



# URSA

Undergraduate, Research,  
Scholarship and Arts.  
Benedictine University

## 2017 Poster Session Program

**March 29, 2017 ❖ 12:00-5:30 pm ❖ Goodwin Hall atrium**

### **Roman Forestor Jr**

*"A Gift for My Family"*

The project is an attempt to plug a hole in my families history. My grandfather never discussed his service during WWII and I am attempting to construct a story that will paint a picture for my family to see what it may have been.

*Faculty sponsor: Vince Gaddis*

### **Jade Beadle, Ugne Dinsmonaite**

*"Arthur J. Schmitt Future Leaders Getting It Together 2017"*

Concept: Provide a health fair for the residents of the Woodlawn/Englewood community at Sunshine Gospel Ministries. By educating the community about oral hygiene, nutrition, and self-esteem.

*Faculty sponsor: Sandra Gill and Joan Henehan*

### **Tabitha Pinchot**

*"Advertising Content Analysis about Secret Deodorant and Women's Equality"*

The goal for this project was to choose an ad and analyze the contents of that ad. The ad I chose for analysis is an ad for Secret Deodorant, a woman's deodorant. The ad presents a picture of a woman wearing a pink dress. She appears to be hanging onto a cement floor while struggling to climb on top of it. On top of the floor there is an image of three men sitting at a table. Their faces are cut off; however, you're able to tell its men due to the suits and ties they're wearing. This image is suspended in the sky, as if to be floating. The sky is a soft blue with subtle white clouds appearing.

Underneath the woman's feet the copy reads, "Freshness that works harder, because you have to work harder to get ahead." Below the copy is a picture of the deodorant and more copy, "Stress tested for Women." Here is a woman struggling to make it in a man's world. Her struggling represents the fight for equality. The ad is suggesting that since a woman has to work twice as hard, she should not have to worry about her deodorant as well.

*Faculty sponsor: Luigi Manca*

### **Aamna Khalid**

*"Arthur J. Schmitt Future Leaders Project: Syrian Refugee Awareness Week 2017"*

For my Arthur J. Schmitt Future Leaders project, I worked with UNICEF and SOS to plan, organize, and create Syrian Refugee Awareness Week (2/20/17 – 2/23/17). The aim of this week was to educate the Benedictine community about the situation in Syria, raise funds for UNICEF and the Syrian American Medical Society (SAMS), and provide an outlet for expressing thoughts about the Syrian crisis through an open mic night. The Syrian Civil War is one of the biggest humanitarian crises of our time, so I believe it is essential to make a positive difference to alleviate Syrians' suffering and be hopeful.

*Faculty sponsor: Joan Henehan and Sandra Gill*

**Zubair Farooqui, Sumaiya Shahjahan**

“The Stigma Towards Mental Health in the Latino Community”

Treatment can be highly effective for improving mental health in a wide variety of patients; however, treatment is only effective among those who receive it. A major barrier to mental health treatment is the related stigma present in the Latino community. A strong understanding of mental health stigma is critical for elevating the quality of care among this patient population, but little data exists to inform ways to reduce the stigma in this community. Therefore, the goal of this project is to add to the understanding of the stigma by 1) conducting a systematic literature review that will review previous studies to effectively understand the different perspectives that contribute to the stigma and 2) present pilot data collected by the principal investigators among patients at a local community health clinic. During several months of interning at a free health clinic with a majority of Latino patients, investigators observed discomfort and evasion related to mental and emotional strain. Results will be used to improve the understanding of mental health stigma among Latino patients and to recommend future strategies for reducing it in this community.

*Faculty sponsor: Christine Fletcher*

**Jay Ahuja**

“3D-printing of Ancient Human Fossils: Inexpensive and Effective”

The purpose of this research project was to print ancient human fossils using a MakerBot Replicator three-dimensional (3D) printer. These fossils will be used in support of human evolutionary research and teaching at Benedictine University. Files of these fossils are available at Morphosource (<http://morphosource.org>), African Fossils (<http://africanfossils.org>), and a few other freely-available online resources. After downloading the files, I converted them into file-types the 3D printer can use and adjusted the position of each object on a printing application. The print itself required a substantial amount of time, but the general process of 3D printing is minimally complicated, cheap, and useful, particularly as these fossils would only otherwise be available for study in person at museums in Africa, Asia, and Europe. Dr. McCarthy and I are currently working to create classroom resources to enhance human evolution teaching at Benedictine University that incorporate these 3D-printed fossils.

*Faculty sponsors: Robert McCarthy*

**Dominic Jayes**

“The topic of this poster is to analyze an advertisement of my choosing and find the overall strategic ways the ad is persuading the audience. While doing this, I am able to point out different details, find hidden meanings, and use the knowledge I've gained from Comm 201: Advertising Persuasion and Consumer Society to give an overall analysis of the ad.” The analysis of this Dolce and Gabbana fragrance ad comes from a 2016 issue of GQ magazine. At first glance we see a rocky mountain covered with snow in the background as a dark blue sky illuminates right above it. There is a man wearing a white thermal with his shirt unbuttoned and his shining chest showing. To the right of this man, there is a woman wearing ski goggles and holding ski poles with her black coat unzipped, showing her bra, which allows us to see her gleaming stomach. To the right of this couple, there are the two fragrance bottles, the taller one being for women and the shorter one being for men. The story of this couple revolves around a vacation ski getaway high up in the mountains. The blue sky is without a single cloud or flake of snow, which suggests this peaceful place they are in is safe, but better yet, a utopia.

*Faculty sponsor: Luigi Manca*

**Tiffany Pickett**

“The Reduction of Methane Formulation within Cattle in Response to the Implementation of Canola in the Feed of Cattle”

By solving small pieces of climate change, we may be able to gradually minimize the effects of climate change on human and ecosystem health. Over the years, studies have shown that cattle are major producers of a greenhouse gas, methane, which plays a part in destroying our protective ozone layer. Implementing rapeseed into their diet has proven

to reduce this production. Since rapeseed is mostly found in Eastern Asia, we've decided to study its cousin, Canola, which is easily available in North America. We plan to investigate similar methane reducing properties using a titration to observe the effects of each seed's oil with methane gas.

*Faculty sponsors: Anne Marie Smith, Karrie Stone*

### **Grace Wangler**

*"The Combined Effects of Cadmium Stress, CaCl<sub>2</sub>, and Heat Stress on the Germination of Soybean Seedlings (Glycine max)"*

Advances in protecting exposed agriculture can be made through a deeper understanding of the toxic effects that Cadmium has on plant populations. Numerous studies have been focused on plants that have undergone Cadmium stress in coordination with one other environmental factor, but no study has been conducted to identify the effects of multiple factors, including cadmium stress, on the germination and overall health of plants. My proposed research will attempt to identify the combined effects of Cadmium, a saline solution (CaCl<sub>2</sub>), and heat stress on the germination rate of soybean seedlings. This will be studied by planting soybean seedlings in soil samples of controlled pH and minerals in a laboratory environment. There will be numerous groups of trials, in which each will aim to isolate one of the three variables. In addition, more trial groups will identify the combined effects of two, then three, variables on the germination rate of the seedlings.

