

# *Celebration of Scholarship and Creativity*



Worcester State University  
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# *A Celebration of Scholarly and Creative Accomplishments*

Welcome to the Fourth Annual Worcester State University Celebration of Scholarship and Creativity. This event has become a very special yearly tradition on our campus, but it actually only highlights what goes on every day across our academic programs—namely, faculty mentoring students on scholarly, research, and creative projects. Of course, our faculty have always excelled in effecting student learning in the classroom; our history and our mission are, after all, as a student-centered, teaching institution. Increasingly, however, we have come to understand that another vital aspect of student learning takes place outside of the classroom, in the laboratory, the studio, the archive, working with faculty and other students in the discovery and communication of the knowledge and the development of skills that result from experimentation and analysis, from contact with primary source materials, and from practice and inspiration.

As you walk from venue to venue today, you will see and hear the impressive outcomes of our emphasis on student achievement in scholarship and creativity. This year, we have expanded the range of student and faculty work to include not only the wonderful poster presentations that have distinguished the first three celebration events, but also critical paper presentations, panel discussions, and performances. This expansion provides a more complete representation of the wide range of work that students and faculty are doing across all of the academic disciplines, from the natural and social sciences to the arts and humanities.

So please join with us in and enjoy this 2011 celebration of the scholarly and creative accomplishments of our faculty and students.

Charles Cullum, Ph.D.  
Provost/Vice President  
Academic Affairs



**BIOLOGY**

PHYLOGENETIC ANALYSIS OF HUMAN GUANINE NUCLEOTIDE EXCHANGE FACTORS

**Katherine Figella**

*Faculty Adviser: Brad Bryan, Ph.D.*

Guanine nucleotide exchange factors (GEFs) are enzymatic proteins that catalyze the exchange of guanosine diphosphate (GDP) for guanosine triphosphate (GTP) to activate a subset of cellular proteins. Genes encoding GEFs are found from bacteria to humans, and represent approximately 0.75% of the total protein coding genes in the human genome. To examine the phylogenic relationships between human GEFs, we utilized a bioinformatic approach to cluster GEF protein sequences based on homology. GEF protein sequences were analyzed by the Clustal-W multiple sequence alignment tool which utilizes an algorithm to align divergence protein sequences based on homology. Our analysis of human GEF proteins reveals the presence of unique GEF protein sub-families that suggest marked divergence through evolution.

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RHO KINASE REGULATES GLOBAL GENE TRANSCRIPTION IN ENDOTHELIAL CELLS

**Katherine Masterjohn**

*Faculty Adviser: Brad Bryan, Ph.D.*

Angiogenesis (the formation of new blood vessels from pre-existing blood vessels) is a prerequisite for tumor progression as it provides the tumor with fresh oxygen & nutrients, removal of waste products, and a route for the tumor to spread throughout the body. The serine/ threonine protein kinases ROCK1 and ROCK2 have been shown to regulate endothelial cell (blood vessel cells) motility, proliferation, survival, and permeability. A whole genome microarray study was previously performed on endothelial cells treated with sham or the pharmacological inhibitor Y-27632 (which inhibits the activity of both ROCK1 & ROCK2). Inhibition of ROCK1 & ROCK2 activity in endothelial cells results in a statistically significant change in gene transcription of 176 genes controlling a number of processes including proliferation, survival, migration, etc. This data suggests that control of the cytoskeleton through modulating ROCK activity also regulates global gene expression patterns.

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FROM INFANT TO YOUTH: A LOOK AT THE DELIBERATE ACCELERATED GROWTH OF ELEVEN NORTHERN RED-BELLIED COOTERS FROM OCTOBER TO APRIL

**Shaun Polissack, Samuel Rhode, Natasha Fuller, Molly Hunt, Travis Zoba, Joseph Deveraeux**

*Faculty Advisers: Steven Oliver, Ph.D., Ellen Fynan, Ph.D.*

Northern Red-bellied Cooters *Pseudemys rubriventris*, endemic to Plymouth County, Massachusetts, are a federally endangered species of turtles a near zero chance of survival to adulthood in the wild. Massachusetts DFW has implemented a Head-Start Program where hatchlings are fostered to willing parties through the cold months (October to April). By maintaining optimal temperature, turtle growth and survival can be substantially increased. In October, Worcester State University received eleven cooters: eight from one clutch, two from a separate nest, and one stray. Each week, the turtles were weighed, measured, and photographed to track their growth and any changes their plastron (bottom shell) made. Despite being exposed to the same conditions and availability of food, their individual growths varied. The growth pattern of the whole group and among individual cooters will be compared and contrasted.

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PREPARATION OF A STANDARD OPERATING PROCEDURE FOR AN AUTOMATED DNA SEQUENCER

**Theresa Shafer**

*Faculty Adviser: Ellen Fynan, Ph.D.*

The order, or sequence, of bases in a DNA molecule can provide valuable information to researchers and clinicians. The chain-termination method, developed by Sanger in 1977, involved an enzymatic reaction, electrophoresis of the sample, followed by manual reading of the sequence. In 1987, the first automated sequencer became available. Automated sequencing shortened the time to process samples, allowing a higher throughput. The DNA sequence of the samples are read automatically and stored in a computer database. Recently, an automated sequencer was donated to WSU by a local biotechnology company, Sequegen®. As part of an internship with that company, a standard operating procedure for this equipment was prepared to enable students, faculty and staff in the Department of Biology to learn to use this instrument. The preparation of this document describing the multiple detailed steps of the procedure (pre-run preparation, setting up the computer program, and sample preparation) will be discussed.

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SMALL MOLECULE INHIBITION OF CYTOSKELETAL DYNAMICS IN MELANOMA TUMORS RESULTS IN ALTERED TRANSCRIPTIONAL EXPRESSION PATTERNS OF KEY GENES INVOLVED IN TUMOR INITIATION AND PROGRESSION \*

**Carrie Spencer, John Montalvo, Sarah R. McLaughlin**

*Faculty Adviser: Brad Bryan, Ph.D.*

Rho kinase signaling plays an important role in the oncogenic process largely through its regulation of F-actin dynamics, and inhibition of this pathway results in reduction in tumor volume and metastasis across a number of tumor types. While the cytoskeletal-regulatory role of Rho kinase has been a topic of in-depth study, the mechanisms linking Rho kinase to altered gene expression are largely unknown. Global gene expression analysis was performed on melanoma tumors treated with sham or the small molecule inhibitor Y27632. Inhibition of Rho kinase activity in melanoma tumors results in a statistically significant change in gene transcription of 94 genes, many of which are critically involved in tumor initiation and progression. In addition to regulating tumorigenesis through modulation of the phosphoproteome, Rho kinase signaling also contributes to the regulation of the tumor transcriptome.

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EVALUATION OF THE DIVERSITY OF INTESTINAL MICROBIOTA OF NORTHERN RED-BELLIED COOTERS

**Matthew Tetreault, Travis Zoba, Samuel Rhode, Hieuhanh Nguyen, Corey Lancelotta, Colin Renaud, Natasha Fuller**

*Faculty Advisers: Ellen Fynan, Ph.D., Steven Oliver, Ph.D.*

Northern Red-Bellied Cooters are being raised at WSU under the guidance of the Mass. Department of Fish and Wildlife. The four-week post-hatch turtles arrived in Fall 2010 and have been fed a diet of romaine lettuce, supplemented with ReptoMin® after November 1, 2010. A total of 11 cooters are being reared, nine of which are from one clutch; two turtles are from a different clutch. There has been increasing interest in understanding the relationship between a host and its microbiota, particularly the function of microorganisms residing in specific body areas. In this study, the diversity of intestinal microbiota was monitored over time in the cooters. Intestinal samples were collected monthly and inoculated into Biolog® Ecoplates. The plates were incubated at 30°C for 24 hours and the results determined by reading the optical density. The diversity of the gut microbiota over time and among the individual cooters will be discussed.

**BUSINESS ADMINISTRATION AND ECONOMICS**

BUSINESS SKILLS AND ENVIRONMENTAL SUSTAINABILITY

**Sam DeBenedictis**

*Faculty Adviser: Jay Mahoney, Ph.D.*

Worcester Regional Environmental Council is a non-profit organization located in Worcester. They maintain gardens in urban areas employing young disadvantaged teens 14 to 16 to cultivate and harvest food. The kids have attempted to launch entrepreneurial endeavors, such as selling salsa and hot sauce made from their produce, however whether this generated a profit or a negative cash flow, was unknown. They lacked an understanding of the business side. We planned a four week program to teach marketing, management and accounting skills. We created simple, easy to understand, and fun lessons to introduce basic concepts and readily applicable skills. Incorporated into every presentation were issues of ethics and moral reasoning in the business environment. We constructed, administered and analyzed a feedback instruments for the participants. Results showed the students saw tremendous value in the program and many indicated an increased interest in the business aspect of agriculture and renewable.

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THE FINANCIAL LITERACY OF COLLEGE FRESHMEN

**Christina Foley, Jessica LaVoice**

*Faculty Advisers: Janice Yee, Ph.D., Elizabeth Wark, Ph.D.*

Given the variety of financial instruments and tools available to college students, from loans, to automatic teller machines, to debit cards, etc., it is important to gauge how well students understand the risks and implications in using any of these tools. One would expect that students would become more sensible in their financial behavior as their exposure to financial tools and instruments increases and they progress closer to graduation. In order to test this hypothesis, ten freshmen seminar classes were surveyed at the beginning and end of the fall semester of 2010 using the 2008 Jump Start Coalition's Survey of Financial Literacy among College Students. The results indicated no improvement in financial literacy throughout the semester and were then compared to the Jump Start Coalition's national results. After comparing both sets of data, potential areas for financial literacy improvement were identified at the university, state and federal level.



### FINANCIAL LITERACY

**Karol Pawlowski, Julie Broderick, Uarda Ziami**

*Faculty Adviser: Jay Mahoney, Ph.D.*

The MoneySkill financial literacy program is an interactive online module course directed at influencing financial responsibility and understanding among young adults. Our goal was to provide this free program to area high schools and began the first phase with three schools. We briefly described the program and its benefits. We followed by creating a PowerPoint presentation with handouts that would inform the interested parties about the program. Our presentations were designed for teachers and administrative staff. Many of the attendees elected to adopt the program, and the flexible modules allowed it to be used in a variety of courses. We constructed, administered and analyzed a feedback instrument to assess our effectiveness. Our program received positive reviews from the teachers and their students and the majority of teachers indicated their intention to continue to incorporate MoneySkill in their curriculum.

## CHEMISTRY

### STABILIZATION STUDIES OF METAL-CHELATING COMPLEXES VIA COMPUTATIONAL METHODS

**Kweku Acquah**

*Faculty Adviser: Eihab Jaber, Ph.D.*

The bidentate chelating ligands of a metal ion are known to result in a more stable molecule due to the chelate effect when compared with monodentate ligands on the same metal ion. In this work, we examine the enthalpic contribution to the stabilization of the metal ion complexes as the ligands change from monodentate to bidentate and subsequently, as the molecule itself become more macrocyclic. Copper (II), Cadmium (II), and Nickel (II), were used as the subject metal ions, and the monodentate and bidentate chelating ligands were NH<sub>3</sub> and ethyldiamene (EN), respectively. The equilibrium values for Ni(en) and Cd(en), were 46.9, and 337.5, respectively. Our findings suggest that different equilibrium positions are established upon addition of new ligand interactions, favoring the bidentate chelating ligand interactions over the monodentate ligands interactions.

