Twelfth Annual

Celebration of Student Academic Excellence

Thursday, April 7, 2016 | Center for the Arts

University at Buffalo The State University of New York
Twelfth Annual
Celebration of Student Academic Excellence
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KEY

CURCA Funded Project (Center for Undergraduate Research & Creative Activities)
Member of LSAMP (Louis Stokes Alliance for Minority Participation)
Member of CSTEP (Collegiate Science & Technology Entry Program)
Member of McNair Scholars Program
Member of Honors College
Women in Science and Engineering
College of Arts & Sciences

Students
Mary Aalbue, Chloe Barg, Sarah Hoover, Alex Watts

Major
Theatre Performance

Research Mentor
Professor Maria Horne

Title
Culture and Performance appreciation in London

Abstract
We will be presenting the places we went to in London and what we learned from our experience. We will discuss the history of London and the performances that we went to see. We will all discuss the research projects that we conducted there and how we gathered our information. We will also talk about living life as a true Londoner and how we are more culturally diverse because of our trip. Our presentation will include a poster filled with the memories from our trip that we would like to share.

Student
Judite Ayeh

Major
Biological Sciences

Research Mentor
Dr. John C. Panepinto, PhD

Title
Role of rmt5 in Cryptococcus neoformans Titan Cell Formation

Abstract
The pathogenic fungus Cryptococcus neoformans is found in soil, and is emerging in patients with compromised immunity. In response to the mammalian lung, C. neoformans forms enlarged cells called titan cells. Titan cells are unable to be engulfed by macrophages and serve as a reservoir during infection and latency. PRMT5, a protein arginine methyltransferase, catalyzes the addition of methyl groups on arginine residues in target proteins. A C. neoformans mutant rmt5Δ, lacking RMT5 gene, is reduced in virulence and produces misshaped titan cells. In mammalian cells, PMRT5 modulates the Erk MAP Kinase pathway. We hypothesize that Rmt5 regulates titan cell formation through modulation of MAP Kinase signaling in C. neoformans.

Student
Nina Baldy

Major
Psychology

Research Mentor
Micheal Dent, PhD.

Title
Does Social Housing Influence Ultrasonic Vocalization Discrimination in Adult Female CBA/CaJ Mice?

Abstract
Mice frequently are used as an animal model for human hearing and communication, but their total hearing capabilities have not yet been explored. The current study sought to elucidate if female CBA/CaJ mice are able to discriminate between ultrasonic vocalizations (USVs) of different individuals. Stimuli presented to subjects included four categories of USVs produced by a familiar cagemate and an unfamiliar mouse from a different group. It was predicted that mice would be able to discriminate between the USVs of a familiar mouse better than between the USVs of an unfamiliar mouse. Results thus far have shown that the familiarity level of the subject with the stimulus mouse has no effect on discrimination performance within a single call category produced by either mouse. Further results from this study may shed light on acoustic communication in mice and allow a better understanding of the use of this animal as a model for human communication.

Students
Kathlene Bark, Lilibeth Javier, Colleen McLenigan, Ashley Rossi, Johanna Taylor, Juliana Willey, Katie Youngman

Understudy: Aurora Hastings

Research Mentor
Professor Thomas Ralabate, Immediate Past Chair of the Department of Theatre and Dance and Artistic Director of Zodiaque Dance Company
positive affect, lower negative affect, and less passivity during father-child interactions at 24 months. These results suggest that attachment security with at least one parent at 12 months predicts social interaction with fathers at 24 months.

Student Rachel Boerschig
Major Linguistics and Psychology
Research Mentor Dr. Jeri Jaeger, PhD

Title Developing Lexical Heuristics With Slips of the Tongue: Examining Word Frequency Across Age and Lexical Error Type

Abstract Spoken errors are a constant occurrence but various factors affect the errors made. For lexical errors (substitutions and blends), both the semantics and phonology of the relevant words are important. Another matter that needs to be explored is the relevant words' frequencies and how this interacts with the other moderating factors. The hypothesis is that higher frequency words would always be more involved in errors due to more opportunities to be involved, but that higher frequency words would be proportionally more likely for children than adults in a cross-sectional corpus study since their lexicons are smaller consisting of more high frequency words. More interesting are the interactions between the other moderating factors (semantic and phonological similarities) and word frequencies over time. Again, high frequency words are expected to be most involved but the proportions of high frequency words are expected to vary across age groups.

Student Alexa Bracci
Major Biological Sciences

Title Recent evolution and subfunctionalization of two pathogen interacting salivary proteins, HTN1 and HTN3

Abstract Histatins are a family of salivary proteins with anti-fungal and anti-bacterial properties. We studied the complex and recent evolution of HTN1 and HTN3, two similar genes that code for members of the histatin family. Using BLAST, which searches genomes for similar sequences, we found HTN1 and HTN3 in humans, nonhuman Great Apes (e.g., chimpanzees), and Old World monkeys. Our comparative analyses indicated that HTN3 evolved in an early placentall mammal ancestor through a duplication of neighboring STATH gene. HTN1 evolved later, through duplication of HTN3 in the ancestor of Great Apes and Old World monkeys. We were able to find HTN3, but not HTN1 in New World monkey genomes, an out-group for the Great Apes and Old World monkeys. We also documented the differences that directly changed the protein sequence between HTN1 and HTN3, through which we will extend our analyses to functional impact of these genes in primate evolution.

Student Ashley Cercone
Major Anthropology and Classics

Research Mentor Dr. Mark Golitko, PhD, Dr. Peter Biehl

Title Ceramics production and trade across the Great Hungarian Plain: Chemical analysis of Bronze Age ceramics from Békés 103 in Eastern Hungary
Abstract

The Bronze Age in Europe is noted for an increase in foreign interaction and trade, yet some areas show few signs of receiving non-local goods. Using chemical analysis of Bronze Age ceramic pastes from the cemetery of Bekes 103 and nearby clay sources, this poster further explores the movement of ceramics on the Great Hungarian Plain by examining whether or not there are differences between graves in terms of acquisition and use of local versus non-local ceramics.

Students

Siobhan Clements, Gavin Guild, Racheal Whiteside

Research Mentor

Dr. Jason Briner, PhD

Title

A Comparison of Late Pleistocene and Holocene Sediment Records from Western New York

Abstract

The goal of this study is to compare the sediment records collected from Dragonfly Kettle Pond and Beaver Meadow in western New York (WNY) to newly collected sediment from Allenberg Bog, a nearby wetland located farther south and closer to the ice sheet limit than the previous two sites. The sediment recovered from these three wetland environments will provide information about the post-glacial history of the area and lead to a narrower constraint on deglaciation of western New York, an area with a poorly understood early deglaciation history. Using a Russian Peat Corer and a Livingstone Corer, 3.1 m and 5.96 m of sediment were collected from Beaver Meadows (13BM-D) and Dragonfly Kettle Pond (13DFK-A), respectively. Similarly, at Allenberg Bog, the two aforementioned coring devices were used to recover the lowest 6.6 m (15ABB-7) and 0.3 m (15ABB-1) of sediment from two different sites located in the bog, with penetration depths of >14m below the bog surface. Moisture content, organic matter content, magnetic susceptibility and density measurements were collected at 5 cm resolution for most of the cores, with 1 cm resolutions in some sections. The cores comprise basal glacial sediment, overlain by lacustrine sediment, overlain by peat. Radiocarbon ages from Beaver Meadow and Dragonfly Kettle Pond sediments indicate that sediment accumulation began at 15.2 ka, and the transition from lacustrine to peat environment happened ~10.8 ka. Samples from Allenberg Bog are currently undergoing radiocarbon analysis to see if the transition from lacustrine to peat is around the same age. The results of this study will hopefully improve the constraints on deglaciation in WNY, and provide more insight into the composition and character of the sediment within each sediment core. Ultimately, this information will be important for reconstructing the environmental and climate history of WNY during the Late Pleistocene and Holocene.

Students

Siobhan Clements, Gavin Guild, Racheal Whiteside

Research Mentor

Jason Briner, PhD

Title

A compilation of basal radiocarbon ages from post-glacial lakes and bogs in western New York

Abstract

In eastern New York, recent work has revealed a gap in time between initial ice sheet deglaciation and when the first organic matter is deposited in lakes and bogs (Peteet et al., GRL, v. 39, 2012); such an age gap is not apparent in Ohio (K.C Glover et al., Quaternary Research, v. 76, 2011). We hypothesize that the northeastern US seaboard was chilled, with active permafrost, during the first millennia following deglaciation. We aim to investigate this time period in western New York (WNY), which lies between Ohio and eastern New York. Multiple lakes and bogs have been cored in WNY during the Late Pleistocene and Holocene.

The results of this study will hopefully improve the constraints on deglaciation in WNY, and provide more insight into the composition and character of the sediment within each sediment core. Ultimately, this information will be important for reconstructing the environmental and climate history of WNY during the Late Pleistocene and Holocene.
**Title**
Improving procedures for ion exchange chromatography used in Beryllium-10 surface-exposure dating chemistry

**Abstract**
Cosmogenic beryllium-10 surface-exposure dating is a method used to directly date geologic landforms deposited throughout Earth’s history. This method relies on the production of the isotope beryllium-10 that accumulates in the mineral quartz preserved in rock surfaces. The initial step in this process is to isolate quartz from a bulk rock sample by using a series of physical and chemical processes. Subsequently, beryllium-10 is separated from other unwanted elements in the quartz, such as aluminum and titanium, through sensitive chemistry using ion exchange chromatography. To test the efficiency of this procedure, aliquots were taken at each stage of the chemistry to measure the changing elemental composition in the quartz samples. Aliquots were analyzed using inductively coupled plasma atomic emission spectroscopy. Better defining the elemental composition of the sample through the chemistry helps to determine the efficiency of the procedure, and ultimately helps improve beryllium-10 isolation techniques for future experiments.

**Students**
Megan C. Corcoran, Avriel D. Schweinsberg

**Research Mentor**
Dr. Jason Briner, PhD

**Title**
Exploring the Power of Visualizing Poetry

**Abstract**
In 2012 Shane Koyczan collaborated with a dozen artists to animate his anthem anti-bullying poem, To this Day. Over the following four years the work went viral, its total view count on YouTube is currently over eighteen million. This example of impressive collaboration between poetry and visual art is the basis for my creative project. In COM 447, last semester as a student, and this semester as a TA, I have presented the visual interpretation of Koyczan’s work to undergraduates as a way to develop visual literacy in interpreting the poem. This exercise encouraged students to create personal expressions that deal with issues of bullying by remixing new composite imagery based on the foundational visuals. This poster aims to show the results of validating an audience’s ability to interpret texts through other mediums, in this case utilizing Photoshop to create digital imagery inspired by the poem, To This Day.
**Student**  
Christopher Fancher

**Major**  
Classics, Business Administration

**Research Mentor**  
Bradley Ault, PhD, Don Mcguire, PhD, Olga Crombie, MS

**Title**  
Study Abroad – An Alternative Learning Method for Students of Classical Studies

**Abstract**  
The academic study of Classical and Ancient History is often confined to the examination of primary and secondary written texts. While this method provides great insight into the ancient Greco-Roman world, studying abroad offers an incomparable opportunity and an alternative method of learning to students who would not be touched or galvanized by typical classroom techniques. The UB Classics in the Mediterranean study abroad program provides a first person, on-site analysis of Classical sites in Italy. This allowed students to gain a first-hand understanding of the classical world. An Alternative Learning Method for Students of Classical Studies will illustrate what UB Students experience when taking courses in Classical History domestically compared to the learning methods students enjoy when studying in Italy on the UB Classics in the Mediterranean winter program.

**Students**  
Sushmita Gelda, Antara Majumdar

**Research Mentor**  
Joseph A. Gardella

**Title**  
The Interplay of Education and Partnerships

**Abstract**  
A sustainable model of education inspires students to be leaders within and outside their immediate community. Non-profit organizations can partner with public schools to offer disadvantaged students an educational standard that does not require students to simply “pass a test” but to become confident researchers, communicators, and leaders. Through the Interdisciplinary Science and Engineering Partnership (ISEP), we have been mentoring students in an eighth-grade science classroom in Harriet Ross Tubman Academy (Public School 31). As undergraduate mentors, we developed Beyond the Block to give students access to an internationalized, skills-based education. This project began as a pen-pal activity and has grown into a program focused on research, communication, and leadership – skills which are essential for success as both a student and a citizen. In the future, we hope Beyond the Block will become a core program in all schools that value interdisciplinary learning, creativity, and commitment to social change.

**Students**  
Shawn Gibson, J Theresa Rubi

**Major**  
Biological Sciences

**Research Mentor**  
Dr Laura Rusche, PhD

**Title**  
Telomere-Binding Protein Rif2; Product of Subfunctionalization or Neofunctionalization from the Replication Protein Orc4

**Abstract**  
Canavan disease (CD) and Periventricular Leukomalacia (PVL) are neurological diseases characterized by excessive glutamate that cause damage to oligodendrocytes and oligodendrocyte precursor cells (OPCs) in the brain white matter. The metabolites N-acetylaspartate (NAA) and N-acetylaspartylglutamate (NAAG) are correlated to CD while increased immune response, as triggered by lipopolysaccharide (LPS) and TNF-alpha, are believe to underlie PVL. Because of their common excess glutamate phenotypes, the present work seeks to delineate the role of OPC glutamate receptors in these white matter diseases. Contrary to previous findings, we found that NAA and NAAG metabolites had no effect on NMDA-evoked OPC current. However, compared to control conditions, we found that LPS- and TNF-alpha-treated acute brain slices exhibited decreased AMPA- and NMDA-evoked current amplitudes. Together, our results suggest that LPS and TNF-alpha have potential therapeutic value due to their protective effects in under glutamate toxicity conditions.
ABSTRACT
The telomere is a region of repetitive DNA that conserves the integrity of chromosomal ends. It is essential to understand the telomere because it dictates the cell’s viability. Rap1, a regulatory protein involved in telomere length, recruits Rif2 proteins. The Rif2 protein in Saccharomyces cerevisiae protects telomeres by blocking the kinase Tel1, thereby inhibiting telomere elongation. Comparative genome analyses reveal that Rif2 proteins descended from the replication protein Orc4. We wanted to understand how a telomere-binding protein evolved from a replication protein. Specifically, we wanted to distinguish whether the Rif2 protein is a product of subfunctionalization or neofunctionalization. To do so, we used Chromatin Immunoprecipitation (ChIP) to determine whether the non-duplicated Orc4 protein from Kluyveromyces lactis is associated with telomeres. Such an association would be expected if the non-duplicated protein already had a Rif2-like function. However, our preliminary results showed that KLOrc4 was not associated with telomeres. Therefore, the Rif2 protein may have evolved this trait after duplication and therefore may be a product of neofunctionalization.

Students
Sophie Goliber, Carolyn Roberts

Major
Geology

Research Mentor
Dr. Beata Csatho, PhD

Title
Reconstructing the Calving Front History for Helheim Glacier, Greenland

ABSTRACT
Over the last decade, the Southeast region of the Greenland Ice Sheet thinned at a higher rate than other regions and is characterized by a high diversity of outlet glacier behaviors. While the region is experiencing overall mass loss, some major outlet glaciers exhibit varying levels of dynamic thinning and thickening, despite an overall warming climate. Helheim Glacier exhibited a rapid thinning/thickening/thinning pattern from 2003-2012. To understand what is happening at Helheim, a detailed calving front reconstruction was created using historical maps, aerial photographs and satellite imagery collected between 1938-2015. Helheim retreated and readvanced to an equilibrium position from 2003-2007, with a maximum retreat in 2005. The calving front then oscillated around a relatively stable position from 2007-2014. However, during 2015, it retreated to the 2005 position. The calving fronts will be used in the Ice Sheet System Model (NASA/JPL) to investigate different climatic forcings at Helheim.

Student
Amy Gorski

Major
Psychology

Research Mentor
Dr. Shira Gabriel, PhD

Title
“Imperfect Perfectionism”: The Relationships Between Perfectionism, Implicit Romantic Beliefs, and Adult Attachment

ABSTRACT
Although most research has found that when studied independently, adult attachment styles, implicit romantic beliefs, and perfectionism affect an individual’s thoughts, feelings, and behaviors towards romantic relationships; the extent to which these variables influence one another is unknown. The purpose of this study is to examine if these variables affect one another in predictable patterns. The first study attempts to examine the relationship between these three variables, whereas the second study observes their impact after manipulating a romantic narrative—that represents levels of implicit romantic beliefs. I predict that individuals with greater levels of maladaptive perfectionism are more likely to have an anxious adult attachment style as well as report higher measures of destiny theory. I also predict that, if certain correlations exist, media exposure should impact individuals differently depending on their levels within each variable. Observing these interactions could provide a further understanding of the effects romantic media has on certain individuals, and better our general understanding of how these three variables influence on another in a real world setting.

