



# *Academic Excellence Celebration*

STUDENT RESEARCH PRESENTATIONS

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*Thursday, April 12, 2018*

*2:00–7:00 PM*



**GEORGIAN COURT UNIVERSITY**

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THE MERCY UNIVERSITY OF NEW JERSEY



# *Program*

## **SESSION I**

**2:00–4:00 PM**

### **Poster Presentations**

*Casino*

### **Oral Presentation**

*Jeffries Hall, Room 119*

## **REFRESHMENTS**

**4:00–5:00 PM**

*Casino*

## **SESSION II**

**5:00–7:00 PM**

### **Poster Presentations**

*Jeffries Hall, Room 134*

### **Oral Presentations**

*Jeffries Hall, Room 119*

This program has been arranged by the Academic Research Subcommittee  
of the faculty at Georgian Court University.

### **Academic Research Subcommittee**

Chair: Amitabh Mungalé, Ph.D.

Lisa Dille, Ed.D.  
Jean Parry, Ph.D.

Christopher Perrin, Ph.D.  
Stephanie Rahill, Ph.D.

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## SESSION I

### Poster Presentations

#### **Assessing the Spread of Asiatic Sand Sedge Using Remote Sensing**

*Jacob Riedel*

Mentor: Louise Wootton, Ph.D.

#### **The Effectiveness of Essential Oils as Antimicrobials**

*Christina Morgese, Farris Ellington & Thomas Quattrocchi*

Mentor: Michelle Esposito, Ph.D.

#### **B.S.W. Students' Perceptions of Personal Growth and Professional Competency Throughout the Field Practicum Experience**

*Awilda Vazquez, Patricia McGuire, Brianna Bacchetta & Keitha Rhoden (Ph.D. in Social Work candidate, Fordham University)*

Mentor: Megan Sherman, Ph.D.

#### **Integrated Process for Electrochemical Reduction of CO<sub>2</sub> to Value-Added Chemicals and Fuels**

*Liam McGlaughlin & Jerry Kaczur (Industry)*

Mentor: Prasad S. Lakkaraju, Ph.D.

#### **Drug Rehabilitation in Juvenile Males Under 16: Monmouth County, New Jersey**

*Jessica Carter*

Mentor: Matthew Sheridan, Ed.D.

#### **History of the Monmouth County Sheriff's Office**

*Scarlett Figueroa, Alexa Scimone & Morgan LaDuca*

Mentor: Matthew Sheridan, Ed.D.

#### **Sexual Assault Prevention on a College Campus**

*Elizabeth Wright, Taylor Murphy & Morgan LaDuca*

Mentor: Matthew Sheridan, Ed.D.

#### **Critical Velocity and Anaerobic Distance Capacity in High School Distance Runners**

*Thomas O'Toole & Michael Wortley*

Mentor: Michael Wortley, Ph.D.

#### **Deuterium Exchange Kinetics in Hypophosphite Ion: NMR, Raman, and DFT Studies**

*Alba Herrero, Brienna T. Virola & Liam McGlaughlin*

Mentor: Prasad S. Lakkaraju, Ph.D.

#### **Exploring the Correlation Between VARK Paper Tests and Evoked Synaptic Activity**

*Hailey Handerhan*

Mentor: Jean Parry, Ph.D.

#### **Are Phones More Social Than Humans?**

*Karen Davis*

Mentor: Susan E. O. Field, Ph.D.

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## SESSION I

### Poster Presentations, *continued*

#### **Creating Employment Internships to Offset Future Employee Shortages**

*Danielle Calabro*

Mentor: James J. Carroll, D.B.A.

#### **Employment Hours Mean More Than Money**

*Kathy Greene*

Mentor: James J. Carroll, D.B.A.

#### **A Note on “Decoy” Brands**

*Grace Talian & Amitabh Mungalé*

Mentor: Amitabh Mungalé, Ph.D.

#### **Reducing Nervous Habits During Public Speaking Using Awareness Training**

*Brittany Pawlik*

Mentor: Christopher J. Perrin, Ph.D.

#### **An Alternative Proof of a Special Case of the Defect Version of Hall’s Marriage Theorem**

*Christina Fontana & Qiaoli He*

Mentor: Lei Cao, Ph.D.

#### **Sum Numbers of Wheel Graphs and Bow Tie Graphs**

*Erinn Edwards*

Mentor: Lei Cao, Ph.D.

#### **Modeling of Young’s Experiment**

*Kimberly Carter*

Mentors: Beth Schaefer, Ph.D. & Sarita Nemani, Ph.D.

#### **Comparing and Contrasting Various Random Walks**

*Danielle Russo*

Mentors: Beth Schaefer, Ph.D. & Sarita Nemani, Ph.D.

#### **Current Methods of Study on American Football Helmets with the Goal of Reducing Impact Forces**

*Courtney Tylutki*

Mentor: Beth Schaefer, Ph.D.