*Faculty sponsors: Anne Marie Smith, Karrie Stone*

### **Maureen Black**

*"The Removal of Manganese from Drinking Water by Adding Alginate Beads"*

The topic of clean drinking water is important because consuming heavy metals is dangerous to human health. Research has been done involving the discovery and removal of many heavy metals from drinking water. Promising results were seen when alginate beads were used to remove a large quantities of heavy metals. Manganese was not tested with alginate beads and scientists have suggested future research be done involving additional heavy metals in drinking water and the alginate beads. An atomic absorption spectrophotometer will be used to determine the amount of manganese that is absorbed by the alginate beads after their creation.

*Faculty sponsor: Anne Marie Smith, Kari Stone*

### **Elijah Medlock**

*"The Effects of Deforestation on Soil Organic Carbon Levels in Vertosol Soil on Queens Island, Australia"*

Deforestation is a global issue that is a major contributor to greenhouse gasses in the atmosphere. By better understanding how soil is affected by deforestation, we hope to come up with solutions to restore the natural soil chemistry. Several studies have been done investigating how soil organic carbon (SOC) levels change as vegetation changes, which affects all soil types differently. In addition, it has been found that soil reacts differently to what is planted after the native vegetation has been removed. Since all soils react differently, it is important to gather as much information as possible about each type of soil. No research has been done investigating how deforestation affects vertosol soil. We propose to investigate the vertosol soil in Queens Island to find out how the SOC levels are impacted by deforestation. Soil samples will be taken from under native vegetation of Queens Island as well as areas with crops. By comparing the SOC levels in each of the soil samples, we hope to understand how deforestation impacts vertosol soil.

*Faculty sponsor: Anne Marie Smith, Kari Stone*

### **Quynh-Nhi Nguyen**

*"Removal of Mercury in Aquatic Ecosystems Using Eichhornia Crassipes for Bioremediation"*

Mercury can bioaccumulate in animals and subsequently humans who may consume those animals. In recent years, scientists have closely studied the patterns, possible causes, and the concentrations of mercury in aquatic environments

and wildlife. While overall analysis of mercury levels has garnered the most attention, the bioremediation of mercury in water is a solution not many scientists have fully explored. Certain plants have noteworthy amounts of glutathione, which plays a role in filtering out heavy metals. The eichhornia crassipes, commonly known as the water hyacinth, an aquatic invasive, has shown potential effectiveness in minimizing the mercury concentration in waters. By incorporating the water hyacinth into various aquatic environments and measuring the changes of mercury concentrations, we will be investigating the actual effectiveness of this proposed solution.

*Faculty sponsors: Anne Marie Smith, Kari Stone*

### **Cassidy Henson**

“The level of Mercury Concentration Material Transfer to Avian Eggs of the Pagophila eburnea”

Research of mercury transfer from Arctic Avian parents to eggs is necessary because it is crucial to the life-span of avian species. Numerous studies have been done concerning how landscape and population have been affected, however reproduction and the material transfer to the contents of avian eggs have little to no research. The mercury transfer occurs during reproduction through the material transfer to Pagophila eburnea, commonly known as Ivory Gull, eggs, especially in the contents of the egg. The Ivory Gull is classified as near threatened and higher methyl mercury levels are an immediate threat. We will travel and collect Ivory Gull egg samples and obtain blood samples from Ivory Gull parents of the eggs collected to compare levels of mercury concentration. Samples will be brought back and examined for mercury concentration.

*Faculty sponsor: Anne Marie Smith, Kari Stone*

### **Desia Thurmond**

“The Effects of Fertilizer Composition on Greenhouse Gas Emissions from Soil ”

It is important to understand the effects fertilizers have on soil because specialized fertilizers can control the amount of greenhouse gas emissions that are released back into the atmosphere. Being able to control the emissions at the source can help maintain not only human but the life of the planet as well. Several studies have been done to show the different effects of adding carbon dioxide, methane, and nitrous oxide chemical compounds to the soil. Others have looked into different compositions of fertilizer and their effects with the soil, yet there hasn't been any research on studying the effects of combining two such ideas. With the idea of specialized fertilizer, more components can be added to create a more stabilizing fertilizer for the soil and its environment. This research would be conducted by studying the chemical compounds and fertilizer compositions that yielded success and combining the two samples. The tests would be conducted using chromatography and values would be taken of the greenhouse gases over time.

*Faculty sponsor: Anne Marie Smith, Kari Stone*

### **Elizabeth Pietruczyk**

“Advertising Content Analysis of a 2017 European Wax Center Advertisement”

This is a magazine ad for the European Wax Center in a 2017 Glamour Magazine. When looking at this ad, the first thing we notice is a woman sitting near a door with her left shoe off. If we look closer at the image, we can see that her hair and clothes are a bit messy. If we turn our attention towards her face, we can see she is clearly not happy and looks as though she is troubled by something. Beautiful eyebrows that are paired with the phrase that we see makes the audience believe that no matter how good or bad their life gets, if they go to the European Wax center, they will always have gorgeous eyebrows. Overall, going to the European Wax Center will always make your eyebrows look beautiful. And with beautiful eyebrows, she can easily find another man who will not disrespect and cheat on her. *Faculty sponsor:*

*Luigi Manca*

### **Tyler Vavrek**

“Synthesis of 1,2,4-dioxazinanes via aza-Michael desymmetrization”

Endoperoxide containing drugs such as artemisinin are the frontline treatment for malaria. Unfortunately malaria parasites are developing resistance to current antimalarial drugs and new classes of therapeutics are needed. 1,2,4-dioxazinanes are a relatively unknown heterocycle that has potential biological activity. We report the diastereoselective synthesis of 1,2,4-dioxazinanes via a catalyst free, one-pot cascade reaction. A wide range of peroxyquinols, aldehydes and amines were successfully combined to create novel 1,2,4-dioxazinanes as single diastereomers in high yields. The reaction mechanism is proposed to proceed via peroxyhemiaminal formation followed by an aza-Michael desymmetrization reaction. These novel 1,2,4-dioxazinanes show cytotoxicity towards a number of cancer cell lines.  
*Faculty sponsors: David Rubush*

### **Brad Riva**

“Analysis of Tito's Handmade Vodka Magazine Advertisement”

In this ad a man and his dog are relaxing on his ranch after his long day at work. When he comes home all he wants to do is put his feet up and look out over his land with a drink in his hand. He works a high paying job but likes to get his hands dirty on the weekends. He loves his country and his vodka. This man can be defined as a proud worker because he embodies the company's commitment to quality and promises reliable product. The multiple stars in the ad and the central chart that compares Tito's to other countries. The colors of orange and black are associated to Austin Texas because that is where it is made, and the University of Texas has the same color scheme. This ad is engineered to target the middle-aged man who comes home from work and wants to put his feet up and forget about work. He wants to get away from technology and go back to the real things in life, his country, his dog and his vodka.

*Faculty sponsor: Luigi Manca*

### **Mohammed Haq**

“Masculinization of Kohler Kitchen and Bath Products- Advertisement Content Analysis”

This project provides a detailed content analysis for a 2016 advertisement found in GQ magazine for Kohler, a company that sells kitchen and bath products. Analysis of this advertisement sheds light on the peculiar methods taken by advertisers for Kohler to masculinize their products to appeal to the male viewers by feeding off a man's psychological nature, and remove a feminine-only stigma behind their products. Examination of the advertisement's narrative and the plethora of associations incorporated provide a thorough breakdown on Kohler's advertisement methodology to show consumers the many techniques advertisers use to influence the purchase of their products in our consumer society.