Student
Connor Graham

Major
Theatre Performance

Research Mentor
Kathleen Golde

Title
The Artist’s Journey: Getting it True

ABSTRACT
Through the process of directing a production of, “The Glass Menagerie,” as my Honors College thesis project, I have learned innumerable valuable lessons about my role as a director and as a collaborator in the world of professional and educational theatre. My research details my process from its initial conception to its imaginative realization. Rather than just selecting excerpts to be placed on a poster, this hands-on display will feature much of the paperwork, notes, scripts, posters, pictures, props, and even audio and video recordings of the process and production that went into making the final product. There is an ancient Chinese proverb, “The journey is the reward.” I am eager to share my journey and how I am discovering the tools that help me create the most truthful work as an artist that I can. I believe that our community of academics and artists would benefit from this display.
Student
Zachary Grosso

Major
Geological Sciences

Research Mentor
Dr. Alison Graettinger, PhD

Title
Using maar crater shape to infer external influences on volcanic eruption evolution

Abstract
A maar is a shallow volcanic crater that is formed by one or more underground explosions that occur when magma comes into contact with groundwater. These underground explosions occur at all depths at various times beneath the crater in a diatreme, which is a conical structure full of debris of fragmented host rock and lava. It is very common for maar craters to be formed by multiple explosions that migrate vertically and laterally in space and time. This semester’s research involves observing various maar craters and inferring possible explosion footprints using GIS techniques. Maar crater shapes are used to investigate how tectonic setting affects the final size and shape of a maar, and how the size of a crater relates to the minimum number of explosions required for formation.

Students
Casey Grover, Elizabeth Houck

Major
Pharmaceutical Sciences, American Studies

Research Mentor
Professor B. Wejnert, PhD

Title
Tell Your Story: Journals of Immigrants in Buffalo, NY

Abstract
This project uses both interviews and data to assess the incoming population to Buffalo, NY. The cultural background and ease of transition to the American way of life is assessed for these newcomers to Buffalo. Personal interviews shed light on the difficulties that immigrants face, especially among the refugee population, of hardships in their home country as well as difficulties adjusting to the United States. Through the knowledge from these data and personal narratives, policies could be assessed and changed to make the transition easier through assistance and governmental programs. Local programs and communities must be knowledgeable about newcomers to the city of Buffalo in order to serve them in the best way possible.

Student
Elizabeth Hunter

Major
Classics, Physics

Research Mentor
Dr. John Dugan

Title
Unseemly Devices: The Voluptas atque Horror of the De Rerum Natura

Abstract
The past 2,000 years of Lucretian scholarship has determined that this poetic undertaking of the nature of the universe is jarring, full of discontinuities, flawed with antinomies, and muddled by its own subject matter. Scholarship
on the De Rerum Natura is largely bifurcated with philosophers whose methodology focuses on the potent wormwood and philologists whose methodology leaves them captivated by the thickest coats of honey. One might think no consensus on Lucretius can be found. That would, however, be to overlook the vast and complex mosaic that is omnia natura, for mere pieces de rerum.

By analyzing the structure of the poem, this study reveals Venus and Epicurus as counterparts working congruently to present the major themes of the work, emulsifying the wormwood and honey. Understanding their complementary companionship, in turn presents the poetic design, which the poet intended in his philosophical exposition on the nature of the universe.

**Student**  
Nicole Hunter  
**Major**  
Psychology  
**Research Mentor**  
Micheal L. Dent, PhD  
**Title**  
Do Adult Female CBA/CaJ Mice Show a Preference for the Vocalizations of Cage Mates Over the Vocalizations of Strangers?

**Abstract**  
Female mouse preferences for male vocalizations are common topics of preference studies, however few have examined exclusively how female mice respond to other female USVs. Ten female adult CBA/CaJ mice will be tested in a preference experiment to see if they prefer ultrasonic vocalizations (USVs) made by a familiar or unfamiliar mouse. Familiar mice will be cage mates of the test mouse, while unfamiliar mice will be a novel socially housed animal. Each test mouse will be exposed to all cage mate and stranger vocalizations. Preference will be measured by the amount of time the test animal spends inspecting and staying near a speaker on either side of the test cage. Caller familiarity will be the independent variable of the study while preference will be the dependent variable. I predict that cage mate status will influence preference for cage mate USVs due to familiarity with the individual caller.

**Student**  
Patricia N. Johnson  
**Major**  
Chemistry  
**Research Mentor**  
Dr. Timothy R. Cook, PhD  
**Title**  
Steps Toward a Mechanically Active Gadolinium Chelate

**Abstract**  
Mechanophores, functional groups activated by mechanical force have myriad applications including sensors, data displays, and self-healing materials. Current mechanochemical systems are made of organic molecules and exhibit interesting properties, but they also have significant limitations; they are rarely reversible, require relatively high activation forces, and are generally intolerant of aqueous environments. Conversely, chelates of metal ions can reversibly change their coordination sphere, have bonds weaker than C-C bonds and so require less force to activate, and are often tolerant of water. Few systems incorporating organometallic complexes as mechanophores have been investigated, but metal chelates can be designed to be diverse and effective mechanophores. This project encompasses the design and synthesis of a gadolinium chelate as a mechanophore, which will initiate a knowledge base on innovative combinations of organic polymers and metal ions by developing a realistic, versatile system that can be expanded upon in the future.

**Student**  
Armond June  
**Major**  
Biological Sciences  
**Research Mentor**  
Charlotte Lindqvist, Ph.D.  
**Title**  
Metagenomic Investigation of the Whale Gut Microbiome

**Abstract**  
Exposed surfaces of the animal body are inhabited by a multitude of microbial communities that provide functional features the host may not need as part of their own genomic evolution. Comparative studies of mammalian microbiomes are key to understanding not only the composition, function, and evolution of microbial symbionts, but of possible codiversification of the microbiota and their hosts. We explored gut microbiomes of two marine mammals, a baleen and toothed whale, that differ in their feeding strategies, digestive anatomy, and physiology. 16S rRNA amplicon and shotgun genomic sequencing on distal gut samples show these whale species harbor unique gut microbiomes, while on a superficial level, the functional potential of their microbiomes are highly similar to terrestrial mammals. We hypothesize the difference in microbial flora is a result of dietary, environmental, and evolutionary influences, and that their gut microbiomes co-diversified with their hosts to occupy functions convergent across mammalian phylogeny.

**Student**  
Sitora Khodjaniyazova  
**Research Mentor**  
Professor Frank V. Bright  
**Title**  
Reducing Feature Spreading in Contact Pin-Printed Organosilane Arrays on Porous Silicon
Abstract

Porous silicon (pSi) exhibits strong, visible photoluminescence (PL) at room temperature, but the PL from as-prepared pSi (ap-pSi) is unstable. The goal of our research is to simultaneously stabilize the pSi PL and create microarrays. One way to achieve these goals is to create oxidized porous silicon (ox-pSi) and then contact pin print (CPP) organosilanes onto the ox-pSi. Unfortunately, although this strategy works, it is time consuming and the features are very large (>1 mm in diameter). Recently, we discovered that we can CPP and graft 3-aminopropylithethoxysilane directly onto ap-pSi. The characteristics of these platforms will be described.

Student
Shereen Khoo

Major
Psychology

Research Mentor
Dr. Leonard Simms, PhD

Title
The Relationship between Openness and Depression: Analyses on the Global and Facet Level

Abstract

Through out history, the relationship between personality and psychopathology has been of interest. Past studies investigating Openness and depression have often found non-significant correlations. However, these studies have only investigated Openness and depression at the global level and used a non-clinical sample. The present study seeks to examine the relationship between Openness and depression at both the global and the facet levels and by using a clinical sample. The variance accounted for by Neuroticism, Extraversion, gender and age will also be controlled for through multiple regression analyses. The hypotheses are that (1) Openness and depression will not be significantly correlated at the global level but (2) will be either positively or negatively correlated on the facet level depending on the facet. (3) Significant correlations will remain significant, though weakened, even after controlling for Neuroticism and Extraversion and (4) correlations between Openness to Feelings and Openness to Fantasy with depression will remain significant, though weakened, after controlling for gender. Implications on clinical treatment of depression and the validity of the Openness construct will be discussed.

Student
Amanda Killian

Major
Graphic design, Art History

Research Mentor
Renee Ruffino

Title
Representations of Woman Artist in Museum Products

Abstract

Women artists often have to struggle to be collected and respected by museums. An equally insidious form of gendered bias occurs in the ways women artists are "sold" or marketed to visitors. This becomes clear in museum stores and gift shops, where "high" art intersects with consumer products. These products include apparel, home goods, books, and other ephemera targeted to a diverse range of museum visitors. Setting aside the problematic of marketing artists to consumers, I will investigate instead the problematic of marketing artists to consumers. Frida Kahlo, a woman artist whose high level of visibility (relative to other woman artists) makes her a prime target for merchandizing will be my focus as I search for museum products that represent or misrepresent her. Through a critical analysis of graphic design, I will diagnose and propose alternatives to the problematic of marketing artists to consumers, all teens between the ages of 17-20 (M = 18.1, SD = 0.7)

A group of undergraduate research assistants coded videos for any distractors present while the teens were driving. This study is utilizing a non-experimental observational research design, looking at the relationship between event-type (risky event vs. non-risky event) and the presence of distractors. Outcomes will include an assessment of the frequency of distractors observed as well as the seriousness of the different types of distractors. It is hypothesized that teenagers with ADHD will have more distractors present prior to a risky driving event than a non-risky event. Currently, 578 videos have been coded. Preliminary analyses suggest that the coders are reliable. The Interclass Correlation Coefficient (ICC) of the total distractors coded thus far is .68. The Kappa for the cell phone usage
distracters is .79. Currently, the most frequently present distractors include; “conversation with a passenger” present 19.6% of the time, “singing, humming, whistling” present 10.0% of the time, “looking at something outside car” present 8.5% of the time, “adjusting radio/volume/gps/controls” present 8.1% of the time, and “looking at something in cabin” present 5.9% of the time. Additional analyses will be conducted to investigate whether certain distractors are differentially related to risky driving events, whether the presence of multiple distractors is more common for risky events, and whether certain “distracting” behaviors are unrelated to risky driving outcomes. The potential for these data to inform future behavioral intervention efforts for teenage drivers with ADHD will be discussed.

Student Luke Lyle
Major Physics, Mathematics
Research Mentor Professor Sambandamurthy Ganapathy, PhD
Title Phase Transition in Vanadium Dioxide Nanostructures
Abstract Strongly correlated materials exhibit a wide variety of extraordinary optical and electronic properties that can serve as a panacea for industrial applications. We present electronic transport measurements of vanadium dioxide nanostructures, a strongly correlated transition metal oxide system, with a unique thermally driven insulator-metal phase transition ~ 340 K. This transition can also be driven by electrical and optical means thereby making this a very useful material for switching applications. The research aims to address issues such as percolation of nanoscale metallic domains at temperatures near the phase transition. The nucleation and propagation of domains across the transition are studied through a high resolution optical microscope for both electrical and thermal stimulations. This work is supported by NSF DMR 0847324.

Student Angelina Montes, Robert O’Keeffe
Research Mentor Dr. Mary Bisson, PhD
Title Effect of Substrate Composition on Cadmium Uptake in Chara australis
Abstract Phytoremediation is the use of plants or algae to remove contaminants from the environment. Chara australis is a freshwater macroalga being studied in Dr. Bisson’s lab for its ability to uptake and store the heavy metal Cadmium in its shoots. However, in many experiments, Chara explants were grown in store bought topsoil, instead of the river sediment they might be used to clean. The project compares the composition of the substrates and their effect on the uptake of Cadmium in Chara australis, as well as the depth of the penetration Chara’s rhizoids to further investigate Chara’s effectiveness as a phytoremediator.

Student Yuichi Okugawa
Major Physics
Research Mentor Dr. Avto Kharchilava, PhD
Title Study of the Higgs Boson in ZH associated production.
Abstract The Higgs boson (H) was sought for almost five decades until it was finally discovered at the Large Hadron Collider (LHC) in 2012. Since then detailed studies of its properties are conducted by large international team of scientists. One aspect of the research is to observe all possible decay channels of the Higgs boson, in particular to a pair of bottom quarks. This decay channel has not been observed so far, but with future runs of LHC, and with more data collected by experiments, we hope for success. The current analysis reports on simulation studies for the Higgs boson associated production with a Z boson and possible improvements in the existing approaches.

Student Richard Patti
Major Anthropology, Sociology, Political Science
Research Mentor Dr. Debra Street, PhD
Title Sociology of Food: London
Abstract An overview of the 2016 Winter session Sociology of Food Trip to London. The project will highlight the learning that went on in the classroom, but most importantly will discuss the experiences that everyone on the trip was able engage in outside of the traditional classroom setting. I feel this is where a study abroad trip is most valuable and the bulk of the project will be focused on the learning adventures that happened outside of CAPA Institute, such as day trips, field work, and market observation. I am just looking to share one of the best experiences of my life with all those who harbor even the slightest interest in studying abroad.
Research Mentor
Dr. Mara Huber, PhD

Title
Community Development in Tanzania: Communication and Sentience

Abstract
A twenty-something woman travels abroad to Tanzania to focus on community development, specifically how it relates to communication. Through observations and conversations with locals, she explores the similarities and differences in several types of communication among Tanzanians and Americans. Educational communication, cultural communication, and technological communication were three main areas of study in relation to community development. Through her dissonance, she also finds generosity, spirituality, and determination radiating from the people of the rural region of Mara, Tanzania.

Student
Meg Ryan

Major
Psychology

Research Mentor
Dr. Julie Bowker, PhD

Title
Negative Peer Experiences, Shame, and Internalizing Outcomes During Early Adolescence

Abstract
Although the internalizing costs of peer difficulties during early adolescence have been well-established, little research has examined possible mechanisms that explain why adolescents who are rejected, isolated, and victimized suffer psychologically. This study of 149 Indian young adolescents (Mage = 13.73 years; 56% boys; 76% Hindu) examined shame as a potential mediator of the associations between negative peer experiences and two internalizing outcomes (social anxiety, depression) during early adolescence (10-14 years). Peer and self-report data of rejection, isolation, and victimization were gathered. Participants completed measures of shame, social anxiety, and depression. Unexpectedly, multiple regression analyses and bootstrapping procedures revealed some evidence that rather than mediating, shame actually strengthens the associations between peer problems and internalizing outcomes. These surprising results suggest a suppressor effect which may be specific to the Hindu/Indian culture given the unique role of shame in socialization and close relationships.

Student
Chris Sbarra

Major
Geology

Research Mentor
Jason P. Briner Associate Professor

Title
Dating Coastal Sediment Stratigraphy at Bennett Beach, Lake Erie, Western New York

Abstract
A paleosol within a coastal sand dune at Bennett Beach is of unknown age and origin. This project will date the paleosol and improve our understanding of Lake Erie’s coastal history. Pottery fragments found below the soil, were identified as early Woodland pottery (500-900 BCE) based on their corded surface texture. Charcoal was found at the same depth as the pottery fragments and may date to the early Woodland. Radiocarbon dating the paleosol will determine when the native people lived at the site and the age of the structure. This project will provide an understating of the post-glacial environment, and the cultural history of the site. There is one prominent paleosol exposed, but there is a series of older, weaker paleosol layers. Future plans for the site include the use of ground penetrating radar to better determine the complete structure of the site.

