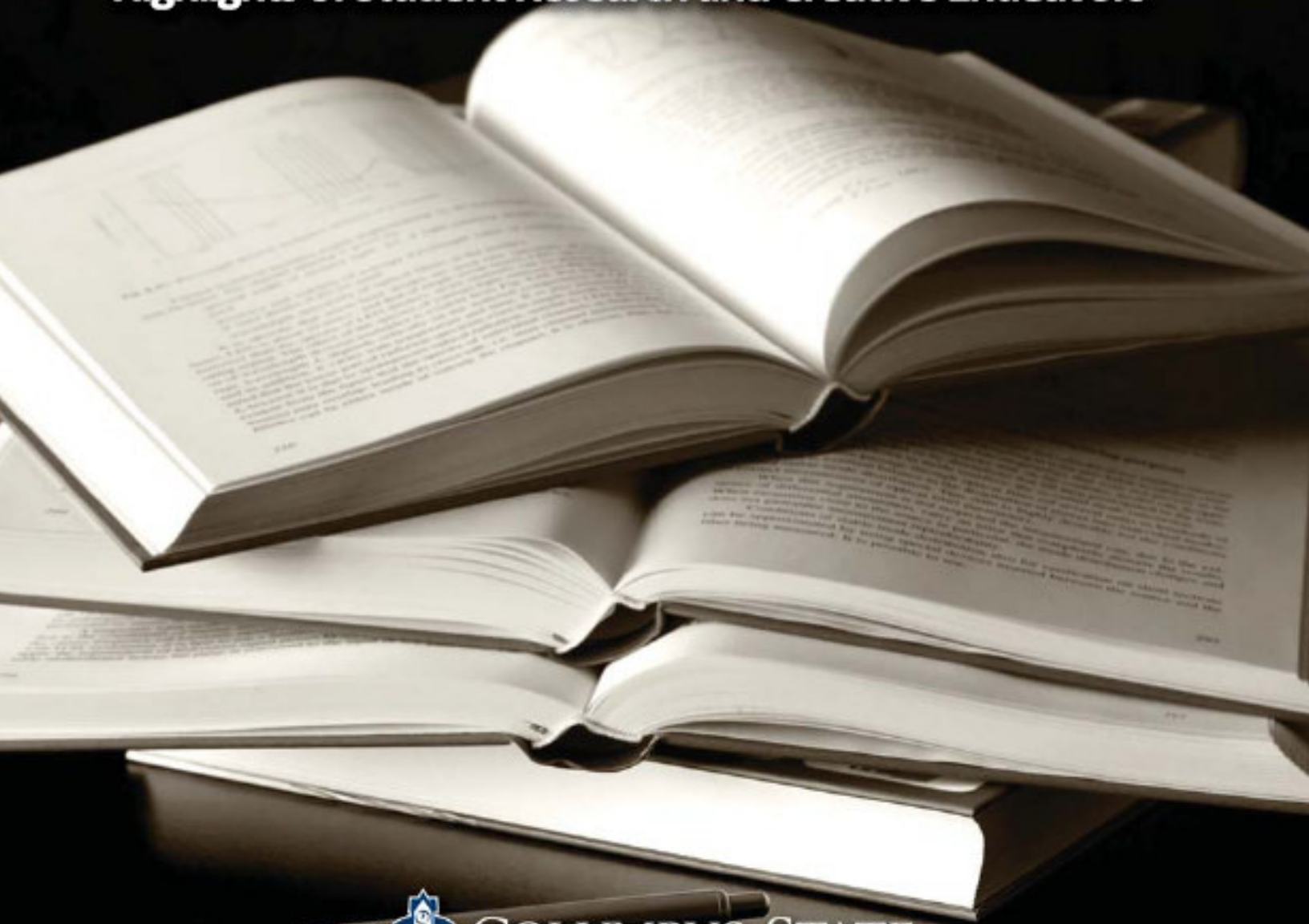


# ABSTRACTS 2012

Highlights of Student Research and Creative Endeavors



COLUMBUS STATE  
UNIVERSITY

Abstracts 2012: Highlights of Student Research  
and Creative Endeavors

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by

Columbus State University  
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## **Abstracts 2012: Highlights of Student Research and Creative Endeavors**

What follows is a collection of abstracts summarizing the scholarship conducted by undergraduates at Columbus State University during the 2011-2012 academic year. These projects highlight undergraduate research conducted in a wide variety of disciplines, ranging from literary analysis to laboratory based sciences. The abstracts represent many ongoing projects on our campus and catalog those that have been published or presented.

This volume begins with articles published in peer-reviewed journals, including *Momentum*, *Columbus State University's Journal for Research and Critique*. It continues with projects that have been selected for presentations at national, regional and statewide disciplinary conferences. Among them are several that have garnered awards for outstanding undergraduate scholarship. Projects that have received competitive research grants, including our campus Student Research and Creative Endeavors (S-RACE) Grants, are also featured.

Many undergraduates have presented their work with our local community, either through the dissemination of best practices in nursing to regional hospitals, colloquium presentations of lecture-recitals at the RiverCenter for the Performing Arts, or at Columbus State University's Tower Day held in April 2012.

Together these abstracts demonstrate the commitment of our faculty to engage students in their disciplines and represent outstanding mentorship that occurs on and off our campus throughout the year. Our students have amassed an impressive collection of projects that contributes to both academia and our local community, and these abstracts will hopefully inspire others to delve into scientific and creative inquiry.



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*\* All projects are presented alphabetically within each category.*





## PUBLISHED SCHOLARSHIP

### **The Progenitor of Type Ia SNR 0519-69.0 was Either a Persistent Supersoft X-ray Source or Double-Degenerate System**

One of the main problems in astrophysics is the unknown nature of the Type Ia Supernova (SN Ia) progenitor system. Current models of SNe Ia involve the detonation of a Carbon-Oxygen (CO) white dwarf (WD) that has reached the Chandrasekhar limit (1.4  $M_{\odot}$ ) via mass transfer from a companion star. Many different types of progenitor systems have been proposed that involve various possible companion stars. These can be divided into the double-degenerate (DD) model, which contains two WDs, and the single-degenerate (SD) model, which contains one CO WD and a main sequence, subgiant, or, red giant companion. By examining remnants of known SNe Ia, we can search for any ex-companion star and thereby infer the progenitor system for a given SN Ia. Schaefer & Pagnotta (2012) proved that the progenitor of SNR 0509-67.5 was a DD system since the central region was devoid of any stars to deep limits. Using archival Hubble Space Telescope images, we examine the 600 year old LMC SN remnant SNR 0519-69.0, which is known to be a Ia based on its light echo and X-ray spectra (Rest et al. 2005 and private communication, Hughes et al. 1995). The geometric central region was determined using both the  $H\alpha$  and the X-ray shell to be RA 05:19:34.83, DEC -69:02:06.92 (J2000), and any possible ex-companion star must be within 4.7" of this center. We report on the stars in this central region to a limiting V magnitude of 26.05. With the HST color-magnitude diagram, we find that the central region has no red giants or subgiants. There are only two published models that are consistent with our observational limits: persistent supersoft X-ray sources and DDs. For SNR 0519-69.0, we have proven that the progenitor was not a symbiotic star, a recurrent nova, a helium star, or a spin-up/spin-down system.

*Zachary Edwards  
Earth &Space Science*

*Co-Authors:  
Ashley Pagnotta  
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Louisiana State  
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*Published:* Astrophysical Journal Letters, March 2012, Vol. 747, No. 2

*Presented:* CSU Tower Day, 2012

*Awarded:* Best Poster Tower Day 2012

*Funded in part by:* National Science Foundation Research Experiences for Undergraduates Program



## Effects of Eye Contact on Human Emotions

*Breé Legere-Mahovetz  
Cristina Pace*

*Faculty mentor:  
Dr. Starlette Sinclair  
Department of  
Psychology*

When people maintain eye contact during a conversation, their communication becomes more meaningful and synchronized (Wiens, Harper, & Matarazzo, 1980). For this experiment, we were interested in whether receiving eye contact mattered for interviewees and if a participant's level of introversion/extraversion influenced their expressed emotion towards an interviewer. Thirty-eight undergraduate students at Columbus State University were randomly assigned to receive eye contact or not receive eye contact during an interview setting. Participants who received eye contact rated their interviewer and her effect on their emotional state as significantly more positive than participants who did not receive eye contact. Our results were consistent with work by Tipton and Rymer (1978), who showed that eye contact, garnered more positive assessment of interviewers and therapists. Although not significant, participants who were rated to have an introverted personality reported more discomfort (negative feelings) toward the interviewer in the eye-contact-received condition. Receiving eye contact appears to serve as an important social cue in communication; however, the emotional aspect of it--whether positive or negative--can be influenced by individual differences in personality.

*Published:*  
Momentum: CSU's Journal for Undergraduate Research & Critique, Spring 2012

*Presented:*  
Georgia Undergraduate Research in Psychology Conference (2012), CSU Tower Day (2012)

## **The Temptation of Christopher Marlowe**

This paper discusses the allegations made against Renaissance writer Christopher Marlowe in regards to his disbelief in Christianity and religion on the whole. It analyzes his works, namely *Doctor Faustus*, *Tamburlaine the Great*, and *The Jew of Malta*, as potentially subversive critiques of the dangers of organized religion.

*Laurie Nix*

*Faculty Mentor:*

*Dr. Susan Hrach*

*Department of English*

*Published:*

Momentum: CSU's Journal for Undergraduate Research & Critique, Spring 2012

## **Meme versus Gene: Saint Leander and His Sister Florentine**

*Heidi Packard*

*Faculty Mentor:  
Dr. Daniel Gullo  
Department of  
History & Geography*

In sixth-century Spain, Archbishop Leander of Seville composed a letter to his younger sister Florentine, wherein he persuades her to remain a virgin and commit to a life of celibacy. The typical life trajectory for a woman of her age and social status would entail marriage and motherhood. Instead, Florentine chose the path encouraged by her brother, thus denying some of the most fundamental human desires for sexual intercourse, pair bonding, and child rearing. What could have prompted her to make such a life altering decision? The key to understanding Florentine's choice lies in understanding human biological drives. In his landmark book, *The Selfish Gene*, evolutionary biologist Richard Dawkins offers an intriguing explanation for human behavior by explaining our biological and genetic origins. He shows that our genes influence much of how we think and behave and that these genes exist and are successfully replicated because they have some survival value for the individual. Dawkins also coined the term *meme*, to describe the replication of cultural ideas. He proposes that memes function in an analogous manner to genes. By viewing Leander's letter through the lens of Dawkins' meme/gene analogy, it is possible to better understand why Leander and Florentine were both committed to the ideal of virginity in lieu of marriage and procreation. The memes conveyed in Leander's letter offer persuasive reasons for Florentine to remain a virgin, specifically the promise of future eternal rewards, advanced spiritual status, and social benefits.

*Published:*

Momentum: CSU's Journal for Undergraduate Research & Critique, Spring 2012

## **Hope for Religious Reconciliation in Shakespeare's *The Comedy of Errors***

Throughout the reign of Queen Elizabeth I, England suffered from perpetual religious dissension and uncertainty. Under the rule of Protestant Elizabeth, secrecy, confusion, suspicion, and possible punishment haunted those who attempted to practice Catholicism. Consequently, England was a divided family forced to wander aimlessly and search for compassion and trust from those who had abandoned them. Both Catholics and Protestants yearned for a time in which they could live together in a harmonious, accepting, and prosperous familial relationship. Shakespeare was greatly familiar with the strain placed on the relationship between Catholics and Protestants during his tumultuous age, and craftily placed religious references and symbols in his works. My paper discusses how Shakespeare's *The Comedy of Errors* captures the desire of Protestants and Catholics to achieve spiritual renewal and political reconciliation in their country. I argue that the play's divided family, which travels on foreign soil and attempts to recover those members who have strayed, represents the divided religious sects of Elizabethan England. Through his play, Shakespeare offers a resolution to the religious turmoil of his time with his implementation of the moralistic teachings of the Elizabethan homilies, authorized sermons used by the Church of England during Elizabeth's reign. Shakespeare demonstrates that if the Protestants of Elizabethan England were to adhere to these homilies and be as compassionate and understanding as the play's Catholic characters, England would obtain the harmonious and spiritual unity desired by both Catholics and Protestants.