#### **Metallurgical Analysis of Various Cleaned Coins Using X-ray Analysis**

*David Schenk & Alesia Mulbah*

Mentor: Anne Tabor-Morris, Ph.D.

#### **Nonlinear Mathematical Optimization for a Production System**

*Sally Thomas-Ridgway*

Mentor: Banani Dhar, Ph.D.

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## **SESSION I**

### **Oral Presentation**

#### **The Reasons Why Slave Revolts Failed in the Middle Passage**

*Daniel Ginchereau*

Mentor: Norah Gharala, Ph.D.

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## **SESSION II**

### **Poster Presentations**

#### **The Relationship Between Academic Self-Efficacy and Academic Success**

*Caroline Cohen*

Mentor: Stephanie Rahill, Ph.D.

#### **Is College Possible? Perceptions of Social Support in First-Generation Students**

*Alexandria Yanick*

Mentor: Stephanie Rahill, Ph.D.

### **Oral Presentations**

#### **Straight Talk: Strategies for Sharing Assessment Results with Families**

*Sara Aldorasi, Lauren Torzewski & Devon Wagner*

Mentor: Stephanie Rahill, Ph.D.

#### **Attitudes of Faculty Toward Complementary and Alternative Medicine (CAM) and the Level of Integration of CAM Content Within New Jersey B.S.N. Nursing Programs**

*Lisa Wardle & Sachiko Komagata*

Mentor: Sachiko Komagata, PT, Ph.D.

#### **Fear Versus Trust: The Impact of Fear on Birth Experience and Maternal Outcomes**

*Victoria Flores*

Mentor: Sachiko Komagata, PT, Ph.D.

#### **School Psychologists' Job Attitudes: A Systematic Review**

*Dana Sobel*

Mentor: Theresa J. Brown, Ph.D., BCBA-D

# Abstracts

## Assessing the Spread of Asiatic Sand Sedge Using Remote Sensing

Jacob Riedel

Mentor: Louise Wootton, Ph.D.  
Chair of the Department of Biology,  
Professor of Biology & Director of Sustainability  
Department of Biology

Asiatic Sand Sedge, *Carex kobomugi*, is an invasive species of dune plant found in coastal communities such as in the dunes of the New Jersey coast. It competes aggressively with native plant species, such as American Beach Grass, *Ammophila breviligulata*. Attempts were made to keep track of *C. kobomugi* by using handheld GPS loggers and walking to the locations of the invasive grass to keep track of the populations. However, this method was limited as the sedge often grows in inaccessible areas. To counter this, a UAV (unmanned aerial vehicle, commonly known as a "drone") equipped with an NDVI (Normalized Difference Vegetation Index) camera and a GPS logger was used to fly over areas of the dunes at the southern end of Island Beach State Park, New Jersey. NDVI technology is used mostly for determining crop density by measuring the amount of chlorophyll, or greenness, of an image. We had hoped to use it to differentiate native and invasive grasses by their different pigment compositions. The images collected were geotagged and stitched into mosaics to create large maps of the dunes. Post-processing filters were applied to the images using various software and online services such as ARCMAP, Drone Deploy, and Maps Made Easy. Unfortunately, I was unable to differentiate between the native and invasive grasses using the images I collected because the images created using the model of camera we had available were not compatible with the software I had available to assess the differences in pigment profiles between the two species. A different model of camera will need to be purchased and mounted on the drone in order to complete this project.

## The Effectiveness of Essential Oils as Antimicrobials

Christina Morgese, Farris Ellington & Thomas Quattrocchi

Mentor: Michelle Esposito, Ph.D.  
Assistant Professor of Biology  
Department of Biology

Ubiquitous microscopic organisms inhabit every corner of the world. Many of these microbes can be classified as normal flora whose purpose is to serve as favorable bacteria protecting humans from harmful bacteria. Regardless of the purpose of a microbe, whether it be to harm or benefit, some bacterial growth can be disrupted by the use of antimicrobials. Common antimicrobial products used are generally harsh chemicals, such as bleach, alcohol, or Lysol. Powerful disinfectants like these can have adverse long-term effects, such as corrosion of materials, death of normal flora, and organic tissue damage. Natural antimicrobials have been thought to substitute the use of chemical antimicrobials and can be tested by disk diffusion. *Escherichia coli*, *Streptococcus pyogenes*, *Staphylococcus epidermidis*, *Staphylococcus aureus*, and *Pseudomonas Aeruginosa* will be streaked on Nutrient Agar plates. In the center of each plate, a blank disk will be saturated with various potential antimicrobials, including peppermint, lavender, honey, green tea, lemon juice, lemongrass, tea tree oil, and orange, among others. We anticipate that *Pseudomonas* will remain unaffected due to a previous study performed where it remained unaffected by most antimicrobials. *E.coli*, *pyogenes*, and *epidermidis* are expected to have zones of inhibitions. *Staphylococcus aureus* is expected to have either a slight zone of inhibition or none due to the fact that it eats through organic material. If natural antimicrobials do as well as chemical antimicrobials, this benefits in diminishing the spread of resistance to antibiotics and decreasing damage to objects, and to humans as well.