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### GREENING MIDDLE AND HIGH SCHOOL CHEMISTRY LABS

**Daniel Duffy**

*Faculty Adviser: Margaret Kerr, Ph.D.*

This study took preliminary lab procedures and made them less toxic to humans and the environment. Working with Dr. Margaret Kerr and Beyond Benign, an organization involved in green chemistry education, the goal was to help create resources for high schools, especially with limited resources. These labs are supposed to be more environmentally sound than traditional high school chemistry lab. The lab procedures were also edited, altered, made more grammatically correct, and standardized so they could be provided to schools and used efficiently. All of the labs were performed so that the results could be provided along with the procedures for them. We are also doing community outreach with this program and working with a middle school that currently doesn't have access to a lab. This project will provide me a nice portfolio of green chemistry labs, as I hope to be a high school chemistry teacher some day.

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### MOLECULAR MODELING OF CATALYTIC OZONE DESTRUCTION BY THE HYDROXYL RADICAL

**Nitya Durvasula**

*Faculty Adviser: Eihab Jaber, Ph.D.*

The hydroxyl radical plays a key role in the destruction of stratospheric ozone through a self-perpetuating cyclic reaction. This destructive cycle is carried out in a two step reaction in which the hydroxyl radical catalyzes the creation of diatomic oxygen from ozone and singlet oxygen. This mechanism is of interest largely because of its contribution in the destruction of stratospheric ozone. In this work, we aim to computationally model this cycle in a way that is reasonable to recreate in an undergraduate physical or environmental chemistry laboratory setting, but which correlates well with experimental findings. Computational methods were largely performed at the ab initio levels of Hartree-Fock and Density Functional theories with various basis sets. Our findings suggest that the geometries and enthalpies of species in this cycle computed at lower levels of theory compare well with experimental findings that use higher levels of theory.

## CREATION OF WATER-SOLUBLE POLYMERS CONTAINING PHOTOACTIVE COUMARINS

**Stephen Glynn***Faculty Adviser: Margaret Kerr, Ph.D.*

The purpose of this project was to create substituted coumarin molecules as part of a polymer chain to be used as a water based soluble photoresist. This research focused on the synthesis of these polymers as well as varying the alkyl chain length and substitution position on the coumarin molecule to measure the effect on the rate of dimerization of the polymer. The majority of this work was done at Chulalongkorn University in Bangkok, Thailand as part of an undergraduate exchange program.

## BIFURCATED HYDROGEN BONDING ENERGY IN THE ROLE OF STABILIZATION OF THE G-TETRAMERS OF TELOMERIC DNA \*\*

**Jonathan Gorky***Faculty Adviser: Eihab Jaber, Ph.D.*

Telomeres are structures at the ends of chromosomes (endcaps), which are guanine-rich sequences that protect the ends from destruction. These sequences contain domains of G-tetramers in which, G-G pairs are held together by intermolecular hydrogen bonding. It is believed that the hydrogen bonding of these G-G pairs occur by bifurcated interactions in the absence of monovalent cations. Cooperative interactions are thought to play a key role in the stabilization of these G-tetramers. In this work, the energetic contribution to the stabilization of these G-G pairs by bifurcated hydrogen bonding was evaluated by methods of computation chemistry using software that analyzes thermodynamic properties of molecules. The cooperative nature of the G-G dimer, trimer, and tetramer were examined using a unique method of twisting monomers and calculating the change in binding energy at the HF/6-311G++(d,p) level.

## METAL CHELATE MOLECULAR MODELING OF N,N'-DI-2-PICOLYL-1,3-PROPANEDIAMINE STRUCTURES

**Nicole Hanna***Faculty Adviser: Eihab Jaber, Ph.D.*

Metal-ligand supramolecular systems have been of interest in the design of molecular pharmaceuticals. One important question in designing some classes of antibiotics is how to design the molecules so that they bond selectively the specified metal of choice, meaning fewer side effects from bonding to other metal ions important to physiological systems. DPA-2 (N,N'-di-2-picolylethylenediamine) and DPA-3 (N,N'-di-2-picolyl-1,3-propanediamine) are polydentate chelating molecules which have an interesting combination of both ring- and linear-integrated nitrogen donors. Under analysis is the energetic difference ligand-metal stability over a range of metals when changing from a 5-membered ring in DPA-2 to 6-membered in DPA-3. Computational efficiency using GAUSSIAN 03W in calculating these thermo chemical parameters was compared among traditional low-level molecular mechanics, scaled to ab-initio Hartree-Fock, and density functional theory B3LYP methods.

## CHEMISTRY SEMINAR: THE IMPORTANCE OF GREEN METRICS IN PHARMACEUTICAL INDUSTRY

**Jessica Karłowicz, Shelley Kaliszewski, Mike Allen, Ryan Johnson***Faculty Adviser: Meghna Dilip, Ph.D.*

Percent yield has been the standard measurement of reaction effectiveness in the chemical industry, but can be misleading with respect to the environmental impact of production. Green chemistry evolved into a standard that most industries want to rise to in order to address this issue. It utilizes green metrics as a means of measuring the environmental impact of chemical reactions. In this poster, we discuss the four most used green metrics and compare them. These four green metrics are practiced in the pharmaceutical industry and a prime example is the synthesis of sildenafil citrate. This process has improved over the years to reduce waste.

## COMPUTATIONAL ANALYSIS OF THE CONFIRMATION OF HEME IN HEMOGLOBIN

**Elias Morroe**

*Faculty Adviser: Eihab Jaber, Ph.D.*

Hemoglobin is a protein that binds and transports oxygen throughout the body. Contained within the protein chain are prosthetic groups called heme where dioxygen binds to an iron ion. The surrounding amino acid ligands directly influence the shape of the porphyrin ring as well as the energy of reactivity and the function of the iron center in electron transfer (3). This study compared the active site of heme derived from experimental (Protein Data Bank) methods and from ab initio (PubChem) methods. The stability of the molecule was calculated using DFT and a series of basis sets with Gaussian 3.0. The active site of each molecule was visualized by comparing HOMO and LUMO diagrams. The heme molecule derived from experimental methods was shown to portray the characteristics that heme is known to have.

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## CAFFEINE A COMPUTATIONAL STUDY ON THE FORMATION OF CARBON MONOXIDE POLYMERIC CHAINS

**Kyle O'Donnell**

*Faculty Adviser: Eihab Jaber, Ph.D.*

Carbon monoxide molecules have been known to form polymeric like-chains that consist of several molecules in length, with relative stabilities often referred to as polyketones. Understanding the stability of these molecules can help predict how easily these polymeric forms of carbon monoxide can exist in the atmosphere. In this study, the electronic structures and geometries of carbon monoxide polymeric chains of different lengths have been calculated with the use of Density Functional Theories, at the B3LYP method with respect to the 6-311+G (d,p) basis set. The stabilities of these molecules have been predicted by calculating their respective energies and monitoring their energy differences as a function of polyketone length. This work eludes to the formation of a more stable polymer as carbon monoxide monomers are increased. Our future work will explore how terminal groups commonly found in the atmosphere affect the stability of these polyketones.

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## EXTRACTION USING SUPERCRITICAL CO<sub>2</sub>

**Jonathan Parrella**

*Faculty Adviser: Meghna Dilip, Ph.D.*

Caffeine can be extracted from coffee beans using liquid near critical CO<sub>2</sub>. This process is currently used in industry. Here we present this method, modified for use in an undergraduate lab. Liquid CO<sub>2</sub> replaces toxic and volatile solvents such as methylene chloride and is thus considered "green". The efficiency of caffeine removal will be analyzed using the analytical technique, high performance liquid chromatography (HPLC).

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## FLUORESCENCE STUDIES OF COUMARIN DERIVATIVES

**Jason Smith**

*Faculty Adviser: Margaret Kerr, Ph.D.*

Coumarin was made synthetically by students at Worcester State University in an attempt to examine the unique fluorescence properties of the product. The molecule, 7-hydroxy-4-methylcoumarin, has fluorescent properties and is commonly researched because of its ability to crystallize easily, as well as its aggregation and fluorescence quenching. Solvent concentration variants with DMSO and methanol were used in order to examine coumarin's ability to fluoresce. The results were then placed under UV light in order to observe the reaction upon irradiation. After a series of solvent concentrations with the 7-hydroxy-4-methylcoumarin molecule were tested, the right concentration needed to measure the coumarin on the new fluorescence spectrophotometer was concluded.

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## PARTITIONING OF METALS USING IONIC LIQUID BASED AQUEOUS BIPHASIC SYSTEMS

**Bradford Spencer, Christiane Germaine**

*Faculty Adviser: Meghna Dilip, Ph.D.*

Ionic Liquids (IL) are substances garnering much interest recently due to their potential in "greening" chemical processes. ILs are essentially salts that are liquid at room temperature, and are attractive to chemists for their non-volatility, conductivity, nonflammability, etc. which could lead to their replacement of other more hazardous/wasteful solvents. In this study we show the partitioning of metals without the use of ligands, and additional acid/base using an ionic liquid based aqueous biphasic system. Metals partitioned include copper, nickel, and chromium. Factors affecting partitioning will be reported.

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## CHEMISTRY SEMINAR... THE CHEMISTRY FUEL CELLS

**Vivian Wangari, Samuel Maina and Joshua Laflash***Faculty Adviser: Meghna Dilip, Ph.D.*

Fuel cells are devices that convert chemical energy to produce electrical energy. This poster discusses the application, types and uses of fuel cells. There is great debate about the greenness and cost of producing fuel cells. Currently, technology is still in early stages of development and that is cause for concern.

## COMMUNICATION

## ESPERANZA Y SU ÉXITO (HOPE AND YOUR SUCCESS)\*\*

**Alta Carroll, Ph.D., Julian Berrian, M.F.A.**

Esperanza y Su Éxito(Hope and Your Success) is a non-profit, Spanish language TV program produced/hosted by local educator/activist Esperanza Donovan-Pendzic in collaboration with Worcester State University's Center for Community Media. Each thirty minute episode features segments pertaining to health awareness, finances, politics, cultural arts, food and education. Professors Julian Berrian and Alta Carroll work in tandem with Esperanza Donovan-Pendzic to produce the program and mentor student interns. Esperanza y Su Exito can be viewed on WCCA TV 13 in Worcester, Mass. Our performance/presentation includes a video montage featuring images, music and sound bites from seasons one through three of Esperanza y Su Éxito. Alta Carroll, Julian Berrian, Esperanza Donovan-Pendzic and several student interns will be present to entertain questions about the television program.