*Meg Reeder*

*Faculty Mentor:  
Dr. Patrick McHenry  
Department of English*

*Published:*

Momentum: CSU's Journal for Undergraduate Research & Critique, Spring 2012

## Using Opaque Predicates to Obfuscate Metamorphic Malware

*Rodrigo Sardinias*

There is an ever persistent race against the people who write Malware and those that write the Anti-Virus engines. This has been going on for some years now, with one occasionally pulling in front of the other for a short while, only to get one-upped shortly after. Malware today is more efficient and malicious than it has ever been before, and the trend is not stopping. One of the techniques malware employs today to evade anti-virus engines is called metamorphism. It is the ability of a program to transform itself into something that looks different, while still keeping its functionality. One of the prominent methods that anti-virus engines employ depends on being able to identify a program and then extract what is called a signature from it to be able to detect the same program in the future. In our research we take a look at some of the techniques used by metamorphic malware, currently the most sophisticated form of malware. We look specifically at opaque predicates, and how they are used to make it more difficult to determine whether a program is malicious, and to make variants of itself that, on the outside, appear to be different programs. We explain what an opaque predicate is, how to make a strong opaque predicate, how to use them, and how they are currently being used today for both good programs as well as malware. We then go into detail about a program that we are developing that behaves as metamorphic malware does. Our program is able to produce variants of itself, employing opaque predicates to make transformations to the control flow of the new program which make the variant appear to be a different program.

*Faculty Mentor:*  
*Dr. Radhouane*  
*Chouchane*  
*TSYS School of*  
*Computer Science*

*Published:*

Momentum: CSU's Journal for Undergraduate Research & Critique, Spring 2012

## Marlowe's Portrayal of the Masculine Complex

This article aims to uncover and analyze the hidden motivations of three of Christopher Marlowe's most notable male protagonists (Tamburlaine, Faustus, and Edward the Second). Ultimately, each of these characters is driven by a subconscious desire to prove his own masculinity, perhaps a result of the playwright's sexist approach to character development (which explains the complete lack of depth, personality, or independence in any of Marlowe's female characters). Tamburlaine, Faustus and Edward, while appearing very different on the surface, prove remarkably similar at the basest psychological levels. Each is chiefly motivated by some form of gender insecurity (i.e. the need to prove themselves worthy members of the masculine gender), a psychological condition ultimately resulting in overcompensation. Tamburlaine, for example, overcompensates through excessive violence and murder, the mockery and rejection of all things feminine, and the unyielding desire for absolute power and dominion. Faustus, while much more subtly disturbed by his insecurities, hopes to prove his masculinity by obtaining absolute knowledge and power, all in the effort to earn recognition and respect from the world's most important people. And Edward, whose throne has been challenged by his nobles, proves a crazed egomaniac who will stop at nothing to keep the man he loves and earn the respect to which he feels himself entitled. Ultimately, each character reacts defensively and unreasonably when his manhood is in some way challenged, suggesting that they are each uncomfortable with their own gender and/or sexuality. Knowing what we do of Marlowe's private life, could he be projecting his own gender-based insecurities through these male protagonists? This study of Marlowe's most well-known leading males aims to suggest that as a possibility as each character's desires, motivations and insecurities are put through the rigorous test of psychoanalysis.

*Jonathan Sanders*

*Faculty Mentor:*

*Dr. Susan Hrach*

*Department of English*

*Published:*

LUR: Literary Undergraduate Research, Currently in print

# PRESENTED AT NATIONAL AND STATE CONFERENCES

## The Effect of $17\beta$ -Estradiol on Angiotensin II Production in Mice Astrocytes Under Oxidative Stress

*Neena Alex* Angiotensin II (Ang II) is a protein hormone involved in the Renin-Angiotensin system (RAS) and is synthesized by several human cell types including neural glia cells in the central nervous system. Research has established that Ang II is involved in neural regulation of blood pressure, control of water intake, and sodium appetite. In high amounts, Ang II is associated with increased blood pressure and can lead to pathogenic cardiovascular effects associated with hypertension. Previous research also suggests that  $17\beta$ -estradiol plays a patho-protective role against cardiovascular disease by acting on RAS to decrease blood pressure. Thus, this study aims to investigate whether  $17\beta$ -estradiol accomplishes its patho-preventative role in part by acting at the neural level to inhibit Ang II production. The astrocytes were treated with hydrogen peroxide to simulate the diseased environment in vitro. The astrocytes were then treated with  $17\beta$ -estradiol and Tamoxifen, an estrogen receptor inhibitor. Production of Ang II was measured using ELISA Angiotensin II Assay. Ang II levels in the supernatant of cells treated with  $17\beta$ -estradiol varied little from that of cells untreated with  $17\beta$ -estradiol. These results suggest that  $17\beta$ -estradiol does not affect Ang II production at the neural level to protect against hypertension-related cardiovascular disease.

*Faculty mentors:*  
*Dr. Kathleen Hughes*  
*Dr. Monica Frazier*  
*Department of Biology*

*Presented:* Joint Meeting of Beta Beta Beta Southeastern Region & Association of Southeastern Biologists

*Awarded:* Second Place, Frank G. Brooks Award

*Funded in part by:* CSU S-RACE Grant \$300

## **Salinity stress and PVLEA3 gene expression in Phaseolus vulgaris**

The common bean, *Phaseolus vulgaris* is cultivated globally as a nutrient rich staple. Abiotic stresses tend to compromise the optimum production of this staple crop, which causes a disadvantage for countries that depend on its production for food and economic stability. Salinity stress is a type of abiotic stress that constraints the production of the common bean. Late Embryogenesis Abundant (LEA) proteins are hydrophilic molecules that accumulate at high levels during seed maturation. These proteins play a role in protecting against the destructive conditions abiotic stresses impose on plants. The focus of this study was to analyze the PVLEA3 gene and its expression in two varieties of common bean (Burnia and UNS-117) under salt stressed conditions. Samples were collected from both varieties for molecular analysis and the rates of photosynthesis as well as stomatal conductance were measured. A two-way ANOVA revealed that there was a significant difference in the rates of photosynthesis and stomatal conductance between treatments but not between the varieties. The expression of *pVLea3* gene will be quantified using Real Time Polymerase Chain Reaction (PCR). We expect that the expression of the PVLEA3 gene will be significantly higher in UNS-117 as opposed to Burnia due to the former being categorized as drought tolerant and the latter drought sensitive. A follow up study to this experiment completed at Columbus State University serves to analyze the PVLEA3 gene sequence of the two bean varieties under salt stressed conditions. The *PvLEA* gene sequences from the control and salt-stressed plants will be compared to other plant or animal species to observe any differences or similarities.

*Abolanle Abikoye*

*Faculty mentors:*

*Dr. Monica Frazier,*

*Dr. Kevin Burgess,*

*Department of Biology*

*Dr. Latha Melmaiee,*

*Dr. Venu Kalavacharla*

*Dr. Sathya Elavarthi*

*Delaware State*

*University*

*Presented:*

Delaware State University National Science Foundation Research Symposium (July 2011)

*Funded in part by:* CSU S-RACE Grant \$300, National Science Foundation REU \$4200



## The Sociopolitical Implications of Drag

*Timothy Bussey* The purpose of this project is to analyze the role of drag queens while assessing the sociopolitical implications of their presence within both hetero- and homosexual communities. In addition to researching this single aspect of drag queens, this work will also delve into why drag queens still exist and how they have changed since the time of the infamous Stonewall Riots in the late 1960s.

*Faculty mentor:  
Dr. Masako Okura  
Department of Political  
Science and MPA  
Program* The finalization of this work will culminate as an examination of the possibility of drag working to destabilize gender within the public sphere. Stated within the research, this possible role of eliminating gender roles functions in regards to the theory of social capital which would act as the vehicle for said destabilization. From this point, it could be feasible for one to assume that drag could also reinforce a positive image of the queer community for the greater portion of society. As a whole, this work will address the fundamental question of, ‘why does drag exist.’

*Presented:*  
Midwest Political Science Association Conference (2012), CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant, \$300

# **Correlation of Ashland-Wedowee-Emuckfaw Belt and Dahlongega Gold Belt Stratigraphy, Northwestern Georgia-Northeastern Alabama, Southern Appalachians**

In the southernmost Appalachians of Alabama and Georgia, the eastern Blue Ridge composite terrane has traditionally been mapped as two separate lithotectonic belts: the Ashland-Wedowee-Emuckfaw belt (AWEB) and the Dahlongega Gold belt (DGB). Both terranes lie northwest of the northeast striking Brevard Zone and southeast of the northeast striking Hollins Line fault system and younger Allatoona fault, although the Chattahoochee fault is the bounding fault for much of the DGB northeast of the Cartersville transverse zone. The amphibolite facies AWEB is composed primarily of metasedimentary rocks, with minor amounts of intercalated amphibolite, and has been intruded by a number of Devonian/Carboniferous and older granitoids. These amphibolite/metasedimentary sequences are thought to have formed along the post-Rodinian Iapetus rifted margin of Laurentia. Lying along strike of the AWEB to the northeast, the DGB in northwestern GA consists of metasedimentary (New Georgia Group) and metavolcanic rocks (Pumpkinvine Creek Formation). The Pumpkinvine Creek Formation, a bimodal metavolcanic sequence with suprasubduction geochemical characteristics, is interpreted to have formed in a Middle Ordovician back-arc basin on the Laurentian margin, suggesting that at least portions of the New Georgia Group strata originated as sediment interlayered with the volcanic sequences. Similar interpretations have also been made for the correlative Otto Formation farther to the northeast in the DGB. In northwest GA, at the juncture of the two belts, their similar structural positions and lithologic character have led some workers to suggest that rocks of the Wedowee and Emuckfaw Groups (AWEB) can be correlated with those of the New Georgia Group (DGB). Other workers, however, have suggested that one or more major faults separate the two terranes. Detailed geologic mapping southwest of Carrollton, GA, at the location of one of the proposed faults, suggests that rocks of the AWEB and DGB are stratigraphically continuous and not in faulted contact. Correlation of stratigraphy across the two belts suggests that they should be considered a single terrane consisting of Laurentian early Paleozoic rifted-margin sequences and younger Ordovician back-arc volcanic and intercalated sedimentary rocks.

*Jess Gilmer*

*Faculty mentor:*

*Dr. Clinton Barineau*

*Department of Earth & Space Science*

*Presented:*

61st Annual Meeting of the Geological Society of America, Southeastern Section (April 2012)

*Funded in part by:* CSU S-RACE Grant, \$300

## Parallel Computing of Free Distributive Lattices

*Janice Hill* In 1897, Richard Dedekind asked how many monotone boolean functions existed for a particular number of variables. The sequence of numbers he discovered, {2, 3, 6, 20,...}, would later be named the Dedekind numbers. The Dedekind number of  $M(n)$  counts the number of monotone boolean functions of  $n$  variables. Dedekind discovered that these numbers were related to the nodes of a free distributive lattice of  $n$  generators. While there is an algorithm for finding the next lattice, it is time consuming and difficult to get from one free distributive lattice to the next free distributive lattice in a sequence. In 2010, research began at Columbus State University to use Wolfram Mathematica 7 to parallelize the algorithm for finding the next free distributive lattice in a series. Mathematica 7 has the capabilities of parallelizing computations over multiple cores. This can be accomplished either on a single multicore machine or multiple machines connected via a network. By harnessing the power of today's multicore technology, it will allow for computing more complex functions at a faster rate. Therefore, using this technology will allow for solving for the next free distributive lattice to be done more quickly and efficiently, and allow for larger free distributive lattices to be computed. While Mathematica 7 makes running parallel operations feasible, the algorithm for finding the next free distributive lattice does not parallelize easily. The algorithm for finding this lattice is not balanced, meaning one core is consistently performing more calculations than the other cores. The algorithm for finding the next free distributive lattice will need to be redefined so that the algorithm is balanced and is able to be parallelized efficiently. Once the free distributive lattices are calculated, they can be built and examined in Mathematica 7 allowing for further research involving monotone boolean functions.