## **B.S.W. Students' Perceptions of Personal Growth and Professional Competency Throughout the Field Practicum Experience**

*Awilda Vazquez, Patricia McGuire, Brianna Bacchetta & Keitha Rhoden (Ph.D. in Social Work candidate, Fordham University)*

Mentor: Megan Sherman, Ph.D.

Assistant Professor of Social Work & Coordinator of Field Education

Department of Social Work

Social work is an applied profession wherein the connection between academic and practical competency is essential. In social work education, the significance of merging classroom with practice culminates in the field practicum experience. A student's level of perceived competence in their field placement may contribute to how successful they will be in future employment. This conceptualization is especially relevant for students pursuing a Bachelor of Social Work (B.S.W.) degree, who are in the process of acquiring the knowledge and skills required to practice generalist social work post-graduation. Additionally, social work students graduating from a B.S.W. program accredited by the Council on Social Work Education may pursue advanced standing placement in a Master of Social Work program wherein full-time studies consist of one year versus the traditional two-year program. Therefore, the success of B.S.W. students has a lasting impact on social work education and the profession. This mixed methodology research study explores B.S.W. students' perceptions of personal growth and professional competency throughout the senior field practicum. The relationship between feelings of competency, academic standing, and student mental health is also surveyed. Review of prior literature has revealed limited investigations examining the dynamic journey of B.S.W. students and the role that mental health challenges have in a student's perceived level of professional competence. The current research study is an attempt at narrowing this knowledge gap.

## **Integrated Process for Electrochemical Reduction of CO<sub>2</sub> to Value-Added Chemicals and Fuels**

*Liam McGlaughlin & Jerry Kaczur (Industry)*

Mentor: Prasad S. Lakkaraju, Ph.D.

Professor of Chemistry

Department of Chemistry & Biochemistry

The project, as a whole, is to create an integrated process that would convert carbon dioxide to fuels and value-added compounds. The specific work done during this interval was on pervaporative concentration of the initial product, formic acid. The integrated process could allow carbon dioxide waste to be a source of fuel and value-added chemicals. Pervaporation could allow for increased energy efficiency in concentration over current methods (azeotropic distillation) if a suitable membrane was identified. A crossflow test chamber was fabricated by our collaborators (Dioxide Materials, Boca Raton, FL) and used in the Lakkaraju lab to test the permeation rate and perselectivity of various candidate membranes. Of the membranes tested, the most efficient for selectivity, permeation rate, and operational cost effectiveness were identified.



## **Drug Rehabilitation in Juvenile Males Under 16: Monmouth County, New Jersey**

*Jessica Carter*

Mentor: Matthew Sheridan, Ed.D.

Instructor & Coordinator of the Criminal Justice Internship Program  
Department of Criminal Justice, Anthropology, Sociology & Human Rights

This paper discusses drug addiction in adolescent males and the availability of resources for drug rehabilitation while inside the detention center. The main focus is the availability of resources, as well as the success of these resources to aid and achieve rehabilitation with adolescent males. The information cited in this paper serves a research purpose but not a research proposal. The goal of the paper is to collect sufficient research on the success of rehabilitation services with adolescent males in New Jersey. The juvenile detention centers in New Jersey will be compared with juvenile detention centers in several other states. The comparison of different states' juvenile detention centers will clarify differences between resources and facilities. Addiction is prevalent in New Jersey, as well as in other states, and the age of the drug user is getting lower. This paper is significant because it will provide information about proper drug rehabilitation resources and help us to understand if there is more that can be done to help these individuals successfully rehabilitate and avoid recidivism.

## **History of the Monmouth County Sheriff's Office**

*Scarlett Figueroa, Alexa Scimone & Morgan LaDuca*

Mentor: Matthew Sheridan, Ed.D.

Instructor & Coordinator of the Criminal Justice Internship Program  
Department of Criminal Justice, Anthropology, Sociology & Human Rights

The Monmouth County Sheriff's Office is the oldest sheriff's office in New Jersey and predates the establishment of the United States as a country. The county's sheriffs begin in 1683 with the appointment of Eliakim Wardell, at that time referred to as a Royal Sheriff. The Sheriff's Office is responsible for courthouse security, serving criminal warrants and nonsupport warrants, corrections, and 9-1-1 communications. It also supports K-9 units. As we study and research the history of the Monmouth County Sheriff's Office, we will be exploring the significance of the office, including the police academy and the K-9 unit. To satisfy the need for professional well-trained police officers, the Monmouth County Board of Chosen Freeholders, in cooperation with the Monmouth County Police Chiefs Association and the Monmouth County Prosecutor, established the Monmouth County Police Academy in 1963. The police academy opened at its current location in 1985 and became a department of the Monmouth County Sheriff's Office in 2011. The Monmouth County Sheriff's Office K-9 units are called upon year-round to assist local police departments with narcotics and explosive detection, as well as suspect apprehension and or missing person searches.