Student
Taylor Schutt

Major
Studio Art

Research Mentor
Renee Ruffino

Title
Identity Designing: Just a Spoonful of Simplicity

Abstract
Identity branding is the visual way a company attempts to represent itself to consumers and the competition using principles of design as well as the strategic use of aesthetic components. As new companies seek help in the professional development of their brand, they fail to see the benefits and importance of creating a strong marketing brand first. Today, companies strive to be recognized but don’t necessarily understand that most of the longest reining success stories have come from companies who have utilized the simplicity and elegance of minimalistic design into their brand. But more importantly, any changes that would be made to the brand, would be over a span of years, and these changes would be subtle versus drastic, with the latter causing brand and market failure due to the loss of identity. The Disney Company is an example of this success and has turned a name into more than a brand, but a place and an empire of entertainment, great story telling, and merchandising. This research will attempt to deconstruct how Disney has been a success with its branding efforts that began in the 1920’s with the minimalistic design of its favorite character, Mickey Mouse. Furthermore, deciphering how one can develop a strong and successful identity by using consistency and how making gradual changes over time does make the strongest and most memorable brand.
Fragile x syndrome (FXS) is a leading inherited form of autism, characterized by social and communication deficits. It is caused by a mutation in the fragile x mental retardation (Fmr1) gene. Consistent with observations in humans, the Fmr1 rat model of FXS exhibits abnormal social communication in the form of ultrasonic vocalizations (USVs). Both Fmr1-KO and wild type (WT) rats produce USVs within a 35-80 kHz range. Both groups were exposed to 3 different call-inducing conditions. Comparatively, Fmr1-KO rats generated less USVs than the WT rats across all conditions. Analysis of different categories of calls revealed that loss of Fmr1 expression caused less varied calls generated by the Fmr1-KO rats. When compared to WT rats, Fmr1-KO rats generated less frequency-modulated calls in all conditions. Further analyses of USVs will provide the opportunity to study communication in rat models for other pathologies characterized by social and communication deficits.
and in motor protein mutations. These observations suggest that axonal transport defects activates the PI3K pathway to decrease oxidative stress induced neuronal cell death and degeneration.

H. Eliza Upton-Green

Spanish, International Studies

Dr. Dalia Muller, PhD, Dr. Craig Centrie, PhD

La dominicanización de la frontera
Under Rafael Trujillo: How the Institutionalization of anti-haitianismo Shaped National Identity

I argue that the Trujillo regime, which institutionalized anti-Haitianism for the first time in Dominican history, sought to consolidate and maintain power through a racist nationalist agenda based on rejecting both Haiti and blackness. The nationalization of the border, or la dominicanización de la frontera, aimed to destroy a historically bicultural and transnational zone where Haitians and Dominicans did business together, made families, spoke each other’s languages, and crossed the border daily to go to markets or schools. The 1937 massacre of over 10,000 Haitians in the border region was followed by an ideological campaign using schools, churches, and cultural border agents, and was based on anti-Haitian material produced by the regime’s intellectuals. The dictatorship’s cultural programs and institutions taught Dominicans not only to reject their African heritage, but also to place the African association onto their Haitian neighbors, and to perceive Haiti as a threat and source of barbarism.

Alexandra K. Van Hall

Chemistry

Dr. Marisa Segal, PhD

Treponema denticola’s outer membrane vesicles uptake mechanism on host cell types

This objective of this research is to test for uptake mechanisms of T. denticola’s outer membrane vesicles on host cell types. This bacteria is part of the spirochaete bacterial family that causes severe periodontal diseases, affecting the soft tissues and bones supporting the teeth.

Leandra Velazquez

Biological Sciences

Dr. Michelle Visser, PhD.

Answering Fundamental Questions of Development: Biochemical Insights into Spindle Polarity

Asymmetric cell division is essential in the development of human stem cells to developed tissues. Lack of control of this process can lead to cancers. While asymmetric cell division has been studied, the mechanisms controlling the process are not well understood. Saccharomyces cerevisiae, common yeast, provides a convenient model with which to view and understand asymmetrical cell division. We propose that a protein (target) of the spindle pole body, analogous to the centrosome, is phosphorylated during mitosis, leading to asymmetry. This was studied using a protein kinase assay. Kinase was harvested from yeast cells overexpressing the protein and used in assay with target harvested from bacteria. The experiments showed, through mobility shift and direct phosphorylation detection, that the kinase does phosphorylate the target. Increasing knowledge of this type of cell division could lead to advances in stem cell research and greater understanding of how to target asymmetrically dividing cancerous cells.
**Student**
Racheal Whiteside

**Major**
Environmental Geosciences

**Research Mentor**
Dr. Jason Briner

**Title**
Radioactive Dating of Allenberg Bog to Determine Paleoclimate of Western New York

**Abstract**
One method to construct accurate accounts of a certain location's paleoclimate includes collecting sediment cores and analyzing specific qualities of the cores. This research uses sediment cores collected from Allenberg Bog to create a record of Western New York's paleoclimates after the most recent ice age. Each core undergoes various tests to determine magnetic susceptibility, moisture content, organic content, carbonate content, and age. The major tools associated with performing said tests include a magnetic susceptibility sensor, high intensity furnace, freeze drying machine, radiocarbon dating technology, and basic laboratory materials. These four characteristics can then translate into a geologic timetable of when key events occurred in relation to the last ice age. A second goal of the research lies in determining if old carbon contaminated the sediment cores. Contamination can lead to inaccurate radiocarbon ages of samples leading to an incorrect timetable for the paleoclimate. In order to ascertain the presence of old carbon two samples must be submitted for radiocarbon dating, and the resulting ages compared.

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**Student**
Celia Zhang

**Major**
Speech and Hearing Science

**Research Mentor**
Dr. Wei Sun, PhD, Dr. Ji Li, PhD, Dr. Bohua Hu, PhD

**Title**
Loss of Sestrin-2 function potentiates age-related sensory cell degeneration

**Abstract**
Age-related hearing loss (ARHL), one of the most common conditions affecting the elderly, is predominately associated with oxidative stress. Sestrin-2 is a stress inducible protein that has been shown to suppress the production of reactive oxygen species in the heart and protect tissues from oxidative stress. However, there is no information concerning the contribution of Sestrin-2 to age-related sensory cell degeneration. Strong expression of Sestrin-2 is identified in the cochlea of wild-type (WT) mice, particularly on the outer hair cells (OHCs). Compared to WT mice, Sestrin-2 knock-out (KO) mice exhibit early onset of hearing loss and show significant OHC loss at the basal end of the cochlea as early as 6 weeks old. These results suggest that Sestrin-2 may play an important role in the auditory system and serve as a protective molecule against ARHL. The exploration of this novel protein will provide insights into the biological mechanisms of ARHL.

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**Student**
Sarah Zobel

**Major**
Environmental Geosciences

**Research Mentor**
Dr. Beata Csatho, PhD

**Title**
Geological Impacts of Ice Sheet Mass Loss

**Abstract**
The Greenland ice sheet is one of two remaining ice sheets on the Earth today and is losing mass faster than ever. Studies have shown that parts of the ice sheet have lost large amounts of mass in short periods of time and that regional patterns of mass loss differ greatly. The potentially differing geological compositions of the land beneath the ice sheet may have an impact on why sections of the ice sheet are moving at such different rates. This study focuses on suspended sediment plumes that are generated through glacial meltwater runoff and are deposited into fjords. Satellite images from selected locations around Greenland will be used to identify the composition of the sediment. The expected results are that connections will be able to be made between the known geology around Greenland, the source rock of the sediment being studied, and the regional variations in ice loss.
CSTEP

**Student**  
Christina Aponte

**Major**  
Biomedical Sciences

**Research Mentor**  
Dr. Houbo Jiang, PhD

**Title**  
Generation of Regionally Specified Dopaminergic Neural Cells from Induced Pluripotent Stem Cells

**Abstract**  
Parkinson's disease is a neurodegenerative disease involving the malfunctioning and death of dopaminergic (DA) neurons. Due to the depletion of the neurons producing dopamine, there is a lack of the neurotransmitters responsible for communicating the signals necessary for movement and coordination. We found that differentiating induced pluripotent stem cells (iPSC) to DA neuron progenitors followed by transplantation into the rat brain may enable differentiation into DA neurons. After 3-4 months, we will extract the brain, mount it on a sequence of slides, and observe their differentiation. We have yet to produce consistent results. However, we will continue to repeat experimentation and review mechanics of the protocol.

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**Student**  
Joaquin Canay

**Major**  
Biotechnology

**Research Mentor**  
Margarita Dubocovich, PhD

**Title**  
Role of the 3.5 hour light/3.5 hour dark cycle in inducing rhythmic activity in suprachiasmatic nucleus lesioned mice

**Abstract**  
The suprachiasmatic nucleus (SCN), the master circadian clock, orchestrates synchrony among central and peripheral circadian oscillators. Manipulation of SCN outputs results in arrhythmic locomotor activity. In mice methamphetamine and food are able to reconstitute rhythmicity under constant conditions in previously arrhythmic animals, when a running wheel is provided. Preliminary data from our lab suggest a 3.5 hour light/3.5 hour dark cycle is able to produce rhythms similar to acute methamphetamine in SCN lesioned mice. The goal of the current study is to further examine this rhythmicity and examine the potential brain areas involved, including the dorsomedial hypothalamus and habenula.

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**Student**  
Grace Cragie, Oluwatosin Oniyide

**Major**  
Biological Sciences

**Research Mentor**  
Mary A Bisson PhD

**Title**  
A fluorescence microscopy study of ROS production in Chara Australis (R. Br)

**Abstract**  
This experiment was preformed to determine the effect of Cadmium (Cd) on Reactive oxidative species (ROS) production in the phytoremediator Chara Australis. Prior studies have shown that the plant Chara Australis is capable of absorbing cadmium (an industrial pollutant) from aquatic environments, however the effects of cadmium on Chara are currently being investigated. Cadmium induces stress upon Chara; which results in ROS Production. ROS oxidize non-fluorescent DCHF into fluorescent DCF. By measuring Fluorescence in Chara we can determine the concentration of ROS and, the degree of stress on Chara. Without this information determining Charas' role as a phytoremediator is difficult.

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**Student**  
Hoda Moussa

**Major**  
Biological Sciences

**Research Mentor**  
Rosemary Dziak, PhD

**Title**  
Relationship Between GERD-Associated Comorbidities and Gastrointestinal Cancer Outcomes

**Abstract**  
Gastrointestinal (GI) cancers have high incidence and mortality rates. Obesity and obesity-related disorders such as gastroesophageal reflux disease (GERD) and type 2 diabetes (T2D) are associated with increased risk of GI cancers. The possible correlation between GI cancer type and GERD-associated comorbidities in T2D patients was examined. All eligible adult T2D patients diagnosed with GI cancer at Roswell Park Cancer Institute were included in this retrospective analysis (n=222). Overall survival (OS) and disease-free survival (DFS) comparisons utilizing univariate and multivariate analyses were determined. T2D patients with GI cancer and GERD had significantly lower OS and DFS than patients without GERD. GERD was highly prevalent in patients with upper GI cancer diagnoses compared to lower. OS and DFS was significantly higher in patients on metformin therapy to treat T2D. Improving disease and risk factor management and using metformin therapy will aid in decreasing GI cancer incidence and mortality in T2D individuals.
Title
Nano Material as a Bone Regenerative System for the Oral Cavity: a Comparative Study

Abstract
Guided bone regeneration is a common oral surgical procedure in which the barrier membranes are used to guide the growth of new bone with biodegradable, biocompatible calcium sulfate (CS). Most patients undergo this procedure due to tooth loss, infection, and/or sinus pneumatization.

The purpose of this in-vitro study is to compare the characteristics between our nano-calcium sulfate (nCS) hemihydrate, which is in the process of obtaining Food and Drug Administration (FDA) approval, and the clinically approved NanoGen. We measured several characteristics of the CS materials including: antibiotic release by use of a spectrophotometer, cell viability by MTT assay, cell differentiation by ALP, hardness by Vickers test, and setting time by the Gillmore apparatus. The results for the release, ALP, and MTT indicated minimal differences exist between nCS and NanoGen. However, results varied for hardness and setting-time. This information will be valuable for characterizing the clinical usefulness of the two products.

Student
Valerie Prieto

Major
Civil Engineering

Research Mentor
Dr. Ravi Ranade, PhD

Title
An Investigation of Supplementary Cementitious Materials in Ultra-High Performance Concrete

Abstract
Ultra-High Performance Concrete (UHPC) is a special construction material with significantly greater compressive strength than conventional concrete. However, to acquire its high strength, UHPC generally requires more cement, directly leading to an increase in the material’s cost and carbon footprint. In this study, proportions of supplementary cementitious materials (SCMs) are evaluated in a mix design based on three principles: improved microstructure, low porosity, and dense particle packing. It is expected that by incorporating these principles, an optimum amount of SCMs can be determined. This development can potentially lead to a framework for the mix design process of a UHPC that will optimize the use of more sustainable ingredients, benefiting both the environment and society.

Student
Sushobhna Batra

Major
Biochemistry, Biological Sciences

Research Mentor
Dr. Richard A. Rabin, PhD

Title
The Mechanism of Hepcidin-induced Degradation of Transmembrane Iron Transporters DMT1 and Ferroportin

Abstract
Iron is an essential nutrient for most life because it is involved in fundamental processes such as oxygen transport, electron transfer, DNA replication, and cofactor for enzymes. The expression of two transmembrane iron transporter proteins, DMT1 (an iron importer) and ferroportin (the only known iron exporter in mammals), is controlled by hepcidin, a small protein signaling molecule made in the liver. Past research has shown that hepcidin decreases the expression of both DMT1 and ferroportin, but this biochemical mechanism is unknown. The specific aim of this research is to test hepcidin-induced activation of the Nedd4 system that mediates the ubiquitination of DMT1 and ferroportin. Western blotting and immunostaining techniques will be used to confirm the presence of the Nedd4 system. This project is a small part in the study of iron homeostasis, a balance that deals with serious pathophysiological conditions such as anemia, Parkinson’s, and Alzheimer’s.

Students
Maulasri Bhatta, Krishna Chatpar

Major
Biology
Research Mentor
Joshua J. Wang, MD; Sarah X. Zhang, MD

Title
An artificial three dimensional human retinal capillary model for in vitro study of retinal vascular diseases.

Abstract
Retinal capillaries consisting of endothelial cells and pericytes have unique structures that provide rich nourishment to retinal neurons and form the inner blood-retinal barrier. Damage to retinal capillaries leads to disturbed barrier function, reduced blood flow, vascular leakage and retinal edema pertinent to diabetic retinopathy and age-related macular degeneration. Despite numerous breakthroughs in basic research using cell culture or rodent models, majority of the discoveries failed to translate into treatments. A major challenge associated with this failure involves the lack of a validated model that recapitulates the in vivo property of human retinal vasculature. In this project, we take advantage of the newly developed micro/nanofabrication technique to construct an artificial 3D system of human retinal capillaries using primary human retinal endothelial cells and pericytes. This model system is expected to provide a simple, reliable, and inexpensive tool for future study of blood-retinal barrier and drug screening for retinal vascular diseases.

Students Melissa Dolan, Zakiya Rhodie

Major Pharmacology and Toxicology

Research Mentor Dr. Richard A. Rabin, PhD

Title Role Of The Innate Immune System In The Neurotoxic Effects Of Ethanol

Abstract Ethanol is one of the most abused drugs in the United States. Its effects are seen in all organ systems throughout our body, and it can have a great effect on the central nervous system. Consumption of ethanol is a major factor in reckless behavior leading to automobile casualties and accidents, which can lead to traumatic brain injury, causing an inflammatory environment and cellular damage in the brain. Microglial cells are the innate immune system of the central nervous system and play a large role in the inflammatory response of the brain caused by infections, cell damage, and diseases. Microglial cells main role is phagocytic uptake of debris, such as dead cells and microbes. Microglia have been linked to various neurodegenerative diseases such as Parkinson’s, Alzheimer’s, to development of the brain, synaptic remodelling in the adult brain, and traumatic brain injury. Thus, testing the effect ethanol has on microglial cells and their role in phagocytosis can lead to a stronger understanding in the activity of microglial and their function with phagocytic uptake for foreign material and cellular damage. The overall process of activated microglial in removing pathogens or damaged tissues consist of: first microglia must locate foreign pathogen or debris, next they must phagocytize by engulfing the pathogen or debris, and finally digest the newly engulfed material. This process is guided through distinguishing between healthy normal host cells and activating from a basal state to a variety of active states when the microglia are in the presence of damaged cells or pathogens from injured brain cells. The microglia are able to distinguish between the damage and healthy host cells through the actions of various receptors. Using a BV2 microglial cell line as a model, through previous studies, a stimulation of phagocytosis of fluorescently labelled microspheres has been seen through the use of microscopic images with a fluorescent microscope, where blind images and manual cell counting quantified a stimulation in the amount of cells engulfing the fluorescent beads. Recent studies, have shown a different amount of fluorescent beads engulfed by the microglial cells through individual cell counting by BD Fortessa SORP flow cytometry with the presence of ethanol. Various experiments were conducted to determine the presence of ethanol in microglial function through phagocytosis of fluorescently labelled microspheres, while further studies are continuing the testing on various number of beads being engulfed, while testing the presence ethanol has on microglial activity through the immunological pathways.