*Faculty sponsor: Luigi Manca*

### **Alaina Thompson**

“The Feasibility of Implementing Airborne Wind Turbines in Lake Michigan”

My poster is on the feasibility of implementing airborne wind turbines(AWT) into Lake Michigan. My proposal is very similar to one of the sources I am using which is on the feasibility of implementing them in Northern Ireland. I will use various wind data and facts about AWT to see if they would be capable of being put into Lake Michigan. Most AWT are still in prototype phase and very few are available on the market. There are various models to choose from, yet my paper will emphasize on the Flettner and kite models as they are more sensible and less obstructive to other people.

*Faculty sponsor: Jean-Marie Kauth*

### **Phil Whitman**

“2017 U.S. Weekly Magazine Lunchable Ad for Dr. Luigi Manca's Communication 201 course, depicting the influences of subliminal advertising and the affluent nature of the mind filling in blank space”

The primary association evokes happiness within a child, a hallmark of good parenting. The association of a child's happiness and the Lunchable creates an incentive for the mother to purchase this for their child. The emptiness of the room creates a utopia for the parent causing them to associate the idea of their child receiving a personal education.

The girls light blue clothing represents her innocence and accentuates the purity of this product. The color of the box is green which presents the idea of safety and financial stability, along with yellow to emulate happiness and warmth. The yellow of the box mirrors the sunny day outside the window the Lunchable bringing creativity and light to the child. The outlandish images coming out of the box further demonstrate the expansion of the child's imagination due to it bursting with fun, allowing her to think freely even when inside the classroom.

*Faculty sponsor: Luigi Manca*

**Kristine De La Garza, Sharon Chacko, Nourhan Mohamed, Aisha Baggia**

“Barack Obama Inaugural Speech 2008 Analysis for Speech Class”

Excerpt of our speech analysis. In order to unify a politically divided nation and to persuade Americans that they made the right choice electing Obama as president, Obama utilizes inclusive diction and an optimistic and hopeful tone. He employs an appeal to nationalism with the abstract diction choices of patriotism, service, and responsibility in order to unite Americans in hopes of expressing these ideals and to emphasize that a nation is better off united. Obama persistently appeals to family, patriotism, and nationalism through his mentions of family and by emphasizing ideals of "democracy, liberty, opportunity, and unyielding hope", which are all values that everyone in the United States cares for and holds to a high standard. Obama also seeks to join the citizens in rebuilding the nation into a better, stronger country.

*Faculty sponsor: Luigi Manca*

**Faisal Khan, Ozair Hosain, Kausar Khan, Syeda Saberi**

“Sexual Assault by Michelle Obama speech analysis. Discusses her goals that were presented with the speech”

This speech analysis describes the motives and background of the situation that former First Lady, Michelle Obama, presented in her speech. This speech analysis discusses the background of Michelle Obama and the topic that she presented in her speech: sexual assault. Mrs. Obama had three main goals she chose to address in this speech. The first was to campaign for Mrs. Clinton while exploiting President Trump. The second was to raise awareness for feminine equality and empowerment and the third was to set up the stage for the next female president and authority figure.

*Faculty sponsor: Luigi Manca*

**Maseera Moin, Sharyn Doden, Jessica Newhouse**

“Alkyltrifluoroborates as electrografting precursors for surface modification of glassy carbon electrodes”

Electrografting can be used to form a film of molecules that are covalently bonded to a surface, and this approach should allow the surface's properties to be modified and controlled. While aryl diazonium salt precursors are the most widely used in electrografting studies, our research focuses on investigating the suitability of organoboron precursors, such as trifluoroborates, for these applications. A benefit of these precursors is the possibility to access alkyl-decorated surfaces. The electrochemical procedures for electrografting alkyltrifluoroborate precursors onto glassy carbon electrodes, as well as preliminary characterization of the resulting modified electrodes, will be discussed.

*Faculty sponsor: Sarah Shaner*

**Roshni Patel**

“Advertising Content Analysis of Olay Luminous from Allure Magazine”

This content analysis includes identifications, a snapshot of the ad, the narrative or story depicted in the advertisement, associations presented and concluding understanding of the content in the ad.

*Faculty sponsor: Luigi Manca*

**Dylan Wodrich**

“Advertising Content Analysis of The Grand Tour from Popular Science Magazine, 2017”

This ad is for The Grand Tour, an Amazon Original Show. The advertisement is from the January/February 2017 issue of Popular Science. The center of the ad shows the three famous automotive presenters standing in the desert. The logo appears above, as well as the infamous quote that Jeremy frequently says. The ad also shows a burning tire, a goat eating a steering wheel, and black smoke from the right side of the page. The story being told is one of mischief. The hosts were likely trying to do something useful and completely failed. The random nature of the ad is intentional. There is no story to this ad, which is indicative of the content of the show. This ad aims to associate the mischief of the presenters with the new show, Amazon, and the presenters' old show, "Top Gear". In conclusion, the ad is designed to persuade both new and returning fans of the presenters to watch the new show because it will provide them with endless laughter.

*Faculty sponsor: Luigi Manca*

**Andrea Goyao**

"Advertising Content Analysis: Wonderful Pistachios"

*Faculty sponsor: Luigi Manca*

**Prerana Mitta**

"How detrimental are the effects of Manganese from improper e-waste disposal on the endocrine functioning of the brain and thyroid in humans?"

This research project aims to understand the findings thus far regarding how manganese from improperly disposed electronic waste negatively impacts the hormonal functioning of the thyroid and brain in humans. My research explores experiments that have analyzed the health problems that excess manganese exposure leads to in rats. Furthermore, I delve into studies that explore how manganese functions as a critical trace element but also as a problematic agent in the endocrine system. These findings are connected to the growing problem of improper e-waste disposal, as is demonstrated by several studies in the area of e-waste toxicants and related human health indicators. Thus far, the contents of e-waste have been shown to be sources of excess manganese, and manganese has been shown to interfere with proper endocrine functioning in animals; therefore, through this research project, I intend to propose that further studies be conducted in which the overarching relationship between e-waste and the human health problems associated with manganese exposure be solidified, so that potential causation existing in this area may be acknowledged and acted upon accordingly.

*Faculty sponsor: Jean-Marie Kauth*

**Maria Sposito**

"Advertising Content Analysis, Company: Burts Bees"

*Faculty sponsor: Luigi Manca*

**Farheen Moinuddin**

"Namaste Salaam: Hindu-Muslim Relations Then and Now"

Not only are Hinduism and Islam the religions of the majority in South Asia, but they are also two of the largest religions in the world. Both religions have an underlying message of peace and some similar practices, such as fasting and completion of a pilgrimage. Nonetheless, the two religions differ considerably on a variety of different topics, including type of theology and concept of God, scriptures and messengers and apostasy, to name a few. The interaction between Hinduism and Islam began in the 7th century CE, including periods of religious violence, social and status conflict, and prejudice, but also periods of tolerance and peaceful cooperation. The contemporary interaction between the two religions still includes some communal tensions in certain areas due to socio-political conditions. However, Hindu-Muslim relations outside the confines of historical and political influences no longer carry the connotation of sectarianism and strife, but rather, aim to appreciate each other through peaceful coexistence and dialogue. This project

demonstrates the shift in the relationship and interactions between Hinduism and Islam over the span of several centuries.