## PROMOTIONAL POSTER DESIGN PROJECT

**Students in CM 244: Graphic Design***Faculty Adviser: Suzanne Gainer, M.F.A.*

The students were given an assignment to create a promotional poster for the "Celebration of Scholarship and Creativity" Event. The top 10 posters representing 2 sections of CM244: Graphic Design were chosen to present at the event. The top poster was chosen as the official poster for the event.

## COMMUNICATION SCIENCES AND DISORDERS

## SPEECH PRODUCTION AND PERCEPTION MEASURES FOR CHILDREN WITH HEARING IMPAIRMENTS: PSYCHOMETRIC QUALITIES

**Elizabeth Budness, Kristen Ciocci, Erica Casey, Laura Callery, Maile Lange, Sarah LoMonaco, Emily Morrison, Joshua Perkoski, Morgan Roux, Erica Thayer***Faculty Adviser: Susanna Meyer, Ph.D.*

The purpose of this study was to examine the psychometric characteristics of assessment tools used to evaluate the speech perception and speech production of children with hearing impairment. Speech-language pathologists and audiologists have an ethical obligation to use valid and reliable assessment tools. Although validity and reliability of norm-referenced assessment tools have been studied, assessment tools for children with hearing impairments has not received the same attention. McCauley and Swisher (1984) and later Bento and Larrivee (2003) created a norm-referenced evaluation checklist. McCauley (1996) developed criteria to evaluate the psychometric qualities of criterion-referenced tests changed into a checklist by Matthews and Sharon (2007). These checklists were applied to examine the psychometric characteristics of assessment tools used to evaluate the speech perception and speech production of children with hearing impairment. The psychometric qualities of these tests are presented in the poster.

WHAT DID YOU SAY? PREVENTION OF NOISE INDUCED HEARING LOSS FOR COLLEGE STUDENTS \*

**Alix Anatavica, Lauren Kosinski, Melissa Silva**

*Faculty Adviser: Susanna Meyer, Ph.D.*

Recent advances in technology expose college students to prolonged intervals of loud music, a potential cause of hearing loss. The use of iPods and MP3 players put college students at risk for noise-induced hearing loss. Studies show that these young adults present with hearing loss in higher numbers than in years past. The hearing loss impacts communication, education, career prospects as well as quality of life. Noise induced hearing loss is completely preventable. Information regarding the risk factors, characteristics of hearing loss, as well as the steps to prevent hearing loss in college students are presented in this poster.

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EARLY PREDICTORS OF ENGLISH LANGUAGE ACQUISITION IN INTERNATIONALLY ADOPTED CHILDREN \*

**Jennifer Carroll, Kristina Catacchio, Susanna Meyer, Ph.D., Emily Soltano, Ph.D., Linda Larrivee, Ph.D.**

An area of concern for speech-language pathologists (SLPs) is second first language acquisition (SFL). Little research exists to document the English language development of internationally adopted (IA) children from diverse backgrounds. The present study examined the prelinguistic communication and productive language of seven IA children over a six month period to determine possible predictors of language delays. Prelinguistic communication and productive language at first visit was compared with both prelinguistic communication and productive language at second visit. Six of the seven children showed marked change after the six month period. Data analysis determined patterns and clusters of test results. One child was an outlier in that no marked change was noted in the six month period. Implications will be discussed and information regarding typical and atypical language in IA children can help develop local norms to guide SLPs in treatment and assessment of IA children.

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LANGUAGE AND LITERACY MEASURES FOR CHILDREN WITH HEARING IMPAIRMENTS:  
PSYCHOMETRIC QUALITIES \*

**Jennifer Carroll, Katherine Clavette, Cristina Domestico, Lauren Kender, Lauren Kosinski, Dylan Tolomeo, Megan Welch**

*Faculty Adviser: Susanna Meyer, Ph.D.*

The purpose of this study was to examine the psychometric characteristics of assessment tools used to evaluate the language and literacy of children with hearing impairment. Speech-language pathologists and audiologists have an ethical obligation to use valid and reliable assessment tools. Although validity and reliability of norm-referenced language and articulation assessment tools have been studied, assessment tools for children with hearing impairments has not received the same attention. McCauley and Swisher (1984) and later Bento and Larrivee (2003) created a norm-referenced evaluation checklist. McCauley (1996) developed criteria to evaluate the psychometric qualities of criterion-referenced tests, changed into a checklist by Matthews and Sharon (2007). These checklists were applied to examine the psychometric characteristics of assessment tools used to evaluate the language and literacy of children with hearing impairment. The psychometric qualities of these tests are presented in the poster.

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DOES MOC REFLEX STRENGTH PREDICT DPOAE CHANGES AFTER NOISE EXPOSURE?

**Keith N. Darrow, Ph.D.**

In humans and animals, vulnerability to traumatic noise is highly variable. Despite over 50 years of human susceptibility testing there is no known predictor of acoustic vulnerability. Recent work in animal model has demonstrated an inverse relationship between severity of noise-induced permanent threshold shift and strength of ipsilateral-mediated medial olivocochlear (MOC) reflex. The purpose of this study was to examine the relationship between MOC reflex strength and noise-induced temporary shifts in humans. MOC reflex, observed as a rapid adaptation of distortion product otoacoustic emission (DPOAE) level, was measured twice and varied across subjects; however reflex strength within individuals was highly stable across two test sessions. Noise susceptibility was assessed in each subject by measuring DPOAE levels before and after exposure to a 92dB SPL noise for 15 minutes. Noise-induced shifts across subjects did vary significantly. A correlation of MOC reflex strength and noise susceptibility was not found.

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SPEECH LANGUAGE PATHOLOGISTS' (SLPS') INVOLVEMENT IN LANGUAGE EVALUATION OF INTERNATIONALLY ADOPTED ENGLISH LEARNERS \*

**Elizabeth Kappos, Jennifer Kerr, Linda Larrivee, Ph.D., Susanna Meyer, Ph.D., Emily Soltano, Ph.D.**

A new area of concern for SLPs is second first language (SFL) acquisition. SFL acquisition, a process whereby knowledge of one's first language diminishes as a second language is learned, has become a significant issue in the field of speech-language pathology. Unfortunately, study of SFL acquisition of international adoptees is still in its infancy. Therefore, a lack of knowledge of the progression of language development leads to an inability to identify children at risk for difficulties in language development. This in turn leads to children not receiving needed services until they fall far behind. The study examined the role that SLPs play in SFL based on 741 returned questionnaires. SLPs collaborate with English Language Learning (ELL) specialists and evaluate the children only after referrals by ELL specialists or parents. SLPs function as consultants to teachers and special educators, but feel they would benefit from additional training.

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BELIEFS AND ATTITUDES OF CHILDREN AND ADULTS WHO STUTTER REGARDING THEIR ABILITY TO OVERCOME STUTTERING

**Kenneth Melnick, Ph.D.**

Stuttering therapy often requires considerable attention to be spent addressing the affective and cognitive components of the disorder. While a number of scales have been developed to assess attitude towards communication, none have been developed to assess perceived ability to help oneself surmount the stuttering. Children and adults were assessed using the Mindset Scale for Stuttering. Results demonstrated that adults (but not children) who showed a more positive attitude were more likely to have a stronger prediction of success. According to some, children's perceptions about their ability to solve problems are not necessarily unchangeable; it may be possible to alter them from a more fixed to a more growth mindset. If we discover, in future studies, that negative attitudes are related to a fixed mindset, it may be possible to alter this to a more growth mindset through counseling, enabling children and adults to more effectively manage their stuttering.

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PREVENTION OF THE NEGATIVE EFFECTS OF HEARING LOSS IN CHILDREN \* (\*\*)

**Susanna Vennerbeck, Maile Lange, Lauren Kender, Julie Langevin**

*Faculty Adviser: Susanna Meyer, Ph.D.*

Hearing loss is not always preventable, but the negative effects of hearing loss can be reduced by early diagnosis and intervention. By educating parents and teachers, children will be identified early and preventative steps can be initiated to limit the negative effects of hearing loss. Preventative measures may vary depending on a child's age and stage of development. Parents of infants and toddlers can learn about the effects of hearing loss on speech and language development and learn to recognize the symptoms of middle ear infection, a leading cause of conductive hearing loss in young children. Parents can learn to monitor the loudness levels of toys to prevent noise induced hearing loss. Early childhood and elementary school educators can learn about the effects of even a mild hearing loss on their students' performance and development. Older children and teenagers can learn about noise induced hearing loss and its prevention.

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**COMPUTER SCIENCE**

AN APPROACH TO SECURING VOIP SYSTEMS

**Rockwood Cataldo**

*Faculty Adviser: Hemant Pendharkar, Ph.D.*

In the rapidly changing world of global communication, there have been many innovations in voice capability technology. One rapidly expanding technology is voice over Internet protocol (VoIP). VoIP systems are making considerable progress expanding into the telecommunications market because of their low operational cost. General-purpose consumer grade VoIP communication is achieved by using the Session Initiation Protocol (SIP). SIP is used to allow communication between two multimedia systems. Like most communication systems, VoIP systems have security issues. Since VoIP systems are hosted on computer systems that are actively connected to the Internet, they have become a target of misuse. There are several possible ways to secure and, if necessary, lock these systems down upon detection of unauthorized usage or irresponsible user behavior. This project is aimed at examining and auditing the current measures in place and showing how VoIP and PSTN security can be improved simultaneously, thus making VoIP a secure technology to further save communication costs.

## END-USER DRIVEN SEARCH SOLUTIONS

### **Matthew Dellomo**

*Faculty Adviser: Hemant Pendharkar, Ph.D.*

Traditional search utilities show efficiently in design but they leave the user without their desired results in real world usage. The end-user will run multiple random unsuccessful searches with no idea of what they are doing wrong or how to (re)-submit their parameters to successfully locate relevant information. In a real application these searches tend to be resource intensive. Also, computer servers are slowed down by a massive number of search requests. To address this issue, we propose a working solution that has entirely been written in bash and C for processing such searches. This solution uses multiple techniques bringing the search request from one independent technique to another until the results are achieved. One of the future plans for the End-User Driven Search solution is to integrate it as a plug-in to the web-server. This should enable customizing searches to serve the end users with greater control using the http(s) protocol.

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## DOMINOES GAME – SEARCHING FOR WINNING STRATEGIES

### **Jonathan Feal**

*Faculty Adviser: Elena Braynova, Ph.D.*

The goal of the project is to simulate the game of Dominoes and to study the winning strategies for it. A random game will be simulated by a custom made computer program (implemented in C), after which the data will then be collected and studied using a decision tree model. When the decision trees, representing possible Dominoes strategies, are constructed and studied for winning outcomes, they will be tested and evaluated for different game scenarios.

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## ANALYZING BANK DATA USING STATISTICAL MODELING \*\*

### **Trevor Hodde, Matt Morrissey, and James Forkey**

*Faculty Adviser: Elena Braynova, Ph.D.*

People are always trying to make their lives easier by saving time and using technology to perform certain tasks for them. This same technology can help the people marketing goods and services to more effectively market their products. Using personal information stored by banks, it is possible to determine what kinds of needs a particular group of people have. In this project we analyze bank data of married and single people. We study the relationship between person's age, genre, income, married status, family size and the number of cars owned. We use Statistical Modeling, Naïve-Bayes, KStar, SimpleLogistic, and JRip algorithms to discover interesting patterns, present them and discuss the results accuracy.