Students Cullan Donnelly, Armond June

Research Mentor Dr. Michael Garrick

Title Does USP30 affect 1B DMT1 via a Parkin-mediated mechanism?
**Abstract**
The dual nature of iron as an essential nutrient and dangerous reactive oxygen species generator is central to its regulation in the body. Regulation depends on the transferrin cycle, a process still not completely understood. Intracellular iron management involves iron flux into heme biosynthesis in mitochondria and the ubiquitin E3 ligase parkin that targets defective mitochondria. Mitochondrial loss can lead to neuronal failure and subsequently, the neurodegenerative disorder Parkinson's disease. Since the mitochondrial-localized protein USP30 (ubiquitin specific peptidase 30) antagonizes parkin, the purpose of this study is to determine whether the overexpression of USP30 increases expression of the 1B isoform of DMT1 (divalent metal transporter), a known target of parkin. The focus of this fundamental research is to improve the understanding of parkin interactions in the cell because of its strong association with Parkinson's disease and regulation of iron import into the cell.

**Students**
Gowthami Gengatharan, Emily Slominski

**Major**
Biomedical Sciences

**Research Mentor**
Kai Ling Kong, PhD, MS

**Title**
Reducing Relative Food Reinforcement in Infants by an Enriched Music Experience

**Abstract**
The obesity epidemic is a prominent issue in today's society. Intervention at a young age, particularly infancy, may be critical in reversing this increasing trend. Previous studies have shown a relationship between the motivation to eat versus the motivation for other activities and obesity risk in infants. Our pilot study researched the effects of an enriching music program on the relative motivation to eat, food reinforcement ratio (FRR), in infants 9-18 months old. When compared to the baseline FRR value, the post-assessment of infants in the music group showed a decreased FRR value. This suggests that when infants are introduced to a non-food alternative, such as a music program, the reinforcing value of food decreases. Therefore, our study demonstrated that interventions focused on non-food activities are a promising option to both target obesity and modify early childhood lifestyle habits.

**Students**
Benjamin I. George, Aparna Z. Nigam, Gary J. Iacobucci

**Research Mentor**
Dr. Gabriela K. Popescu, PhD

**Title**
Regulation of NMDA receptor properties by differential splicing of GluN1 subunit

**Abstract**
NMDA receptors (NMDARs) are glutamate-and glycine-gated ion channels that mediate excitatory neurotransmission in mammalian central nervous system. They are heterotetramers of two obligate GluN1 and two GluN2 subunits. They are highly Ca$^{2+}$ permeable which is critical for physiological functions. The present work seeks to delineate the relative pore size of GluN1 splice variants (i.e. GluN1-2a, GluN1-3a and GluN1-4a) using the permeant cation DMA (an organic cation i.e. dimethyl ammonium chloride) and whether the GluN1 splice variants have altered Ca$^{2+}$ permeability. We use DMA as the permeant ion to determine the pore size of various splice variants and varying concentrations of Ca$^{2+}$ to understand permeability of the receptor. Here, I show that GluN1-1a splice variant has reduced Ca$^{2+}$ permeability compared to GluN1-4a containing NMDARs and that there is a change in DMA permeation through the pore which is indicative of altered pore dimensions.

**Student**
Victoria Gosy

**Major**
Biomedical Sciences

**Research Mentor**
Dr. Wilma Hofmann, PhD

**Title**
Identification of the nuclear export signal of myosin IC

**Abstract**
Myosin IC (MyoIC) is a member of the myosin superfamily that plays an important role in dynamic nuclear processes. Understanding the mechanisms that contribute to the nucleo-cytoplasmic transport of MyoIC will provide valuable insights into its nuclear function regulation. The objective of this study was to identify the nuclear export signal (NES) of MyoIC. To this effect, I created various MyoIC-GFP expression constructs with deletions or mutations in specific amino acids using site directed mutagenesis. The cellular localization of the GFP-fusion proteins was analyzed through fluorescence microscopy of transfected mammalian cells. Cells expressing various constructs were treated with Leptomycin B, a known pharmacological NES inhibitor and analyzed for changes in the cellular localization of the respective constructs. Results from these experiments suggest the presence of an NES in tail region of MyoIC. These data are an important first step in identifying the pathways and factors that contribute to the nuclear localization of MyoIC.

**Students**
Michael Greene

**Major**
Biomedical Sciences

**Research Mentor**
Dr. Rosemary Dziak, PhD

**Title**
In Vitro Effects of Strontium Citrate on Human Osteoblasts
Abstract

Persons who exhibit signs and symptoms of bone degenerative diseases frequently use strontium citrate supplementation in order to increase bone regeneration. Since at least, in the United States, strontium is not FDA approved and is taken as an over-the-counter nutrient supplement, without extensive clinical trials, the optimal concentration of this supplementation for bone formation is unknown. The objective of my research is to identify an in vitro concentration for strontium citrate in which bone formation is maximized. Since the in vitro effects of strontium citrate are expected to be a function of osteoblastic cell aging; I have studied the effect of strontium on activity of human osteoblastic cells as a function of cell culture passage as well as strontium concentration. The parameters I have assessed are osteoblastic metabolic activity as an indicator of cell proliferation, and alkaline phosphatases, a marker of differentiation.

Student
Arsalan Haghdel

Major
Biomedical Sciences

Research Mentor
Dr. Xiaozhong Wen, MD, PhD

Title
Multicomponent intervention on smoking cessation in pregnancy; a single-case experiment with multiple baselines

Abstract

Our aim is to develop an effective intervention program on maternal smoking cessation during pregnancy. In this single-case experiment with multiple baselines, 13 daily smokers in early pregnancy were recruited from Buffalo, NY in 2015. Participants had 1 (early intervention group), 3 (delayed intervention group) or 5 (late intervention group) repeated baseline visits, and then received the same intervention with 4 components: stage-tailored education, monitoring and feedback on quitting, contingent financial incentives along with financial planning, and family support. Consistent smoking trajectories were observed across the 3 groups: none stopped smoking before intervention regardless of waiting duration, most patients started to quit smoking (verified by urine-cotinine) after intervention. Assuming drop-outs as smoking, conservative estimation of smoking cessation rate was 84.6% at 2 weeks of intervention, 76.9% at 8 weeks of intervention, and 70.0% by the end of pregnancy (35+ weeks). In conclusion, our intervention could achieve high smoking cessation rate during pregnancy.

Students
Leila S. Joseph, Saleh Mahmood

Research Mentor
Dr. Mulchand S. Patel, PhD

Title
Insulin Resistance Induced by Early Life Overnutrition is Reversed by Caloric Restriction

Abstract

Overnourishment of the rat during the suckling period results in the development of hyperinsulinemia, adult-onset obesity and insulin resistance. To investigate insulin resistance in the skeletal muscle of adult male rats, the litter size was reduced from 12 (NL) to 3 (SL) male pups/dam from postnatal day 3 to day 21. Both NL and SL rats were fed lab chow ad libitum until day 140. Another SL group was pair-fed (SL/PF) to NL rats starting from day 21. On day 94, one half of the SL/PF rats continued to be pair-fed, while the remaining SL/PF rats were allowed ad libitum feeding until day 140. Another SL group was pair-fed (SL/PF) to NL rats starting from day 21. On day 94, one half of the SL/PF rats continued to be pair-fed, while the remaining SL/PF rats were allowed ad libitum feeding until day 140. Another SL group was pair-fed (SL/PF) to NL rats starting from day 21. On day 94, one half of the SL/PF rats continued to be pair-fed, while the remaining SL/PF rats were allowed ad libitum feeding until day 140. Another SL group was pair-fed (SL/PF) to NL rats starting from day 21. On day 94, one half of the SL/PF rats continued to be pair-fed, while the remaining SL/PF rats were allowed ad libitum feeding until day 140. Another SL group was pair-fed (SL/PF) to NL rats starting from day 21. On day 94, one half of the SL/PF rats continued to be pair-fed, while the remaining SL/PF rats were allowed ad libitum feeding until day 140.

Students
Rebecca Kish, Lin Zhao

Major
Biomedical Sciences

Research Mentor
Dr. Michael Buck, PhD

Title
Computational Prediction of CTCF Mediated Topologically Associating Domains

Abstract

Our DNA is often visualized as a linear fragment where biological process take place in small linear neighborhoods. In reality our DNA is folded into a complex hair-ball, where DNA sequences megabases away are localized in close three-dimensional proximity. CCCTC transcription factor, CTCF, is a key protein in the process of organization of three dimensional landscape. CTCF is a DNA binding protein with an 11-zinc finger binding domains and has been characterized to mediate topologically associating domains. Topologically associating domains are highly conserved between cell lines and effect genetic expression. If domains associate, it is theorized that they would have similar ChIP-Seq signal. Publicly available CTCF ChIP-Seq signal across various cell lines was compared to every other signal to find correlation. Accurate prediction of these domains by correlation would circumvent ChIA-PET and other costly wet-lab experiments.
**ABSTRACT**

Iron is a cofactor that plays critical roles in numerous biological processes including oxygen transport, electron transport, and DNA synthesis. Although it is necessary in nearly all eukaryotes, free iron is highly toxic because it produces free radicals. Organisms have developed pathways to import, chaperone, sequester, and export this metal ion. Disruption of iron homeostasis leads to either iron deficiency or iron overload, contributing to a variety of medical problems including anemia, hemochromatosis, and neurodegenerative disorders.

How iron is transported into the cell is known for example, but how iron is transported into the mitochondrion is not well understood. Yet the majority of intracellular iron metabolism takes place in the mitochondria, so understanding how iron actually enters the mitochondrion is vital. This project ultimately looks to address whether two iron transporters, Zip 8 and Zip 14, are present in the outer mitochondrial membrane.

**ABSTRACT**

Triple negative breast cancer (TNBC). Increase in LR expression and serum leptin levels have been associated with BC, especially in TNBC, but the mechanism underlying the association has yet to be identified. Based on computational analyses we hypothesized that the small peptides designed based on leptin sequence to provide structural and mechanistic clues towards the generation of peptide antagonists of LR. The high affinity positions of leptin sequence in the active binding site of LR are localized based on High Ambiguity Driven Biomolecular Docking (HADDOCK) scores, followed by a designed compound administration in vitro were used to determine the effect of potential anti-cancer agents. Discovery of novel druggable LR pockets and lead molecules targeting these alternative binding pockets have provided structural clues towards the development of new generation of small molecule therapeutics that could be used in TNBC and as complementary treatments to the already existent therapies.

**Students**

Tae K. Lee, Emmanuel Yawson

**Major**

Biomedical Sciences

**Research Mentor**

Rajendram Rajnarayanan, PhD

**Title**

Novel Anti-Cancer Agents Targeting Leptin Receptors

**ABSTRACT**

D2 dopamine receptors (D2R) are expressed throughout the brain and are an important target in the treatment of many disorders including schizophrenia and addiction. However, D2R have a complex neuroanatomical localization, being present in many brain regions and on postsynaptic neurons as well as presynaptic terminals. The function of pre- and post-synaptic D2R are entirely different from one another. To manipulate the presynaptic D2R population only, we infused recombinant adeno-associated viruses (AAV) into the substantia nigra (SN) which produces short hairpin RNAs (shRNA) designed to knock down D2R. Since these neurons project to the striatum, the resulting loss of D2R in the striatum will be restricted to the presynaptic dopaminergic terminals, leaving the postsynaptic D2R intact. Recently we have shown that presynaptic D2R depletion from the SN results in a number of behavioral and neurochemical alterations that are indicative of a hyperdopaminergic state, which is also observed in schizophrenia. In order to further investigate the effects of presynaptic D2R manipulation, we collected tissue punches from the brains of AAV-infused rats, isolated RNA, and determined the efficiency of AAV-mediated presynaptic D2R knockdown via quantitative real-time PCR. We have observed a drastic reduction in D2 mRNA levels in the SN and alterations in proteins associated with dopamine neurotransmission. Together these results establish how the D2R enhances SN dopamine neurotransmission in the striatum. These results have broad implication in our understanding of dopamine based neurological disorders.

**Students**

Yun Beom Lee

**Major**

Biochemistry and Neuroscience

**Research Mentor**

Dr. Caroline E. Bass, PhD

**Title**

Knockdown of Presynaptic Dopamine D2 Receptors from Mesolimbic and Nigrostriatal terminals: mRNA analysis

**ABSTRACT**

Deciphering the Epigenetic Characteristics of Repetitive Elements in the Mammalian Genome and their Impact of Transcription

**Students**

Antara Majumdar

**Major**

Biomedical Sciences

**Research Mentor**

Dr. Anne Ferguson-Smith, PhD

**Title**

Impact of Transcription in the Mammalian Genome and their Characteristics of Repetitive Elements

**ABSTRACT**

Metastable epialleles are the result of insertions of endogenous retroelements and these are variably expressed in genetically identical individuals due to variation of methylation levels at the promoter region. This is established early during development. In this study, we tried to identify how many metastable epialleles are present in...
the murine genome. We used whole-genome bisulfite sequencing datasets generated for pure populations of B and T cells from CAST and BL6 mouse strains. A metastable epiallele signature was sought out. Our results ruled out several candidates with inter-individual variation in methylation, and of this several were located within/ close to genes that had variable expression levels between individuals. However no correlation of IAP methylation and expression of gene was found. All successful candidates had ragged methylation profiles and RNA-seq reads aligned in our initial datasets. We expect that this may lead to a signature of metastable epialleles in our datasets.

Current results reveal that these isoforms do not yield the same DMT1 levels after mitophagy, results which raise the question of how these isoforms differ in their metabolic responses.

**Abstract**

Humans require iron for several functions such as red blood cell production, enzyme production, and blood sugar conversion. The transferrin cycle allows iron uptake for cells to perform these vital functions. DMT1, a major metal transporter, imports iron into the cytoplasm of cells and exports it from endosomes. Four DMT1 isoforms exist, with two differing in the transcription start site and two differing with the presence or absence of an iron response element (± IRE). This project focuses on these isoforms in order to begin determining their relative roles on the outer mitochondrial membrane. By uncoupling mitochondria with carbonyl cyanide m-chlorophenyl hydrazone (CCCP) to induce mitophagy and utilizing western blotting to view protein concentrations, I have compared the amount of DMT1 remaining.

**Students**

Allan Nip, Kerri Pryce

**Research Mentor**

Dr. Arin Bhattacharjee , PhD

**Title**

Regulation of the Sodium (Na+) dependent Potassium (K+) channel (KNa) Slack and Slick by Magi-1

**Abstract**

The sodium-dependent KNa channels called Slack and Slick, share 74% amino acid sequence homology, with the last 8 amino acids being identical. This region of the channels is predicted to be a Post-synaptic density-95/Discs large/Zonulaoccludens-1 PDZ binding domain and therefore predicted to interact with PDZ containing scaffold proteins. Scaffold proteins stabilize and determine the localization of membrane proteins to various sub-cellular locales. In this study we have identified the PDZ protein Magi-1, as a binding partner that is essential for plasma membrane expression for both Slick and Slack. Using co-immunolocalization and immunoblotting assays, we demonstrated that Magi-1 localized with Slack and Slick in heterologous expression systems. Next using voltage-clamp patch-clamp recordings we demonstrated that Magi-1 co-expression with either Slack of Slick increases outward current density. In summary our preliminary findings suggest that the Slack and Slick binding to the Magi-1 scaffold protein stabilizes their expression at the plasma membrane.

**Students**

Bruce A. Pfeifer, Srigaunesh Ramachandra Rao, Aryn Rowsam

**Major**

Biochemistry

**Research Mentor**

Dr. Steven J. Fliesler, PhD

**Title**

Effect of Laminin Substrate on Attachment and Morphology of 661W Cells in Culture

**Abstract**

Purpose: Cell culture substrates may differ with respect to charge, hydrophilic character, and specific interactions with cell surface receptors, the latter specifically when the substrate is coated with cognate attachment proteins. One distinguishing feature of neurons in culture is elaboration of neurites, which have some similarity to dendrites and axons, the latter requiring extracellular matrix (ECM) components for extension, stabilization, and function. 661W cells (immortalized mouse retinal cone cells) are a surrogate cell culture model for retinal photoreceptors. Although they don’t develop outer segments or become morphologically polarized, they can exhibit a neuronal phenotype in response to culture conditions. Here, we examined the effects of different types of cell culture substrate treatments with regard to their effects on 661W cell attachment and neuron-like morphological development in vitro.