## **Sexual Assault Prevention on a College Campus**

*Elizabeth Wright, Taylor Murphy & Morgan LaDuca*

Mentor: Matthew Sheridan, Ed.D.

Instructor & Coordinator of the Criminal Justice Internship Program  
Department of Criminal Justice, Anthropology, Sociology & Human Rights

The college campus is a place where students are beginning to explore their passions and learn about the subjects in which they plan to extend into a career. The campus should be a safe environment for all students to grow emotionally and intellectually. Therefore, it is important that college officials make every effort to ensure that campus policies and environmental precautions are up to the highest standards to ensure the safety of its students and faculty members. Preventing sexual assault victimization is the focus of the study to ensure the safety of students through the maintenance of campus amenities such as cameras, lighting, and emergency phones. Environmental awareness and effective policies are critical for the prevention of sexual assault and violent victimization.

## **Critical Velocity and Anaerobic Distance Capacity in High School Distance Runners**

*Thomas O'Toole & Michael Wortley*

Mentor: Michael Wortley, Ph.D.

Assistant Professor of Exercise Science

Department of Holistic Health & Exercise Science

There have been many attempts to model human endurance using the performances of elite athletes. Relatively little attention has been given to average and low-level performers, however. The purpose of this study was to apply a linear critical velocity model to a season of New Jersey high school track and field results in order to characterize the physiological status of a wide range of young distance runners. The results of the boys' and girls' 800-m, 1600-m, and 3200-m races were downloaded for 36 high school track meets during the 2015 season from a publicly available website. Best performances for each individual athlete were identified from the indoor season and the outdoor season, and the linear critical velocity model was fit to the data using the 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentile performances. A four-way repeated-measures ANOVA was used to identify differences between sexes, grades, the time of the season, and percentiles. Significant differences in critical velocity were found between sexes, grades, and percentiles, but not between the times of the season. Significant differences in anaerobic distance capacity were found between sexes, grades, and time of the season, but not between percentiles. These results suggest that it is aerobic power that separates top performers from average and lower-level performers. It also suggests that athletes improve their performance within a season by improving their anaerobic capacity, but improve between seasons by increasing both anaerobic distance capacity and their maximum aerobic power.

## **Deuterium Exchange Kinetics in Hypophosphite Ion: NMR, Raman, and DFT Studies**

*Alba Herrero, Brienna T. Virola & Liam McGlaughlin*

Mentor: Prasad S. Lakkaraju, Ph.D.

Professor of Chemistry

Department of Chemistry & Biochemistry

Deuterium, also known as "heavy hydrogen," is the most famous hydrogen isotope, containing two neutrons and one proton. In polar solutions with species containing hydrogen, deuterium is prone to undergo an exchange reaction with the hydrogens in the molecule. The objective of this research is to understand and evaluate the reaction of sodium hypophosphite ( $\text{NaH}_2\text{PO}_2$ ) and sodium deuterioxide ( $\text{NaOD}$ ) in  $\text{D}_2\text{O}$  solvent, and to spectroscopically observe the exchange of deuterium atoms with hydrogen by NMR and Raman spectral analysis. The results have been obtained mainly using the Anasazi Eft-90 NMR spectrometer, and the results show a first-order reaction with respect to the deuterium exchange kinetics. Further experiments to see the effect of the change of concentration of reactants on the rate of the reaction are being carried and a Raman Spectra for liquid kinetics are also being carried out to further analyze the reaction. DFT computational calculations are performed to get a complete understanding of the Raman spectral characteristics.

## **Exploring the Correlation Between VARK Paper Tests and Evoked Synaptic Activity**

*Hailey Handerhan*

Mentor: Jean Parry, Ph.D.  
Assistant Professor of Biology  
Department of Biology

There are four broad types of learning strategies; visual, aural, verbal, and kinesthetic. This research examines the four main types of learning styles to determine which of these modes of learning will more actively stimulate the average college student, therefore enhancing their ability to learn. A cohort of at least 10 college students will be tested on their synaptic plasticity via an Electroencephalogram (EEG) Heart and Brain SpikerShield device. Each student will first be given a VARK test, which will be used as a reference point for identifying optimal learning strategy, and those results will be supported or refuted by comparison to an EEG recording taken during a simple language lesson taught in each of the four formats (visual, aural, reading, kinesthetic). A proof of concept analysis has been completed, and student data collection is currently underway.