*Faculty sponsor: Jayashree Sarathy*

### **Uzair Siddiqui**

“Analysis of MARKTEN advertisement found in Glamour magazine”

This ad is targeted towards women since it is in Glamour magazine. They want women to get their men to switch from traditional cigarettes to vape pens. They have associated vape pens with artistic qualities like playing an instrument, and they display a piano here to show that vapers can be classy people. This suggests that vaping can make your husband/boyfriend artistic and classy. The two things that are triangulated are the man vaping and the woman’s arm around the man; this is done to relate those two things together. The red color is a romantic color leading women to think vaping will make their significant other romantic., which could motivate consumers to buy this product if they have any desire in them at all to smoke.

*Faculty sponsor: Luigi Manca*

### **Anum Razak**

“Hydratrak from Women's Health Magazine of January 2017 the fun way to track healthy hydration”

Snapshot of the ad: When you look at this ad, the first thing you notice is a woman who is fresh-face, clear skin, no makeup, hair tied, and has a backpack on and she is listening to some music. You can notice how she looks pleased about to drink the water in her new bottle. The bottle has a nice presentation, it shows up as a bright color making the water look fresh and crisp. On the side you see other water bottles that are colorful and have different types of styles with them. The water bottles have bands on them to track down how much water you drink in a day. The bands are bright and colorful, and you can move them to check your water intake. The captions provide that drinking water every day will promote healthy weight loss, helps energize muscles, and keeps skin looking good. It also shows it won an award of international Forum’s Home Style which is stated at the bottom end of the ad on the left side.

*Faculty sponsor: Luigi Manca*

### **Kara Epping**

“Analysis of the Marie Claire February 2017 Maybelline Ad for the new line of mate nude lipsticks”

The project is an analysis of the Maybelline lipstick ad. I looked for patterns of stereotyping in the ad. I also analyzed the way that woman are seen in this ad and how they are reflected in the eyes of the reader of the magazine. I found that the ad is trying to show that nudity is an acceptable thing. They also tried to relate it to all skin types to express that all skin colors are equal. The final conclusion I got from the ad is that the consumer might get the idea that if they buy the lipstick they could end up natural and nude like the girls in the ad.

*Faculty sponsor: Luigi Manca*

### **Madison Schumacher**

“Business Sustainability and the Triple Bottom Line”

As Businesses continue to evolve, they often redefine their products and selling tactics in order to remain competitive with market and consumer demands. While efficiency is often the goal of the company, measuring the degree in which the company is pursuing sustainable growth can be difficult. The triple bottom line (3P) is an accounting framework that analyzes the bottom line of the company's social, environmental and financial performance throughout the period. The incorporation of a triple bottom line framework would call for the company to ultimately redefine success as more complex than a liquid resource, but also as an intangible asset.

*Faculty sponsor: Jean-Marie Kauth*

**Adrian Pierzchanowski**

“Arthur J Schmidt Scholars Program: Benedictine Basketball Bash for the Members of the Wellness House of Hinsdale”

The project was monitored under the direction of the Arthur J. Schmidt Scholars program, including Ms. Joan Henehan and Dr. Gill. For this service project the Wellness House of Hinsdale, a nonprofit organization that helps families afflicted with cancer, was invited to Benedictine University for a basketball game and also a pizza dinner with carnival type games for children. Preparation for this event began around 4 months before the event. Gym reservation required extensive meetings with the Benedictine athletic department. Also, meetings occurred between us and the Wellness House of Hinsdale to talk about effective advertising strategies so that members can attend. About 14 raffle prizes were gathered for the event. We contacted many business about raffle donations, and received donations varying from Northwestern football game tickets to various gift cards. A Potbelly fundraiser occurred in January to raise necessary funds to hold event. Much of our pizza was donated by Papa Johns. The actual event ran smoothly. Around 15-20 people showed up, a little less than we expected. However, the event was a success and everyone who came had a great time.

*Faculty sponsor: Joan Henehan*

**Maryam Mohamed**

“Evaluating Drinking Quality of Water In West Africa”

There is several evidence to back up the claim that water is an essential part of life. The necessity for water, although prevalent in all parts of the world, is not easy accessible for people living in developing and third world countries. Many measures have been taken in order to increase the amount of clean water in these countries, including wells set within Africa. However, without the proper care and maintenance to the infrastructure, the wells tend to become almost useless in providing clean water for those depending on it. Several studies have been conducted in order to identify specifically what contaminants are invading the well water and the water in West Africa what is causing these contaminants to be present, and what easy and inexpensive measures can be taken in order to ensure the cleanliness of the wells. My research is about analyzing contaminants in drinking water in West Africa and its effects on human health. My question is what methods can be used to measure contaminants in drinking water, what contaminants are present, why these contaminants appear in water, and what threat these contaminants pose to human health?

*Faculty sponsor: Jean-Marie Kauth*

**Casey Williams**

“Aveeno Night Cream Advertisement Starring Jennifer Aniston, this poster is explaining how the product company Aveeno uses Jennifer Aniston with other small associations to sell their product”

This is an ad for Aveeno night cream. In this image we see a middle-aged woman pictured which happens to be actress Jennifer Aniston. An association for this product is that they are using Jennifer Aniston to help sell their product, she is a well know, well liked actress by middle-aged women and she is known to be very beautiful even at age 48. Another association is the huge diamond on her ring finger, showing us the fact that she is married. She is wearing white like the cream itself and has blackberry colored nails which are same color as the lid, the blackberry, and the words on this jar. Above the bed board there is a caption that reads “Naturally Beautiful Results.” This story is told through Jennifer; in her personal life she uses Aveeno night cream before bed because she wants to look younger longer. If you just look at her it is proven that there is Naturally Beautiful Results, this product can really stop the affects of aging on women.

*Faculty sponsor: Luigi Manca*

**Jacob O'Donnell**

“The Legal System and its Effects on Climate Change”

Climate change is a pressing topic and significant issue in today's society. Recent scientific research displays that pollution and the use of non-renewable resources will lead to crucial, and non-reversible environmental changes. My

project consists of an in-depth analysis of the legal system. Considering the current social and fiscal issues of nations across the globe, I will assess to what extent the leaders and politicians of today can utilize law to delay or stop the inevitable effects of climate change from developing into more severe consequences that could cause momentous transformations to the lifestyles of all beings and to the physical landscape of the world we know today.

*Faculty sponsor: Jean-Marie Kauth*

### **Sakina Musani**

“Case Study on the Effectiveness of the Common Core State Standards”

Education for students from Kindergarten to 12th grade has become a popular topic in America since the implementation of the Common Core State Standards (CCSS). Educators and administrators have been debating on whether to adopt the Common Core State Standards. While the CCSS have created certain issues in the education of students, experts in this subject have proven that students can advance in school with the Common Core State Standards. This work examines the effectiveness of the Common Core State Standards to find the improvements that need to be made in order to improve the type of education students are receiving. In addition to including outside sources to study the issue on adopting the CCSS, an interview was conducted to further inspect how students can learn in an ideal manner.