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## NATIONAL DEFICIT AND FEDERAL SPENDING – DOES SPENDING MORE ALWAYS MEAN COSTING MORE?

### **Michael Simmarano**

*Faculty Adviser: Elena Braynova, Ph.D.*

In this project we study and analyze federal financial statistics for the period of 1900 up to 2011. The data includes yearly statistics on GDP, total spending, deficit, and spending on various departments such as defense, welfare, healthcare, education and pensions. It may seem that more spending means a higher deficit, but this may not be the case. For example, some say that more healthcare spending will save money in the long run for the country by lowering other costs. The answer is not clear. The project discovers relations between national deficit and various federal spending statistics, studies and represents them.

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**CRIMINAL JUSTICE**
**EVALUATION OF JOB TRAINING PROGRAMS IN FEDERAL PRISON****Michelle Beauregard, Richard Casello, Ed Donovan, Matt Dyer, Kara Rogato, Toni DeAngelo, Mike Deveau***Faculty Adviser: Hye-Sun Kim, Ph.D.*

Research shows us that recidivism rates are highest upon ex-prisoners within the first three years of their release (Trevis, 2005). Current studies have indicated that gaining employment after release from prison reduces chance of involvement in criminal activity. ( Bahr,, Harris, Fisher, & Armstrong, 2010).. More qualitative research has shown us that a well-planned daily schedule allows for a better chance of not returning to prison (Trimbur, 2009). Therefore we suggest that a 40 hour work week will decrease recidivism rates with ex prisoners. The Release Preparation program implemented in federal prisons offers intense preparation starting eighteen months prior to release. We believe this would decrease recidivism rates when the program is implemented to the fullest. We also believe men and women would both receive positive results from this type of post-release program.

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**PRINCE AND THE PAPER: NEWSPAPER NARRATIVES OF TWO BULLYING-RELATED SUICIDES \*\*****Robert A. Brooks, Ph.D.**

This presentation examines newspapers' constructions of events surrounding two youth suicides in Massachusetts. The suicides were reportedly prompted by protracted bullying and generated significant media coverage and public attention; this coverage was credited with ensuring passage of a long-stalled anti-bullying bill. Of central concern here are the media narratives involved in: the construction of the youth as victims, the putative link between the bullying and the suicides, allocation of blame and responsibility, and public and political responses. These issues will be placed within the larger context of media-induced reactive approaches to criminal justice policy-making.

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**FEMALE SEX OFFENDERS****Jeff Caparell, Peter Ferrelli, Erika Romeo, Kyle Jones, Chad Kasik, Kwity Pamo***Faculty Adviser: Hye-Sun Kim, Ph.D.*

Our group is going to be looking at Female Sex Offenders while focusing on school teachers and non-domestic incidents. Over the past decade or so female sex offenders have become more prevalent in our society and is a growing concern for parents sending their children to school. Our group will be looking at what motivates these woman to have sexual relationships with younger boys even while most of the women caught are married and have a family of their own. We want to get to the bottom of why they choose to do this and jeopardize the rest of their lives. We will use different theories to explain why these types of women demonstrate that type of behavior and how they compare to male sex offenders in our society. We will be looking at two different cases and other studies done to complete our research.

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**DRUG OFFENDER RECIDIVISM RATES: ARE DRUG COURTS MORE EFFECTIVE THAN INCARCERATION?****Caitlin Cleary, Justin Grigg, Marina Da Silva, Megan Placque***Faculty Adviser: Hye-Sun Kim, Ph.D.*

Recidivism rates for drug offenders vary across the country. Over the past several decades, drug court programs have spread nationwide. Before, offenders would be sent to prison, but now they are being rehabilitated with these drug courts. The programs aim to put a halt to drug activity which is considered to be a main cause of their criminal offending. Our focus is to discover why certain drug courts are more effective than others. New Jersey is said to have a drug court system that should be a "model" for all other programs. We want to compare the differences between New Jersey's model program and Massachusetts' program to determine why one is highly praised over another.



#### CUSTOMER SERVICE IN POLICING

**Steve Delage, Andrew Frigon, Thomas Belanger, Phillip Mullin, Michael Caffrey, Richard Casello, Patrick Dapkas**

*Faculty Adviser: Stephen A. Morreale, D.P.A.*

There is little research on customer service in policing, even when the community interprets the jobs of police officers is that they are supposed to “protect and serve.” The dissatisfaction of the public may be alleviated if officers can explain “why” to the questions the public may have. There is an importance of police leaders to offer answers to the community’s questions. In the past, criminal justice researchers have had a very narrow view of these topics and one tactic that needs to be considered is to adopt strategies from the business world in order to improve customer service in policing. Policing is a service driven business and much could be learned and adapted from business. Reviewing how other countries focus on customer service in policing we gain a better understanding of what is needed. This research attempts to provide a better approach for both police and citizens and offer insight for methods to improve customer service.

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#### EXPLORING COMMUNICATIONS IN POLICE AGENCIES

**Scott Ellis, Samuel Loretta**

*Faculty Adviser: Stephen A. Morreale, D.P.A.*

Effective communication is a crucial element with which a department will depend upon for its success, and operation. Poor communication will lead to a break down, or ineffective operation of an organization both in day to day operations as well as the success of future long term goals of an organization, such as stated in Trahan 2008 article “Six Communication Secrets of Top-Performing Organizations”. Failed communication within a department can lead to poor communication outside of a department and thus effect the department’s public perception, and create friction between the organizational goals, and the communities perceived needs. This process is usually due to poor interaction between the departments’ officers’ perception and the public’s perception, in other words a friction in “outcome-oriented elements” between the citizens expectation, and the departments (Gallagher, Maguire, Mastrofski, Reisig, 2001).

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#### EVALUATION OF DRUG TREATMENT PROGRAM IN PRISON: KEY-CREST PROGRAM IN DELAWARE

**Alyssa Eveland, Nick Dias, Jonathan Morais, Kyle Minnicucci, Joe Lefebvre, Nick DiBlasi, Ryan Matte**

*Faculty Adviser: Hye-Sun Kim, Ph.D.*

Drug abuse is the leading cause of incarceration. FBI reported 580,900 arrests for drug offenses, in 1980. The number of arrests peaked at 1,559,100, in 1997. In 1999, there were 1,532,200 drug arrests, which accounted for 10.9% of arrests. Due to the increase in drug related arrests state governments have been presented with a unique problem to which they must find a unique solution. The state of Delaware has implemented a specific drug treatment program to rehabilitate offenders and reduce recidivism. This program, The Key-Crest Program, is a three step program which has been evaluated to determine if it is a successful program. The drug offender’s percentage with regard to reoffending has been significantly reduced by participating in this program. Based on our findings we have made recommendations to the state of Massachusetts and its drug rehabilitation programs.

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#### EFFECTIVENESS OF DRUG TREATMENT PROGRAMS AMONG OFFENDERS

**Laura Novoa, Marc Quitidamo, Casey O’Connor, Gary Murphy**

*Faculty Adviser: Hye-Sun Kim, Ph.D.*

This article examines the current drug treatment programs that correctional facilities offer. The reintegration model will be discussed as this is an approach that the state of Massachusetts uses in rehabilitating drug offenders. The effectiveness of such programs is examined. Massachusetts uses cognitive behavioral therapy as a form of rehabilitating substance abusers. This article will determine if cognitive behavioral therapy is the best approach for substance abusers and if support programs exist for substance abusers upon release into society. The challenges that prisons have in administering this treatment is addressed. Incarceration may not always be the solution for offenders who are attempting to rehabilitate from drug offenses the inmates have committed. Other alternatives to incarceration are researched and their effectiveness on treatment. We will see the alternatives of incarceration work with drug offenders and how programs such as drug treatments, drug tests and drug rehab centers make a difference.

## JUVENILE OFFENDING

**Dave Urella, Gina Tambollo, Brian Sabatini, Melissa Alvino, Juan Barreiro, Michael Black, Jesse Burns**

*Faculty Adviser: Hye-Sun Kim, Ph.D.*

Many factors contribute to their delinquency without a clear solution in place. Neighborhoods that are structurally disadvantaged experience high levels of juvenile crime and can be explained through the social processes that occur. The social learning theory and life course theory help identify key areas of concern pertaining to juveniles, including lack of parental supervision, learning behavior through peer acceptance, joining of gangs and drug use. Although there may not be a clear method for rehabbing the offending, it is clear that the earlier they receive the treatment the higher the success rate will be. This idea can be seen through the labeling theory. Here, it is more important for the juvenile to receive alternative methods and learning tools to improve their behavior than to use incarceration for their punishment, when they may not even understand the reasons for their actions.

## SUBSTANCE ABUSE TREATMENT PROGRAMS IN PRISON; DO THEY WORK TO REDUCE RECIDIVISM RATES?

**Chris Zutaut, Chris Resteghini, Elizabeth Bitar, Kris LaCroix, Abraham Gray, Matt Fallon**

*Faculty Adviser: Hye-Sun Kim, Ph.D.*

Upon the first three years that a prisoner is released from prison they are highly more likely to relapse and return back to prison. Our presentation focuses on substance abuse treatment programs in prison. Our research investigates if the substance abuse class in prison works to reduce recidivism rates amongst recently released offenders. We focus on current issues with substance abuse, and the general fact that 2.3 million prisoners are released from prison every year and about 2/3 of those prisoners recidivate during the first three years upon release. We examine past studies, including Bahr's article (2009), "Successful Reentry: What differentiates Successful and Unsuccessful Parolees?" to conclude; that there is a need for policy change to include more substance abuse programs in prison, to help ease the transition from prison to society. Successful reintegration with treatment programs will result in fewer crimes being committed by released offenders.

## EDUCATION

## BULIMIA NERVOSA IN THE FEMALE ADOLESCENT POPULATION: CONSIDERATIONS FOR TREATMENT AND SCHOOL-BASED INTERVENTION \*

**Sarah Goreham, Ashley Niggel, and Nicola Melehov**

*Faculty Adviser: Diane Tighe Cooke, Ph.D.*

Our project is based on an intensive literature review which explores the statistics and features of Bulimia Nervosa in the female adolescent population. We additionally explored the applicability of Cognitive Behavioral Therapy in the treatment of Bulimia Nervosa specific to this population. We took this a step further by examining the applicability of utilizing a cognitive-behavioral approach in the form of a Media Literacy program as a school-based intervention program. Special consideration is given to the developmental context of the female adolescent population as it pertains to body image and the development of Bulimia Nervosa.

## CLOSING THE ACHIEVEMENT GAP: A NATIONAL POLICY OF FAILURE AND MISDIRECTION \*\*

**Patrick J. O'Connor, Ed.D.**

At the present time, American schools are at the center of a national debate, an increasingly acrimonious debate about their quality, their methods, and especially, their fundamental purpose. Presently, however, the stakes are higher than they have ever been: our public schools are expected to accomplish something they have never done before--educate all children to high academic standards. This new demand for improved academic performance has created a national debate about Standards Based Education, a debate about the meaning of standards; about how best to establish them and how to measure whether they have been attained and mastered. In my lecture, I want to explore one fundamental question in this debate: Is the No Child Left Behind Act the correct policy for our nation's schools?