Methods: 661W cells (passage #30-32) were cultured in partially defined DMEM/F12 medium (containing 0.2% bovine calf serum) and plated onto 12-well culture plates (N=5). Tissue culture plastic (TCP) was coated with: 1) poly-L-ornithine (PORN) and 20% fetal bovine serum (FBS); 2) laminin-nidogen complex (65 µg/ml in modified Hank’s balanced salt solution (MHBSS)); 3) iMatrix-511 (Nippi laminin-511 fragment, at 2.5 µg/ml in modified Earle’s balanced salt solution (MEBSS); 4) MEBSS alone; or 5) no additions (TCP). 661W cells were seeded at a density of 15,000 cells/well. Images were obtained with an inverted microscope,
24 h post-incubation. Each cell in a given field was evaluated with respect to five cell body morphology categories: triangular, polygonal, elongated/bipolar, ellipsoid/miscellaneous, or rounded. To quantify extension of neuronal processes, the average number of neurites per field was determined. Length of the five longest neurites/field was measured and compared as a function of substrate condition. Statistical analysis of the data was performed (Student’s t-test, significance threshold p<0.05).

Results: Triangular and polygonal morphologies are associated with well-attached, proliferating cells. The effect of substrate composition, expressed as percentage of cell population with these morphological characteristics, was as follows: TCP, 34%; MEBSS, 42%; PORN+FBS, 36%; laminin-nidogen, 63%; and iMatrix-511, 58%. The average number of neurites/field and the average length (in μm, ±SEM) of the five longest neurites, respectively, under the various substrate conditions were: TCP, 36 and 67±16; MEBSS, 35 and 71±18; PORN+FBS, 22 and 60±25; laminin-nidogen, 65 and 124±20; and iMatrix-511, 54 and 145±16.

Conclusions: We conclude that laminin-containing substrates provide greater cell-substrate attachment and promote neuronal morphology of 661W cells better than do more conventional tissue culture substrates.

LSAMP (Louis Stokes Alliance for Minority Participation)

Students
Maria Camila Lopez, Cancan Yang

Research Mentor
Pinar Okumus, PhD

Title
Material Characterization and Instrumentation for Segmental Bridge Columns with Ultra-High Performance Concrete

Abstract
Research has shown that the bottom segment of a segmental bridge column is the most damage prone region during seismic activity due to rocking over the foundation. Bridge column specimens with conventional concrete, reinforced Ultra-High Performance Concrete (UHPC), and un-reinforced UHPC were tested under quasi-static and dynamic loads implementing different sensors to measure the displacement at key points of the structure. Cylinder compression, and split tension tests were performed to characterize properties of conventional concrete, reinforced Ultra-High Performance Concrete (UHPC), and un-reinforced UHPC were tested under quasi-static and dynamic loads implementing different sensors to measure the displacement at key points of the structure. Cylinder compression, and split tension tests were performed to characterize properties of conventional concrete and UHPC. Test results assess the improvement of the column seismic performance due to UHPC’s high tensile and compressive strength, and sustained tensile strength after cracking as well as the role of steel rebar in UHPC during earthquakes.

Student
Falliou Djigal

Major
Environmental Engineering

Research Mentor
Dr. John D. Atkinson, PhD

Title
Impact of Swelling on Polymeric Adsorbents

Abstract
Polymers are emerging adsorbents with beneficial properties that include negligible impurities, high specific surface area, and high pore volume. They uniquely swell upon exposure to solvents, but the impact of polymer swelling on adsorption/desorption systems controlling environmental pollutants has not been fundamentally addressed. Accordingly, a commercially available hyper-crosslinked polymer bead was immersed in 6 solvents until equilibrium swelling was achieved, simulating realistic adsorption/desorption conditions. Swelling in ethanol was highest, with polymer beads showing a nearly 30% increase in volume. Volumetric swelling in water was as much as 72 – 77% lower than swelling in organic solvents, attributed to the polymer’s varying solvent compatibility. With better understanding of polymer size changes due to swelling, performance in adsorption/desorption systems can be better predicted.

Student
Esteven D. Tiňeo Mateo

Major
Geology, Chemistry

Research Mentor
Dr Alison Graettinger

Title
Maar Crater Morphology

Abstract
Maars craters are formed when rising magma interacts with groundwater. There can be a continuous set of localized explosions or the location of the explosion can move laterally, causing an elongation. A database of young maars craters on Earth was used to examine the physical characteristics that defines a Maar on Earth. A Geographic Information System was utilized to determine the dimensions of the crater, and Google Earth was used to study the morphology of the craters. There was water and volcanoes in Mars. This makes Mars a likely candidate to find Maars.
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Celebration of Student Academic Excellence 2016

Student
Jessica Turner

Major
Environmental Engineering

Research Mentor
Dr. James N. Jensen, PhD

Title
Determining the Efficiencies of Solar Cookers to Disinfect Water Based on Surface Area and Shape

Abstract
According to UNICEF, in 2014, the number of people in the world without clean drinking water was more than twice the population of the United States. We seek ways to empower people to treat their own drinking water, including sustainable treatment methods to reduce pathogens responsible for waterborne diseases below acceptable levels. Solar thermal disinfection (specifically, solar cooking) is an ancient method that has recently gained momentum. The impact of solar cooker shape and size on disinfection efficiency is poorly understood. In this study, the efficiencies of rectangular and parabolic solar cookers to heat water were explored to optimize design. Efficiencies were tested in the field in summer conditions at about 43° N latitude. Efficiencies also were calculated using a mathematical model that counts the percentage of light rays that reflect in the solar cooker to reach the water.

Ronald E. McNair Scholars Program

Student
Eileen Diih

Major
Cognitive Science

Research Mentor
Dr. Laura Anderson

Title
Creative Adaptions for Increasing Healthy Eating Habits in Low Socioeconomic Status (SES) Families

Abstract
A nutritious diet is essential for optimal human growth and well-being. Low SES families encounter economic, social and educational barriers which obstruct their access to fresh produce and may encourage unhealthy eating behaviors. Research has shown that low SES individuals are harder to reach through standard lifestyle interventions and, as a result, these interventions must be modified creatively to be effective. (Bukman et al., 2014) This project will entail a preliminary literature review that highlights future implications and the need for continued studies in this area. Special emphasis will be given to the fresh produce differential between low and high SES communities, as well as innovative solutions for addressing this disparity.

Student
Marlene Morales

Major
Exercise Science

Research Mentor
Peter Horvath, PhD

Title
The Effect of Shiitake Mushrooms on Post Prandial Limpemia and Oxidative Stress

Abstract
The top three leading causes of deaths in America are heart disease, cancer and stroke. The lifestyle risk factors include a diet high in fat/simple carbohydrates leading to obesity. A high fat diet combined with insulin results in an increase in oxidative stress with oxidative damage of lipoproteins. Shiitake mushrooms may counterattack this effect due to its abundance in ergothioneine, an antioxidant that may lower lipid oxidation and ergosterol that could lower cholesterol absorption into the blood. 24 participants will consume three burgers (shiitake mushroom, white button mushroom with low ergosterol/ergothioneine and a regular burger) and blood collection for six hours. Blood will be analyzed for plasma lipids and measured for oxidative stress.

Student
Temitayo Sodeke

Major
Biological Science

Research Mentor
Murali Ramanathan, PhD

Title
Modeling Patient Adherence in a Compromised Population

Abstract
In the pharmaceutical sciences, adherence is the extent to which a subject correctly follows a prescribed dosing regimen. Poor adherence is a frequent factor in numerous avoidable hospitalizations and emergency room visits. The effects of adherence on dosing patterns, which are crucial for identifying intra-individual variability in drug concentration, have not been extensively investigated. This research builds on the previous research evaluating a novel pharmacometric Markov-chain, von Mises distribution model for adherence. We will critically assess whether dosing patterns in patients with dementia or depression can be described using the Markov Chain-von Mises model and compare these results for a once-daily hypertension
drug. Model parameters will be derived from the dosing histories, inter-dose intervals and their daily dose calendar plots. By comparing adherence and dosing patterns in patients with hypertension to those with dementia and depression, it will provide insights into adherence in vulnerable patient groups.

**School of Architecture & Planning**

**Student**

Dylan Burns

**Major**

Architecture

**Research Mentor**

Professor Michael Silver

**Title**

Toolbox Humanoid: Construction Site Co-Robot for Masonry Applications

**Abstract**

The On-Site Construction Robot (OSCR) has evolved through the use of digital fabrication in the form of CNC milling and 3D printing in carbon fiber, fiberglass, and titanium. The Toolbox Humanoid project seeks to use robotics to advance the capabilities and efficiency of masonry construction by evolving the role of masons from skilled labor to skilled technicians who operate OSCR. OSCR opens the door to an infinite number of architectural design possibilities and applications, allowing for the precise creation of complex curvilinear forms in a medium that often has the connotation of being largely orthogonal. OSCR also allows for use as device to reconfigure interior space through the use of stackable, modular units. By starting with a mass of uniform units in an interior space, OSCR can move and re-stack them to create any type of interior configuration, which could have a strong application in art gallery and loft spaces.

**Students**

Charles Canfield, Kelsey Liz Habla

**Major**

Architecture

**Research Mentor**

Mr. Jonathan Shimon

**Title**

How do community gardens in low-resource neighborhoods contribute to alleviating food insecurity?

**Abstract**

Food insecurity in Buffalo continues to pose a challenge, especially in low-resource neighborhoods. For example, of the 32,927 households with children under the age of 18, 39% (12,842) rely on public assistance to meet their food needs. Communities gardens are often are described as a tool for reducing food insecurity. A community garden is a neighborhood space designed, developed, or managed by local residents...
to grow crops. The city of Buffalo encourages temporary use of vacant lots for community gardens, and has about 30 community groups using over 90 parcels of land for community gardens. This research project explores ways community gardens in low-resource communities alleviate food insecurity. The paper draws on a new data set, resulting from a survey of community gardeners that documents the role of community gardens in alleviating food security in Buffalo. Quantitative analysis of survey data will be supplemented with qualitative interview results.

**STUDENT**
Jelani Lowe

**MAJOR**
Environmental Design

**RESEARCH MENTOR**
Dean Robert G. Shibley, FAIA, AICP

**TITLE**
509 Michigan Avenue Redevelopment

**ABSTRACT**
509 Michigan Ave is a dilapidated property that resides in the Michigan Street African American Heritage Corridor (MSAAHC) in Buffalo, NY. The property’s adjacency to the historic Michigan Street Baptist Church only prioritizes the necessity for redevelopment. The Buffalo-Niagara Medical Campus expansion has been a catalyst to a new emphasis on development in Buffalo. Evident through a number of initiatives to provoke the investment in many of Buffalo’s most historic assets. However, it seems that this new emphasis has neglected the MSAAHC. I am currently working as the executive intern for Impacto Consulting Associates, and working extensively with Impacto’s President and Co-Founder; Eunice A. Lewin. Upon reading the tentative development plans for the MSAAHC outlined in a Master Plan (prepared by Huntley Partners) it was concluded that the property 509 Michigan Ave is explicitly neglected. In lieu of this omission, we (Impacto Consulting Associates) have formed a partnership with; Aaron Ott (Curator for public Art for the Albright-Knox Art Gallery), Arthur Hall, M.U.P. (Representative from the Mayor’s Office of Strategic Planning), and Assemblywoman Crystal Peoples-Stokes of the 141th District, in efforts to use the momentum of development to inspire investment in the MSAAHC. As of now the tentative development plans are to redevelop 509 Michigan Ave into some form of public art gallery, or children’s museum focusing on African American Heritage. The goals of this development is to strengthen the importance of the MSAAHC that is seems to have been forgotten, and to emphasize the significant contributions of Buffalo in the national and international establishment of African American heritage. The end objective is to generate foot-traffic to the MSAAHC that would provoke multi-ethnic interest in the existing three anchors of the corridor.

**SCHOOL OF ENGINEERING & APPLIED SCIENCES**

**STUDENTS**
Adetunjii Adesina, Younse Bachar, Mark Buenafe, Lindsey Hunka, Kathryn Katzer, Meagan McCadden, Valeria Prieto

**MAJOR**
Civil Engineering, Environmental Engineering

**RESEARCH MENTOR**
Dr. Andrew Olewnik, PhD

**TITLE**
UB FLOATS

**ABSTRACT**
In recent years, the University has been increasing efforts to make Lake LaSalle a more active part of the university landscape. As a logical addition to this initiative, the University at Buffalo Child Care Center (UBCCC) proposed the idea of a multi-use classroom that would float on Lake LaSalle. As part of the SEAS Experiential Learning Programs two student teams from Civil, Structural and Environmental Engineering developed conceptual designs for a floating classroom with input from Dan Ball, Teacher at UBCCC and Russ Crispell, Director of Outdoor Pursuits during the Spring 2015 semester.

As undergraduate students working on this extracurricular project to enhance their educational experience, they are also looking to enrich life for the campus and surrounding community, and introduce a new, unique, and interactive learning environment. The preliminary classroom concept has been designed to facilitate: (i) exploration for toddlers and preschool children with a view out over the water, (ii) an immersive experience that puts the classroom in the water.
in an ideal setting to support lectures and labs where ecology, environment and sustainability are central, and (iii) a unique community space to host events and display artwork. In addition, the design embraces use of recycled materials in alignment with the university’s vision for sustainability.

During the 2015/16 academic year, the students are continuing their work with a goal to take the floating classroom from concept to reality. The team is comprised of seven undergraduate and graduate students from CSEE, with mentorship from Dr. Andrew Olewnik (SEAS Director of Experiential Learning), as well as a professional engineer and UB alumnus, Jason Havens (Project Engineer & Manager with Clark Patterson Lee).

The establishment of a floating classroom on Lake LaSalle will serve as an exciting attraction for new and prospective students, support the creativity of our existing students, and even inspire the community to always be willing to do something out of the ordinary. As current civil and environmental engineering students, they are excited of the potential to see their designs come to life at their future alma mater.

**STUDENT**
R. Jamie Asbach

**MAJOR**
Mechanical Engineering

**RESEARCH MENTOR**
Dr. Andrew Olewnik, PhD

**TITLE**
Cyber-Empathic Design: Using Sensors to Analyze Anthropometric Orientation for Ergonomic Analysis and Optimization

**ABSTRACT**
In design, the process of connecting information from the consumer to the design space has commonly relied on mathematical constructs (such as part worths of utility/preference). One main issue with this is the presence of designer bias, which arises from previous experience, industry practice, designer-specific mental models, etc. An ideal road to an optimal design would remove this bias and directly connect the consumer information to the design space without requiring a designer to interpret the data. By embedding sensors into products to gather data on their usage, it is theoretically possible to accomplish this. In this branch of the project, the focus will be on sensor embedded desk chairs. From the data collected with these chairs, a model will be constructed to represent the product usage, including anthropometric orientation, without active supervision.

**STUDENTS**
Fatak Borhani, Dan Buckmaster, Erikson Duarte, Walker Gosrich, Alberto Padovan, Javier Yu

**RESEARCH MENTOR**
Dr. M.A. Karami

**TITLE**
Moving surface boundary layer implemented through the indirect piezoelectric effect on an airfoil surface.

**ABSTRACT**
The project focuses on the concepts of Moving Surface Boundary Layer (MSBL) and flow separation delay. Experiments aim at testing the possibility of delaying flow separation on an airfoil by exploiting piezoelectric actuators to generate a travelling wave on its surface. It is theorized that the travelling wave will increase the flow velocity over the top of the airfoil, allowing for the wing to pitch at higher angles of attack before stall occurs. Ultimately, a delayed flow separation improves the overall efficiency of the airfoil which would benefit from increased lift generation and from a substantial decrease of induced drag, even at angles of attack well below stall.