*Faculty mentor:*  
*Dr. Rodrigo Obando*  
*TSYS School of Computer*  
*Science*

*Presented:*  
ACM Mid-Southeast Conference (2010), CSU Tower Day (2012)

*Funded in part by:* CSU Department Funds \$800

## **PRINT Nanoparticles Deliver siRNA to Ewing Sarcoma Cells**

Ewing Sarcoma is the second most common bone cancer of children and adolescents. It is characterized by highly metastatic osseous or extraosseous tumors. Eighty-five percent of cases are linked to a chromosomal translocation between the EWS (Ewing Sarcoma) gene on chromosome eleven and the FLI-1 (Friend Leukemia Insertion) gene on chromosome twenty-two, resulting in the chimeric fusion of the EWS-FLI-1 oncoprotein. EWS-FLI-1 is believed to behave as an aberrant transcriptional activator, and is critical for tumor proliferation and transformation. We hypothesized that PRINT (Particle Replication in Non-Wetting Templates) nanoparticles can deliver siRNA to Ewing Sarcoma cells to inhibit cell growth. Methods included: 1.) Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) to confirm 502 cells as type one fusions 2.) PRINT technology to synthesize nanoparticles 3.) Flow cytometry to quantify particle uptake by Ewing's Sarcoma cells. Results showed the 502 and 894 cell samples as 200 and 400 base pair fragments, confirming the type one and type two EWS-FLI-1 fusions. SEM (scanning electron microscope) images of PRINT nanoparticles displayed uniform and scalable qualities. Flow cytometry analysis displayed the highest particle uptake by Ewing A673 cells at longer incubation times (4 hours) and at larger nanoparticle concentrations (45µg/ml). Resulting data confirms that PRINT nanoparticles can be delivered to A673 Ewing cells.

*Bolivia Hurtado De  
Mendoza*

*Faculty mentors:  
Dr. Ian Davis  
Dr. Joseph DeSimone,  
Dr. Joseph Rugutt,  
Department of Biology*

*Presented:*

UNC Undergraduate Research Symposium (July 2011), CSU Tower Day (2012)

*Funded in part by:* National Science Foundation, \$5000

## Procedurally Creating 3-D Glyphs Using Unity Game Engine

*Jessica Kennemore* Visualization is a helpful part of understanding what data has to tell us. The aim of this research is to procedurally create geometry using the Unity Game Engine in order to produce a three-dimensional glyph that represents a collection of data. The overall goal is to be able to explore, manipulate, and break apart the glyph into smaller sub-collections of data that can be represented by the same glyph. There are many other tools that one could use to accomplish this goal to include: OpenGL, VTK. So, why use a game engine? When considering OpenGL even the base functionality will have to be built from the ground up and everything else built off of that. VTK is a useful step up but is geared towards having modules that will present

*Faculty mentor:*  
*Dr Rodrigo Obando*  
*TSYS School of Computer*  
*Science*

the data in a specific way; this will require more additions in order to make the glyphs interactive and create special effects. With these goals in mind it makes the most sense to use a game engine with such functions built in. Unity is a good tool where existing knowledge of the engine and computer graphics will make the process much faster. The next decision is choosing to procedurally create geometry for the glyph as opposed to modeling a base glyph in a 3-D software, dropping it into Unity, and then modifying it based upon the given data set. Since anything created in a 3-D software is static this will make it much harder to manipulate. Unity has a built in Mesh class that provides the structure for geometry. One can create vertices, normals, and UV's based upon the data set and store them into their respective places in the data structure in order to create the geometry at runtime. This will provide the basis for future activity in data visualization of glyphs.

*Presented:*  
ACM Mid-Southeast Conference (November 2011), CSU Tower Day (2012)

*Funded in part by:* CSU Department Funds, \$800

## **Test Anxiety and Smoking Behavior Among College Students**

The purpose of this study was to find out whether there was a difference in test anxiety between students who smoked and those who did not. Data was collected from 40 undergraduate students enrolled in Introductory Psychology courses at a university in the southeastern U.S. Simple random sampling was used to select the sample. A semi-structured Background Information Questionnaire was developed and used to gather demographic information and smoking behavior followed by administration of the Test Anxiety Scale that was developed by Nist and Diehl (1990). Descriptive statistics and t-test were used to analyze the data. No significant differences in test anxiety among cigarette- smokers and non-smokers were identified from the study.

*Morgan Mercer  
Javonna Westbrook  
Amanda Burton*

*Faculty mentor:  
Dr. Kathakali Mitra-  
Varma  
Department of  
Psychology*

*Presented:*

11th Georgia Undergraduate Research in Psychology Conference (2012)

# **An Analysis of Caribou (*Rangifer tarandus*) Habitat on Unimak Island**

*Martha Newell* Caribou (*Rangifer tarandus*) populations across the circumpolar north have been declining in recent decades. Two potential reasons for the decline include predators (top-down) and climate change (bottom-up). Warming and associated changes in carbon and nitrogen cycling, ambient temperature, snow depth, ice cover, primary productivity and plant phenology are examples of bottom-up effects that may be responsible for the *Rangifer* decline. This study focuses on the caribou herd of Unimak Island, in the Aluetian chain. The goal is to establish baseline information about the habitat, the fundamental processes that drive the ecosystems, and how caribou interact with their environment. My study examined the nutritional quality of two forage species on Unimak Island. *Carex lyngbyei* (a sedge) and *Elymus trachycaulus* (a grass) are both part of caribou diets, and grow in a wider variety of plant communities on Unimak. Because nitrogen is considered a limiting nutrient in most systems, including caribou forage, it was the focal element of this study. I found significant differences for N percentage between community types for *Carex*, and there are significant differences between early and late samplings for both species, which were expected. There was no significant change in *Elymus* N concentration.

*Faculty mentor:*  
*Don Spalinger*  
*University of Alaska,*  
*Anchorage*

*Presented:*  
University of Alaska-Anchorage REU Final Symposium, CSU Tower Day, 2012  
*Awarded:* Best Poster Tower Day 2012

*Funded in part by:* National Science Foundation REU Grant

## **Chandra Examination of the Magellanic Cloud SNR DEM L241**

Massive stars, normally greater than 8 solar masses are primarily responsible for the abundance of heavier elements in the Universe. Before collapse, these massive stars fuse heavy elements up to Iron in their cores. During the core collapse and resulting supernova explosions, heavier elements are fused and distributed. Furthering our knowledge of how these explosion pepper the surrounding interstellar medium is crucial to the understanding of the evolution of a galaxy. Supernova remnants (SNRs), the results of these supernova explosions, are crucial to the growing understanding of our universe. Neighboring our own Milky Way galaxy is a dwarf galaxy known as the Large Magellanic Cloud (LMC) which provides a useful window into the lives and evolutions of supernovae due to its known distance and its relatively low interstellar absorption. The study of high-energy astrophysics offers the ability to further understand SNRs, and those with internal compact objects, like pulsars, are of particular interest. SNR DEM L241, located in the LMC, is a complex core-collapse (type II) remnant at a known distance. It had been previously stated that the hard internal X-Ray source within DEM L241 was a Pulsar Wind Nebula, the hard energetic outpouring due to the strong magnetic interactions associated with pulsars. Using data provided by the Chandra Space Telescope, and spectrum resolved spatially through Harvard's CIAO and SHERPA programs, it is shown that this is not the case. Analysis of spatially resolved spectra, timing analysis and calculated physical properties for various diffuse regions of the remnant were conducted to better understand the evolution of the SNR, and its interaction with the interstellar medium.

*Matthew Perry  
Zachary Edwards  
Brandon Furnish  
Truman Williams  
Dr. Rosa Williams*

*Faculty mentor:  
Dr. Rosa Williams  
Department of Earth &  
Space Science*

*Presented:*

219th American Astronomical Society Meeting (January 2012), CSU Tower Day, 2012

*Awarded:* Best Poster Tower Day 2012

*Funded in part by:* NASA LTSA Grant \$5000



## Synthesis and Characterization of Eight Coordinate Europium and Gadolinium Dicarboxylate Complexes

*Patsy (P. J.) Perry* The fluorescence properties of lanthanide (III) carboxylate complexes are of considerable interest because of their importance in energy transfer processes and laser systems. In this study, europium and gadolinium dicarboxylate complexes were synthesized and characterized. The reaction of two equivalents of  $MCl_3 \cdot 6H_2O$  ( $M = Eu$  and  $Gd$ ) with three equivalents of 2,2'-Bisquinoline-4,4-dicarboxylic acid dipotassium salt,  $C_{20}H_{10}N_2O_4K_2 \cdot 3H_2O$ , in methanolic solution gave white and yellowish precipitates in good yield for Eu and Gd respectively. The precipitates were

*Faculty mentor:*  
*Dr. Zewdu Gebeyehu*  
*Department of Chemistry*

characterized by means of FTIR, and elemental analysis. The IR-spectra of both complexes showed similar absorption bands as the ligand with slight shift to a lower wave number. Elemental analysis results for CHN and IR spectra suggested the formation of bimetallic complexes,  $M_2(C_{20}H_{10}N_2O_4)_3 \cdot 4H_2O$ . A structure for the complexes is proposed in which the two carboxylates ions on each ligand serve as bidentate ligand and also bridge the two metal centers. The three chelating carboxylate ions and two water molecules attached to each metal center resulted in a coordination number of eight to both Eu and Gd. The complexes are stable in air and are insoluble in polar as well as non-polar solvents. Both products decompose and darken between 300-350°C. At present, we are investigating the solubility of these complexes in different solvents and are studying their electrochemical and fluorescence properties.

*Presented:*

Georgia Academy of Science Annual Meeting (March 2011), CSU Tower Day (2012)

*Awarded:* Best Tower Day Presentation 2012

*Funded in part by:* CSU S-RACE Grant \$206

## Remote Recognition of Objects Using an Off-the-Shelf Drone

Unmanned Aerial Vehicles (UAVs) have been in use by governmental bodies for some time now. There are manual drones, semi-autonomous drones and even some fully autonomous drones currently in use. However, these drones are extremely complex and expensive. This project set out to investigate the possibility of using an inexpensive drone to recognize objects remotely. Using consumer grade technology in our project, we wrote software that analyzed images from a quadricopter, and then processed these images. The quadricopter was an off-the-shelf machine from Parrot that was originally flown via an iOS device. We customized the flight software to allow flight via remote computer control. During flight, the drone would record a video stream that we were able to parse into images. We then used a semi-automatic image segmentation process to prepare the images for analysis, and then analyzed them through an image identification algorithm. As a proof of concept, our algorithm counted cars in nearby parking lots. However, with some more algorithm design, this drone could easily be configured to count other objects, with the onboard computer system keeping the machine stable and relaying telemetric data back to our computer. Throughout multiple flights, we found that the quadricopter was quite suited for this type of work with minimal modifications. This research shows the potential of inexpensive off-the-shelf drones for performing aerial observation tasks.

*Mark Plagge  
Lucas Flores*

*Faculty mentor:  
Dr. Shamim Khan  
TSYS School of  
Computer Science*

*Presented:*

ACM Mid-Southeast Conference (November 2011), CSU Tower Day (2012)

*Awarded:* Best Tower Day Presentation 2012

*Funded in part by:* CSU S-RACE Grant \$450

## Observations of Beginner Programming Students from the Student Perspective

*Mark Plagge  
Malika Harris*

*Faculty mentors:  
Dr. Shamim Khan  
Dr. Wayne Summers  
TSYS School of  
Computer Science*

The continuing strong demand for computer science and information technology graduates in the US is projected to grow over the coming years as the gap between the demand for graduates and the rate at which institutions produce them is expected to increase. One major problem facing institutions in recent years has been the low retention and graduation rates of students in computer science. Colleges and universities routinely report that 50% or more of those students who initially choose CS study soon decide to abandon it. The main factor contributing to this is the large number of students who either drop out of or fail in courses that involve computer programming for problem solving: CS1, CS2 and Data Structures. The objective of this NSF-REU grant funded research project was to carry out a peer investigation of why so many students find computer programming difficult. Our investigations show that comfort level, time management and difficulty with abstract thinking play a major role in student success. Through the analysis of surveys and interviews, we found that students have difficulty separating abstract problem solving and implementation of coding. In most cases, students started coding without a predetermined starting point. Our investigation also demonstrated that in order to address this difficulty, more emphasis should be put on training students in abstract problem solving and programming language syntax. Teaching programming using pseudo-code may also be beneficial to introductory level students.