INCLUSION: COMPARING ATTITUDES OF ELEMENTARY AND HIGH SCHOOL TEACHERS \*

**Cheryl Perron, Catherine Mulcahy**

*Faculty Adviser: Christina Bebas, A.B.D.*

Classroom teachers are expected to successfully teach students of all academic levels and needs in the regular education setting. They are required to administer accommodations to students who are labeled special education as well as address the needs of “regular” education students. The attitudes of teachers regarding inclusionary practices can vary greatly. Research has found that teachers’ attitudes about inclusion can have a direct influence on teacher effectiveness (Treder, Morse, & Ferron, 2000). This study intends to compare the attitudes of elementary and high school teachers in Central Massachusetts regarding inclusion through the use of the Survey of Attitudes Toward the Inclusion of Students with Special Needs (Chow & Winzer, 1992). The study will bring to light whether there are differences in attitudes about inclusion between elementary and high school teachers.

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PEDAGOGICAL CONTENT KNOWLEDGE: THE CANDY BAR PROBLEM

**Patti Sprague, Dominic Pingitori, Shannon Jennings**

*Faculty Adviser: Raynold M. Lewis, Ph.D.*

This presentation examines the role of conceptual and procedural understanding must play in order to guarantee “deep understanding” of mathematical concept. Using a Case Study from their ED 325 class, pre-service teachers will show how a student used concrete materials to answer a fraction question correctly, but struggled to find the correct fraction operation to answer the same problem procedurally. (NCTM, 2000).

**ENGLISH**

GODDESSES, MAGES, AND WISE WOMEN: THE FEMALE PASTORAL GUIDE IN SIXTEENTH- AND SEVENTEENTH-CENTURY ENGLISH DRAMA

**Sharon Rose Yang, Ph.D.**

Renaissance pastoral has long been considered a genre for social critique. What has not been noted is the subject of Goddess, Mages, and Wise Women: a female pastoral guide using arcane wisdom and supernatural power to address patriarchal fears of Other projected onto woman, often as witch. In the mode of Bakhtin’s carnival, this guide uses magic, game playing, trials, or a combination to enlighten and liberate her charges from the strict hierarchy of patriarchal Self over female Other. Opening up a new avenue for exploring early modern gender expectations, the guide’s reaches a broad audience through public and private stage offerings of Shakespeare, Lyly, Jonson, Wroth, and others to reveal an emphatically wide range of views on women’s power and limitations.

**HEALTH SCIENCE**

ARE WSU COLLEGE STUDENTS AT RISK OF “DRIVING UNDER THE INFLUENCE OF CELL PHONE USAGE”?

**Students from HC 425: Research Seminar**

*Faculty Adviser: Lynn Bloomberg, Ph.D.*

Past research strongly suggests that college students are at a higher risk than average of being involved in a traffic accident while using a cell phone. The students conducting this research have hypothesized that our student population will not show the same pattern of cell phone use demonstrated in previous research; and to test this hypothesis they will replicate a recent study of cell phone use among college students at a large commuter college--UC San Diego.

This study will utilize the previous study’s observational research methods, while supplementing the original design with other qualitative and quantitative research methods the students have been studying and practicing during the semester. Both quantitative and qualitative data will be collected and analyzed and displayed in the poster presentation.

## EVALUATION OF A COMMUNITY BASED INCLUSIVE SOCIAL CLUB

**Amy Ebbeson, MSW**

Students in HE 220 NS conducted a program evaluation for a community non-profit agency, Alternatives. Club 21 pairs individuals with a Mental Illness served by Alternatives with a Community Volunteer for the purpose of building social capital. The students facilitated small group discussions and then worked one on one to help participants complete a survey designed by Matt Johnsen's research methods class. This data will be used to inform the Club's future. Students confronted the stigma of Mental Illness and made genuine connections with people who are typically discounted and disenfranchised. It was true service that creatively informed class content.

## HONORS

## A VICTORIAN ERA COSTUME: DESIGN, PATTERN DRAFTING, AND CONSTRUCTION

**Malgorzata Malkowska***Faculty Adviser: Susan Johnson-Hood, MFA*

This is a Commonwealth Honors project completed as a VPA Independent Study.

It is a hands-on work covering the process of creating a Victorian Period costume, involving design/rendering; the creation of a sloper; pattern drafting from the sloper and scale drawings of period pieces; and sewing the costume. The costume consists of a long-sleeved bodice with high collar and pleated back; draped overskirt; floor-length underskirt; and ruffled petticoat. Although it is not an exact reproduction of a period piece due to personal design choices, and the use of modern sewing tools, techniques, and fabrics, it is closely modeled after pieces from the late 1870s and early 1880s. As of February 2011, the final costume is still under construction; therefore the poster presentation focuses on the process and anything completed thus far (source images, renderings, patterns, mockup pieces/photos, fabric swatches, petticoat, etc.).

## MATHEMATICS

## MATHEMATICS PROBLEM SOLVING: THE HANDSHAKE PROBLEM

**Lauren Benoit, Ashley Dessert, Danielle Winske***Faculty Adviser: Raynold M. Lewis, Ph.D.*

Students from MA 130 Number and Operations for Teachers will share the strategies they used to solve a mathematical task. Using George Polya's Problem Solving Framework, they will use special cases to investigate patterns that lead to generalizing a formula for the number of distinct handshakes possible for  $n$  people. This problem incorporates the Process Standards of communication, representation, reasoning and proof, and connection recommended by the National Council of Teachers of Mathematics.

## MATHEMATICS PROBLEM SOLVING: THE BALLOON PROBLEM

**Hrisoula Bezas, Ariana Majidi, & Jillian O'Neil***Faculty Adviser: Raynold M. Lewis, Ph.D.*

Students from MA 130 Number and Operations for Teachers will share the strategies they used to solve a mathematical problem. Using George Polya's Problem Solving Framework, they connected mathematical concepts of divisibility, LCM and GCF. During the semester, students must complete four problem solving projects incorporating Arithmetic ideas. Students also will show how a Venn Diagram was useful in representing the answers to the questions posed by "The Balloon Problem".

## SEMI-REGULAR TESSELLATIONS OF THE EUCLIDEAN PLANE

**Chad Binette and Steven Karrmann***Faculty Adviser: Maria Fung, Ph.D.*

We describe all 8 of the semi-regular tessellations of the Euclidean plane. We outline the proof that these are all of them, and discuss a way to notate them that is suggestive of the polygons in each tessellation, and the arrangements of these polygons around a vertex.

DETERMINING PHYSICAL PROPERTIES OF COMPOSITE MATERIALS THROUGH EXACT RELATIONS

**Steven Karrmann**

*Faculty Adviser: Hansun To, Ph.D.*

A composite material is constructed from multiple constituent materials, resulting in a new material that distinguishes the constituents at a microscopic level. The physical properties of the constituents come together to produce the physical properties of the composite material, such as conductivity, elasticity, and magnetism. By examining the microstructure of the composite material, one can determine the effective properties of the composite. These effective properties are expressed mathematically as exact relations. By utilizing the Hall effect, a principle used to measure a current's voltage through a material under the effect of a magnetic field, the exact relations have been identified for a six-dimensional surface consisting of 3 x 3 symmetric matrices lying in a nine-dimensional space of all 3 x 3 matrices. Through mathematical analysis of the exact relations, we attempt to determine the effective properties of composites in the two-dimensional subspaces of this surface.

**NURSING**

STRENGTHENING THE CAPACITY OF HEALTH PROFESSIONALS SERVING MINORITY AND LOW-INCOME COMMUNITIES TO PREVENT ENVIRONMENTAL RISKS

**Stephanie Chalupka, EdD, RN, PHCNS-BC, FAAOHN**

In collaboration with state health departments, professional development workshops for health professionals were conducted in all six New England states. In total, over 1900 nurses, physicians completed the children's environmental health capacity building professional development programs. Participants from over 190 organizations gained new clinical skills for prevention. Over 96% of program participants at the 45 day evaluation responded that they were currently incorporating principles of children's environmental health in their practice and more able to effectively identify and prevent environmental health risk to children from low-income, immigrant/refugee, and minority children. Over 98% reported that they were more effective in changing the practices of parents to minimize or eliminate the impact of environmental health hazards. Changes in practice will provide health promotion and disease prevention benefit to over 77,000 children in the clinical practice of workshop. Funded by United States Environmental Protection Agency Award No. CH-83265501

THE PSYCHOLOGICAL IMPACT OF DISASTER ON EMERGENCY RESPONSE WORKERS, VICTIMS, AND THE COMMUNITY \*

**Deborah Renholm RN, MS**

*Faculty Adviser: Stephanie Chalupka Ed D, RN, PHCNS-BC, FAAOHN*

Mass violence and disaster exposes victims and their emergency response workers to physical and mental traumas. During all aspects of response and disaster relief, response workers experience considerable demands to meet the needs of survivors, families, and the community. When communities mitigate a disaster, they become safer, and the loss of property and life is reduced. Everyone is affected when they are exposed to a disaster. Psychological first aid is a practical effort in meeting victims' basic needs for food, comfort, and safety, and should be implemented along with medical evaluations. Mental health concerns exist in most aspects of preparedness, response, and recovery. Traumatic realities of a disaster impact the whole community. Appropriate interventions during disaster promote resiliency and recovery. When communities take charge of recovery efforts, individuals can regain their sense of control and well being, and communities can successfully move on with their lives after a traumatic experience.



CENTRAL MASSACHUSETTS HEALTH LITERACY PROJECT \*

**Bet Key Wong, Gregory Shuler, Fredrik Oestberg, Amy Keenan, Mary Moynihan, Barbara Demarco, Deborah Ballou, Bahati Geliga**

*Faculty Adviser: Stephanie Chalupka Ed D, RN, PHCNS-BC, FAAOHN*

Central Massachusetts Health Literacy Project(CMHLP)is an academic-community partnership founded by WSU graduate nursing students who share the vision of creating a healthier Central Massachusetts through health literacy efforts.

CMHLP utilizes the framework of Healthy People 2020 and the National Action Plan to Improve Health Literacy to guide its goals and actions. Although students are considered learners, many WSU graduate nursing students have roots in Central Massachusetts and have years of experience as health care providers. They come from diverse cultural, linguistic, and health care backgrounds. Their combined health care experiences and their capability to interpret and perform scholarly work contribute to their ability to assess health literacy needs of local residents, identify the best health literacy practices, and formulate innovative solutions to poor health literacy. Their commitment to the region not only helps sustain the project but provides an everlasting connection between the community and the university.