**STUDENTS**
Meghan Capeling, Alex Commissio, Patrick Krohl, Zachary Manzer

**RESEARCH MENTOR**
Dr. Chong Cheng, PhD

**TITLE**
Drug Delivery Enhancement for Cancer Therapy

**ABSTRACT**
The anticancer drugs: doxorubicin and paclitaxel have low solubility, poor cellular uptake, the tendency for early degradation, rapid excretion through the kidneys, and are expensive. This research consists of engineering a delivery system to promote water solubility, reduce antigenic activity, improve pharmacokinetics, and provide active targeting to the cancerous cells. These systems are composed of polymeric backbones, pH-sensitive linkages, and solubility enhancing components. The pH in cancer cells is generally lower than that of healthy cells. Thus, drug release can be controlled by a
pH-sensitive linkage from the base polymer to the anticancer drug. When the delivery system reaches the acidic conditions of the cancer cell, the linkage will cleave and release the anticancer drug. This could reduce the side effects of chemotherapy and provide a more effective treatment.

**Students**
Nicole Cappa, Chengyu Jiang, Rohan Kuriakose, Rei Yoshinaga

**Research Mentor**
Dr. Andrew Olewnik, PhD

**Title**
ACS Cubesat Testbed and Educational Kit

**Abstract**
Aimed at developing a CubeSat testbench, a physical CubeSat model that could be used to test algorithms and to develop new systems that could be implemented in future CubeSat designs. Our present goal is to develop a light detecting system that would allow the CubeSat to point to a light source. The project has branched into a project that is being developed as an educational tool for K to 12 students.

**Students**
Joseph Carleton, Connor Smith

**Major**
Mechanical Engineering

**Research Mentor**
Dr. Andrew Olewnik, PhD

**Title**
Cyber-Empathic Pen Design

**Abstract**
Cyber-empathic design involves the integration of sensors and information technologies with existing products to allow products, in this case the pen, to observe themselves and report these observations in the form of quantitative data to researchers. From the data, correlations between user features and specific pen designs will be analyzed. While the specific interest here is designing and producing customized writing instruments, the broader impact is exploring methods of design that can support mass customization of products for many different types of applications. This research is tying together “internet of things” data collection platforms with advanced manufacturing techniques, like 3D printing - a design methodology that is critical to providing cost effective mass customized products.

**Students**
Kevin Carpio, Bercely Hurtado, Rei Yoshinaga

**Major**
Aerospace Engineering

**Research Mentor**
Dr. Manoranjan Majji, PhD

**Title**
Microsatellite Attitude Manipulator

**Abstract**
Accurate control and position are essential components of any spacecraft to accomplish their goals. After successfully tested the Canfield Joint Attitude Management (CanJAM), there exists a need to provide a systematic research for possible resonance aspects unforeseen during the flight test. Furthermore, spacecraft have different control requirements according to their dimensions and payload. For this, various reaction wheels are to be analyzed to assure proper control of the spacecraft. A gyroscopic model was designed to be attached to a load cell that will be able to analyze the forces created by the reaction wheels and that is to be attached to the current CanJAM prototype.

**Students**
Kun Woo Cho

**Major**
Computer Science and Engineering

**Research Mentor**
Dr. Wenyao Xu, Assistant Professor

**Title**
Thermal Handprint Analysis for Forensic Identification using Heat-Earth Mover's Distance

**Abstract**
Recently, handprint-based recognition system has been widely applied for security and surveillance purposes. The success of this technology has also demonstrated that handprint is a good approach to perform forensic identification. However, existing identification systems are nearly based on the handprints that could be easily prevented. In contrast to earlier works, we exploit the thermal handprint and introduce a novel distance metric for thermal handprint dissimilarity measure, called Heat-Earth Mover’s Distance (HEMD). The HEMD is designed to classify heat-based handprints that can be obtained even when the subject wears a glove. HEMD can effectively recognize the subjects by computing the distance between point distributions of target and training handprints. Through a comprehensive study, our identification system demonstrates the performance even with the handprints obtained by the subject wearing a glove. With 20 subjects, our proposed system achieves an accuracy of 94.13% for regular handprints and 92.00% for handprints produced with latex gloves.

**Students**
Andrea Ciolko, Zachary Janish, Benjamin Stortz, Benjamin Swart, Ellen Van

**Research Mentor**
Dr. Andrew Olewnik, PhD

**Title**
Design of a Pre-prosthetic for Upper Extremity Amputee
**Abstract**

A 16-year old patient, Megan, recently had her right arm amputated just above the elbow and is waiting on the configuration of an expensive, permanent prosthesis which could take several months. During this time (and afterward) an improved low-cost temporary prosthesis is needed for rehabilitation purposes, and to allow the continuation of regular hobbies including volleyball - which neither the current temporary nor permanent prosthesis can support. The design process implemented was an iterative one; an initial design was proposed, CAD models were generated using Creo Parametric software, and early prototypes were made utilizing a Makerbot 3D printer. After gathering client feedback, generating and filtering additional concepts, and producing several more prototypes, a final design was reached which met the client’s requirements. The design - which includes two interchangeable forearms and a strap suspension system - was fabricated, assembled, and delivered to Megan improving her prehensile manipulation of objects for rehabilitation as well as allowing her to accurately “bump” a volleyball. Room was left in the resulting design for potential generalization of the device to support the needs of other patients with upper extremity amputations.

**Students**

Kevin Darmawan, Michael Fitts

**Major**

Mechanical Engineering

**Research Mentor**

Dr. Joseph Mollendorf, PhD

**Title**

Baseline Pellet Stove Research to Improve Efficiency and Reduce Emissions

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**Abstract**

Our group instrumented a pellet stove to perform baseline testing to acquire data on the emissions and efficiency produced by the stove. The stove has six different settings which were all tested three times for three hours each to ensure sufficient data. The data collected will determine where the most efficient range is located within the pellet stove which will give way to future modifications to increase the efficiency and reduce the emissions.

**Students**

Matthew Falcone

**Major**

Environmental Engineering, Civil Engineering

**Research Mentor**

Dr. James N. Jensen

**Title**

Parabolic Solar Trough for Drinking Water Disinfection

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**Abstract**

Approximately one-sixth of the global population lacks access to improved clean water sources, leading to outbreaks of preventable waterborne diseases, and loss of life. Waterborne pathogens can be destroyed by thermal inactivation...
at 60°C for ten minutes, conditions sustainably produced using a solar trough to focus solar radiation into a pipe centered at the focus of a parabolic trough. The purpose of this study is to determine the most theoretically efficient parabolic solar trough design to sustainably disinfect water in developing countries and emergency conditions. The trough and curve design will be modeled, constructed, and subjected to cross-sectional planar ray-tracing analysis. The results will be compared to the theoretical model, and adjustments will be made for the full-scale trough design. We plan to partner with ongoing efforts in the Mara Region of Tanzania for field testing in the future.

**Abstract**

This paper presents a fused metric for the assessment of physical workload that can improve fatigue detection using a statistical visualization approach. The goal for considering this combined metric is to concisely reduce the number of variables acquired from multiple sensors. The sensor system gathers data from a heart rate monitor and accelerometers placed at different locations on the body including trunk, wrist, hip and ankle. Two common manufacturing tasks of manual material handling and small parts assembly were tested. Statistical process control was used to monitor the metrics for the workload state of the human body. A cumulative sum (CUSUM) statistical analysis was applied to each of the single metrics and the combined metric of heart rate reserve and acceleration (HRR*ACC). The sensor data were transformed to linear profiles by using the CUSUM plot, which can be monitored by profile monitoring techniques. A significant variation between the lifting replications was observed for the combined metric in comparison to the single metrics, which is an important factor in selecting a fused metric. The results show that the proposed approach can improve the ability to detect different states (i.e., fatigue vs. non-fatigued) in the human body.
ABSTRACT
Wireless data traffic has surged in recent years due to a change in the way today’s society creates, shares, and consumes information. Accompanying this change is an increasing demand for faster, more ubiquitous wireless communication networks. Terahertz (THz)-band (0.1–10 THz) communication is envisioned as a key technology to meet the demand for faster and more ubiquitous wireless connectivity. For many years, the lack of compact and efficient THz devices limited the feasibility of such communication systems. Ongoing advances in THz generation and detection schemes are making sources and detectors more readily available, but access to such devices is still very challenging, and no platform currently exists for testing and evaluating the performance of novel THz communication mechanisms. In the face of this obstacle, we are developing the very first simulation platform for THz-band communications. Our platform is based on ns-3, an open source network simulation engine, and incorporates software models of THz devices and the THz channel, as well different physical and link layer solutions built upon them. This platform will allow its users to test and simulate new communication and networking protocols for this future THz-band systems.

STUDENTS
Dante Iozzo, Michael Tong

RESEARCH MENTOR
Edward P. Furlani, PhD

TITLE
Numerical Analysis of Electric Double Layer Capacitors with Mesoporous Electrodes: Effects of Electrode and Electrolyte Properties

ABSTRACT
A theoretical study was performed on the behavior of electric double layer supercapacitors constructed from mesoporous activated carbon electrodes. A three-dimensional computational model is developed to predict the charge distribution within the supercapacitor as a function of key electrode and electrolyte properties. The model encompasses the impact of crucial device parameters, including the size of the ions, the bulk ion concentration, the field-dependent permittivity of the electrolyte, the specific surface area of the electrodes and the applied voltage. These parameters allow for a more accurate representation of supercapacitor phenomena as compared to point charge approximations. The model can be adapted to analyze the effects of arbitrary electrode morphologies and a broad range of electrolyte properties. It provides unique insight into the internal physics of an electrochemical cell and is well suited for the rational design of novel EDL supercapacitors.

STUDENTS
Dr. Tarunraj Singh, PhD

RESEARCH MENTOR
Brian Kiel, Alberto Padovan

TITLE
Development of a Low-Cost Sky Imager

ABSTRACT
Sky imaging is a very useful practice for predicting cloud cover and thus solar energy availability. With this technology, it is possible to decipher when conditions are optimal for harnessing the sun’s energy at solar power plants. A sky imager is a relatively small, weatherproof device equipped with a camera used outdoors to view the sky. In the most basic sense, a sky imager generally consists of three elements: a camera used to record a direct or reflected image of the sky, an arm or device used to block direct sunlight, and a digital video transmitter coupled with image processing software. This project is specifically being conducted to see if an inexpensive sky imager can be constructed and used to collect data necessary for forecasting the motion of clouds, and available sunlight.

STUDENTS
Joshua Kuminski, Conor Westphal

RESEARCH MENTOR
Nils Magiera, M. Sc.

TITLE
IPG CarMaker Based Formula Student Driving Simulator for Driver Training

ABSTRACT
The Institute of Automotive Engineering (FZD) at TU Darmstadt tasked ADP Summer 2015 to design and develop a race car simulator based on the IPG CarMaker platform which would be suitable for usage by the Darmstadt Automotive Racing Team to use for testing and driver training. The project began with investigation of racing driving simulators and requirement development by reviewing existing driving simulators and driving simulator research, fabricating a list of questions, preferences, and assumptions, and considering provided hardware and software. The developed requirements were used to create actionable goals as outcomes for the ADP. The next step was the design and Simulink integration of the software and user controls into the simulator. Once complete, a series of tests with feedback into the design process were executed. Completion of the design project resulted in a functioning driving simulator for use by DART Racing, whereas there was previously no such system.

STUDENTS
Debrup Laha, Samuel Odulaja, Ansh Pandey

RESEARCH MENTOR
Dr. Deborah D. L. Chung, PhD

TITLE
Toward Practical Three-Dimensional Metal Printing

ABSTRACT
This project is aimed at developing a 3D metal printing technology that is cost-effective (due to its combination of high deposition rate and reasonably low power requirement) and is applicable
to the fabrication of large metal objects such as cars. (It should be clarified that cars will not be fabricated in this project.) Printers based on the proposed novel 3D metal printing technology will be designed and built, the feasibility of the technology will be demonstrated and the performance of the printed materials and structures will be evaluated.

Along with this technology development is the development of materials, processes and machines in relation to metal-matrix composites and thixotropic metal-based systems, and largescale implementation consideration.

A related objective is advancing the materials science of 3D metal printing. Hence, the relationship among processing, structure and properties will be investigated in relation to both materials and structures obtained by 3D metal printing.

### Student

**Vienna Mott**

**Major**

Biomedical Engineering

**Research Mentor**

Dr. Parag Chitnis, PhD

**Title**

Ultrasound Stimulation of Neurons

**Abstract**

Neurostimulation using external stimuli such as electrical signals delivered using electrodes or light pulses delivered using fiber optics are used to gain insight into signaling and communication in neuronal networks. These approaches are invasive and not conducive for in vivo translation. A noninvasive alternative to the aforementioned method is ultrasound stimulation. Focusing ultrasonic energy on a particular region of the brain potentially could allow the waves to propagate through the skull and produce neuronal signals. The aim of this study was to demonstrate feasibility of ultrasound-based neurostimulation in vitro. Preliminary results indicated that the 3.3 MHz excitation did not induce a statistically significant change in neuronal activity as quantified using rate of action-potential spikes detected by the MEA. In comparison, broadband ultrasound stimulated the neurons and resulted in a significant increase in spike rate detected by the MEA. In short, ultrasound stimulation could be a promising method for neurostimulation as it is much less invasive than the current methods.
The discovery of graphene, a two-dimensional carbon crystal with unique physical and electrical properties, has made possible the propagation of very high frequency electrical signals through the use of graphene-based nano-antennas. The communication abilities afforded by these nano-antennas will enable many new applications, including nano-networks and Terahertz band communications.

In this work, a design for an array consisting of nano-antennas was modeled and numerically simulated. First, the effects of mutual coupling between elements of the array were investigated. Then the propagation characteristics of the array were simulated for different numbers of elements and varying geometries. The work found that the material characteristics of graphene lead to decreased coupling effects in graphene-antenna arrays, potentially enabling more densely packed arrays with increased gain in a smaller physical footprint.

**School of Management**

**Student**
Lili Chen

**Major**
Business Administration

**Research Mentor**
Professor Nathan Daun-Barnett

**Title**
FAFSA Completion Project

**Abstract**
Work with Buffalo Public School to raise the percent of Buffalo high school students successfully completing the all-important financial aid and college application.

**Student**
Yash A. Dhimal

**Major**
Business Administration

**Research Mentor**
Alex Ampadu

**Title**
CyberWize - Be Wise Cyber Wise

**Abstract**
The primary objective of this initiative was to transform millions of lives through a highly specific educational & training program at an extremely affordable cost so as to attract students from the poorest households. comprehensive cyber-security online-training and certification program, developed by a group of senior professors & advisors from schools such as Harvard Business School, MIT, Carnegie Mellon etc., & senior cyber-security practitioners from US-DHS and other fortune 500 companies, was taught on a mass scale to students in India with the support of the Human Resources Development (HRD) Ministry, Government of India, by utilizing their annual skill development fund of 500 Million Rupees (50 Crores). This program has courses with SME's from the above mentioned prestigious universities and it prepares students to successfully take the CISSP exam, which is the gold standard benchmark around the globe. This compliments the Digital India initiative by Indian PM Modi.

**Student**
Rohan Kapoor, Tamana Ranka

**Major**
Business Administration

**Research Mentor**
Constance Hanel

**Title**
ULCC

**Abstract**
Located in the lower level of the Jacobs Management Center, the Undergraduate Learning and Community Center includes three classrooms, a community area, tutoring facilities and a group study area—all dedicated exclusively to our undergraduates, with technology throughout to enhance their experience. A place to gather, learn and thrive.

**Student**
Austin Obunadike, Prasanna Thyagarajan

**Major**
Business Administration

**Research Mentor**
Veljko Fotak, PhD

**Title**
The struggle is real: A meta-analysis of leadership characteristics among men and women

**Abstract**
The purpose of our project is to explore why men and women differ in their ability to emerge as leaders. This will be accomplished by using meta-analysis (i.e., synthesis of aggregate data of several studies) to explore the process through which gender influences leadership outcomes. Specifically, we are proposing that both traits (i.e., agency & communion) and behaviors (i.e., participation) work together to explain gender differences in leadership emergence. Our role in this project has been to complete a literature review of existing research, code primary studies, and read relevant scholarly articles with the goal of gaining expertise in the field of gender and leadership.
Title
1) Merchandising 2) Start-ups

Abstract
Project is about internship experience. It would be about how we successfully got how women's basketball got their merchandising started.

Student
Maggie Petrella

Major
Applied Mathematics, Economics

Research Mentor
Dr. Vincent Amanor-Boadu, Ph.D.