*Presented:*  
ACM Mid-Southeast Conference (November 2011), CSU Tower Day (2012)

*Funded in part by:* National Science Foundation Grant No. BPC -09-40495

## **Enhancing Awareness and Understanding by Applying Perceptual Mapping and Public Participation GIS: Safe Routes to School**

In fall 2010 Hannan Elementary School administrators saw fewer students walking and biking to school. Hannan plans to join the Safe Routes to Schools (SRTS) program and wanted to understand why there were fewer students making use of these modes to get to school. Our introductory GIS class developed a project to collect student-generated data from fifth graders, to identify neighborhood problems that compromised safe routes. We collected, mapped, and analyzed data that could then be given back to the students and administrators at Hannan. We prepared a presentation on our findings that would be informative and engaging to students and faculty.

*Thomas Rice*

*Faculty mentor:  
Dr. Amanda Rees  
Department of History  
& Geography*

*Presented:*

South East Division of the Association of American Geographers Annual Meeting

*Funded in part by:* CSU Department Funds

## **Surrealism and Bunuel: A Study In Cultural Consciousness**

*Clint Sabom* This project will be a research paper on the ideas and tenets of the Surrealist movement and its founder, Andre Breton. The purpose of this paper will be to explore the changes in Surrealism across time and place, decades and continents (Spain to Latin America) through the work of three films of Luis Bunuel. Since surrealism will have a different relevance and significance to Latin America, a study of surrealist elements in Bunuel's Mexican films will allow me to make cross-cultural comparisons between the two locales through the lens of Surrealism and film. My essay will consider 3 films of Luis Bunuel, one of which in Spain, and two were made, decades later, in Mexico.

*Faculty mentor:*  
*Dr. Alyce Cook*  
*Department of Modern &*  
*Classical Languages*

*Presented:*  
USG Council on Americas' Conference on the Americas (February 2012),  
*Awarded:* Best Undergraduate Paper

*Funded in part by:* SRACE Grant

## **Influence of Hip Hop Music on Black Male College Students**

Hip hop culture is an effective filter of communication for African-American males. The purpose of this study is to discover the influence of hip hop music on African-American students at Columbus State University. We created a questionnaire for African-American students both male and female to fill out. The questionnaire focused on image of hip hop culture on campus and whether there was a positive or negative means correlation on campus. The theme of the survey focused on the contribution of hip hop music to education. Our results found a majority of freshmen and sophomore students didn't find hip hop music having much of an influence on their educational endeavors. For juniors and seniors they found hip hop to have a negative image on campus and they believed the culture has a drastic effect on them and they wanted to see more of a positive portrayal of hip hop on campus. We held a forum where a local radio VJ came and spoke to the students who participated in the study. The speaker expressed his concern with hip hop culture and how his college experience was influenced by the culture and the negative effect it had on his peers. He discussed how a majority of black males in his class failed to complete their education. We passed the same survey out to the students after the forum and there was no change of opinion regarding the negative influence of hip hop culture on campus amongst sophomores and juniors, however amongst freshmen and sophomores there was a shift and they did believe there was a negative influence of hip hop on campus. Their feelings changed because they believed there is not a central focus of the importance of education in hip hop at CSU. We will video record one on one documentary interview with students who participated in the study to discuss what changes could occur which would give hip hop culture a more positive influence for students on campus

*Kelsey Williams*

*Faculty mentors:*

*Dr. Eddie Obleton*

*Dr. Gary Shouppe*

*Dr. Andrea Frazier*

*Department of  
Counseling, Foundations  
& Leadership*

*Presented:* UGA Graduate Research Forum, CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant \$150

## Assessing the Need for a Health Coach in Rural Southwest Georgia

*Samantha Worthy*

Obesity is not only a major health risk in rural southwest Georgia, but also a major concern throughout the United States. Approximately 97 million adults are overweight or obese in the United States. In southwest Georgia, obesity rates are especially alarming—in 2007, 28.3% of people in Lee County and 34.8% of people in Terrell County were obese. Obesity is a preventable and curable health issue that can be remedied through a change in diet and lifestyle. To assess this health issue in southwest Georgia, researchers conducted cross-sectional surveys on 18-80 year old patients in two rural clinics located in Lee and Terrell counties. The surveys assessed how healthy, in regards to eating habits and weight, the patients believed themselves to be. Results indicated that participants medically classified as obese (BMI > 30) understood that they were obese. However, they did not believe their eating habits were unhealthy. This possible misconception could be corrected with the aid of a health coach. Of the obese patients surveyed, 71% were open to using the services of a health coach. Conclusions indicated that, even though patients realized they were obese, they did not see a problem with their eating habits, not connecting a poor diet to the cause of their obesity. The percentage of patients willing to seek help with a health coach is encouraging in the fight against obesity. Educating obese patients about nutrition could potentially lead to better dietary habits and decreased obesity levels across the nation.

*Presented:*

Georgia Academy of Family Physicians Annual Scientific Assembly and Exhibition (November 2011)

*Awarded:* 2<sup>nd</sup> Place

CSU Tower Day (2012)

*Awarded:* CSU One Day Sustainability Award

*Funded in part by:* Southwest Georgia Area Health Education Center \$900, CSU Department Funds

\$471

## **Assessment of Heavy Metals in Lake Walter F. George in Alabama and Georgia**

This study provided a comprehensive assessment of four heavy metals (chromium, cadmium, arsenic, and lead) in twelve water samples. Nine of the water samples were taken from Lake Walter F. George and three were taken from tributaries emptying into Lake Walter F. George. Two rounds of sampling were conducted, one in summer and one in winter. Changes in concentration levels were analyzed. Previous testing has shown levels of certain metals in Lake Walter F. George to exceed limits set by the Environmental Protection Agency (EPA). The temperature program was optimized for ashing and atomization temperature. The analytical procedure was validated using standard reference materials. Accurate results were obtained for all heavy metals and the results were in good agreement with the certified values. The highest concentrations of heavy metals were observed at sampling site 9, Lake Point State Park in Eufaula (Alabama). The elemental concentrations of Cd , Cr, As and Pb measured in Lake Walter F. George water samples fulfill the Canadian and the US EPA guidelines for surface water quality.

*Samantha Worthy*

*Faculty mentor:*

*Dr. Samuel Abegaz*

*Department of Chemistry*

*Presented:*

CSU Tower Day (2012)

Georgia Collegiate Honors Council Conference (February 2012)

*Awarded:* Second Place Outstanding Poster GCHC

*Funded in part by:* CSU S-RACE Grant



## **FUNDED PROJECTS**

The following abstracts feature undergraduates who have received competitive research grants that provide critical support for their projects. Several of our undergraduates have also benefited from larger research grants awarded to the institution as well as those provided by the generosity of community partners. In addition, Columbus State University has offered a competitive grant program to support and promote the research, scholarly and creative efforts of our undergraduate students. The Student Research and Creative Endeavors (S-RACE) Grants, but are often supplemented by departmental funds. We have included those that have been awarded funds during the current academic year.

Funding provides critical support often needed to complete projects. Undergraduates engaging in research have submitted proposals that enabled the purchase of items such as artistic supplies, photography and audio recording equipment, and scientific apparatus. In addition, grants have supported travel that enabled undergraduates to conduct sociological interviews, collect water samples, and disseminate research findings. The undergraduate researchers in this section are recognized for writing successful grant proposals as well as presenting their findings.

## **Croatia: the 28th Member of the European Union?**

This paper aims at showing how Croatia can be considered the next best candidate to join the European Union. After going through a process of understanding some background information on Croatia's standings under political, economic, and social points of view, and showing some of the most important aspects in opposition to Croatia's accession to the EU, the paper will give reasons in support of Croatia's accession to the EU, especially for stability purposes.

*Gianluca D. Bailey*

*Faculty mentor:*

*Dr. Kyle Christensen  
Department of Political  
Science and MPA  
Program*

*Funded in part by: CSU S-RACE Grant*

# The Christology of Salvador Dali: Visual Arts as Theological Text

*Earl Gordon Barnett*

*Faculty mentor:  
Dr. Richard E. Gardiner  
Department of Teacher  
Education*

My research project has been accepted to the joint meetings of the Mid-Atlantic and New England Maritimes meeting of the American Academy of Religion (Hyatt Regency Hotel, New Brunswick, NJ on March 15-16). My presentation has been slotted to take place in a “Religion and Arts” meeting section. My work will be presented to history, religion, and art history scholars from schools such as Harvard, Yale, Brown, Princeton, and Fordham University. My research builds on my work as a Graduate Assistant, revising and writing a chapter on the Cultural Approach to teaching history. In short, the approach aims to explore history through an anthropological lens, as a cultural phenomenon rather than a collection of important names and dates. This includes exploring the operation and intersection of six facets of any civilization: politics, religion, aesthetics, intellectual developments, social structures, and economics. My research builds upon this cultural paradigm, exploring the intersection of religion and aesthetics. It interprets three works by Salvador Dali (Ascension, Crucifixion (Corpus Hypercubus), and Santiago el Grande) as religious texts. These paintings express both Dali’s interpretation of the history of Christian theology and the artistic tradition of Christian art while also functioning as theological texts in themselves. Dali not only interprets historical theology and art history, his works combine the two to create a theological statement uniquely his own.

*Funded in part by: CSU S-RACE Grant*

# The Effects of Bacteria on the Germination of Clover

Plants belonging to the family Fabaceae, known as the Legume family, share a symbiotic relationship with bacteria of the genus *Rhizobium*, an  $\alpha$ -Proteobacteria. These plants encourage the bacteria to enter the intracellular tissue of the roots to form a new structure called a nodule. These nodules house the Rhizobia where they multiply and begin to fix atmospheric nitrogen, using nitrogenase, into ammonia (NH<sub>3</sub>) for the bacteria to use in protein production. The bacteria fix more nitrogen than they need and the excess is used by the plant. Two species that form these nodules are Red Clover (*Trifolium pratense*) and Alice Clover (*Trifolium repens*), also known as White Clover. A species specific inoculant has been developed for Red Clover, but White Clover is typically planted without inoculant. There is little information regarding the effects of *Rhizobium*, or any bacteria in general, on the germination of these two plants. Last semester microbial diversity class, we performed an experiment and obtained some interesting results. We grew these two clover species in medium where one set had no bacteria present at all, and the other was inoculated. The Red Clover germinated no matter what the situation, but the Alice Clover didn't germinate without bacteria present. The complete organismal population of the inoculants used for these species is unknown. To test the effect of bacteria on seed germination, three sets of flasks with different variables were set up and observed. In the first set of flasks, the seeds were germinated as purchased. The second set consisted of seeds that had been sterilized using a 3% bleach solution followed by 70% alcohol, then planted in the sterile medium. The third set was sterilized as before, but then covered in inoculant.

*Will Borin*

*Faculty mentors:*

*Dr. John Davis*

*Dr. Kevin Burgess*

*Department of Biology*

*Presented:*

CSU Tower Day (2012)

*Funded in part by: CSU S-RACE Grant*

## **Investigation of Toxic Heavy Metals in the Soils of Children's Environments in Columbus, Georgia and Phoenix City, Alabama**

*Heather Boyette*

Soil samples have been collected for thirteen schools in Columbus, Georgia, and seven schools in Phoenix City, Alabama from November 2009 to April 2010. Soil samples from twenty schools will be tested for toxic heavy metals concentrations. These samples will be tested for the toxic heavy metals arsenic (As), cadmium (Cd), chromium (Cr), and lead (Pb). Reproducible results have already been obtained for fourteen of the twenty collections with a precision of better than 6% in most cases.