*Faculty sponsor: Alandra Devall*

### **Elber Haro, Stephanie Phillips, Makenna Reese, Ishaily Valdez**

"Tear Down this Wall"

A Brandenburg Gate Speech Analysis

*Faculty sponsor: Luigi Manca*

### **Noura Omari**

“Ain’t I A Woman” Analysis

This project analyzes Sojourner Truth's speech, "Aint I a Women". In this project, Truth's life will be told for the audience to better understand what the speech is about. It emphasizes the importance of injustice and equality. It highlights the goals Truth is trying to portray to the audience. Sojourner Truth has three main goals that she wants her audience to understand: 1.) Equality of the sexes is imperative to a functional society 2.) Women must be appreciated in society 3.) Skin color doesn't define self worth. Through this project, we will invest in the three main goals of Sojourner Truth's speech and we will pinpoint the importance of this speech.

*Faculty sponsor: Luigi Manca*

### **Ali Sultan, Michale Mullen, Hothaifah Othman**

“Determining Sizes of Bryozoan Colonies Across Different Bryozoan Species Found in the Fossil Record”

The Bryozoan phylum consists of colonial, aquatic invertebrate animals commonly found in tropical marine environments. They have a 450-million-year temporal range that starts in the early Ordovician and goes to recent times. Colonies range from one centimeter to over one meter, but the majority of the colonies are only about 10 centimeters. However, most fossilized colonies are not fully intact and they have provided difficulties to figuring out their intact colony sizes until now. Here we test to see the relationship between fragment fossils and colony sizes.

*Faculty sponsor: Philip M. Novack-Gottshall*

### **Saima Armana, Maryam Moeed, Rachel Majerczyk**

“A CRISP(ie)R New Method: The knockdown of CFTR using guided sgRNA transcription to increase transfection efficiency”

Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) is a chloride channel in the apical membrane of intestinal epithelial cells. In inflammatory diseases, such as Crohn's disease, excess bile acids in the colon stimulate Cl<sup>-</sup> secretion to cause fluid loss and diarrhea. CFTR's role in this can be confirmed by developing a model wherein CFTR is knocked down. T84 cells are often used to study intestinal Cl<sup>-</sup> secretion as there is high CFTR expression. Transfection efficiency of these cells have been reportedly low, but in this study we take advantage of the Guide-it sgRNA transcription kit (Takara Inc.) that offers a new level of targeting, efficiency and ease of use.

The sgRNA oligo sequence, designed using the MIT sgRNA design tool, and Guide-it sgRNA In Vitro Transcription kit will be used to produce a transcript that will be transfected into T84 cells using Jet prime transfection. The 2000 bp amplicon T7E assay will be used to screen transfection efficiency. Also, the role for CFTR in bile acids will be screened by fluorimetric analysis of the effects of dihydroxy bile acids, DCA and CDCA, on apoptosis (Annexin V-FITC labeling) and Cl<sup>-</sup> secretion (MQAE fluorescence).

*Faculty sponsors: Jayashree Sarathy, Mark Poch*

### **Bruce Granick, Chand Bhanot, Omair Lai**

**"You Had Me at CRISPR: Exploring Knockout Techniques in T84 Cells"**

Secretory diarrhea is a condition affecting millions of people and is characterized by excessive fluid loss. Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) and bile acids are suggested to play a role in this process. One way to confirm the role of CFTR in bile acid-diarrhea is to generate a model system of cells±CFTR. A common intestinal cell model used to study CFTR function is human colon carcinoma T84 cells. However, these cells do not lend easily to genetic manipulation. Thus, the goal of this study is to use the novel, efficient CRISPR/Cas9 technology to knockout CFTR function in T84 cells and compare the transfection efficiencies of two methods i) CRISPR/Cas9 system, utilizing plasmid to transfect and express a small guide RNA (sgRNA) and ii) sgRNA in vitro transcription system, to deliver a complete transcribed molecule without plasmid intermediary. The transcription efficiencies of both techniques will be evaluated using real time PCR, Western blotting and T7 endonuclease assay. The most efficient method will be used in future studies to genetically manipulate T84 cells and aid in the design of novel therapeutic methods to treat constipation and diarrhea.

*Faculty sponsor: Jayashree Sarathy, Mark Poch*

### **Emily Gornick, Matthew Kirchoff**

**"Plentiful Plasmids and Pretty Green Lights: CRISPR(y) Crafting of CFTR Knockouts"**

Cystic fibrosis transmembrane conductance regulator (CFTR), a Cl<sup>-</sup> channel native to epithelial cells, plays a major regulatory role in intestinal fluid secretion. Bile acids, which mainly aid in lipid digestion, are regulators of Cl<sup>-</sup> secretion and in pathological concentrations result in diarrhea. An accepted model to study Cl<sup>-</sup> secretion is T84 human colon cancer cell line. Unfortunately, their transfection rates are often low. Here, we use Guide-it CRISPR (clustered regularly interspaced short palindromic repeats)/Cas9 kit in an attempt to knockout CFTR in T84 cells and study CFTR's role in bile acid-diarrhea. Purified plasmids containing CFTR knockout sequence for CRISPR are introduced into T84 cells. Transfection rates are quantified by GFP fluorescence and CFTR expression by PCR and Western blotting. After CFTR knockout, WT and CFTR<sup>-/-</sup> cells will be used to study the effect of primary and secondary bile acids, CDCA and LCA, on apoptosis and Cl<sup>-</sup> secretion, using flow cytometry and MQAE fluorescence respectively. These studies will help identify a simple, RNA-programmable method to mediate genome editing in T84 cells, and will help identify key players in bile acid-diarrhea.

*Faculty sponsors: Mark Poch and Jayashree Sarathy*

### **Ciera Duffy**

**"Glacial Melting Impact on Agriculture and Livelihood"**

I am researching how the melting Himalayan glaciers affect the agriculture, and, in turn, the citizens of nearby societies. I chose to study this topic in an attempt to understand how it works and what can be done to combat the negative

impacts. Since these parts of central Asia rely heavily on agriculture, those living there also experienced the indirect consequences of the melting. It is important to answer this question because the lives of people are in danger. Not just now, but future generations too. The habits of people all over the globe, such as in America, are having negative effects on those in other countries. By compiling research done in past studies, trends in the changes occurring become apparent and can be predicted more accurately. By predicting these changes, the damage done to the local peoples and their farms can be minimized.

*Faculty sponsors: Anne Marie Smith, Kari Stone*

### **Charlotte Youell**

“Is it profitable for other large corporations to go green like Nike has?”

I am researching whether or not it is profitable for companies to become environmentally sustainable; however, they will only do so if it is in their best-interest, meaning that there is a monetary benefit from greener alternatives. Due to the large amount of influence and power big corporations hold not only on the market and consumers but competitors as well, I felt they had a responsibility to lessen their environmental impact and encourage other companies to do so as well. Although I still believe it is possible to implement green alternatives, I also recognize that large corporations are hesitant to use greener methods of production due to the potential loss of income. A business does not have moral obligations to conform to an environmental pledge. Therefore, I formulated my research question to address whether there would be a more profitable outcome to going green. Nike is a leading contender in sustainability as well as a strong competitor and I was interested in seeing what methods were applied in order to reduce their carbon footprint and whether companies can also adopt these methods.

*Faculty sponsor: Jean-Marie Kauth*

### **Benjamin Jung**

“How effective are Bioswales at filtering parking garage runoff?”