## OCCUPATIONAL THERAPY

OLDER ADULTS' PERCEPTIONS OF THE IMPACT OF ENTERING ASSISTED-LIVING ON SOCIAL PARTICIPATION LEVELS \*

**Lauren Gaffney**

*Faculty Adviser: Joanne Gallagher, Ed.D.*

**OBJECTIVE.** The purpose of this study was to investigate the impact of entering assisted-living facilities on the social participation levels of older adults. Also, residents' perceptions of how their participation changed and factors that affected participation was explored.

**METHODS.** A self-administered questionnaire was used with 15 participants at an assisted-living facility. The survey explored residents' perceptions of social, mental and physical factors which could affect social participation at the facility.

**RESULTS.** Residents reported that their social participation levels had increased since entering the assisted-living facility. Eating meals with friends and listening music with others obtained highest increases. Mobility and hearing issues were reported to have the highest negative impact on their social participation levels. Residents did not perceive that loss of their spouse or feelings of isolation impacted their participation levels. **CONCLUSION.** This study emphasizes the positive relationship between older adults entering assisted-living facilities and experiencing an increase in their opportunities to engage in social participation.

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THE EFFECTS OF CAREGIVER BURDEN ON PARENTS WHO HAVE A CHILD WITH A DISABILITY \*

**Sarah Gorton**

*Faculty Adviser: Joanne Gallagher, Ed.D.*

The purpose of this study was to examine the impact caring for a child with a disability has on a parent's overall health and well-being. Six parents participated and were mailed surveys to assess what areas of their lives were being affected by the duties of care giving. The results of this study show that parents who have a child with a disability were susceptible to increased stress levels and that it may be difficult to establish a healthy balance among all life roles. It was determined that caregiving affects several aspects of a parent's life, including his or her social life, health, and well-being.

CARING FOR A SPOUSE WITH MULTIPLE SCLEROSIS: THE EFFECTS ON ENGAGEMENT  
IN MEANINGFUL OCCUPATIONS \*

**Melissa Greenlaw**

*Faculty Adviser: Joanne Gallagher, Ed.D.*

The purpose of this study was to examine how caring for a spouse with multiple sclerosis limited engagement in meaningful occupations. A survey including The Zarit Burden Interview was developed and distributed via e-mail to a multiple sclerosis caregiver support group. Eight participants were included in data analysis. Findings suggest nearly all caregivers experienced decreased engagement in meaningful occupations, more specifically social interactions and other relationships were impacted the most. Participants indicated that overall, they did not feel they had enough time to themselves and around their spouse they felt strained. All participants felt that caring for their spouse did not negatively impact their general health. Those providing care for a spouse with multiple sclerosis are likely to experience a decreased engagement in meaningful occupations as a result of that care. Occupational therapists have the skills to work with these individuals to promote engagement in meaningful occupations and overall well-being.

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SOCIAL PARTICIPATION OF RECOVERING ALCOHOLICS \*

**Kimberly Holden**

*Faculty Adviser: Joanne Gallagher, Ed.D.*

The purpose of this study is to examine how recovering alcoholics alter their social participation habits to maintain their sobriety as recovering members of Alcoholics Anonymous.

The information regarding the AA members was gathered through a survey that was explained and handed out by the leader of the AA meeting. A debriefing letter was given to the individuals who agreed to participate. The results from the fourteen surveys collected showed that both age and length of sobriety did not have an effect on the number of activities or hours per week each member participated in. Participants altered their habits but did not change the amount of time that they spent participating in activities. Individuals who alter their social participation habits increase their chances of maintaining sobriety. Since AA members must learn to alter their social participation habits, occupational therapists could assist them as they transition into a sober life.

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THE GRIT LEVELS OF WORCESTER STATE UNIVERSITY'S FRESHMEN STUDENTS IN SELECTED MAJORS \*

**Kathleen O'Hara**

*Faculty Adviser: Joanne Gallagher, Ed.D.*

**OBJECTIVE.** The purpose of this study was to examine the non-cognitive personality traits of grit, ambition, perseverance of effort, and consistency of interests, otherwise known as grit factors, of freshmen students at Worcester State University. **METHODS.** Twenty-one students of the business and occupational therapy major anonymously participated in this study by completing a self-report demographic survey and Grit Scale questionnaire. The two student groups' scores were compared to gain descriptive statistics. **RESULTS.** The occupational therapy students achieved higher scores in relation to each of the four grit factor categories. A total of 85.7% (n=18) of all students reported that they achieved a goal after years of work. All students identified that succeeding and contributing something of lasting importance were important life goals. **CONCLUSION.** With this research, educators can anticipate student retention, anticipate future program growth and better help to guide students in achieving desired goals.

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**PHILOSOPHY**
**PATRIARCHAL 'GIFTS' AND POWERFUL VOICES \*\*****Nicolette Habib***Faculty Adviser: Kristin Waters, Ph.D.*

This essay explores some of the subtleties of race, class, and gender oppression as it functions to increase the power of those in positions of authority and decrease the power of those who are oppressed. The “third wave” of American feminism is known both for its signature accomplishments and for its struggles negotiating differences especially of race in valorizing the concerns, goals, and voices of black women in and out of the movement. The essay explores the ideas of strategies of resistance and means of effective cooperation. How does the fear of losing liberatory ideologies to the ideologies of competing oppressed groups diminish opportunities for politically successful organization? How can we “amplify the voices” of those whose choices are few? The essay draws especially on the work of feminist theorists bell hooks and Susan Griffin to take up the question which has been described as “the trouble between us”?

**CONTINENTAL PHILOSOPHY TRANSFORMATIONS: FROM THE 19TH TO THE 20TH CENTURIES \*\*****Samuel Kirsch, Edward McMahon, Andrew Quist, Jeffrey Siegrist***Faculty Adviser: Henry Theriault, Ph.D.*

In the 19th Century, Germany was the center of European Continental Philosophy. Three figures stood above all others, Hegel, Marx, and Nietzsche. Their works continue to attract great scholarly and popular attention even in the 21st Century. What is more, they each have been central influences on later Continental Philosophy, including the postmodern philosophical movement centered in France starting in the 1960s. The presenters will each trace out an important Hegelian, Marxian, or Nietzschean influence on a 20th Century postmodern philosopher.

**INDIVIDUAL LIBERTIES AND THE USA PATRIOT ACT \*\*****Clifford Oratokhai***Faculty Adviser: Kristin Waters, Ph.D.*

In the wake of the September 11 attacks, the US Congress passed a bill allotting sweeping powers to federal, state, and local law enforcement agencies to investigate individuals thought to be tied to terrorism. This legislation was called the USA Patriot Act of 2001 (Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism). Actions ranging from warrantless searches, wire taps, and investigations of library records were permitted. Two political philosophers of the modern era (17th-19th century) who address the issue of limiting state infringements on individual liberty even for the sake of greater security are Mercy Otis Warren and John Stuart Mill. This paper addresses reasons and arguments for thinking that the Patriot Act constitutes and unwarranted infringement on individual liberty. This essay is especially pertinent as the United States Congress takes up the question of renewing the USA Patriot Act in spring 2011.

**UNDERSTANDING AND ENDING COMPULSORY HETEROSEXUALITY \*\*****Nikole Vetter***Faculty Adviser: Kristin Waters, Ph.D.*

Historically, what poet and essayist Adrienne Rich has called “compulsory heterosexuality,” has served in a number of ways to restrict women’s freedom, physically, reproductively, sexually, economically, and creatively. The absence of women’s control over their destinies is evident in the early 20th century work of Margaret Sanger who worked tirelessly to provide women with birth control, health care, and information about reproduction. Sanger’s writing and activism emphasize the role of individual and community strategies for gaining power and knowledge. Rich argues that traditionally women have not had the option either to be openly lesbian or, even as heterosexuals, to live in an environment which is safe, free from objectification, and which provides control over reproduction. Examples of the ways women’s freedom is restricted range from media objectification to rape and forced pregnancy. This essay argues that through community, friendship, and knowledge, women can effect social change.

PHYSICAL AND EARTH SCIENCES

ICE STORM DAMAGE TO MOUNT WACHUSETT STATE RESERVATION

**John Armstrong**

*Faculty Adviser: William Hansen, Ph.D.*

Ice storms cause heavy damage to trees and power lines because of the added weight: just one-quarter inch of ice accumulation can add 500 pounds per line span. Mount Wachusett State Reservation, with its alpine meadows, ponds, streams, perched bog and the largest Old Growth Forest east of the Connecticut River in Massachusetts, experienced an ice storm in 2008. A GIS (Geographic Information System) database was created using air photos, digital elevation models, and land-use data. Using this GIS data and field investigation, an analysis was performed on the Reservation and the condition of its assets as a result of the storm. The results varied due to slope, aspect and general vegetation.

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THE CHAGA MUSHROOM: INTEGRATING TRADITIONAL AND MODERN MEDICINE

**Holly Bellizzi**

*Faculty Advisers: Douglas Frink, Ph.D., Stephen Healy, Ph.D.*

Medicine is the science of healing, which can be practiced through traditional and modern medicine. Modern methods of treating cancer involve surgery, chemotherapy, and radiation. For thousands of years traditional medicine has used the Chaga mushroom (*Inontus obliquus*) to treat cancer. In modern medicine the main focus is on the disease, however traditional medicine concentrates on the whole body. Integrating traditional and modern medicines using the Chaga mushroom is a safe and effective method to decrease tumor growth. Researchers currently are testing the efficacy of the Chaga for anti-tumor activity and preliminary research suggests that the traditional medicine of Chaga can be integrated into modern medical approaches to treat cancer. This study will explore how the mushroom's efficacy is determined in modern medicine. Interviews from professors and scientific literature testing the efficacy of the Chaga mushroom will present an epistemological view of evaluating traditional and modern medicine.

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LEAD POISONING: PREVENTING HEALTHY CHILDREN \*\*

**Jessica Card**

*Faculty Adviser: Stephen Healy, Ph.D.*

Houses built in the United States prior to 1978 likely contain exterior and interior lead paint. Lead is a highly toxic material, especially to children under the age of six. Exposure results in damage to brain, kidney and nervous system, slowing of growth and development, behavior problems, damage to hearing and speech and impeded cognitive development. In spite of new EPA regulations on renovation where lead is present, educational information available about the dangers of lead and financial assistance offered for abatement, lead remains an environmental hazard and a danger to children. I intend to use internet surveys and door-to-door surveys with Worcester residence as well as interviews with local legislators, community organizers and homeowners to assess awareness and the handling of lead contamination. I anticipate relatively low awareness of the hazards of lead, limited education available about those hazards and difficulty obtaining government funding for abatement assistance.

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EMPOWERING DEVELOPMENT: STRATEGIES FOR BUILDING FUNCTIONAL GROUP SPACES IN WORKER COOPERATIVES \*\*

**Maureen Carroll**

*Faculty Adviser: Stephen Healy, Ph.D.*

This participatory action research engages Empower Energy Coop, a locally based worker cooperative in a workshop featuring team-building modules and business specific exercises to promote the success of the enterprise by enhancing team unity and member communication. Empower was formed by a nonprofit community group with a defined hierarchical organizational structure. As a cooperative, Empower is inherently horizontal in its organization. Empower inherited qualities characteristic of the parent group despite differences in structure. One of the most limiting characteristics is the dependency upon an organizer. This deferment to a leader has carried over into the coop and intercedes the possibility of cooperative ownership. Empower's goals of equal ownership, profitability and horizontality are not mutually exclusive. Through the workshop the participants will be better equipped to assess goals while maintaining mission objectives. This is guided by a literature of cooperative enterprises, business strategies and other studies on groups.