Title
The Effect of Oil Price Variability on Biofuel Production

Abstract
Over the past thirty years, biofuels have been developing as a renewable fuel resource as oil prices have also grown more volatile. This research explores the relationship between these two factors within the past three decades. More specifically, we evaluate the extent to which variability in oil prices has affected the production of bioethanol. We approach this objective by evaluating trends in oil prices and biofuel production between 1985 and 2014, then analyzing the effect that oil price volatility has had on biofuel production opportunities in the United States. We determine that, for both crude oil prices and ethanol production, growth has increased substantially since the year 2000. In order to define the relationship between oil price variability and biofuel production, we create a linear regression function using a stepwise regression technique. We use this regression to explain past developments in bioethanol production opportunities and estimate future changes. We determine that variability in oil prices has a significant and positive impact on bioethanol production.

Student
Sunayna Rangarajan

Major
Business Administration

Research Mentor
Thomas Labert

Title
Make smarter investments with quantitative behavioural finance

Abstract
The purpose of the project is to demonstrate how behavioural finance can be utilized to make the best possible investment decisions in the financial market. While the theories and principles of this recent discipline have gained a lot of attention, there is a lack of clarity on measurement. As a result of which, investors still primarily use traditional finance to guide their investment decisions. By employing market sentiment indicators such as the put-call ratio, my research will demonstrate how various behavioural finance principles can be observed and measured quantitatively. My goal is to make it relatively easier for investors to make the right decisions in the stock market, in the face of uncertainty, and thereby increase the profitability of their investments.

Student
Matthew Ricotta

Major
Business Administration

Research Mentor
Dr. Veljko Fotak, PhD

Title
An Examination on Global Expropriation Episodes and Foreign Direct Investment

Abstract
My undergraduate finance research examined the link between government expropriation and re-nationalization incidents of foreign-owned companies and industries, and the effect which these expropriation incidents had on foreign direct investment (FDI) inflows in to these expropriating incidents worldwide using databases such as Factiva, and SAS regression analyses were performed as well. These analyses were performed by regressing nation’s respective foreign direct investment levels against various indicators of national economics development such as GDP per capita, GDP growth, legal systems, number of previous or recent expropriation incidents in a particular country and the use of bilateral investment treaties. The study’s objective was to indicate whether or not there is a strong and/or well-defined link between government expropriation and how it may act as a disincentive for foreign direct investment.

Title
Evaluation of an Evidence Based Teaching Program for Newborn Safe Sleep

Abstract
Sleep related deaths are the leading cause of infant death. Over the summer of 2015, I participated in the Nursing Undergraduate Research Summer Experience (NURSE) program. My research focused on what influenced new parents regarding baby’s sleep environment. My research was conducted in two parts: a literature review and a cross-sectional descriptive study. The research question was “what influences newborn sleep in the home?” The literature review identified 18 articles and a literature matrix developed. Following IRB approval...
new mothers at Sisters Hospital were invited to participate in the research. Approximately a week after parents discharged from the hospital, they were interviewed about their baby's sleep environment. At the end of the summer experience, 48 mothers were interviewed regarding their baby's sleep. The data indicate the teaching these parents received during the hospital is effective but other factors influence infant sleep environment. Educating parents is important to prevent sleep-related deaths.

**Students**
Sarah Dow, Janelle Garcia, Alexander Salinas, Gabrielle Santander, Heidi Weinborg

**Major**
Nursing

**Research Mentor**
Dr. Laura M. Anderson PhD

**Title**
Energy Balance in United States Adolescents

**Abstract**
More than one-third of children and adolescents are overweight or obese, with children from minority groups disproportionately affected. Energy Balance (EB) or the relationship between the amount of energy taken in from food/drink and the energy expended through daily living and physical activity is how one can maintain a healthy weight. This study investigates EB behaviors in a representative sample of U.S adolescents as well as examines the variations in behaviors across weight classes and ethnic groups. Facilitators to healthy weight include healthful food consumption and adequate energy expenditure at home or school. Barriers to healthy weight include energy dense food consumption and sedentary behaviors. This project is a secondary data analysis of the 2013 Youth Risk Behavior Survey (YRBS) which includes data gathered from 13,583 adolescents across the United States. Using our EB Composite, we will explore adolescent energy balance behaviors across weight classes and ethnic groups.

**Student**
Alexander Salinas

**Major**
Nursing

**Research Mentor**
Yu-Ping Chang PhD, RN.

**Title**
Substance Use, Sleep Hygiene, and Daytime Sleepiness Among College Students

**Abstract**
Substance use and insomnia are common problems in college students primarily due to stress and peer influence in this age group. Substance use and insomnia can have negative impact on students' health and academic performance. However, little is known about the association between substance use and sleep. This is an ongoing study aiming to describe baseline information regarding substance use, sleep hygiene, and daytime sleepiness in a sample of insomnia college students who have been enrolled in a sleep education study. Methods: An anonymous survey was completed by 25 college students. Results: Preliminary findings indicate that 76% of our current sample reported alcohol use and 20% of them reported drug use. Alcohol use is significantly correlated with daytime sleepiness. Furthermore, sleep hygiene is significantly associated with daytime sleepiness. Conclusions: Our preliminary findings suggest a high prevalence of substance use among college students and might have some impact on their sleep.

**Student**
William Waller

**Major**
Nursing

**Research Mentor**
Dr. Sharon Hewner, PhD, RN

**Title**
Exploring Barriers to Care Continuity During Transitions

**Abstract**
The discharge process from a hospital requires multiple health care disciplines working in concert to safely transition patients from the acute care setting. During this transition, gaps in care continuity can occur for multiple reasons. The purpose of this study was to determine the current methods hospitals employ to move patients safely through the hospital and the discharge process. Observational data was collected from hospital staff members and process maps were generated. A three-phase, high-level process map was generated with a focus on the relation between two teams, the clinical team and discharge team. This map visually represented the current workflow and communication patterns that occur and improvement opportunities were identified. Our preliminary findings indicated there are substantial improvement opportunities in the communication between the clinical team and the discharge team. Additionally, the use of Health Information Technology (HIT) can be utilized to guide the intensity of care planning.

**Students**
Bo An, Yuan-Ju Chen, Yang Qu, Ming Zhang

**Major**
Pharmaceutical Sciences

**Research Mentor**
Dr. Jun Qu, PhD

**Title**
A Novel Antibody-Free, Dual-Mechanism Enrichment Strategy for Quantification of Biotherapeutics in Tissue Samples.

**Abstract**
Quantification of target proteins in tissue samples is essential for PBPK studies, yet...
it is still challenging due to sensitivity issue. Although Immunoaffinity enrichment of peptides can increase sensitivity, it is often difficult to develop target-specific antibodies. The objective of this project is to establish an antibody-free strategy utilizing Mix-mode Cation Exchange (MCX) cartridge to enrich the target peptides and simplify matrix components. Multiple target proteins including monoclonal antibodies and important biomarkers were used as model molecules for evaluation and method development. Samples were digested by Surfactant-aided On-pellet Digestion (SOD) technique and loaded onto MCX cartridge. Matrix components were cleaned up under several washing conditions with various pH, ionic, and solvent strength. Previously established pH formulations facilitated the optimization of organic solvent and ionic strength, allowing rapid and specific method development. The results showed at least a 20-fold increase in sensitivity for detecting signature peptides with the optimal MCX strategies. Further PK studies in rat tissues demonstrated the utility of this enrichment strategy for high-throughput and ultra-sensitive quantification of target proteins.

**Abstract**

- **Title**: The Interplay of Antibiotic Resistance and Virulence Attenuation in Acinetobacter baumannii: Profiling Alterations in Pathogenicity in Response to Antibiotic Pressure Over 14 Days
- **Purpose**: In patients with Acinetobacter baumannii (AB) bacteremia, there is a paucity of data regarding the interplay between resistance and virulence capacity. The objective was to analyze the relationship between resistance and virulence of AB when under antimicrobial pressure of PolymyxinB (PB).
- **Methods**: AB isolates came from a strain that was resistant to all carbapenems. 20 waxworms were injected with 105CFU/ml of each isolate into the right proleg. 20 waxworms were injected with phosphate-buffered-saline; 20 waxworms were not inoculated. Waxworms were incubated at 37˚C; mortality was accounted for daily over 6 days.
- **Results**: Greatest mortality occurred in the 0hr,24hr,48hr-isolates, which had mortality rates of 80%(9/20), 95%(19/20),100%(20/20). After 6-days, the 72hr,96hr, and 336hr isolates had mortality rates of 70%(14/20), 45%(9/20), 20%(4/20). MICs showed increases in drug-resistance after drug exposure.
Conclusion: The increasing MIC values and diminished mortality rates revealed that PB antibiotic exposure counter-selected for AB resistance over 336 hrs, attenuating virulence capacity.

**ABSTRACT**

In the vertebrate nervous system, a proteolipid substance called myelin ensheaths neuronal axons and facilitates the conduction of electrical signals by a process termed saltatory conduction. Demyelinating diseases such as multiple sclerosis are characterized by failed restoration of axonal myelin by oligodendrocytes. Remyelination failure in multiple sclerosis has been suggested to occur because of factors such as BMPs and WNTs, which are present in demyelinated lesions; however, a complete understanding of the factors that modulate oligodendrocyte progenitor cell (OPC) fate is essential for developing pharmacological therapies. In prior work, Sulf2 was identified by a genomic analysis of human OPCs done to recognize such pharmacological targets. RT-qPCR on human OPC mRNA showed that SULF2 was downregulated during OPC differentiation. Therefore, in this study, we asked whether Sulf2 inhibits OPC differentiation. To study the effects of endosulfatases in general, we isolated OPCs from transgenic Sulf1(fl/fl)/Sulf2(fl/fl) postnatal mice brains. We used a GFP-Cre recombinase expressing virus to knockout floxed Sulfl1/2 alleles in isolated OPCs in vitro. Following extraction of genomic DNA, PCR, and gel electrophoresis, we confirmed that both sulfatase genes were successfully knocked out.

To study the role of endosulfatases in OPC development, Sulfl1/2 (fl/fl) mouse OPCs were infected with the GFP-Cre recombinase overexpression virus and consequently tested with a BMP7 stimulus. As expected, when control OPCs were differentiated in the presence of BMP7, the proportion of GFAP+ astrocytes was increased and the proportion of O4+ committed oligodendrocytes was decreased. However, after Sulfr ablation using 10 MOI (multiplicity of infection) Cre-GFP virus, which routinely achieved 50% GFP-positive infected cells, we noted a surprising decrease in O4 positive cells relative to the control. We hypothesize that this was a result of OPC toxicity when using the Cre virus, so our future work will examine other ways to induce knockout with more efficiency and less cell death. Furthermore, we intend to assay the downstream biochemical effects of Sulfr ablation using a BMP-specific luciferase assay.

**STUDENT**

Nhan Nguyen

**MAJOR**

Pharmaceutical Sciences

**RESEARCH MENTOR**

Dr. Sathy V. Balu-Iyer, PhD

**TITLE**

Biophysical Characterization of a Novel Immunogenicity-Suppressing Liposome Containing Lysophosphatidylserine and Retinoic Acid

**ABSTRACT**

Immunogenicity against protein therapeutics is the event in which the protein products provoke the body’s immune response against itself or potentially promote a series of clinical adverse effects. Thus, immunogenicity is emerging as a critical challenge to both the patient safety and therapeutic efficacy. Several evidences regarding the ability of lysophosphatidylserine (Lyso-PS) and retinoic acid (RA) in inducing the development of regulatory T cells, thereby suppressing the excessive immune response, have been proposed. The purpose of this project is to investigate the biophysical characteristics and dynamic behaviors, including the gel-to-liquid crystalline phase transition and membrane fluidity, of a novel immunno-tolerogenic liposome containing lyso-PS and RA, using differential scanning calorimetry (DSC) and fluorescence polarization. Liposomal formulations with different mole percent composition of lyso-PS and RA were prepared and scanned from 10°C to 35°C using the DSC technique. Further fluorescence polarization measurements on the nanoparticles of these formulations were also conducted using diphenylhexatriene as a fluorescence probe.

**STUDENT**

Toan Nguyen

**MAJOR**

Pharmaceutical Sciences

**RESEARCH MENTOR**

Dr. Sathy V. Balu-Iyer, PhD

**TITLE**

Biophysical Characterization of a Novel Immunogenicity-Suppressing Liposome Containing Lysophosphatidylserine and Retinoic Acid

**ABSTRACT**

In the vertebrate nervous system, a proteolipid substance called myelin ensheaths neuronal axons and facilitates the conduction of electrical signals by a process termed saltatory conduction. Demyelinating diseases such as multiple sclerosis are characterized by failed restoration of axonal myelin by oligodendrocytes. Remyelination failure in multiple sclerosis has been suggested to occur because of factors such as BMPs and WNTs, which are present in demyelinated lesions; however, a complete understanding of the factors that modulate oligodendrocyte progenitor cell (OPC) fate is essential for developing pharmacological therapies. In prior work, Sulfr2 was identified by a genomic analysis of human OPCs done to recognize such pharmacological targets. RT-qPCR on human OPC mRNA showed that SULF2 was downregulated during OPC differentiation. Therefore, in this study, we asked whether Sulfr2 inhibits OPC differentiation. To study the effects of endosulfatases in general, we isolated OPCs from transgenic Sulf1(fl/fl)/Sulf2(fl/fl) postnatal mice brains. We used a GFP-Cre recombinase expressing virus to knockout floxed Sulfl1/2 alleles in isolated OPCs in vitro. Following extraction of genomic DNA, PCR, and gel electrophoresis, we confirmed that both sulfatase genes were successfully knocked out.

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**STUDENT**

Nhan Nguyen

**MAJOR**

Pharmaceutical Sciences

**RESEARCH MENTOR**

Dr. Sathy V. Balu-Iyer, PhD

**TITLE**

Biophysical Characterization of a Novel Immunogenicity-Suppressing Liposome Containing Lysophosphatidylserine and Retinoic Acid

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**STUDENT**

Nhan Nguyen

**MAJOR**

Pharmaceutical Sciences

**RESEARCH MENTOR**

Dr. Sathy V. Balu-Iyer, PhD

**TITLE**

Biophysical Characterization of a Novel Immunogenicity-Suppressing Liposome Containing Lysophosphatidylserine and Retinoic Acid

**ABSTRACT**

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CD123, the alpha chain of the interleukin 3 receptor (IL-3Ra), has gained substantial interest as a potential therapeutic target. Upon binding to IL-3, IL-3Ra signaling simulates the growth and differentiation of various cell types in the immune system. CD123 is overexpressed in many different types of leukemia, especially in Blastic Plasmocytoid Dendritic Cell Neoplasm and Acute Myeloid Leukemia; however, the fact that CD123 is expressed on only a small portion of the normal immune cells makes it a potential selective target for anti-leukemic therapy. The goal of this project is to develop monoclonal anti-CD123 antibodies, through application of standard hybridoma technology. The monoclonal antibodies may have potential utility within for diagnostic and therapeutic applications.

**Research Mentor**
Prof. Joseph Balthasar, PhD

**Title**
Development of Monoclonal Anti-CD123 Antibodies

**Abstract**
Many cellular signaling pathways are activated in pancreatic adenocarcinoma (PDAC) or pancreatic cancer, and promote tumor malignancy and invasiveness. Sonic Hedgehog (SHH) signaling is one. Previous studies found that SHH signaling may be a good target to improve therapeutic efficacy. To suppress SHH signaling, several drug candidates were developed to inhibit the activity of an important component in the signaling pathway, the Smoothened (SMO) protein. LDE-225 is a SMO inhibitor. SMO increases the expression of Gli-1, a transcription factor that controls expression of numerous proteins in PDAC cells. However, it is not known whether patient tumors vary in the effectiveness of SMO inhibitors, nor if cells develop tolerance to LDE-225, which would appear as elevated Gli-1 expression that does not respond to LDE-225.