*Faculty mentor:  
Dr. Samuel Abegaz  
Department of  
Chemistry*

*Funded in part by: CSU S-RACE Grant*

## **Introgressive hybridization in rare Georgia pitcher plants (*Sarracenia* spp.)**

Habitat modification and fragmentation can have serious demographic and genetic impacts on a variety of plant species. One such genetic threat is asymmetrical introgressive hybridization, which can lead to species extinction via genetic assimilation of rare potential genomes into that of more abundant congeners. However, little is known about the genetic ramifications of hybridization between parental taxa that do not differ in abundance. Pitcher plants belonging to the genus *Sarracenia* are carnivorous plants endemic to North America. Seven of the eight species within the genus are concentrated in the southeastern United States. Despite the heavy concentration, in Georgia, approximately 2% of pitcher plant habitat remains intact. Here, I investigate the potential occurrence of introgressive hybridization in sympatric populations of *Sarracenia rubra* (sweet pitcher plant) and *Sarracenia psittacina* (parrot pitcher plant), two species that are listed as threatened within the state of Georgia. Currently we are using DNA barcode markers to confirm the genetic identity of parental taxa as well as determine the percentage of putative hybrids. Furthermore, microsatellite analyses will be used to establish hybrid indices that will provide novel insight into the process of introgressive hybridization occurring between these two rare species.

*Cristina Caldwell*

*Faculty mentor:  
Dr. Kevin S. Burgess  
Department of  
Biology*

*Funded in part by: CSU S-RACE Grant*

## **Exploring Music Through Summer Festival**

*Toshiro Chun* Summer Music festivals allow the developing musicians to further enhance their ability as a musician through various opportunities. A music festival is equivalent to a professional conference in another field. A Summer Music Festival allows the musician to explore new pieces of music, perform in various ensembles and meet new musicians and professionals which can help expand the musician's professional network. Applying to a music festival is a challenging task that requires the musician to prepare and record an audition recording which pushes the student to explore new pieces of music. Putting together a successful audition recording requires time, patience, intense preparation and dedication to produce a great product. The goal of this project is to put together a high quality audition tape for various festivals such as The Aspen Musical Festival, Roundtop Musical Festival, Banff Music Festival, Texas Music Festival and the Music Academy of the West.

*Faculty mentor:*  
*Dr. Robert Murray*  
*Schwob School of Music*

*Funded in part by: CSU S-RACE Grant*

## **Relationship Between Joints and Stream Flow Directions in the Fortson, Georgia 7.5 Minute Quadrangle**

The Fortson, Georgia, 7.5 minute quadrangle includes amphibolite facies metamorphic rocks of the Georgia Piedmont province and sedimentary rocks of the Gulf-Atlantic Coastal Plain in the vicinity of the city of Columbus, GA. Crystalline rocks of the Piedmont Uchee belt, including those of the North Columbus metamorphic complex, Moffits Mill Schist and Phenix City Gneiss, dominate exposures in the northern portion of the quadrangle and are overlapped in the southern portion by sedimentary rocks of the Cretaceous-aged Tuscaloosa Formation, which dip gently to the south. The Phenix City Gneiss, at the structural base of the crystalline strata, is dominated by amphibolitic gneiss and is exposed primarily in the southern portion of the quadrangle at and immediately north of the Coastal Plain unconformity. To the north-northwest, the Phenix City Gneiss gradually gives way to biotite schist and gneiss of the Moffits Mill Schist, interpreted as the metasedimentary component of a ca. 600 Ma volcanic basin which included Phenix City Gneiss metavolcanic rocks. The Moffits Mill Schist in turn transitions into gneiss and migmatite of the North Columbus metamorphic complex in the northernmost portions of the quadrangle. During this field study, a concerted effort to collect fracture data, in addition to lithologic and basic structural information, was undertaken in order to provide a framework for understanding the potential influence of joints on streams and their direction. Existing and new data was compiled into a digital database (Microsoft Access) and used to construct a digital geologic map in a GIS framework (AutoCAD Map 3D). This year-long research project investigating the geology of Columbus, GA, was supported by a grant from the U.S. Geological Survey's EDMAP program.

*Alexander Colon  
Cheryl Wilkes*

*Faculty mentors:  
Dr. Clinton Barineau  
Dr. Tom Hanley  
Department of Earth &  
Space Science*

*Presented:* CSU Tower Day (2012)

*Funded in part by:* US Geological Survey EDMAP grant - National Cooperative Geologic Mapping Program



## Mechanisms for Dissemination of Health Information Among College Students (West Nile)

*Kaitlyn Cross* The purpose of this study was to determine student knowledge about West Nile Virus, to assess the sources of that information, and to relate that information to student demographics. A novel health information questionnaire was developed and distributed. 558 usable questionnaires representing ~50 majors were returned (age = 22.06 +/-4.9 years; education = 14.46 +/- 1.56 years). 19.4% of

*Faculty mentor:*  
*Dr. Michael Mangum.*  
*Department of Health &*  
*Physical Education &*  
*Exercise Science*

respondents were unable to name a single method of West Nile Virus transmission. 60.2% could name at least one mode (primarily mosquito). 20.1% exhibited objective knowledge of two or more methods of transmission (blood, other tissue transplant, nursing, etc.) Television (79.2%), newspaper (36.0%), radio (24.7%), magazines (11.3%), family/friends (10.6%), classes/school (9.1%), and the Internet ((7.9%) were cited as primary sources, respectively. Less than 0.5% of the sample reported receiving information from primary health-care providers, reinforcing the perspective that preventative health was not a primary function of health-care providers in this instance. It was also determined that students with children were better informed about methods of transmission of West Nile Virus. These data were surprising to a degree in that traditional information sources (television, newspaper) continue to be dominant in what is considered by many to be the “Internet” age.

*Presented:*  
CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant, CSU Department Funds, HPEX

## **Preparation and characterization of Rhodium catalysts on alumina support**

Rhodium metal is reported to be good catalyst for carbon monoxide and nitrogen dioxide elimination from automobiles and industrial exhausts. Rhodium metal catalysts will be prepared on alumina/silica support by Wet Impregnation method and adjustment of pH to neutral and basic mediums. The catalysts will be calcined in air at 300 °C for 2 hrs. The characterization of the catalysts will be done to determine total surface area, active surface area, crystallite size and nature of absorbed sites by using BET, pulse chemisorption and temperature programmed desorption techniques. The properties of the experimental catalysts prepared under different experimental conditions will be compared with a standard rhodium catalyst. The application of the catalysts based on properties will be determined and discussed.

*Denishia Echols*

*Faculty mentor:*

*Dr. Anil Banerjee*

*Department of  
Chemistry*

*Funded in part by: CSU S-RACE Grant*

## **Preparation and Characterization of Platinum Group Metal Catalysts to Reduce Air Pollution**

*Shantress Ferguson*  
*Carlie Smith*  
*Melita Boykin*  
*Lakesha Richardson*  
*Michael Anderson*

*Faculty mentor:*  
*Dr. Anil Banerjee*  
*Department of Chemistry*

Platinum, palladium and rhodium metals on alumina and others supports are used in catalytic converters to reduce air pollution in automobiles. Platinum, palladium and ruthenium metal catalysts, and mixed metal catalysts (Platinum and ruthenium; palladium and ruthenium) on alumina supports were prepared by Incipient Wetness Method. The method included impregnation of either individual or mixed metal nitrate solutions (Aldrich make) onto solid alumina (gamma phase, nanoparticles, Aldrich make) followed by drying in an air oven at 1200C for 24 hr and calcination in air in a tube furnace at 5000C for 2hr. Each catalyst was reduced in hydrogen before characterization. The catalysts were characterized by pulse chemisorption and temperature programmed desorption (TPD) techniques. Crystallite sizes and active surface area of each catalyst were determined by hydrogen pulse chemisorption. The nature of active sites was determined by TPD by calculating the amounts of hydrogen desorption from the catalyst surfaces at different temperatures. The data collected will be used to assess the relative characteristics of individual as well as mixed catalysts.

*Presented:*  
CSU Tower Day, 2012  
*Awarded:* Best Poster Tower Day 2012

*Funded in part by:* CSU S-RACE Grant \$100

## **Collaborative Composition Initiative: Perspectives of the Creative Process**

This project looks at the process of musical composition and juxtaposes the methodology against other creative spheres such as writing and the visual arts while looking at the similarities in the development of a refined work. Musical composition, like composition in prose, follows a general pattern beginning with identification of research materials, and culminating in a compelling presentation of a thesis. A composer begins with a gathering of musical materials and ideas that may be fashioned in the design of a cohesive musical statement. Once a large base of materials and idea of the piece has been identified and/or developed, a composer applies a methodology to craft a piece, choosing from different colors, timbres, rhythmic, and harmonic ideas to strengthen the structural unity of the musical thesis. Like the use of diction to target an audience in prose or an artist's use of charcoal, pastel, or oil paint to illicit an effect on the viewer, a composer must use musical tools to work toward a refined presentation. Once the piece is sketched out with a vision of the completed product, the composer can then go through the drafts and rewrite the work until the music is able to portray the composer's completed vision.

*Ford Fourquarean*

*Faculty mentor:  
Dr. Fred Cohen  
Schwab School of  
Music*

*Presented:*

CSU Tower Day (2012)

*Awarded:* Best Tower Day Presentation 2012

*Funded in part by:* CSU S-RACE Grant, \$200

## Immigration Reform Legislation in Georgia

*Jay Gasper* Georgia is a state that has serious problems with illegal immigration. A recent report by the Pew Hispanic Center stated that Georgia, although ninth in overall population, is ranked seventh in number of illegal immigrants(pewhispanic.org). The most recent number of illegal aliens is about 425,000 for all of Georgia(pewhispanic.org). According to state representative Matt Ramsey (R) that is too many.

*Faculty mentor:* State representative Ramsey introduced to the Georgia House of Representatives, House Bill 87 (HB 87), also known as the Illegal Immigration Reform and Enforcement Act of 2011. This bill is seen as a copy of the recently passed illegal immigration legislation in Arizon by many immigrants rights groups. Those who are opposed to HB 87 believe the bill is inherently biased against the Hispanic population and that the bill gives state and local police officers the authority to ignore immigration suspects' civil rights. HB 87 was passed by the Georgia state legislature in May of 2011 and staying true to its controversial nature, has already caused political strife in the form of lawsuits and protests.

*Dr. Greg Domin*  
*Department of Political*  
*Science and MPA*  
*Program*

*Funded in part by: CSU S-RACE Grant*

## **Geologic Mapping at the Ashland-Wedowee and Dahlonega Gold Belt Juncture in NW Georgia**

Competing interpretations of the continuity of rocks in Alabama (Ashland-Wedowee belt) and Georgia (Dahlonega Gold belt) need to be resolved in order to understand the geologic and tectonic history of ancient North America during the Ordovician (~480 million years ago). Preliminary field mapping near the AL-GA border southwest of Carrolton, Georgia, suggest the two belts of rocks can be stratigraphically correlated across an area where some workers have suggested that one or more faults separate the two geologic regions. The relationship, fault or stratigraphic, between these two regions is important for understand the geologic history, including the polarity of subduction during Ordovician mountain building and the early history of the Appalachians in southeastern North America.

*Jess Gilmer II*

*Faculty mentor:*

*Dr. Clinton Barineau*

*Department of Earth & Space  
Science*

*Funded in part by: CSU S-RACE Grant*

## **To Hold or Not To Hold, That Is The Question: Tracking H.B. 67 in the 2011-2012 Georgia State General Assembly**

*Judith Grimmett* A brief history of the hand-held cellphone's evolution is presented. The problem addressed in this paper is that of "distractions" and legal implications that are created as a result of using a hand-held cell phone while operating a motor vehicle on U.S. highways, airways, waterways and railways.

*Faculty mentor:* The focus of this specific legislation is on the fact that as legal issues of this matter increased nationwide, the State of Georgia General Assembly introduced, debated, revised, passed, and enacted numerous versions of legislation. Then, in some instances, some legislation failed to pass out of committee. Such was the demise of H.B. 67. Why? Personal freedom trumping personal safety.

*Dr. Greg Domin*  
*Department of Political Science and MPA Program*

*Funded in part by: CSU S-RACE Grant*

## **Social Presence Theory in Action: Recreating a Department's Website to Create an Interpersonal Relationship.**

This project involves two teams of Communication students whose work will be submitted for competitive presentation at the 82nd Annual Southern States Communication Association's annual conference in San Antonio, TX (Communication Theory Division has a December acceptance notification). Our research integrates theory and practice as it applies Users and Gratifications and Social Presence Theories to produce a compelling web presence (departmental and its Non-Profit and Civic Engagement Academic Center) to launch in December as an actual Communication Department recruiting, retention, and funding tool. Our student work stems from a Directed Studies class where we could more fully explore and expand upon social media theories and apply them in a real-life setting. Insight provided from our combined theoretical lenses and selected mediated communication channels provides a unique perspective that integrates the Communication Department's academic rigor with its passion for Service Learning and resulting strong non-profit community partnerships that expand capacity for students and local agencies. The theory-driven research has produced an appealing and relevant message to help brand the Communication Department and connect students (potential, current, and alums), community, and potential donors to our department and the services it provides through its academic center, N-PaCE.