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## DIGGING UP THE DIRT ON WORCESTER'S BROWNFIELDS: A COMPARISON OF BROWNFIELD REMEDIATION TECHNIQUES \*\*

**Nicholas Charette**

*Faculty Advisers: Stephen Healy, Ph.D., Douglas Frink, Ph.D.*

The over 1,200 sites in Worcester deemed brownfields are, "real properties, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant."(EPA) Conventional remediation techniques for decontaminating brownfields involve the excavation, removal, and aeration of contaminated soils. These techniques are costly, time consuming, and hazardous to the environment. In contrast, mycoremediation, uses of fungal strains to safely and effectively decompose and sequester hazardous pollutants reducing total petroleum hydrocarbon (TPH) levels in contaminated soils on-site. This study quantifies the benefits of bioremediation in relation to three dimensions: 1. Cost comparison with conventional techniques 2. Time needed to achieve sufficient reductions of soil contaminants 3. The environmental efficacy of both approaches. Worcester can benefit from mycoremediation techniques that transform brownfields into usable, desirable land located in the heart of Massachusetts.

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## RED TIDE RISING: THE RELATIONSHIP BETWEEN RUNOFF AND ALGAL BLOOM FREQUENCY

**Cassem Chebbani**

*Faculty Adviser: Allison Dunn, Ph.D., Stephen Healy, Ph.D.*

Red Tide(Alexandrium Fundyense) is a naturally occurring toxic algal bloom noted for its reddish brown color causing Paralytic Shellfish Poisoning, a potentially fatal syndrome in humans. Increased nutrient laden runoff is the likely cause of an increase in algal bloom frequency. This research aims to find a positive correlation between river runoff and algal bloom frequency in the Gulf of Maine using historic precipitation data. The USGS models project 10–40% increases in runoff in high-latitude North America. GIS and climate modeling software will aid in predicting how runoff will affect bloom frequency and their associated impact on shellfish populations however there are many factors that confound Red Tide analysis, such as the number of variables in play and the sporadic nature of outbreaks.

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## COASTAL WAVE EROSION

**Ryan Dahlberg**

*Faculty Adviser: William Hansen, Ph.D.*

Wave action along the coast can be one of the most aggressive forms of coastal erosion. By using GIS data the coastline can be evaluated to find areas where waves can be the largest and damage will be the most severe. This analysis will be done by comparing MassGis bathymetric and terrain data, severe weather patterns, and concepts of fluid dynamics in three high energy wave areas. Cape Ann, in Northern Massachusetts, the central outer cape in the east, and Westport on Rhode Island sound to the south. These areas have been selected for their specific characteristics of beach composition, exposure to open ocean swell, and fetch. This analysis will hope to find Massachusetts coastal areas in danger of extensive wave action erosion.

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## INCORPORATING HYDROELECTRIC FACILITIES INTO BEACH PROTECTANT STRUCTURES

**Ryan Dahlberg**

*Faculty Adviser: Douglas Frink, Ph.D.*

Renewable energy is a solution to the challenge of growing energy demand in an era of dwindling conventional fuels and the threat of climate change and destruction from ocean processes. Incorporating standardized practice of hydroelectric energy generation and integrating those structures into a beach protectant is a viable solution to this ever growing problem. By analyzing situations individually, looking at the needs specific to an area, considering ecological and budgetary constraints, and combining the strengths and benefits of each, an efficient hydroelectric beach protectant can be created site specifically. The requirements of each situation will determine the viability of what combination of structures can be applied. Hydroelectric generation could serve to offset the costs of offshore beach protectant structures, generate renewable energies while preserving coastal environments under threat from climate change and physical ocean processes.

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LOCAL SCHOOLS GREEN THE CURRICULUM: INTEGRATING GREEN TECHNOLOGY INTO THE GRADE SCHOOL CLASSROOM

**Jaska D'Amato**

*Faculty Adviser: Stephen Healy, Ph.D.*

“Going green” is a popular phrase that refers to the process of implementing a range of sustainable technologies: from single stream recycling to alternative energy generation. Financial assistance from the federal government has encouraged many school systems to adopt green technologies with the expectation that they will reduce costs and conserve resources. Green initiatives present teachers with significant pedagogical opportunities for practical hands-on learning experiences. I will conduct interviews with faculty in schools that have implemented green initiatives to determine how they have integrated it into the curriculum. Based on these interviews I will create lesson plans that could be used in a variety of subject areas including math, reading, writing, science, and social studies. Green initiatives offer schools a chance to integrate practical hands-on learning into student curriculum.

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THE RE-INTRODUCTION OF GREY WOLVES INTO MAINE

**Raymond Depalo**

*Faculty Adviser: William Hansen, Ph.D.*

Grey wolves once roamed all the forests of the northern United States they have had a successful re-introduction in the North Western forests. This study used GIS to determine the suitability of the forests of Maine as a possible re-introduction corridor for the North East. Using available GIS data layers it was determined by analyzing spatial distribution of possible prey, land cover and proximity to large human populations that Northern Maine would be a suitable corridor for re-introduction. Also analyzed were data concerning the realm of the coyotes living in Maine which are the closest relative of the wolf and require similar habitats and food supply.

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ASIAN LONGHORNED BEETLE: DETERMINING HIGH RISK INFESTATION AREAS

**Samuel Dziel**

*Faculty Adviser: Stephen Healy, Ph.D., William Hansen, Ph.D.*

The Asian Longhorned Beetle (ALB), *Anoplophora glabripennis*, is an invasive pest that destroys hardwood trees discovered in August 2008 in Worcester County. Unchecked, ALB will adversely alter the landscape and impact the maple syrup, lumber, and tourism industries in New England. The USDA has committed to full eradication of ALB by establishing a quarantine area and removing all infested trees. The only effective way to detect ALB presence is to survey trees individually, which is time consuming and costly. This project aims to use GIS spatial analysis to highlight areas most vulnerable to future ALB infestation. An examination of the historic spread of infestation will be used to predict future ALB behavior. This method will highlight areas most vulnerable to future ALB infestation and allow for a more effective use of resources to rapidly contain and eradicate ALB.

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PHYSICS AT WAM: A PHYSICS TOUR OF THE WORCESTER ART MUSEUM

**Frank Lamelas, Ph.D., Sudha Swaminathan, Ph.D.**

Analytical techniques based on physical principles are routinely used in art conservation. Many of the paintings and other objects in the permanent collection of the Worcester Art Museum (WAM) have been studied using physical methods. A museum tour can therefore serve as an observational laboratory experience to show students how scientific analysis can be used in an appealing real-world setting. We present a tour of four objects which have been studied using multi-spectral imaging and a nuclear isotope technique. The four examples are part of a larger set which are seen by WSU students enrolled in traditional physics survey courses and also Physics in Art, a specialized course on the physical analysis of art objects.

## CALCULATION OF QUENCHING FRACTIONS IN POSITRONIUM COLLISIONS

**Wyatt Merrill***Faculty Adviser: Sudha Swaminathan, Ph.D.*

Positronium, an “exotic atom” consisting of an electron and a positron in a bound state, may exist in two possible forms, ortho and para, distinguishable by spin, lifetime, and decay modes. In a single collision between ortho positronium and a target atom, a spatial exchange of the electrons can take place leading to a spin exchange without a spin flip, potentially converting the ortho positronium to para positronium. This conversion is referred to as the quenching of ortho positronium. We define the quenching fraction as the ratio of the probability of detecting para positronium to that of detecting ortho positronium. We present quenching fractions for target atoms in various states before the collision, with and without spin detection after the collision. We plan to compare our results with experimental work and with analysis of the electron-positron annihilation spectrum from the center of the Milky Way galaxy.

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## WHAT A DUMP! ENVIRONMENTAL RESTORATION AND REMEDIATION: CHANGING THE LANDSCAPE OF PRE-SUBTITLE D LANDFILLS \*

**Hannah-Leigh O’Brien***Faculty Adviser: Allison Dunn, Ph.D.*

Environmental restoration and remediation (ERR) processes convert closed landfills into public parks. Prior to 1976, municipal landfill dumping was largely unregulated, releasing hazardous methane gas and leachate into the environment. EPA regulations require a layered covering and drainage system as management for pre-Subtitle D landfills, as well as strict compliance of testing protocol for methane gas and leachate. Heavy metals mobilized in landfill leachate can adversely affect the water supply. At the ERR study area, drainage systems divert leachate into the public sewer system. Environmental health risks posed by heavy metals in publicly accessible recreational or surface waters need to be assessed. Water collection and AA spectrometry analysis will show the presence of the known carcinogens lead, iron, and nickel at the Duck Pond and Veterans’ Memorial Pond at Green Hill Park, Worcester, MA.

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## GREEN WORCESTER: SUSTAINABILITY AND PHOTOVOLTAIC DEVICES ON PUBLIC BUILDINGS

**Scott Poitras***Faculty Adviser: Stephen Healy, Ph.D.*

Solar energy is the largest untapped supply of energy available, which can be harnessed through solar photovoltaic devices that convert sunlight into electrical current. The sustainability of ever expanding urban environments has become a significant concern in many municipalities concerned with anthropogenically induced climate change. Photovoltaic energy, the fastest growing energy technology in the world, can satisfy growing energy demand without adding to anthropogenic emissions of greenhouse gases. This research project explores solar energy potential in Worcester, Massachusetts. I will interview public officials to see the city’s present commitment to expand solar capacity. Using GIS, I will determine to extent of Worcester’s total available solar potential to compare with the city government’s existing plans. Although it is not the number one form of renewable energy further advances in PV technology, including greater efficiency and lower prices, could prove competition for the top spot over competing green technologies.

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## GIS AND PUBLIC ACCESS TO MAXIMIZE THE POTENTIAL FOR THE GWLT TO ACQUIRE AND HOLD LAND \*\*

**Michael Procacini***Faculty Adviser: Stephen Healy, Ph.D.*

On a diverse, urban landscape such as Worcester, the threat of decreasing biodiversity via habitat fragmentation from development must be addressed. There are already preserved lands in place with which to continue the spread of conservation lands throughout the city. The diversity of the landscape and of the people in Worcester provides unique opportunities and challenges for conservationists. On one hand, the Greater Worcester Land Trust must preserve biodiversity in the city to sustain a healthy urban ecosystem. On the other, the GWLT must identify lands that will satisfy the public to create a lasting bond between people and land. It is a balancing act that requires investigation of the utility of each proposed tract of land. The most effective strategy for acquiring and holding lands in Worcester is to use GIS to identify lands that would allow for public access and would preserve biodiversity if conserved.