**Student**
Nancy Song

**Major**
Pharmaceutical Sciences

**Research Mentor**
Juliane Nguyen, PhD

**Title**
Absolute Quantification of Self-Replicating RNA Species for an Integrated-PK Model

**Abstract**
Gene therapy using messenger RNA (mRNA) encoding specific proteins has been a highly sought but still elusive gold-standard therapy for a myriad of human diseases. One obstacle that is difficult to overcome is delivering ample quantity of mRNA such that repeated dosing is not required. Unlike conventional messenger RNA, self-replicating RNA is translated into proteins that convert the positive-strand template RNA into negative-strand RNA and vice versa throughout the process of protein translation, thus amplifying the level of RNA coding for the gene of interest (GOI). This self-replicating system allows for longer, higher expression, which can reduce dosing frequency and make gene delivery more feasible without incorporating changes in the germline like typical viral vectors. To understand the kinetics of this mechanism on the RNA level, quantitative PCR is performed on all of the RNA species using primers for the positive strand, negative strand, and the GOI (here a fluorescent reporter gene mCherry) to quantify the RNA expression at various time-points. Standard curves for in vitro transcripts of these RNA species along with β-actin normalization allows for the possibility of absolute quantification. This data will be used to inform an integrated and mechanistic pharmacokinetic model for calculating mCherry expression-data obtained previously with flow cytometry. Understanding the kinetics in absolute quantities of each RNA species will provide the necessary insight for optimal dose selection and equip the model with greater translational utility.

**Student**
Jacinda Zhou

**Major**
Pharmaceutical Sciences

**Research Mentor**
Dr. Sathy V. Balu-Iyer, PhD

**Title**
Determining the Stability and Aggregation Kinetics of Recombinant Human Factor IX (rhFIX)

**Abstract**
Therapeutic proteins are often subject to aggregation, a complex process that may affect the pharmacokinetics and efficacy of the therapeutic. This study aims to test the stability of Factor IX (FIX), a recombinant human coagulation factor used to treat Hemophilia B patients. Using Circular Dichroism (CD) studies, the secondary structure of FIX is characterized and the dynamic changes of that structure at different temperatures of various heating rates are investigated. Fluorescence studies are used to study the tertiary structure of FIX and the effects of thermal stress on aggregation are studied similarly. The kinetics of aggregation for FIX are studied using spectrophotometric turbidity measurements. The aggregation kinetics allows for the better understanding of conformational changes of FIX when it unfolds. This information is helpful in predicting the conditions at which FIX is stable, which assists in developing better formulations for the treatment.
Exercise has been proven to be an essential part of a healthy lifestyle and discourages the onset of disease. When a new physical activity regimen is implemented, compliance is key. Delayed onset muscle soreness (DOMS) is a major deterrent at the onset of a new exercise programs, especially among sedentary individuals. Ergothioneine, an antioxidant most notably recognized for its presence in mushrooms, may reduce muscle soreness. Ergothioneine is not synthesized in humans and is only available from the diet. This study will evaluate the effect of ergothioneine-rich mushroom supplementation on muscle soreness following a bout of eccentric exercise in middle-aged men and women.

This randomized double blind parallel arm study requires participants to walk on a treadmill with a progressive decline in elevation and an increase in speed to induce eccentric muscle damage in the lower limbs before and after supplementation. Participants will be supplemented for ten days with either shiitake mushroom powder (high ergothioneine,) or placebo - white button mushroom powder (low ergothioneine). DOMS will be measured by: physical fitness testing, pain questionnaires, urinary measures, and blood levels of creatine kinase, interleukin-6 and interleukin-2.

We expect ergothioneine to reduce DOMS by reducing systemic inflammation and local inflammation in muscle tissue breakdown. Muscle damage between the shiitake and white button should be similar with lower perceived pain in subjects receiving shiitake. Reduced DOMS may encourage individuals to start or maintain exercise programs, and ultimately lead to better health in the United States. With the ongoing high rates of obesity related comorbidities this would be a welcomed intervention.
Title
The Acute Effects of White Button and Shiitake Mushroom Powder Supplementation on Postprandial Lipemia and Satiety Following a High-Fat Meal

Abstract
Rising obesity levels have increased the incidence of cardiometabolic diseases and a potential treatment strategy is through meat substitution. Mushrooms have a fleshy texture similar to meat products and contain a large number of bioactives that might improve dyslipidemia. We investigated mushroom consumption on circulating levels of blood cholesterol and lipids using a randomized, double blind trial design. Postprandial serum triglycerides were lower in the WB vs SH group. At hour two, triglycerides in the SH group were lower than the WB group and controls. At hours four and six, triglycerides in the SH group were lower than the WB group. Shiitake mushroom powder consumption with a high fat meal effectively lowered serum triglycerides when compared to white button mushroom powder or no powder. High fat meal fortification with shiitake mushrooms may protect against the dyslipidemic impact of a typical high fat meal.

Student
Danielle M. Siebert

Major
Exercise Science, Biomedical Sciences

Research Mentor
Robert Zivadinov, Professor, Department of Neurology, Jacobs School of Medicine and Biomedical Sciences, Director, Buffalo Neuroimaging Analysis Center. Director, MRI Clinical and Translational Research Center

Title
Metabolic dysfunction in a mouse model of MS

Abstract
The cortex, basal ganglia, and thalamus (CxBGTh) are regions of interest in multiple sclerosis (MS), due to observed differences in tissue characteristics between MS patients and healthy controls. Examining the change in these structures as a result of MS disease course is challenging in humans, particularly because availability to a pre-disease baseline is extremely uncommon. The goal of this research is to investigate metabolic change in the CxBGTh at pre-disease baseline and as disease progresses in an animal model of MS, Theiler’s murine encephalomyelitis virus (TMEV): a demyelinating, neurodegenerative, immune-mediated condition.

We have characterized the effect of TMEV infection on the CxBGTh with indicators of metabolite change such as glucose, lactate, alanine, n-acetyl aspartate, glutamate, and gamma-aminobutyric acid in these structures. Analysis of disease progression by magnetic resonance spectroscopy may reveal biochemical mechanisms which help characterize and better predict symptomatic outcome.
THE ACADEMIES

The Undergraduate Academies are a Living Learning Community that introduce students to links between classroom and practical learning through five interdisciplinary lenses: Civic Engagement, Entrepreneurship, Global Perspectives, Research Exploration and Sustainability. Each Academy uses its themes as a means of focusing discussion, organizing experiential learning opportunities, and offering enriched programming to students.

CIVIC ENGAGEMENT

STUDENTS
Fozzia Aden, Allison Smith

RESEARCH MENTORS
Dr. Barbara Bono, Tyler Choi

TITLE
The Locust Street Art Project

ABSTRACT
Art is proven to be a beneficial outlet and is critical in child development. Research has shown that children involved with art see improvements in motor skills, language development, decision-making, visual development, attentiveness, cultural awareness and academic performance. Despite these outstanding benefits, many art programs continue to be cut in schools with decreasing budgets. Recognizing the significance of art education and child development, we wanted to volunteer our time with a local grassroots organization that devotes its efforts to incorporating art within the community. The organization we chose, Locust Street Art, is a volunteer program that has been thriving for over 50 years in the Fruit Belt of downtown Buffalo. Locust Street Art offers an array of classes in the fine arts, media studies, and physical arts, and allows students to display their artwork proudly at an exhibition in June to receive praise and a sense of accomplishment.

STUDENTS
Hamilton D. Allport, David M. Burgio

RESEARCH MENTORS
Dr. Barbara Bono, Tyler Choi

TITLE
The Ability Experience

ABSTRACT
People with disabilities face struggles in their lives that often require outside help and support. Among those who wish to aid in this effort is The Ability Experience. The Ability Experience is a 501 (c)3 non-profit organization founded by Pi Kappa Phi Fraternity in 1977. With a mission statement based on two principles, service and leadership, The Ability Experience uses “shared experiences to support people with disabilities and develop the men of Pi Kappa Phi into service leaders.” Through a multitude of different regional and national events, The Ability Experience has raised over 10 million dollars since its founding. Our project will support this vision by presenting past efforts and sharing current and future goals for how local students and leaders can more effectively connect with and help the disabled community through a “Spread the Word to End the Word” campaign in UB’s Student Union.

STUDENTS
Matthew Cato, Katrina Cropo, Barbara Cubias, Jacob Doyle, Xiangfei Deng, Jian Yang, Zhuangcheng Zheng

RESEARCH MENTORS
Dr. Barbara Bono, Tyler Choi

TITLE
UBReUse: a Zero-Waste Initiative

ABSTRACT
Post-Landfill Action Network (PLAN) is a nationwide organization that advocates for and supports zero-waste college campuses. PLAN facilitates this initiative by presenting the issues at campuses and providing resources to launch programs to aid in the reduction of long term waste production. At the University of New Hampshire the first zero-waste program, Trash2Treasure, was created and successfully diverted over 100 tons of waste from landfills. UBReUse is the current zero-waste program in development here at UB, with the focus of reducing waste in the Ellicott and Greiner dorm complexes at the end of this Spring semester. This project is run solely by student leaders and is the first of its kind at UB. Its long-term goals consist of raising awareness within the student body about waste management and forwarding Re-Use culture, thus creating a permanent zero-waste program at UB, and contributing to Buffalo’s goal of improving the community.

STUDENTS
Cai Baopeng, Eric Dimock, Xuan Xuan Li, Xunqi Li, Yi Liu, Tingyan Mao, Brianna Schultz, RongYu Wang, Eric Welle

RESEARCH MENTORS
Dr. Barbara Bono, Tyler Choi

TITLE
ReTree the District:Phase #4

ABSTRACT
“ReTree the District” is now in its fourth and final phase. The goal of this project is to plant 1,000 trees in the University Heights district, and thus improve the overall well-being of the neighborhood. With the planting of these trees, property values, a sense of community, and general air quality will be improved for the residents. The overall goal of this project is to replace many of the trees that were destroyed in the October 2006 storm, infamously and locally known as “Arborgeddon.” This Project is run mainly out of the University Heights Tool Library. Through the Civic Engagement branch of UB’s Academies, “ReTree the District” is also an independent study course offered for credit. Here, students who serve as Team Leaders must actively participate in the planning for as well as the planting of trees on April 16th.
Global Perspectives

Students
Dominic Ball, Samantha Reiss

Research Mentor
Dr. Colleen Culleton

Title
Study Abroad or Broad Waste of Money?

Abstract
Our research aims to analyze the benefits and costs of studying abroad for American students studying in other countries, as well as for international students studying in America. We hope to answer whether studying abroad is academically and financially effective, and whether it helps students reflect on their place in the global sphere. The United States, in particular, is one of the most popular study abroad destinations, with 13 of the top 20 schools in the world. Since more and more students are choosing to study in the United States, we intend to investigate whether the prestige of an American college education outweighs the price, and what American students stand to gain from an international education. Ideally, our research will show a comprehensive cost-benefit analysis of both the empirical and ideological effects of studying abroad for American and International students.

Students
Kayleigh Brandtetter, Madeline Elminowski

Research Mentor
Dr. Colleen Culleton

Title
America’s Global Expansion to China and Spain

Abstract
Corporate greed has not only spread its influence in the United States, but has also affected the globe. Our focus is on how other countries are affected by the globalization of American restaurants and clothing brands. Because of restaurants like McDonald’s, about 12 percent of children in China are overweight, and the diabetes rate for adolescents is four times that of those in America. In Spain, there has also been a revolution in the fashion industry, especially with the introduction of brands like Nike and Levi’s, which are commonly advertised on Spanish billboards. After researching about these two very different countries, we have found that regardless of the countries’ economic ranking in the world, places are still manipulated by the American way of living. We pose the question, “How has the expansion of American corporate culture impacted the standards of living within these two countries?”

Research Exploration

Students
Zaakirah Barry, Andruilsa Jones, Taylor Mautner, Amanda Passarelli, Yasin Perez, Chelsea Whitney

Research Mentor
Peter J. Horvath, Ph.D

Title
Yoga vs. Chemotherapy: The Breast Cancer Approach

Abstract
Breast cancer is the second leading cause of death for women in the U.S. Methods of treatment vary by geographic location. Holistic medicinal approaches for the treatment of breast cancer may be more effective and have fewer side effects than allopathic. Holistic medicine treats the patient as a whole person, taking into consideration their physical, mental, spiritual, and emotional well being. Holistic medicine attempts to treat symptoms and diseases using a more targeted approach with drugs, radiation, and surgery. It is imperative that alternative modalities and adjunctive therapies are used to reduce the side effects of breast cancer treatment and increase its efficacy.

Students
Kenan Begovic, Marissa Catanzaro, Al Qaraghuli Farah, Vincent Scozzaro, Ivan Wong

Research Mentors
Peter J. Horvath, Ph.D

Title
Climate Change is Paving the Way for the Zika Virus

Abstract
The Zika virus has had a horrific effect on certain geographical areas, leading to birth defects and infectious illnesses. Climate change has increased the range of the Aedes Aegypti mosquito, which is the primary vector for the Zika virus. This makes climate change an increasing threat to public health. Climatic temperature elevations have a direct relationship with an increase in mosquito populations and range, which ultimately leads to an increase in infectious diseases. A pregnant Aedes Aegypti mosquito can easily access the human bloodstream through insertion of the proboscis and transmit the disease. The disease can also be transmitted from person to person, which can result in a worldwide epidemic. While we cannot completely ameliorate climate change, the transmission of the Zika virus can be mitigated by factors such as sexual prophylactic sheets, water treatment plans, or further pursuing the genetic modification of male mosquitos. Understanding these implications of climate change on mosquito-borne illnesses is a crucial public health issue to prevent future epidemics.

Students
Quadry Bello, Jaeyoon Jung, Niomarie Rivera, Sergio Rosa, Weijin Zhu

Research Mentor
Peter J. Horvath, Ph.D

Title
Engineering and Space Travel

Abstract
Principles of engineering are helping to facilitate space travel. Multiple
the effects of climate change on the Hawksbill, proactive steps can be taken through mitigation efforts such as, ecotourism, policy reinforcement, and the reduction of waste. Saving the Hawksbill sea turtle will serve as a model for the protection of different species around the world.

STUDENTS
Young Hyun Choi, Huangwei Ding, Isabel Montes, Darius Raihan Rub, Sarah Thompson

RESEARCH MENTOR
Peter J. Horvath, Ph.D

TITLE
Could Nuclear Energy be an Important Component of a Clean Energy Future?

ABSTRACT
Clean energy production has become a contentious debatable issue regarding the topics of the environment and economics for businessmen, scientists, engineers as well as politicians. Solar, hydroelectric, geothermal, tidal, and wind are clean energy sources with nuclear being one of them. Compared to other energy sources, nuclear energy is considered as a clean energy source because of its minor carbon footprint production. For better policy making and the public at large, the whole production chain and associated impacts needs to be considered including environmental and economic decisions. Minimum carbon footprint will lead to reduced pollution and decreased production of greenhouse gases such as carbon monoxide, carbon dioxide, sulfur dioxide in check.

SUSTAINABILITY

STUDENTS
Elise Addeo, Jonathan Hodgson, Delia Lainez

RESEARCH MENTOR
Dr. Kenneth Shockley

TITLE
The Era of Renewable Energy

ABSTRACT
Many established renewable energy sources have the capacity to produce enough energy to help fuel a college campus. One of these energy sources is biomass, which relies on the use of plant and animal waste to produce energy. Another renewable energy source with great potential for this application is wind. This type of energy has no direct emissions, but does occupy a good deal of physical space. A third source of renewable energy, hydropower, is created through the conversion of water’s potential energy to electricity, and does
so without substantial reduction of water quality. Solar power also provides a promising means of generating renewable energy. One approach to solar power particularly appropriate to this investigation relies on photo-voltaic cells to generate electricity. Our research will investigate the capacity of each of these energy sources to contribute to a college campus of the scale and scope of the University at Buffalo.

**STUDENTS**
Phoebe Bicheler, Pamela Chong, Allison DeMaria, Sarah Tanner

**RESEARCH MENTOR**
Dr. Kenneth Shockley

**TITLE**
A Comparative Study of Composting Methods

**ABSTRACT**
In the same sense that the soil in the ground feeds us, the soil needs to be fed. One process of feeding the soil is known as composting, a controlled biological process of decomposing organic matter. Composting also provides a promising alternative to the current global waste management system. By recycling organic waste and food scraps, we reduce the amount of pollutants released from landfills into the biosphere. In this project we will explore, observe, and compare the approach taken to composting by three different institutions: University at Buffalo, the Massachusetts Avenue Project (MAP) and Root Down Farm. We will investigate each establishment’s composting facility, focusing on the sustainability of their approach, and examine the relation between the approach of each establishment and its scope and setting. Our research will allow us to understand the benefits and disadvantages of composting systems implemented at these different institutions.