While parking garages are highly convenient for parking under weathered protection and providing excess storage in limited space, they pose great environmental threats. Hundreds of chemicals such as gasoline, petroleum, polycyclic aromatic hydrocarbons, silt, and even E Coli litter the floor of the slopes of parking garages across the world. Although no one sits down to eat food right off the floor, when rain is present, it washes these chemicals down the garage slopes and as a result they eventually flow into nearby plants, ponds, lakes, and streets where they become dangerous micro-pollutants. Pollution is a serious issue that can lead to the spread of water-borne diseases. This is where Bioswales come into play, they are grassy marsh-like areas containing some vegetation that can easily filter and break down these micro-pollutants. In order to see just how effective Bioswales are at acting as a natural filter, I conducted countless research in order to determine what specific chemicals Bioswales effectively absorb. I also read over multiple surveys in order to determine what additives can help increase the filtration rate of Bioswales.

*Faculty sponsor: Dr. Jean Marie Kauth*

### **Martin Dahlquist, Benny Masi, Holly Ward, William Campos**

“An Analysis of Martin Luther King's "I have a dream" Speech”

This speech analyzes Martin Luther King's "I have a Dream Speech". It was given during our speech 110 class with Dr. Luigi Manca. He filmed us and wants to have our film showed at the URSA Conference. The speech discusses King's Life and the Civil Rights Movement. We discuss other activists as well as King himself. We also then discuss what were the goals of King for his speech, and how he achieved them when delivering the speech.

*Faculty sponsors: Luigi Manca*

### **Ahmad Ahmad, Jacob Linao**

“Electrochemical study of chromium(III) terpyridine complexes”

The underlying goal of our research was to observe and study the accessible oxidation states for a series of chromium complexes of the general form  $[\text{Cr}(\text{Rtpy})_2][\text{PF}_6]_3$  (in which R = H, Ph, tolyl, BrPh, NMe<sub>2</sub>Ph, MeOPh). Electrochemical experiments were conducted with a potentiostat in an air- and moisture free environment. The cyclic voltammograms of the chromium complexes all exhibited at least three reversible reductions, and no oxidative features were seen. The identity and nature of the R group was shown to directly affect the potential at which the reductive features were observed. The experimental methods and electrochemical results will be presented.

*Faculty sponsor: Sarah Shaner*

### **Jacob DeSalvo**

“What Sort of Impact Does the Environment Have on Brain Tumors?”

Evidence suggests that there is a strong link between specific environmental effects and an increased risk in brain tumors, specifically in pesticides and mobile device electromagnetic frequencies. The hypothesis that air pollution has an effect on the risk in brain tumors was rejected, but the mobile devices and pesticides were supported by the analysis of various case studies. In order to further clarify and find any extraneous environmental links to brain cancer, a larger population case study should be done taking into account all kinds of demographics, family history, phone usage, travel history, all kinds of exposure to pollutants (whether that be in food, air or water), and more.

*Faculty sponsor: Jean-Marie Kauth*

### **Rana Ahmad, Jonathan Stiles**

“The Dynamical Complexities and Density of States of Nanoclusters”

There are many descriptors known about the microscopic world but ways to utilize some of these descriptors have yet to be discovered. We are attempting to understand the specific nature of certain nanoclusters; by modeling dynamical complexities of these nanoclusters, we can better understand their nature in chemical kinetics and reactions. Due to the extremely small size of these systems, this project is difficult to do via traditional experimental methods. Thus, we employ computational methods to discover molecular dynamics for these nanoclusters. By programming various algorithms and many-body potentials, we analyze the descriptors of a nanocluster in order to help us create models for these small-size systems.

*Faculty sponsor: Darya Aleinikava*

### **Boyoung Joo, Afshan Ahsan, Ferhan Syed**

“Elemental analysis of potassium in organic berry liquors from Northern Europe”

The objective of this study was to determine and compare the concentrations of potassium, an essential dietary element, in various industrially produced liquors originating from Estonia and Finland. The liquors are mainly produced for domestic consumption with some sold to nearby European countries. The liquors analyzed were manufactured from organic sea buckthorn berries, black currants, blueberries, cloudberries, cranberries, red raspberries, and wild strawberries. The potassium levels were quantified by atomic spectroscopy. The samples were diluted as needed, followed by standard addition procedure of potassium and flame-atomic absorption spectroscopy by AAnalyst 200 from Perkin Elmer. Mean absorbances, graphical standard addition, and linear regression were used to determine the concentration of potassium in the original beverage samples.

*Faculty sponsors: Niina Ronkainen*

### **Avery Abraham, Michael Mullen**

Active learning done in a morning class compared to an afternoon class

We used the COPUS method, Classroom Observation Protocol for Undergraduate STEM, to compare active learning done by students in a morning class to an afternoon class. The COPUS method is used to measure how faculty and students are spending their time while in class without evaluating the professor's performance. We defined active

learning as listening, answering, and asking questions while spending less time waiting for the professor. Here we report more active learning was done by the students in the morning class than in the afternoon class. The COPUS method has allowed us to better understand how class time is spent and can help guide future curriculum. The data collected for this analysis is part of a larger project to document teaching methods in the College of Science.

*Faculty sponsor: Allison Wilson*

**Brandon Nguyen, Dhwani Patel**

“Do In-class Activities Increase Student Responsiveness?”

The prevalence of students asking individual questions and responding to instructor questions is an important measure of student comprehension for instructors. Many college professors gravitate towards lecture driven courses in which students may be reluctant to ask questions in front of an entire class. Consequently, it is imperative to examine if students are more likely to inquire when working in group or individual activities apart from the lecture. Classroom observation data of various courses were collected by the learning assistants of Benedictine University. The data were then compared to precise the frequency of student questions when an instructor was lecturing versus when an instructor incorporated in-class activities. Students answering instructor questions and asking their own questions was determined to be less prevalent when the instructional approach of necessitating individual thinking or group work was employed. Interestingly, lecturing throughout the duration of the class showed that students were more likely to conduct an inquiry. The data collected for this analysis is part of a larger project to document teaching methods in the College of Science.

*Faculty sponsor: Allison Wilson*

**Andrew Trybula, Zach Pogioli**

“CRISPR-y Worms: A Knockout of pgp-3 Is On The Menu”

Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) is a Cl ion channel in the apical surface of intestinal cells and regulates intestinal fluid secretion. Excess bile acids are shown to play a role in pathologies related to inflammation and diarrhea, yet the role of CFTR in this process must be confirmed. In this study, we utilize the model organism *Caenorhabditis elegans* to study the role of CFTR homolog P-glycoprotein-3 (pgp-3) in bile acid-induced fluid secretion. Previously, we have shown dihydroxy bile acid, CDCA, increased intestinal secretion and caused cells to explode. In attempt to study the role of pgp-3, we used pgp-3(RNAi) to knock down the expression of pgp-3, but were not successful using this methodology. Here, we use the CRISPR system to knockout pgp-3 by feeding the *C. elegans* plasmids expressing a pgp-3 sequence specific complete sgRNA with Cas9. Depending on its success, using this technique could prove to be a viable method for creating *C. elegans* mutants without use of electroporation. We will use wild type and pgp-3 deleted mutant worms to study effects of bile acids, CDCA and LCA, on intestinal fluid secretion using the osmotic stress assay.