## **Are Phones More Social Than Humans?**

*Karen Davis*

Mentor: Susan E. O. Field, Ph.D.  
Professor of Psychology & Director of the Advising Fellows  
Department of Psychology & Counseling

The present tests the effects of cell phone usage on interaction quality during face-to-face conversations. We expect to recruit 120 students, making 60 friend dyads, currently enrolled in psychology courses at Georgian Court University. Dyads will be sent a McGill Friendship Questionnaire before coming to the laboratory, where they expect to complete a reaction-time task. One participant from each dyad will be recruited as a confederate participant and asked to arrive 15 minutes early. Upon arrival, the confederate will receive a prepaid cell phone and strict instructions to reply to any text received during the experiment. Dyads will be seated in a laboratory room with reaction-time equipment and asked to wait a few minutes while the experimenter finishes printing documents. Dyads will be randomly assigned to one of three conditions, determining how many texts the confederate receives in the experimenter's absence. Interactions will be video recorded and coded for interaction quality. An Interaction Quality Scale will be administered upon the experimenter's return. We expect to collect data supporting our hypothesis that a face-to-face interaction will be negatively perceived when one of the participants is using a cell phone. Findings of this study will expand on recent research and offer a foundation for future studies.

## **Creating Employment Internships to Offset Future Employee Shortages**

*Danielle Calabro*

Mentor: James J. Carroll, D.B.A.

Professor of Business Administration

Department of Business Administration, Accounting & Economics

Hackensack Meridian Health (HMH) employs approximately 28,000 employees in their 13 hospitals. The departure of the “baby boomers” from the workforce not only means loss of employees to hospitals, but also increases in patients as the aging baby boomers need medical services. Danielle proposed a large-scale internship program as part of the solution. Danielle’s project included both the design and the implementation plan for this massive program. Internship programs serve many masters including employers, interns, licensing boards, certifying organizations, and possibly universities, if credit is awarded. Danielle identified dozens of programs online in many different industries. Features of each program were considered. The uniqueness of internships in health care were considered using the personal networks of Danielle and Dr. Carroll to identify comparable hospitals with fully operating internship programs. The implementation of the internship program included

- interview skills,
- selection skills,
- skills with licenses and certifications requirements and boards,
- skills in how to give feedback to the intern, and
- skills in satisfying university or professional training school requirements.

Costs to implement and operate the program were developed, and a payback period was projected. The program was presented to senior management. Reviews to executive level management are planned.

## **Employment Hours Mean More Than Money**

*Kathy Greene*

Mentor: James J. Carroll, D.B.A.

Professor of Business Administration

Department of Business Administration, Accounting & Economics

Ocean Mental Health Services, Inc. (OceanMHS), based in Bayville, New Jersey, is a not-for-profit organization that provides behavioral health services. Client success can include finding accessible governmental assistance programs with a goal to make the client a fully participant member of the community. Medicaid requirements include hours of employment. This is challenging clients of OceanMHS. Kathy Greene’s project was to identify and develop an activity in which employment hours can be obtained by the clients of OceanMHS. Kathy’s idea was to operate a thrift shop as a business within OceanMHS. Her project provided the details and feasibility of starting and operating a consignment/thrift shop including

- locating a reduced rent location;
- creating staffing plans;
- locating a source of inventory to stock the store;
- reviewing Department of Labor laws to assure compliance with both New Jersey State Labor Laws and the requirement of the Medicaid program (specifically done based on the exact number of hours planned per employee);
- developing operational and advertising plans for the business;
- developing budgets for startup and continuous operations of the business;
- preparing an overall feasibility study; and
- presenting the details of this plan to the chief executive officer of the organization for a critical review.

The critical review found no flaws in this work, and plans for possible operation of this business are being made. This model may be valuable to other not-for-profit organizations serving populations of this type.

### **A Note on “Decoy” Brands**

*Grace Talian & Amitabh Mungalé*

Mentor: Amitabh Mungalé, Ph.D.

Assistant Professor of Business

Department of Business Administration, Accounting & Economics

Adding a decoy brand that is dominated by one brand in the choice set but not by another brand has been shown to alter the relative market shares of a two-brand choice set: a violation of Luce’s Choice Axiom. The current study started as a literature review and is expected to culminate in a replication and extension of the original stream of research depicting violations of the regularity hypothesis in choice models. Researchers in behavioral decision theory and marketing have consistently focused on two-brand choice sets with a third decoy brand. Although this research has shown important limitations of traditional economic theory, the scenarios are sometimes too narrow to encompass those found in the marketplace. We propose a scenario in which the third entrant, instead of being a decoy, is on the indifference curve, such that the results adhere to Luce’s Choice Axiom, whereas the fourth entrant (a decoy), will consistently violate regularity (particularly the “Independence of Irrelevant Alternatives”). Importantly, we will also investigate the effects of the introduction of a fifth entrant (a second decoy). The effects of two decoys have never been tested in the literature, although it is logical to expect such a scenario to result from an evolutionary tactical battle between brands in the marketplace. We expect the addition of the second decoy to negate the advantage conferred by the original decoy to the dominant brand, but not negate the disadvantage to the non-dominant brand.

### **Reducing Nervous Habits During Public Speaking Using Awareness Training**

*Brittany Pawlik*

Mentor: Christopher J. Perrin, Ph.D.