*James Tyler Higgins*

*Faculty mentor:  
Dr. Danna Gibson  
Department of  
Communication*

*Funded in part by: CSU S-RACE Grant*



## Electronic Music Controllers

*David Malkiel* This research encompasses the interaction between music and technology and how both can be combined to achieve an understanding of how much technology has influenced music and music composition over the past century, through the transformation of a concertina into a synthesis of electronics and physical interactions.

*Faculty mentor:*  
*Dr. Matthew McCabe*  
*Schwob School of Music* The concertina had its reed sets removed to make way for a micro-processing board by Arduino, as well as a barometric sensor. From there, basic programming was studied to make all the components communicate properly. The programming had to emit the proper data in order for it to be read by the music programming language of Max/MSP. The remainder of the research was spent learning to utilize Max to compose a piece of music.

*Presented:*  
CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant, \$300

## **Evaluating the efficacy of Indian herbal medicines on cancer cells and confirming their genetic identity using DNA barcoding.**

Plants have been used for thousands of years as remedies to cure the sick and now a growing number of Americans are turning to natural medicines because of their low cost and decreased side effects. Ayurvedic medicines, in particular, have been shown to prevent DNA mutation, decrease tumor formation, reverse the process of carcinogenesis and even inhibit cancerous cell growth. This study focuses on the species identification and efficacy of herbal medicines previously identified as potentially beneficial for anti-cancer treatment. The purpose of this study was to sample manufactured Ayurvedic capsules, extract their plant derivatives, and apply them to cancer cell lines to evaluate their effect of cell growth and proliferation. Furthermore, DNA barcoding was employed in an attempt to confirm the species composition of each of the capsules employed in this study. Preliminary results indicate that in some cases putative anti-cancer treatments have an effect on cancer cell lines and DNA barcoding shows potential for the confirmation of species identity. This research underscores the potential use of DNA barcoding to assess the quality of naturopathic medicines as well as the need for further testing to confirm the efficacy of anti-cancer treatments currently on the market.

*Hemalata Mandiga*

*Faculty mentors:*

*Dr. Kevin Burgess,*

*Dr. Monica Fraizer*

*Department of Biology*

*Presented:*

CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant, CSU Department Funds, \$360

## **Spectral Analysis of Supernova Remnant DEM L 241**

*Cameron McCarty* A supernova remnant is the expanded remains of a collapsed stellar explosion. We examine the Core Collapse (Type II) supernova remnant, SNR DEM L241, located in the Large Magellanic Cloud (LMC).

*John Hood*

The LMC is a satellite galaxy to the Milky Way located about 50 kiloparsecs away from our location. X-ray spectroscopy allows scientists to analyze and discover elemental composition, temperature, and energy flux. Using the x-ray data from the Chandra Space Telescope we are able to focus on certain regions of DEM L241 and analyze the absorption spectrum of each region individually, thereby creating a better model of the known composition of the object. By running our data through the proper programs provided by Harvard (Ciao and Sherpa), background noise can be eliminated and even more accurate charts can be created. Through this process, the data that is collected can also be checked and compared to previous research, by CSU staff and other collaborators, in each individual area of the remnant, such as the rim. By following the same procedures and steps that previous researchers have followed, it is possible to find new evidence to confirm, reject, or modify previous models of what we are observing.

*Faculty mentor:*  
*Dr. Rosa Williams*  
*Department of Earth &*  
*Space Science*

*Presented:*  
CSU Tower Day (2012)

*Funded in part by:* CSU Department Funds

## Effects of Bilberry Supplements on Immortalized Esophageal Cells

Several studies explain cancer prevention is possible through diet, and in some cases diet may assist the body with inhibiting the progression of preexisting cancers. A dietary pattern characterized by a higher intake of fruits, vegetables, and dark bread is associated with a lower risk of esophageal cancer. Berry consumption is of particular interest to this study. Berries contain a wide range of polyphenolic compounds called phytochemicals. Phytochemicals are believed to have important antioxidant activities that provide cancer protection within the human body by regulating toxin levels in the blood, and inhibiting abnormal cell division by targeting signaling pathways related to the cell cycle. There are two phytochemicals that are accountable for these antioxidant properties: ellagitannins and anthocyanins. They belong to a class of phenolic compounds called flavonoids. Anthocyanins are noted as being unique to other members of the flavonoid family. Its central ring structure holds a positive charge, and it demonstrates higher free scavenging activity. Therefore, this study will consider the characterization of a bilberry dietary supplement and its potential use in the treatment of esophageal cells.

*Marisa Naciuk*

*Faculty mentor:*

*Dr. Monica Frazier*

*Department of Biology*

*Presented:*

CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant, CSU Department Funds, \$900

## **Sedimentary Provenance Analysis of the Cretaceous Eutaw Formation, Coastal Plain, Southeastern U.S.**

*Donald Osborne* Across the region of Mississippi, Alabama, and Georgia within the Gulf-Atlantic Coastal Plain lies a stratigraphic layer of sedimentary rock known as the Cretaceous Eutaw formation (83 to 89 million years old). Stratigraphically above the Tuscaloosa Group, the Eutaw Formation represents a shallow marine environment receiving sediment from rocks of the eroding Appalachian Mountains on the adjacent continent. The objective of this project is to attempt to constrain the specific Appalachian source(s) of these sediments and the effects of lateral transport by coastal processes. This will be accomplished by comparing detrital components of the Eutaw with various source terrains in the southern Appalachians, in addition to constraining the distribution of detritus along the paleomargin of North America. Results of this work may allow for differentiation of the Eutaw and potential classification of subunits and their sedimentary sources.

*Faculty mentors:*  
*Dr. Bill Frazier*  
*Dr. Clinton Barineau*  
*Department of Earth & Space Science*

*Funded in part by: CSU S-RACE Grant*

## **DNA Barcoding of Indian Herbal Medicines and Testing Their Effects on Cancer Cell lines**

Many cultures rely on the use of medicinal plants as the main source of treatment for numerous illnesses. Specifically, the amount of people world-wide that are diagnosed with cancer is increasing at an accelerated rate. Testing the quality and efficacy of plant-based medicines that are currently on the market is an essential component of the prevention and treatment of this disease. The purpose of this study was to test the quality and efficacy of Ayurvedic capsules that contain various plant based-remedies previously identified as beneficial to overall health. I used DNA barcoding to confirm the species identity of 25 different capsules and applied liquid extracts of each capsule to cancer cell lines to test their efficacy on cell growth and proliferation. Preliminary results indicate that DNA can be isolated from Ayurvedic capsules and that DNA barcoding shows potential for species identification in some cases. Furthermore, preliminary results also indicate that extracts from Ayurvedic medicines that have been previously identified as benefiting general health also have potential anti-proliferative and apoptotic inducing properties in cancer cell lines. This research underscores the need to test for safety, quality, and efficacy of putative treatments for the benefit of the consumer plant-based medicines.

*Presented:*

CSU Tower Day (2012)

*Funded in part by:* CSU Department Funds, \$105, CSU SRACE Grant, \$317

*Parag Patel*

*Faculty mentors:*

*Dr. Kevin Burgess*

*Dr. Monica Frazier*

*Biology*

# The Rayleigh-Ritz-Galerkin Method for Elliptic Differential Equations

*Pedro Perez* Many times when dealing with differential equations we seek appropriate, exact solutions but we soon realize that this may be impossible. So we then are naturally led to find an approximate solution that is within accepted error bounds. The spaces under consideration will be  $PC_0^{1,2}(I) \equiv \{\phi \in PC^{1,2} \mid \phi(0) = \phi(1) = 0\}$  and the span of  $\tilde{S} \equiv \{\bar{B}_0, \bar{B}_1, \dots, \bar{B}_n\}$  where  $\tilde{S}$  is a linearly independent set of  $B$  splines,  $\tilde{S} \subset PC_0^{1,2}(I)$ , and  $I = [0,1]$ . We begin by considering the problem of approximating the solution,  $u \in PC_0^{1,2}(I)$ , to the self-adjoint linear second-order elliptic differential equation

$$-D[p(x)Du(x)] + q(x)u(x) = f(x)$$

with the boundary conditions  $u(0) = u(1) = 0$ , where  $0 < x < 1$ . We introduce the Rayleigh-Ritz method of approximating the solution which consists of determining an element  $u_{\tilde{s}} \in \text{span } \tilde{S}$  that minimizes a functional over  $\text{span } \tilde{S}$  where  $u_{\tilde{s}}$  is the approximation to  $u$ . We then show the Galerkin method of approximating the solution which consists of determining an element  $w_{\tilde{s}} \in \tilde{S}$  such that  $a(w_{\tilde{s}}, \bar{B}_i) = (f, \bar{B}_i)_2$  for all  $0 \leq i \leq n$ . Finally, we show that in fact both methods are identical in this context and thus we have what is called the Rayleigh-Ritz-Galerkin (RRG) method. We then extend the ideas to semi-linear second-order and to two-dimensional elliptic differential equations. We also give general a priori error bounds for the approximations from the space  $\text{span } \tilde{S}$ .

*Presented:*  
CSU Tower Day (2012)

*Funded in part by:* S-RACE Grant \$300, CSU Department Funds, \$74

## **RISO Plus**

The Coca-Cola Space Science Center's (CCSSC) influence extends beyond the Columbus State University population to include members of the general public, especially grade school students. This semester, the Real-time Interactive Solar Observatory (RISO) has been undergoing upgrades that will open new doors for these students, transforming it into the new and improved RISO Plus. RISO Plus builds on the remote solar observing capabilities of RISO to include night-time observing. The software will also be expanded to offer better data collection and analysis tools. There are multiple components to these upgrades, from technical improvements to the addition of educational guides. For technical improvements, camera and filter optimization, software and hardware upgrades and an entirely new RISO Plus program were implemented and designed. Along with this, the Real-Time Monitoring section of the CCSSC's website was redesigned and includes features such as real-time solar observing, a weather station, a seismograph, and 2 All Sky Cameras, all of which broadcast from CCSSC and can be accessed anytime from anywhere. Further technical improvements are slated for the remainder of the semester and throughout the summer. To insure the reliability of the interactive RISO Plus software, field testing will commence at the end of April in locations such as local schools, Australia, India and Nepal. On the educational side of the upgrades, activities have been designed to guide students through the collection and analysis of data. These activities lead students through the scientific process to draw accurate conclusions about astronomical events. They include lesson plans and activity guides for instructors as well as suggestions for additional resources. The technical and educational components were designs in tandem to enhance the learning experience provided by the program. RISO Plus will greatly improve the astronomy education opportunities that CCSSC can offer.

*Matthew Perry  
Katherine Lodder*

*Faculty mentor:  
Dr. Rosa Williams  
Department of  
Earth & Space  
Science*

*Presented:*

CSU Tower Day (2012)

*Awarded:* Best Tower Day Presentation 2012

*Funded in part by:* Coca-Cola Space Science Center NASA SPACE Grant



## **Album Recording and Production**

*Caleb Pringle* The goal of this project is to write, record, and produce an album of original musical material while following the same standards and values that are practiced in the professional music recording industry. On a creative level, it incorporates all areas of musical craft, from composition to arrangement and performance. It encompasses all the knowledge a music student at Columbus State University is expected to possess, collected into a single creative effort that has never before been attempted in the department or university. The process will include thorough research of music industry standard production techniques, and will require extensive knowledge of common recording industry practices. At its completion, the project has the capacity to yield not only a final product, but a representative work of art reflective of four years of music study at Columbus State University.