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## MULTI-DISTANCE SPATIAL CLUSTER ANALYSIS: DETERMINING SPATIAL DEPENDENCIES FOR A HYBRIDIZED SPECIES

**Michael Sutton**

*Faculty Adviser: Stephen Healy, Ph.D., William Hansen, Ph.D.*

Habitat fragmentation causes population decline within some mammal species through reproductive isolation and trait transference. Efforts by conservation groups to preserve animal species have led researchers to focus on the relationship between habitat and animal behavior. By modeling range centers of species populations and spatial pattern changes this study explores spatial relationships of habitat members in fragmented populations using data from the National Land Cover Database (2.0), biogeography of habitat, land stewardship maps, and MassGIS data layers. Rankings from 1 to 4, with marginal habitats being assigned a value of 1, suitable habitats a value of 2, highly suitable (or preferred) habitats a value of 3, and optimal habitats assigned a value of 4 represent the spatial changes. This analysis provides an interpolation of habitat for the *Canis Latrans* coyote/hybrid and selective reproduction zones and geographic behavior relating to trait transference with other species, like the *Canis lycaon* (Eastern Wolf).

## PSYCHOLOGY

### PSYCHOLOGICAL FACTORS ASSOCIATED WITH FACEBOOK USAGE

**Leah Ritacco**

*Faculty Adviser: Seth Sorgan, Ph.D.*

This study extends research on the relationship between Facebook usage and accumulation of social capital. We demonstrate gendered correlations between weekly Facebook usage and three types of social capital as well as the strength of participants' self-presentational goals. For males (n=26), Facebook usage had significant positive correlations with bridging and maintained social capital, as well as self-presentation. For females (n=101), Facebook usage had significant positive correlations with self presentation and bonding social capital. According to Aukett, Ritchie, and Mill (1988), female friendship is characterized by sharing and emotional closeness. These authors portray friendships between men as segmented and centered around activities rather than being based on the exchange of interpersonal feelings. This may help explain the present findings. As Facebook continues to become an everyday feature of our social lives, the dynamics of online relationships may come to more closely resemble the patterns of offline communication.

### PROCRASTINATION AND COPING PREDICT DEBILITATING ACHIEVEMENT ANXIETY IN MALE AND FEMALE UNDERGRADUATES

**Andrea Weiss, Carolyn Wilcomb, Catherine Ellis, Michael Watson**

*Faculty Adviser: Champika K. Soysa, Ph.D.*

One dimension of achievement anxiety facilitated achievement and the other debilitates it. Procrastination, coping, and achievement anxiety were investigated in 193 undergraduates. Increasing procrastination was associated with increasing debilitating achievement anxiety (DAA) and decreasing facilitating achievement anxiety (FAA) for both men and women. In addition, for women, procrastination was associated with maladaptive coping (denial, venting, behavioral-disengagement, and self-blame), and inversely related to adaptive coping (active coping). For men, procrastination was only related to maladaptive coping (behavioral-disengagement and self-blame). Further, for women and men, maladaptive coping (denial, venting, behavioral-disengagement, and self-blame) was related to DAA. No significant relationships were found between adaptive coping and FAA, however, for either men or women. Procrastination and venting predicted DAA in women, while procrastination and denial predicted DAA in men, reflecting a partially gendered prediction of debilitating achievement anxiety. Procrastination alone inversely predicted FAA in both men and women.

*Accepted for presentation at the Association for Psychological Science conference in May 2011.*

## PSYCHOSOCIAL PERSPECTIVES OF THE SRI LANKAN TSUNAMI EXPERIENCE

**Champika K. Soysa, Ph.D.**

Sri Lanka gained global attention due to the devastation it suffered, together with Indonesia, Thailand, and India, among others, after the tsunami of December 26, 2004. It appears that, in that moment, our awareness of our mortality triggered our sense of humanity, thereby superseding our differences. Such events are rare in human history, in terms of both the extent of devastation as well as our humility. Natural disasters perhaps elicit empathy more easily than human-made ones, because we are free to respond on the basis of our humanity as opposed to our ideology. A brief description of the context in which Tsunami 2004 occurred will be provided here in order to convey the complexity of the situation, followed by issues associated with psychosocial intervention (in *Tsunami Communication*, Hampton Press, 2010).

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## SYNCHRONY: INTRATEXT AND INTERTEXT WRITING WITH COLLEGE JUNIORS

**Champika K. Soysa, Ph.D.**

Cerdán and Vidal-Abarca (2008) distinguish between intratext and intertext assessment of student learning, where intratext assignments addressed content from a single source, and intertext ones required integration of material from multiple sources. They found that students were better able to transfer their knowledge to novel situations if they engaged in an intertext rather than intratext assignment. At the same time, students who completed one or the other type of assignment were equally able to identify and understand isolated ideas. This presentation will describe a writing assignment for college juniors that used both intratext and intertext components to foster graduated learning. In addition, student evaluations of the project will be presented (N = 41). In C.K. Soysa (Chair), *Orchestrating authorship: Teaching writing across the psychology curriculum*. Symposium presented at the meeting of the American Psychological Association, San Diego, CA.

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## MODERATION OF THE RELATIONSHIP BETWEEN AUTHORITARIAN PARENTING AND ACHIEVEMENT ANXIETY IS GENDERED

**Andrea Weiss, Carolyn Wilcomb***Faculty Adviser: Champika K. Soysa, Ph.D.*

Authoritarian parenting style, procrastination, self-focused perfectionism, and debilitating achievement anxiety were investigated in female and male undergraduates. A median-split of procrastination scores created a dichotomous variable of high and low procrastinators. Authoritarian parenting predicted debilitating achievement anxiety for high procrastinators, but not low procrastinators, in women. A median-split of self-focused perfectionism scores created a dichotomous variable of high and low levels of self-focused perfectionists. Authoritarian parenting predicted debilitating achievement anxiety for high self-focused perfectionists but not low self-focused perfectionists, in men. Further analyses revealed that procrastination moderated the relationship between authoritarian parenting and debilitating achievement anxiety in women, and that self-focused perfectionism moderated the relationship between authoritarian parenting and debilitating achievement anxiety in men. These findings established gender differences in the ways that authoritarian parenting relates to achievement anxiety among undergraduates, and may inform intervention strategies that could alleviate their distress.

*Accepted for presentation at the Association for Psychological Science conference in May 2011.*

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## PARENTAL AUTHORITY STYLES, PROCRASTINATION, PERFECTIONISM, AND DEBILITATING ACHIEVEMENT ANXIETY IN UNDERGRADUATES

**Andrea Weiss***Faculty Adviser: Champika K. Soysa, Ph.D.*

Parental authority styles, procrastination, perfectionism, and debilitating achievement anxiety (DAA), were investigated in 98 undergraduates. The parenting styles considered were authoritarian, authoritative, and permissive. Authoritative parenting by mothers and fathers was inversely associated with procrastination in women. Two types of perfectionism were identified, self-focused and parent-focused. Authoritarian parenting was associated with parent-focused perfectionism and authoritative parenting was inversely associated with parent-focused perfectionism, for women. Among men, on the other hand, authoritative and permissive parenting were inversely associated with parent-focused perfectionism. Further, authoritarian parenting was associated with self-focused perfectionism in both women and men. Finally, while authoritarian parenting, procrastination, and self-focused perfectionism each predicted DAA separately, when examined together, only procrastination and self-focused perfectionism predicted DAA. These findings reflect the adverse associations of authoritarian parenting and the beneficial associations of authoritative parenting, and identify priorities for intervention among undergraduates experiencing achievement-related anxiety.

*Presented at the Eastern Psychological Association conference in March 2011.*

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## URBAN STUDIES

### HOT TEAM FIGHTS HUNGER IN THE COMMUNITY AND ON CAMPUS \*\*

**Thea Aschkenase, Laken Euzibio, Judith Knight, Carolyn Graham, Helen Shuster, Gladys Wood, Zenaide Ribeiro**  
*Faculty Adviser: Maureen Power, Ph.D.*

The Hunger Outreach Team, (HOT) takes an intergenerational approach to helping people put food on the table. HOT members are involved in research, education and direct assistance to seniors and college students applying for SNAP benefits, (formerly known as Food Stamps). SNAP now serves 43 million Americans (1 in every 5 individuals) Many more people are eligible for SNAP but don't know it. The team researches the latest innovations in SNAP across the country, as well as the latest findings from MA Law Reform Institute, and makes that up to date info available to Resident Services Advisers, Senior Center Directors, and college students. HOT offers information sessions to groups of seniors using "Snap" bingo games and then assists them with applications. A major outreach effort to WSU students is underway. Not only does SNAP help individuals, every \$5 of new SNAP benefits generates \$9.25 in the local economy.

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### NAIROBI: FIRST WORLD, THIRD WORLD CITY

**Shiko Gathuo, Ph.D.**

The Kenyan capital of Nairobi is a city of contrasts. Home to UNEP and host to many international corporations and Nongovernmental Organizations, Nairobi is also partly made up of Africa's largest slum area. In the last seven years, Kenya has experienced rapid economic growth. This growth has spurred a real estate boom that has seen the development of gated mansion communities and huge apartment complexes. Yet, the majority of the population has not been touched by this new wealth. The result is the bifurcation of the populace into First World and Third World living conditions. This picture poster presentation will consist of sights and scenes of Nairobi in 2010. The presentation illustrates the struggles of a city caught between two worlds.

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## VISUAL AND PERFORMING ARTS

### WORCESTER WINDOWS

**Bethany Strothers**

*Faculty Adviser: Catherine Wilcox-Titus, Ph.D.*

Bethany Strothers is curating Worcester Windows for this semester, continuing the work of Karen Finnegan who coordinated the first exhibition in the fall when Worcester State took over the Worcester Windows project. Worcester Windows uses vacant downtown windows as gallery space for the exhibition of artworks by area artists. The theme for this cycle is Dreaming in Color, and we have invited artists to celebrate the end of winter and the beginning of the spring and summer by submitting work that is vibrant and colorful. Bethany has designed the Call to Artists, coordinated the contacts between businesses and artists, and with my assistance, she will take the lead in jurying which art is selected for inclusion in this cycle. The work will be exhibited from April 4 to July 31.

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## WORLD LANGUAGES

### GENDER REPRESENTATIONS AND IDENTITY: SAMPLES OF LATIN AMERICAN PERSPECTIVES \*\*

**Christina Foley, Kristyn Branisel, Eric Michaud**

*Faculty Adviser: Guillermina Elissondo, Ph.D.*

At present, Latin American social scientists are producing cutting-edge research on how gender and sexuality can affect the construction of identities. Social scientists such as Norma Fuller, Marcela Lagarde, and José Olavarría have reconceptualized the influential contributions of Michel Foucault, Judith Butler, Mikhail Bakhtin, and Stuart Hall in their research. After studying these theories as well as contemporary oral narratives, documentaries, and fiction pieces, we undertook an ethnographic project on the lives of three Latin American subjects. These individuals have experienced distinct hardships and lifestyles shaping their differing views on gender and sexuality in their individual cultures. After completing our investigations, we compared and contrasted our subjects' experiences with those of the works we had previously studied. We then compiled our findings into two research papers designed to expand knowledge and increase awareness of gender representations and identity in Latin America.

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