*Faculty sponsor: Mark Poch, Jayashree Sarathy*

**Kathleen Roe, Susan Anthony, Tess Michalica, Braden Timmons**

“Rest in Peace: Students Create Obituaries as Assessment”

Educators need to consider the perspective of the diverse racial, ethnic, social and cultural backgrounds of each student they teach and by allowing different ways to assess the students allows the teacher to do so. Therefore, this presentation is over the assignment given where students had to select one or the other of the following: 1) create a character (you pick name, age, sex, etc.) and take him/ her through Erikson’s eight stages of psychosocial development. Describe/clearly identify the different stages as you write an obituary for your character or 2) create a character (you pick name, age, sex, etc.) and take him/ her through Kohlberg’s three levels and six stages of moral reasoning. Describe the different stages with examples and be sure to clarify each stage/level in an obituary for your character.

*Faculty sponsors: Alandra Devall*

**Sarabbir Thiara**

“Advertising Analysis: Hydroxycut helps lose weight in just few weeks”

The advertisement is intended for women who want to lose weight, and have an ideal beach body so they can look beautiful. The creator evoked negative feelings in women who are overweight and unhappy about it; he or she also evoked positive feelings in some of those same women who have now found an effective way, through using Hydroxycut, to lose weight. Also the creator used before and after picture to persuade women with the benefits of taking hydroxycut. Most importantly, the creator used an ideal beach body to persuade women to buy the product because they know every women wants to have a nice attractive body.

*Faculty sponsor: Luigi Manca*

**Tony Marzano**

“Analysis of Advertising Persuasion Methods used by 2008 Triscuits Magazine Ad”

The story of the ad is told in text at the top of the ad, which reads “Jessica opened her box of Rosemary & Olive Oil Triscuit crackers. The aroma instantly transported her to the countryside. One bite, and she’d finally found the complexity and flavor she craved, a combination sadly missing from the pretty boy in the ascot. Rosemary & Olive Oil, a tasty romance awaits.” Since this ad appears in Country Living Magazine, a womens magazine, the message the ad is selling of how “Triscuits are more satisfying then men” and that “men are bad” are messages that tends to resonate with the demographics that read this magazine.

*Faculty sponsor: Luigi Manca*

**Nicole Jeffrey, Veronica Adamiak-Duncan**

“The Effects of Learning Assistants on 100-Level Classes versus 300-Level Classes”

Improving student learning is key in education. It is important to engage students in classroom activities to better facilitate their learning. Our project investigated the effects of learning assistants on 100-level classes versus 300-level classes. We observed two college level classrooms, one in the physical sciences and the other in the biological sciences each for 50 minute periods. The data was collected using the Classroom Observation Protocol for Undergraduate STEM (COPUS). This enabled us to observe the instructor and student actions throughout each class. Following the data collection, we calculated the percent differences of what was done in the 100 level course, and the 300 level course. Although we found many similarities between the two classes, there was one major difference. We found that students in the 300 level class spend more time asking questions than the students in the 100 level class. This may be due to the fact that the 300 level course is a major course, so students would generally be more interested in asking questions.

*Faculty sponsor: Allison Wilson*

**Samantha Triani**

“Arthur J. Schmitt Project - A Night for Wishes, an event benefiting Make-A-Wish Illinois”

*Faculty sponsors: Joan Henehan*

**Taylor Walthers**

“Arthur J. Schmitt Project: Melanoma Awareness Campaign”

This scholarship project examines the harmful affect of the sun with emphasis on college students as they head off to spring break. Causes of skin cancer, information on UV Index scales, and the harmful effect of indoor tanning beds are looked at and presented to students across campus.

*Faculty sponsor: Joan Henehan*

**Baroosh Durrani, Anwar Elmosa, Ayah Ali, Raneen Bishawi**

“Angelina Jolie UN Speech on the Syrian Refugee Crisis”

On Friday, April 24th, 2015, Angelina Jolie appeared in front of the UN Security Council in New York to raise awareness for the ongoing refugee crisis in Syria. In her speech, Jolie addresses three goals. These goals include her desire to prove to everyone that she is more than just an egotistical celebrity, the encouragement for the UN to unite in taking a step further in solving the refugee crisis, and to convince the European and US public to not be indifferent. This video poster presentation is an analysis of Ms. Jolie's speech and how she achieves those goals.

*Faculty sponsor: Luigi Manca*

**Nela Isic, Sami Tashwali**

“Comparing 100 Level Biology Courses Using the COPUS Method”

In our research, we compared two 100-level biology courses using the Classroom Observation Protocol for Undergraduate STEM (COPUS) method. One of the courses observed was a requirement for science majors, while the other was a course offered for non-science majors. The COPUS method was intended to analyze what both the instructor and students were doing during the class. We determined that science majors were more active in the learning process by answering more questions posed by the instructor and listened/took notes more frequently than students in the non-science major class. We also noted that the science major oriented course involved more clicker questions, follow up questions posed by the instructor and real-time writing on the board. The data collected for this analysis is part of a larger project to document teaching methods in the College of Science.

*Faculty sponsor: Allison Wilson*

**Anna Scheidel, Heinery Arevalo**

“A Continuation of Surveying Pollinators in East China”

Current human populations rely heavily on mass productions of food crops. Most of these crops rely on pollinators to cross pollinate their flowers in order to produce a significant yield. With changing weather patterns and expanding human populations come concerns of effects on the populations of pollinators. For the past three years, Drs. Cheryl Heinz and Steven Day of Benedictine University, Lisle, have led groups of students to East China in order to monitor and record pollinator activity. We are building a database of pollinator abundance and diversity, including visit frequency and pollinator identity. In summer of 2016, a group of six students and their professors collected data from Beijing, Beigou, Xiuyan, Tieling, and Shenyang.

*Faculty sponsor: Cheryl Heinz*

**Marko Saric, Brian Anaya**

“Using The COPUS Method To Compare Classroom Activity With And Without Learning Assistants”

In this project, we analyzed data taken from classrooms which assess what the instructor does and what the students do in response. To collect this, we used the Classroom Observation Protocol in Undergraduate STEM (COPUS) method, which requires the user to record teacher-student interactions (such as lecturing, note-taking, group work, and so on) at two-minute intervals within a lecture. Our goal is to determine if there is a difference in teaching style between a class which does not contain a learning assistant (LA) and one which does -- from the data which was collected, a class containing LAs suggests that more group work activities can be used throughout the lecture. Also, in classes with LAs, the lectures were centered more around group work allowing for more one-on-one discussions. Classes without LAs followed a more "call and response" direction with a smaller gap between questions posed and questions answered. The data collected for this analysis is part of a larger project to document teaching methods in the College of Science.

*Faculty sponsor: Allison Wilson*

**Furkhan Ali**

“Meeting Exotic Organisms, Teaching all Kinds of People, Facing Adversity Everyday, and Surpassing all Odds all in One Zoo”

During the summer of 2016, we worked as Senior Roving Naturalists at Brookfield Zoo. This job entailed many tasks. Not all of them were mentioned in the job description either. We were given training by elite Certified Interpretive Planners in the art of Interpretation. Using these skills we conveyed information regarding wildlife and nature to guests at the zoo as well as outstanding auditors who came to analyze our quality of work. We strived and struggled to serve the entire zoo in our work. Sometimes we faced scorching heat and insect bites, other times torrential rain and crowds, but we made sure to show our supervisors, coworkers, and especially visitors to the zoo that we could do a job like no other. In addition, we also trained apprentices in helping us to perform our duties and inspired them to carry on our legacy. We learned with them, gave speeches with them, and even cleaned up after animals with them. Lastly, we all had a great time working with various animals, some of whom we got really close to.