Assistant Professor of Psychology

Department of Psychology & Counseling

Recent research has suggested that awareness training (AT), as a simplified version of habit reversal, is effective in reducing nervous habits during public speaking. However, the number of studies is limited and to date, none have demonstrated generalization of treatment effects to a naturally occurring speaking event. As such, the current study aimed to replicate and extend the literature on the use of AT to reduce nervous habits during public speaking. Following AT, all participants demonstrated a reduction of nervous habits when giving a speech in front of both a single experimenter and a small audience. For one participant, generalized effects were demonstrated when presenting in front of a class.

### **An Alternative Proof of a Special Case of the Defect Version of Hall’s Marriage Theorem**

*Christina Fontana & Qiaoli He*

Mentor: Lei Cao, Ph.D.

Assistant Professor of Mathematics

Department of Mathematics, Computer Science & Physics

Hall’s marriage theorem is a powerful result in combinatorics that specifies when distinct elements can be chosen from a collection of overlapping finite sets. It is equivalent to several beautiful theorems in combinatorics, including the König-Egervary theorem, Menger’s theorem, the max-flow min-cut theorem and the Birkhoff -Von Neumann theorem. We provide an alternative proof of a special case of the defect version of Hall’s marriage theorem when both bipartite sets  $X$  and  $Y$  have the same cardinality. That is the necessary and sufficient conditions of the existence of a perfect matching between two sets with the same cardinality. The main tool is the sub-defect of doubly substochastic matrices and the completion of binary matrices without total support, that is given a square binary matrix without total support, at least how many rows and columns needed to be added so that the result matrix has total support.



## **Sum Numbers of Wheel Graphs and Bow Tie Graphs**

*Erinn Edwards*

Mentor: Lei Cao, Ph.D.

Assistant Professor of Mathematics

Department of Mathematics, Computer Science & Physics

A graph  $G = (V, E)$  is called a sum graph if for each vertex  $v \in V$ , there exists a unique positive integer label  $\lambda(v)$  and a set  $S$  containing all labels, so that for any  $u, v \in V$ ,  $uv \in E$  if and only if  $\lambda(u) + \lambda(v) \in S \subseteq \mathbb{N}$ . The sum number of a given graph  $G$  is defined as the smallest number of isolated nodes which when added to  $G$  result in a sum graph. We show that the wheel graphs and bow tie graphs are not sum graphs and give the upper bounds and lower bounds of the sum numbers of each type of graphs.

## **Modeling of Young's Experiment**

*Kimberly Carter*

Mentors:

Beth Schaefer, Ph.D.

Professor of Physics

Sarita Nemani, Ph.D.

Associate Professor of Mathematics &

Department Chair

Department of Mathematics, Computer Science & Physics

Young's experiment was fundamental in showing that light has wave properties. Thomas Young first demonstrated the double slit experiment in 1801, well before the advent of Maxwell's Equations, which gave for the first time a theoretical framework for electromagnetic radiation. Most of the time when it is presented, approximations are used for the intensity in one dimension. For this project, we are calculating exact values of the intensity instead of using approximations. Mathematical equations for intensity as a function of wavelength and frequency are used to model the three-dimensional intensity in space using the program Mathematica. Graphical images will be used to present the results at both close and long-range values and through different planes. We found intriguing images at close range that made us want to explore the topic further by actually setting up physical experiments to try and image the results we found through modelling. This project was supported by the New Jersey Space Grant Consortium.

## **Comparing and Contrasting Various Random Walks**

*Danielle Russo*

Mentors:

Beth Schaefer, Ph.D.

Professor of Physics

Sarita Nemani, Ph.D.

Associate Professor of Mathematics &

Department Chair

Department of Mathematics, Computer Science & Physics

Random walks have a wide application in the modern world. Karl Pearson first introduced random walks in 1905 to describe the walk of a drunkard. Shortly thereafter, this new theory was applied to Brownian Motion. In the modern era, random walks have been applied to virtually every scientific discipline from the development of hurricanes to brain circuitry. Our research project involves studying one-, two-, and three-dimensional random walks of various types such as off- and on-axis, biased, and self-avoiding. The computer program Mathematica was used to simulate various random walks and to compare them. In this presentation, we are going to go over the basic types of various random walks by showing visual examples along with the computer code. We will also discuss the applications of random walks in the real world.

## **Current Methods of Study on American Football Helmets with the Goal of Reducing Impact Forces**

*Courtney Tylutki*

Mentor: Beth Schaefer, Ph.D.

Professor of Physics

Department of Mathematics, Computer Science & Physics

There has been great public scrutiny surrounding the National Football League (NFL) and the sport of American football regarding concussions leading to chronic traumatic encephalopathy (CTE). Developing safer football helmets has been a priority for many scientists and engineers for decades. This project will investigate the modern methods used to test the safety/protection of American football helmets and will compare them to methods used in the past. There are many factors that are involved in the process of making football helmets safe; the presentation will include how these factors are measured in the laboratory. The tests include mimicking the forces sustained during a helmet-to-helmet strike in the laboratory, measuring the impact forces during a drop tower test, using dummies to reconstruct hits from various angles, and simulating and measuring head acceleration from impacts. The results of these tests drive the engineering of safer American football helmets to reduce the occurrence of CTE; an overview of the improvements currently being implemented will be presented as well as a brief overview of the past engineering history of the American football helmet.