*Faculty mentor:*  
*Dr. Matthew McCabe*  
*Schwob School of*  
*Music*

*Funded in part by: CSU S-RACE Grant*

## **Video Game Violence and the Law: Content, Framing, and the Supreme Court**

Video Game Violence and the Law: Content, Framing, and the Supreme Court is a project designed to analyze how the Supreme Court rules in cases regarding the constitutionality of video games. When the public links violent crimes to video games, their sentiments become strong enough to catapult video game regulation to the top of state agendas. The states, in order to answer the call of the people and decrease the chances of incidents like school shootings, attempt to regulate video games. However, the states are countered by the Supreme Court and its idea that video games deserve the protection of the First Amendment. In order to examine the Supreme Court's rulings on video game regulation the states attempt to pass into law, the project explores various crimes, both foreign and domestic, which affect both the states' and public's opinion of the link between video games and violent crime. The states' interpretations of the Constitution in comparison to the Supreme Court's view will also be examined in order to better understand the discrepancies between the two organizations. This project is designed to examine the thought processes of the public, states, and Supreme Court when it comes to if and how much video games should be regulated.

*Alessandro  
Raimondo*

*Faculty mentor:  
Dr. Kyle  
Christensen  
Department of  
Political Science  
and MPA Program*

*Funded in part by: CSU S-RACE Grant*

## **There and Back Again: A Gardener's Tale**

*Emily Randall  
Matthew Perry*

*Faculty mentor:  
Dr. Roger Brown  
Department of Earth &  
Space Science*

Throughout the United States and the world, the cost of feeding one's family has risen dramatically, and the origins of our food are either from thousands of miles away or relatively unknown. However, those who have started growing some of their own food have been able to partially offset the endless cycle of poverty by using this hobby to supplement themselves financially. "There and Back Again" is a multi-semester research project aimed at the immersion of Columbus State University students in the cultures of India and Nepal to observe how farming and the use of small community gardens can help put an end to the poverty cycle. Embedding ourselves within the backdrop of the developing

world will provide useful and real-world experience that will allow us to examine how organic and sustainable living practices are a means of empowerment and provision. By developing and perpetuating organic, sustainable farms located throughout these areas, experience on how to cultivate sustainable lands will deepen our own understanding of specific skills and the crops associated with them, as well as educating and promoting sustainable and healthy living to those in the communities. Upon completion of travel, experience and information will be disseminated throughout the campus and the community, empowering the Columbus community with the motivation to cultivate community gardens. The end state of this project is to create a Columbus State University backed outreach and learning programs aimed at encouraging members of our community to reap the benefits of small, sustainable farming.

*Presented: CSU Tower Day (2012)  
Awarded: CSU One Day Sustainability Award*

*Funded in part by: CSU S-RACE Grant*

## **Feet that Don't Touch the Floor: Perceptions in Marketing Theatre for Young Audiences**

The government is in debt and at war, the educational system is consumed by standards and testing, celebrities are overpaid and over-paparazzi-ed, politicians are philandering, and the American citizenry is trying to make sense of it all. With all of this occurring simultaneously, why should American people turn their attention to the under-funded and overpopulated sector of live theatre? What benefits does live theatre offer to society? If the impact is so vital, why do so many theatres struggle to make ends meet? What is missing

in the equation? In the haste of the day to day, we lean back on our trusted routines and often forget to look forward. More than ever, it is necessary to seek feedback, to be objective, and to take risks. It is no longer enough to be creative artists challenging the people; theatres that have earned reputations of high merit have suffered with the rest. We must now accept a challenge from our audience. It is vital that we strive to be active listeners, responding to the needs of the people and remain flexible as they share their time and energy with us. First we must get to know the people: Who is our audience? What do they want out of their experience? Where do they go when they want to escape or be entertained, educated, or enlightened? How do we market the arts to them? How do we expand our audience? How do we maintain their support? How do we best serve their needs? Within the realm of theatre, my focus is on theatre for young audiences (TYA). I delve into marketing and the perceptions held by the audience (and in this case, their parents) and the arts leaders of TYA organizations. My goal is to find out what TYA arts leaders assume of their audience's parents and what parents actually think. Comparing the perspectives, I hope to provide a discussion for the efficacy of different marketing techniques and strategies of arts management for TYA, make predictions about the future of TYA, and suggest inevitable changes that will affect theatre as a whole.

*Melora Slotnick*

*Faculty mentors:  
Dr. Becky Becker  
Department of Theatre  
Dr. Cindy Henning  
Honors Program*

*Presented:* CSU Tower Day (2012)

*Funded in part by:* CSU S-RACE Grant

## **Ethnobotanical Genomics of the Medicinal Plants of Nigeria: DNA Barcoding Confirms the Identity of Species Having Antibacterial and Antifungal Properties.**

*Mfoniso Umoren*

*Faculty mentor:  
Dr. Kevin Burgess  
Department of Biology*

The goal of this research was to confirm the species identity of medicinal plants in West Africa and evaluate their medicinal efficacy. Specifically, I collected 12 plant species in Nigeria that are known widely for their antibacterial and antifungal properties. DNA barcoding was then used to confirm species identification based on sequence variation in the *rbcL* gene region of the chloroplast genome. Plant extracts from each species were then isolated and applied to plates containing bacterial and fungal cultures to evaluate their medicinal efficacy. Preliminary results indicate that DNA barcoding can be used to confirm the species identification of medicinal plants collected in Nigeria. Furthermore, in some cases, plant extracts confirm putative antibacterial and antifungal properties. Results not only provide a novel contribution to the Ethnobotanical literature but also provide insight for researchers in Nigeria who are currently working with these medicinal plant species.

*Presented:  
CSU Tower Day (2012)*

*Funded in part by: CSU S-RACE Grant,\$588, CSU Department Funds \$197*

## **The successful performance and the new unlimited opportunities for active development of the music student**

This project contains two projects in one since for the realization of both of them the same equipment is needed. The first part of the project would make possible to participate at the different music projects and win the competitions for the prominent CSU music student, this way bringing the honor to the CSU making its music department more positively famous. The second part of the project is recording of the rehearsals/concerts of the new music compositions of the same student that could help her improving the work significantly.

*Liliya Ugay*

*Faculty mentor:*

*Fred Cohen*

*Schwob School of*

*Music*

*Funded in part by: CSU S-RACE Grant*

## Dependency Theory: Integrating Social Media into the Department's Homepage

*Christina Van Allen* This project involves 2 teams of Communication students whose work will be submitted for the competitive presentation at the 82nd annual Southern States Communication Association's annual conference in San Antonio, Texas (Communication Theory Division has December acceptance notification). Our research integrates theory & practice as it applies Uses and Gratifications and Social Presence Theories to produce a compelling web presence (departmental and its Non-Profit & Civic Engagement Academic Center) to launch in December as an actual Communication Department recruiting, retention and funding tool. Our student work stems from Directed Studies class where we could more fully explore and expand upon social media theories and apply them in a real-life setting. Insight provided from our combined theoretical lenses and selected mediated communication channels provides a unique perspective that integrates the Communication Department's academic rigor with its passion for Service Learning and resulting strong non-profit community partnerships that expand capacity for students and local agencies. The theory-driven research has produced an appealing and relevant message to help brand the Communication Department and connect students (potential, current and alums), community, and potential donors to our department and the services it provides through its academic center, N-Pace.

*Faculty mentor:*  
*Dr. Danna Gibson*  
*Department of*  
*Communication*

*Funded in part by: CSU S-RACE Grant*

## **Gender Differences in Mediation: An Analysis of Mediator Gender and Settlement Rate**

This research project addresses gender differences in mediation, regarding settlement rates of male and female mediators within the state of Georgia at the county level. This study explores the application of feminine and masculine norms in this type of alternative dispute resolution and the aim is to determine which gender may be better suited to mediate by means of observing settlement rate. A literary analysis of gender stereotypes, namely, an examination of qualities that are deemed as “masculine” and “feminine,” lends itself to the formulation of the hypothesis that female mediators may have a tendency to be more successful in achieving higher levels of settlement in mediation than male mediators.

*Charlotte Walker*

*Faculty mentors:*

*Dr. Kimberly Gill*

*Dr. Kyle Christensen*

*Department of Political  
Science and MPA Program*

*Funded in part by: CSU S-RACE Grant*



## **Developing new improved indicators for the acid-base volumetric titrations “To be presented at SERMACS 2011, Richmond, VA”**

*Taralynn Y. Williams*

*Faculty mentor:  
Dr. Yousef Ahmadibeni  
Deptment of Chemistry*

The first phase of this project was developing two new acid-base indicators which are widely used in undergraduate and research labs to analyze acids and bases. The project covered different aspects of chemistry including general, organic and analytical chemistry and two new acid base indicators were introduced with detailed experimental profile to be used for acid-base titrations in the chemistry laboratories. I would like to present this research at SERMACS 2011, Richmond, Virginia.

*Funded in part by: SRACE Grant*

## **Retirement Planning for Generation Y**

Research project that began as an assignment in ACCT 4116-Contemporary Accounting Theory, and, through a number of rewrites, was developed into a publishable-quality research paper. The Abstract follows: “Retirement is a fact of life for those who make it that far. Planning for it should be a simple process, but with changes in the way it is funded and outside forces, it is anything but simple. Employers, employees, and society are faced with the same problem: how to provide a secure retirement in an ever-changing world. No group has more uncertainty in their retirement plans than Generation Y who, having just entered the workforce, are now faced with major decisions regarding retirement. Faced with declining employer contributions to pension funds and a Social Security meltdown, young workers must make their own path to retirement that will sustain them well into their twilight years. Tough decisions and sacrifice will be the options many will be faced with.”

*John Walker*

*Faculty mentor:  
Dr. Rita C. Jones  
Department of  
Accounting & Finance*

*Funded in part by: SRACE Grant*



## COMMUNITY PRESENTATIONS

### **The Best Practices to Prevent Deep Venous Thrombosis (DVT)**

The purpose of this research was to determine whether the use of mechanical devices and combined pharmacological prophylaxis minimize the formation of DVT during hospitalization. Data was collected from specialized research databases such as EBSCOhost and CINAHL, including seven evidence based practice articles. The articles include randomized controlled trials and systematic reviews. According to evidence based practice data, using mechanical and pharmacological prophylaxis together is the best way to prevent DVT formation. For better outcomes in patients with increased risk of bleeding, either the uniform or sequential compression devices should be started immediately in the preoperative phase, and continue until complete ambulation. Intermittent pneumatic compression devices are not effective if used for only 24 hours. Thigh-length stockings are proven to be the most beneficial in preventing proximal DVT formation. Low-Molecular Weight Heparin and Statins are used as a pharmacologic prophylaxis for patients with an increased risk for clotting. Statins possess anti-inflammatory and immunomodulatory effects that can translate into antithrombotic activity for long term therapy use. However, there are no studies to prove short term effectiveness. Based on this research, early mobilization is still known as the most effective way to prevent DVT.

*Alice Asare  
Liliana Blankenship  
Etsubdenke Templier  
Mariama Sylla  
Nellie Samuel*

*Faculty mentors:  
Mrs. Sally Richter  
Ms. Noreen  
McDonough  
Dr. Latonya Santo  
Dr. Sheri Noviello  
School of Nursing*

*Presented:* St. Francis Hospital (November 2011), CSU Tower Day (2012)

## **Implementing Change to Prevent Catheter Associated Bloodstream Infections**

*Wendy Chipman  
Jenny Cherry  
Patricia Chambliss  
Kellie Myles  
Anna Raymer*

*Faculty mentor:  
Dr. Elizabeth Frander  
School of Nursing*

Patients who are critically ill often have central venous access devices placed to aid in their treatment and prevent multiple needle sticks. Although advantageous, they also have the potential to be a mean of access for bloodstream infections in these already compromised patients which in turn increases mortality rates. Our research of evidence based on practices for the care and access to these devices includes several studies done based on the Center for Disease Control's recommendation of a bundle care package compared with current practices and interviews with healthcare professionals who specialize in the placement of these venous access devices. The bundle care package consists of a Central Venous Catheter Team, continuing education, proper handhygiene, use of protective barriers when working with the devices, chlorhexidine preps, and the use of an impregnated Biopatch to cover the insertion site. One study, performed by AHRQ Research Activities (2009) at a Michigan hospital using the bundle care package, showed a reduction in catheter related bloodstream infections of 66%. Our presentation will provide information from other research studies needed by healthcare professionals for continuity of care and improving patient outcomes as well as for the non-medical person in recognizing signs of infection and the care they should expect with venous access devices.

