influenced much of Schumann’s music. Schumann’s strong literary influences stemmed from his father, who was a publisher, and Schumann himself founded and edited the music journal Neue Zeitschrift für Musik. The literature of novelist Jean Paul Richter especially affected him, and his novel Die Flegeljahre ("Years of Indiscretion") serves as a basis for understanding Schumann’s music. Schumann’s strong literary influences stemmed from his father, who was a publisher, and Schumann himself founded and edited the music journal Neue Zeitschrift für Musik. The literature of novelist Jean Paul Richter especially affected him, and his novel Die Flegeljahre ("Years of Indiscretion") serves as a basis for understanding Schumann’s music. Schumann’s strong literary influences stemmed from his father, who was a publisher, and Schumann himself founded and edited the music journal Neue Zeitschrift für Musik. The literature of novelist Jean Paul Richter especially affected him, and his novel Die Flegeljahre ("Years of Indiscretion") serves as a basis for understanding Schumann’s music.

Programs written in the Java programming language are executed by a run-time system that performs program instructions. Additionally the run-time system may change program instructions to more efficient ones as the program is being run. One such common change is known as function inlining. Without inlining, every time a program uses a function, the run-time system must locate the function, execute its instructions, and return to continue the main program execution. Inlining copies the function’s instructions directly into the main program, eliminating the overhead of locating the function and returning. Profilers are software tools that monitor programs as they are running. A profiler gathers information about the proportions of the total time that is spent on various segments of a program. The goal of our research project was to determine the accuracy of this information for a common profiling approach, known as byte-code injection: inserting instructions that record timings of individual program segments. We developed one set of programs where inlining was occurring and another set where inlining was not taking place; otherwise these programs were the same. By comparing the running times of these two sets of programs with and without the use of a profiler, we have shown that by inserting instructions to monitor a program, profilers disable inlining, causing a slowdown. Thus we demonstrate that the “observer effect” of profilers makes them inaccurate tools to monitor performance when inlining is involved. Profilers are commonly used in programming languages research and researchers should be aware of their potential inaccuracy.