## **Metallurgical Analysis of Various Cleaned Coins Using X-ray Analysis**

*David Schenk & Alesia Mulbah*

Mentor: Anne Tabor-Morris, Ph.D.

Professor of Physics, Coordinator of the Physics Program & Director of GCU NASA Science Outreach

Department of Mathematics, Computer Science & Physics

Coins subjected to cleaning fluids and tested for trace amounts of those chemicals using X-ray fluorescence spectroscopy and X-ray diffraction as well as scanning electron microscopy are compared with other coins that had been cleaned 50 years ago in some instances as well as to results from the literature.

## **Nonlinear Mathematical Optimization for a Production System**

*Sally Thomas-Ridgway*

Mentor: Banani Dhar, Ph.D.

Assistant Professor of Mathematics

Department of Mathematics, Computer Science & Physics

This research examines measures of economic efficiency in aircraft production. A type of nonlinear function is contrasted with more traditional methods for estimating a dynamic cost function. This cost function is grounded in economic theory and includes the effects of both learning and production rate on total program costs. The model solved here links direct labor requirements to fixed delivery schedules under the assumption that the firm attempts to optimize production rate over time. The implication is that the optimal variable cost function path is mainly a function of time. This approach permits a production program to be modelled as a series of tasks connected by experience. The variable cost is modelled with a learning curve, and annual fixed cost is spread according to the number of units produced during the year. Since there is limited access to contractor accounting records, and the different components of price do not follow the same learning curve, the approach used here separates the fixed and variable cost statistically, models the variable cost with a mathematical model, then distributes the fixed overhead in proportion to the variable cost. The cost function expresses the minimum cost attainable from the given input combination by controlling the disturbance term. Sensitivity analysis includes alternative delivery schedule efficiencies.

## **The Reasons Why Slave Revolts Failed in the Middle Passage**

*Daniel Ginchereau*

Mentor: Norah Gharala, Ph.D.

Assistant Professor of World History

Department of History, Geography & Political Science

The purpose of this project was to analyze and research the conditions that made it possible for a handful of white slavers to suppress hundreds of slaves during their travels through the Middle Passage. While not every slave ship was the same, there were several attributes that allowed for the maintained dominance of the slavers over the enslaved aboard the various vessels. My hope was that this study would raise awareness for the atrocities committed by the slave shippers from 1500 to 1850. During my research, I found many disturbing cases and information regarding this topic. With the help of Dr. Gharala, I was able to incorporate both quantitative and qualitative research into my analysis. While this paper has reached about 18 pages thus far, it is still a work in progress, as I am still researching and refining my argument. The Mercy core values also had an impact on my decision to embark on this research project, specifically the value of justice which, in history, is so often shrouded as a whirlpool of facts, and biased historical information can skew and even negate any mentioning of atrocities such as slave shipping conditions.

## **The Relationship Between Academic Self-Efficacy and Academic Success**

*Caroline Cohen*

Mentor: Stephanie Rahill, Ph.D.

Assistant Professor of Psychology

Department of Psychology & Counseling

This poster session will present results of a survey study that compares academic self-efficacy of first-generation college students and continuing generation college students. Academic self-efficacy both at the secondary level and once in college will be highlighted. Recommendations for developing and supporting academic self-efficacy, particularly for secondary students who would be the first in their families to attend college, will be discussed.

## **Is College Possible? Perceptions of Social Support in First-Generation Students**

*Alexandria Yanick*

Mentor: Stephanie Rahill, Ph.D.

Assistant Professor of Psychology

Department of Psychology & Counseling

This poster session will present results of a survey study that explores the perceptions of social support of first-generation college students. The perceived social support that students reported receiving from peers, teachers, support personnel, and family members in the decision-making process to attend college and during the college admission process will be discussed. Perceptions of social support and knowledge of how to seek out support services once at college will also be highlighted.



## **Straight Talk: Strategies for Sharing Assessment Results with Families**

*Sara Aldorasi, Lauren Torzewski & Devon Wagner*

Mentor: Stephanie Rahill, Ph.D.

Assistant Professor of Psychology

Department of Psychology & Counseling

School psychologists continue to spend a great deal of their time in assessment-related activities (Castillo, Curtis, & Gelley, 2012), including the creation of psychological reports and the presentation of assessment results to educators and parents. While seasoned practitioners have likely developed a preferred style for sharing assessment results, there is limited information in the literature about best practices when presenting results to parents and educators. Reflecting upon and evaluating how assessment results are communicated during meetings to teachers and parents is a worthwhile endeavor that will ensure that school psychologists do not become stuck in a routine of presenting results in the same, possibly outdated, manner for every child who is evaluated. This presentation will review the literature based on best practices in presenting assessment results to parents and educators. It will also review initial data from interviews with school psychologists about “what works” when presenting results in meetings, common pitfalls to avoid, and strategies for improving oral presentation of results practices to ensure that presentations are child-centered and parent-friendly.