*Faculty sponsor: Allison Wilson*

**Emily Gornick, Jason Devlin, Tyler Vavrek**

“Synthesis of a Novel Endoperoxide and Evaluation of the Drug’s Ability to Induce Apoptosis in Colon Cancer Cells”

Artemisinin is currently the frontline treatment for malaria and has recently demonstrated potential as an anticancer drug, shown to work by decreasing cell proliferations and inducing apoptosis and cell death. In this study, we developed a simple synthesis of novel endoperoxide-containing small molecules similar to artemisinin. The synthesis combines imines and peroxyquinols to form novel 1,2,4-dioxazinanes in a one-pot cascade reaction. The efficacy of one such synthetic derivative, namely DMR-1, to induce apoptosis in cancer cells was studied using a human colon carcinoma cell line, T84. Cells were grown to confluency in 12-well plates and then treated with increasing doses (5 – 100 $\mu$ M) of DMR-1. Treated and control cells were analyzed for apoptosis and cell death using a flow cytometer. We report that DMR-1 increased apoptosis at concentrations as low as 5 $\mu$ M; however, there was no dose-dependent increase in apoptosis. Such a result may be a consequence of the T84 cell line’s slow proliferation and tendency to secrete mucin, which will be addressed in future studies by increasing the dose of DMR-1 and testing its effectiveness on the rapidly growing A549 lung cancer cell line.

*Faculty sponsor: Jayashree Sarathy, David Rubush*

**Kayla McHale**

“Proposal for the Implementation of Energy Efficient and Green Cloud Computing Techniques”

With the Internet of Things becoming increasingly omnipresent, cloud computing networks will reach a new level of demand never before seen. Already, the data centers which support the cloud networks use exorbitant amounts of energy, and contribute a significant impact on the environment with the energy and waste generated by these centers. Going forward, we must come up with a solution that may be implemented across cloud computing networks that could range from new algorithms to heuristic approaches.

*Faculty sponsors: Jean-Marie Kauth*

**Maimoona Fatima, Jasmine Bains**

“Phylogenetic Incongruences in Mammals and Hominins”

In phylogenetic studies there is a tendency for researchers to exclude postcranial data because postcranial elements are missing or due to the belief that they are functionally or developmentally “prone to homoplasy.” This study tested the hypothesis that postcranial characters cannot be used to reconstruct phylogenetic trees using a character congruence approach. We identified 98 published mammalian datasets that included skull, dental, and postcranial characters. We used several phylogenetic software programs, including Mesquite, Phylogenetic Analysis Using Parsimony (PAUP), TreeRot, and FigTree to calculate Partitioned Bremer Support (PBS) values for each dataset, and analysis of variance to

determine significant differences between data partitions. Across all cladograms, postcranial PBS values were greater than or not significantly from 69.4% of skull PBS values (68 studies) and 64.3% of dental PBS values (63 studies). Postcranial data provided the primary support at 301/1148 nodes (20.8%) and exhibited positive values at 710/1483 nodes (47.9%). These results indicate that postcranial data should in fact be used to help construct mammalian and hominin phylogenies.

*Faculty sponsor: Robert McCarthy*

### **Fardeen Sayed**

“Deforestation's Role in Increasing Disease in Humans”

Overpopulation of the planet is forcing different species to come into more contact with one another. Deforestation has been directly linked to an outbreak of Lyme disease in the United States and the potentially devastating Nipah virus outbreak in Malaysia which led to the slaughter of one million pigs. These past instances have led to a plethora of research. A connection is appearing between deforestation and the outbreak of disease in humans. Deforestation can result in a pandemic in a variety of ways. One common way is the growing human population is spreading into forests. These areas are populated by bats, mosquitoes, and other vectors- carriers of disease. Additionally, deforestation and the loss of flora results in global warming. The warming temperatures are building towards the ideal climate for disease carrying vectors, allowing to develop and reproduce at a faster rate. The research proposal seeks to understand this relationship in more linear aspects but more importantly look into solutions.

*Faculty sponsors: Jean-Marie Kauth*

### **Syeda Hassan**

“The Effects of Hydraulic Fracturing on the Respiratory System”

As the demand for oil is increasing, current technology allows companies to obtain oil using hydraulic fracturing. Hydraulic fracturing, also known as fracking, is pumping a mixture of water, sand and chemicals into the ground to extract oil. While this process is resourceful and fulfills consumers’ demand for oil, there are concerns about the dangers of hydraulic fracturing on the respiratory system is an issue. Is there a correlation between hydraulic fracturing and respiratory disease due to the chemicals that are released into the air? To test this, I propose collecting air samples from three locations. One location would be a hydraulic fracturing site, which would count as the test group. The other location would be a rural area, which would be the control group since air pollution would be the lowest in this area. The third location would be a city since the air is highly polluted. From each sample, I want to look at the chemicals found and how dangerous they are specifically to the respiratory system and compare them to the samples from each other location. This could give an idea of how harsh the chemicals used in hydraulic fracturing are for the respiratory system.

*Faculty sponsor: Jean-Marie Kauth*

### **Faith Donner**

“The Effect of Antibiotics in Water after Typical Treatment Technologies on Antibiotic Resistant Bacteria-caused Infections”

According to the World Health Organization, one of the most serious global public health crises is antibiotic resistance. The interaction and transfer of genetic information from one organism to another results in antibiotic resistant genes. Since their widespread use in the 1940s, antibiotics have saved many lives; however, every year there are more instances of bacteria becoming resistant to typically used antibiotics. For these reasons, it is of the utmost importance that global change occurs for the way that antibiotics are prescribed, used, and disposed of to prevent the cycle that requires the development of new medicines. Prevention is extremely vital, as the efficiency of water treatment technologies in reducing antibacterial genes is still unclear. I decided to pose the research question: Is antibiotic resistance a serious problem in water, even with the existence of modern treatment technologies? As an expansion of this question, I propose that a study be conducted in multiple urban and rural environments to detect antibiotic resistant bacteria (ARB)

and then compared to the rates of ARB-caused infections in hospitals within a certain radius of the water processing plants.

*Faculty sponsors:* Jean-Marie Kauth

**Mahmoud Abdel, Ahmad Altumizi**

“A comparison in the amount of active learning offered in a 200-level chemistry course and a 200-level biology class”

We were interested in seeing if there was a difference between how certain science courses were taught. More specifically, we wanted to see if there was a difference in student-professor interactions in a 200-level chemistry course compared to a 200-level biology course. We observed how students interacted in organic II and human physiology. We did this to find out if there is a difference in the learning environment between the two. The research team was trained on how to observe and marked the specific codes associated for specific actions done by students and the professor observed based on the Classroom Observation Protocol for Undergraduate STEM (COPUS) tool. Active learning in our study was whether the students were engaged in other actions besides listening. After analyzing the data, we concluded that the 200-level chemistry courses incorporated more active learning than a 200-level biology course. The data collected for this analysis is part of a larger project to document teaching methods in the College of Science.

*Faculty sponsors:* Allison Wilson

**Rachel Johnston, Michaela Johnston**

“The Benefits of an Informal Teaching Internship at Morton Arboretum”

The internship at Morton Arboretum as a summer science camp assistant involved leading games, hikes, and nature talks and preparing for and assisting with activities for children from kindergarten to sixth grade.

*Faculty sponsor:* Allison Wilson