## **Attitudes of Faculty Toward Complementary and Alternative Medicine (CAM) and the Level of Integration of CAM Content Within New Jersey B.S.N. Nursing Programs**

*Lisa Wardle & Sachiko Komagata*

Mentor: Sachiko Komagata, PT, Ph.D.

Chair of the Department of Holistic Health & Exercise Science & Associate Professor of Holistic Health

Department of Holistic Health & Exercise Science

The trend towards the CAM therapies within conventional medicine continues to grow. In connection with this, some academic institutions have responded with the integration of CAM coursework within school curricula.

**Purpose:** To survey New Jersey baccalaureate nursing programs to determine the extent with which nursing programs have integrated CAM content within their curricula; and the attitudes of nursing school faculty regarding the integration of CAM within the nursing program as well as their individual practices (if any) of CAM.

**Methods:** An anonymous survey questionnaire of the deans and directors of baccalaureate nursing programs in the state of New Jersey and faculty members of New Jersey baccalaureate nursing programs was conducted.

**Results:** The faculty survey was sent electronically to 232 full- and part-time New Jersey faculty members; 105 responded for a response rate of 45.25%. The results indicated that a majority of respondents (58.10%) believed CAM practices should be integrated within the B.S.N. nursing school curricula. The response rate dropped to 19.9% when respondents were asked if they believed CAM should be utilized in health care, but of those responding, 93.2% agreed with this approach. This trend to skip questions continued when respondents were asked if they practiced CAM treatments personally, with 60 respondents choosing to skip the question. However, the most popular treatments of those responding were meditation (64.10%), music therapy (48.72%), and guided imagery (41.03%). Of the 16 programs surveyed, 12 directors responded (75% response rate) and indicated that 58% of New Jersey B.S.N. programs integrate CAM topics within the programs. Reasons for integration include rising patient interest, the importance of recognizing cultural differences, and the belief that CAM is helpful to patients. If CAM was not integrated within the curricula, directors cited lack of faculty training as the primary reason. Directors were asked if they believed their programs would benefit by adding CAM and of those responding (31%), all responded affirmatively. Additionally, 80% of directors reported the academic institution supported CAM integration within the curricula.

**Conclusion:** In analyzing the two groups, there was a gap between faculty’s belief regarding the positive utilization of CAM within healthcare treatments and its integration into B.S.N. curriculum. The inclusion of CAM within B.S.N. curricula indicates that New Jersey nursing programs are seeking to align the education of students with current trends in health care. However, the lack of faculty knowledge regarding CAM treatments and philosophies remains a perceived barrier to higher levels of curricula integration.

## **Fear Versus Trust: The Impact of Fear on Birth Experience and Maternal Outcomes**

*Victoria Flores*

Mentor: Sachiko Komagata, PT, Ph.D.

Chair of the Department of Holistic Health & Exercise Science & Associate Professor of Holistic Health  
Department of Holistic Health & Exercise Science

This study explored women's trust-based and fear-based beliefs about birth. It asked: Do women trust their bodies' innate intelligence to give birth, or does fear override trust? The study sought to understand whether beliefs, fears, and trust associate with birth experiences and birth outcomes. Data were collected by way of a qualitative, cross-sectional survey distributed to Georgian Court University faculty, staff, students, and alumni, as well as to women undergoing HypnoBirthing, home birthing, and water birthing. The study posed 43 questions—each inquiring about beliefs and fears associated with birth—and then mapped them to birth experience and outcome. The results of this study indicate that fear states are associated with higher incidences of interventions and C-sections. In addition, the results show that no fear and low fear values are associated with self-reported calm states and more positive birth experiences. Therefore, this study concluded that the ability to maintain a calm meditative state during labor may be effective in the improvement of birth experiences and birth outcomes because it supports the neurohormonal physiology of birth.

## **School Psychologists' Job Attitudes: A Systematic Review**

*Dana Sobel*

Mentor: Theresa J. Brown, Ph.D., BCBA-D

Professor of Psychology

Department of Psychology & Counseling

We conducted a systematic review of research on school psychologists' job attitudes. To do so, all available published and unpublished research ( $N = 58$ ) on job attitudes among school psychologists were gathered and evaluated. As a result of the review, trends in the study of school psychologists' job attitudes were documented. These included examining how job attitudes relate to roles, place of school psychology practice, differences between actual and ideal roles, personal characteristics, and burnout. In addition, results indicated that job satisfaction was the most commonly studied job attitude with most school psychologists reporting average to above average levels of job satisfaction. Typically, job attitudes were measured with one or a few questions, which, at times, were developed in an ad hoc fashion. Finally, results from this review indicate that there has been no examination of the relationship between job attitudes and job behaviors. Limitations of this systematic review and the reviewed literature are discussed. Future research will want to explore the link between job attitudes, such as job satisfaction, but other attitudes as well, and job behaviors. Researchers should do so using psychometrically sound measures.



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