*Presented:*  
St. Francis Hospital (November 2011), CSU Tower Day (2012)

## **Best Practices for the Prevention of Surgical Site Infections**

Surgical site infections are major complications following a surgery. Post operative surgical infections increase patient mortality rates and hospital costs. The research question was: In preoperative surgical patients, does the use of chlorhexidine with no hair removal compare to the use of povidone-iodine with hair removal to decrease the incidence of surgical site infections postoperatively? A thorough review of the literature demonstrated that using chlorhexidine was superior to using povidone-iodine in preparation for surgery. Specifically, use of 2% chlorhexidine wipes the night before surgery, use of electric clippers or depilatory cream for hair removal, and use of 2% chlorhexidine and 70% isopropyl alcohol solution immediately before the application of surgical drapes, was statistically significant in decreasing the incidences of surgical site infections. A new best practice guideline was developed based on the findings. Implementing the new guideline will decrease the incidence of surgical site infections resulting in improved patient outcomes and increased cost effectiveness.

*Monique Cobb  
Yvonne Zeng  
Jane Rivers  
Tiffni Williams  
Kehinde Oludimimu*

*Faculty mentor:  
Ms. Noreen  
McDonough  
School of Nursing*

*Presented:*

The Medical Center (November 2011), CSU Tower Day (2012)

## **Easing the Process of Death: Withholding Artificial Nutrition and Hydration at the End of Life**

*Angela Cruz*  
*Shuntelle Anderson*  
*Kristen Scogin*  
*Kalysha Vazquez*  
*Sarah Wright*

The decision-making process regarding withholding artificial nutrition and hydration at the end of life is convoluted, encompassing ethical and medical circumstances. The primary focus of this research was aimed at those patients in an active phase of dying, and determining the efficacy of continued administration of the intervention in achieving a peaceful death. Extensive research was conducted through the analysis of current systematic reviews and multi-perspective observational studies. It was determined that the onset of multiple adverse system responses would indicate the need to withhold the intervention, as the potential harm from continued administration outweighed the benefit. These findings were organized in an evidence synthesis table, where the research information was deemed valid and reliable. A guideline was developed that outlined both the adverse and advantageous system responses, which dictate the decision to withhold artificial nutrition and hydration. In addition, several alternative comfort measures were described which could be used in easing the process of death. The early inclusion of all parties involved – the patient, family, physicians, nurses and clergy – is pivotal in easing the decision making process at the end of a patient's life.

*Faculty mentor:*  
*Dr. Elizabeth Frander*  
*School of Nursing*

*Presented:*  
St. Francis Hospital (November 2011), CSU Tower Day (2012)  
*Awarded:* Best Poster Tower Day 2012

## **Best Wound Care Practices for Chronic Infected Wounds**

There are approximately five million Americans who suffer from chronic, non-healing wounds at any given time. A study was conducted to determine the best wound care practices comparing silver to other traditional dressings. Multiple randomized controlled trials, meta-analysis, and systematic reviews between the years of 2007 and 2011 were examined to determine the effectiveness of silver dressings on chronically infected wounds. The findings demonstrate that silver is most effective in treating chronically infected wounds by reducing wound size and inflammation, and producing faster wound closure and other positive patient outcomes. Based on the findings, a guideline was formulated to provide the correct application process of silver dressings to appropriate wounds. Although silver dressings have demonstrated significant improvement in patient wound outcomes, further research is needed to examine other therapies such as wound vacuums and hyperbaric oxygen therapy.

*Kathleen Moore  
Ashley Brantley  
Angel Bussell  
Cierra Coulter  
Gabriel Leonidas*

*Faculty mentor:  
Ms. Noreen  
McDonough  
School of Nursing*

*Presented:*

St. Francis Hospital (November 2011), CSU Tower Day (2012)

*Awarded:* Best Tower Day Presentation 2012



## **The Value of Unrestricted Visiting Hours Paired with Quiet Time in the Critical Care Setting**

*Melanie Miller*  
*Brittany Webb*  
*Whitney Arellano*  
*Hilary Antley*  
*Renaye Ottman*

The purpose of our research was to determine whether open or restricted visiting hours are more beneficial to patients in a critical care setting. The research question is: For adult patients in a critical care setting, would open or restricted visiting hours provide better patient outcomes? This topic is important to medical professionals, patients, and their families; the value of a patient support person impacts patient care and outcomes. The benefits of open visiting hours may include higher patient satisfaction, greater family involvement, improved patient outcomes and lower medical costs. The research included current guidelines established by professional organizations as well as results from studies cited in scholarly articles. Randomized controlled trials were limited on the topic, but many descriptive studies provided patient, family, and healthcare professionals' opinions. Sources were current, using only research conducted after 2006. Tools used to measure results were valid and reliable. Most of the literature showed that open visiting hours improved patient outcomes and satisfaction significantly more than closed visiting hours; however, contradictory evidence showed that patients without visitors had a slightly lower mortality rate. In order to address this conflicting evidence, a guideline providing for open visiting hours with set quiet times throughout the day was established. The evidence showed that this guideline could best address patient needs for familial support while allowing for a restful atmosphere in the critical care setting.

*Faculty mentor:*  
*Dr. Sheri Noviello*  
*School of Nursing*

*Presented:* St. Francis Hospital (November 2011), CSU Tower Day (2012)

## **Breastfeeding Promotion and the Prevention of Childhood Obesity**

Childhood obesity is an epidemic in today's society. It has more than tripled in the past thirty years. It is imperative to find out what is causing children to become obese in order to make a change. The research project was conducted to determine the effect of breastfeeding in the prevention of childhood obesity. The PICOT format was used to compile the research question, evaluating the population, intervention, comparison intervention, outcome, and time frame. The question researched was, in preschool and school-age children, does breastfeeding in comparison with bottle feeding have a lower incidence of obesity in the first six years of life? The researchers compiled current evidence from various databases, such as CINAHL, peer-reviewed articles, and the Centers for Disease Control and Prevention, to find the best recommended practice for breastfeeding and the prevention childhood obesity. The findings show that breastfeeding, in correlation with other modifiable variables, contributes to the reduction of childhood obesity. With the evidence based practice stating that breastfeeding plays an integral role in reducing obesity in school age children, extensive education should become a standard of care for all nurses involved in prenatal, labor, and pediatric care to assist in reducing our nation's obesity rate.

*Maegan Phillips  
Mandi Ruter  
Jenna Anthony  
Amber Bell  
Jeanmarie Hoopes*

*Faculty mentor:  
Dr. Cheryl Smith  
School of Nursing*

*Presented: Medical Center (November 2011), CSU Tower Day (2012)*

## **Will Scheduled Cholesterol and BMI Screening, in Addition to Regular Well Child Physicals in Children, Ages Two to Eighteen, Help in Early Detection of Cardiovascular Disease?**

*Lisa Newman*  
*Jenna Hackaday*  
*William Putnam*  
*Justin Jordan*  
*Sarah Hackaday*

According to Healthy People 2020, heart disease is the leading cause of death for people in the United States. Over a third of the people in the US have one or more types of cardiovascular disease. Will scheduled cholesterol and BMI screenings, in addition to regular well child physicals in children, ages two to eighteen, help in early detection of cardiovascular disease? The researchers reviewed several types of peer reviewed articles that indicated a strong link between childhood BMI and cholesterol levels and adult cardiovascular issues. If these findings were recognized and implemented in practice, the number of individuals with adult on-set cardiovascular disease could be significantly reduced. These researchers suggest new clinical guidelines regarding screening and possible prevention of cardiovascular disease.

*Faculty mentor:*  
*Dr. Cheryl Smith*  
*School of Nursing*

*Presented:*  
Columbus Regional Hospital (November 2011), CSU Tower Day (2012)

## **Salinity Comparison of Leaves in Rhizophora Mangle (Red Mangrove)**

The Red Mangrove (*Rhizophora mangle*) is a member of a diverse group of plants that are able to thrive in the high salinity of a coastal environment. There are over a hundred varieties of mangroves in the world, and three are found on Andros Island in the Bahamas. Red Mangrove grow in the shallow bays around Forfar Field Station on Andros Island. The guides at Forfar have been known to point out during a tour of the mangrove environment that the plant manages salt content by sequestering all of the salt into one leaf. The leaf then turns yellow and dies leaving the rest of the plant unaffected by the salinity of the water. If this were true, the yellow leaf would have a much higher salt content than the green leaves on the tree. This project was undertaken to determine whether the yellow leaves of the Red Mangrove have a higher salt content than the other leaves. Yellow leaves from four Red Mangroves were tested for salinity, along with green leaves growing near the yellow leaf, and green leaves from the opposite side of the plant. The salt concentration of the different leaves on each plant showed no significant difference, thus disproving the wives tale perpetrated by the staff at Forfar.

*Valerie Staples*

*Faculty mentor:  
Dr. Julie Ballenger  
Biology*

*Presented:*

St. Francis Hospital (November 2011), CSU Tower Day (2012)

# **Evidence Based Practice Upholds Theory of Electronic Medication Reconciliation Implementation to Improve Patient Outcomes in the Hospital Setting**

*Alex Tinoco* Over 400,000 preventable drug injuries occur each year in hospitals with medication errors being the most frequent type. Research has proven that information technologically based programs implemented in hospitals are beneficial to improving patient outcomes. Thus a question for research was developed based upon the PICO criteria. Among patients requiring medical treatment through the use of medications, is electronic medication reconciliation more effective in decreasing medication errors and adverse drug events than using the pen and paper process of medication reconciliation? The research conducted was based upon expert opinion, randomized controlled trials, and an interview. The studies used to confirm these findings were based upon a high level of evidence, specifically randomized control trials. The implementation of electronic medication reconciliation was found to be valid and reliable based upon critical appraisal. To improve overall patient safety, medication reconciliation must advance; this research provides a solution to this ongoing problem.

*Faculty mentors:*  
*Dr. Cheryl Smith*  
*Noreen McDonough*  
*School of Nursing*

*Presented:*  
St. Francis Hospital (November 2011), CSU (Tower Day, 2012)

## **Best Practices For Managing Pain in the Elderly**

Millions of elderly suffer needlessly from pain on a daily basis. What are the best practices for pain management in elderly patients? Pain management in this population is challenging due to factors such as medication side effects, perception of pain, multiple medication use, and changes in cognition. These factors, along with failure to report pain, misconceptions about pain tolerance, and risks of addiction to opioids, lead to the mismanagement of pain. It is imperative as nurses to recognize the importance of proper pain management to provide the ultimate care for patient's overall physical and psychological well-being. In order to effectively manage pain in this population nurses need to be skillful in pain assessment; knowledgeable in pharmacologic and non-pharmacologic approaches and recognize the importance of an interdisciplinary-team approach for care. This paper addresses the best practices for pain management in elderly patients using case-controlled study articles that were published within the last five years. The population is the elderly, the intervention is pain management and the outcome is a decrease in overall pain. There is no comparison or time used; as these were not applicable.

*Tomiko Womack  
Arleathia White  
Jenae Acosta  
Christie Jolley*

*Faculty mentor:  
Dr. Cheryl Smith  
School of Nursing*

*Presented:*

Study Abroad Class and Biology Faculty (2011), CSU Tower Day (2012)

## **PROJECTS PRESENTED AT TOWER DAY**

Tower Day is an annual showcase for undergraduate research and creative endeavors sponsored by the Columbus State University's Honors Program. Undergraduates from all disciplines were invited to submit their proposals for presentations, posters and panel discussions. Those selected were invited to the day-long colloquium on April 10, 2012, which hosted # researchers presenting to an estimated audience of over #.

During the event, undergraduate presenters were judged by a panel of faculty and honors students. Ten projects, including five presentations and five posters, were selected to receive Outstanding Research & Creative Scholarship Awards and recognized for their achievement at the annual Scholastic Honors Convocation. Those who have granted permission to print their abstracts are included in this publication.

## **An Index of the Invasive Species of Oxbow Meadows Using DNA Barcoding**

Oxbow Meadows is home to a variety of plant life including both native and invasive species. The presence of invasive species in this area has largely been left unreported which makes it hard for biologists to truly see how far certain invasive species are reaching. Using DNA barcoding on the *rbcL* portion of the chloroplast genome, an index of the invasive species at Oxbow Meadows was created. The DNA was collected and the taxonomic identifications were done by students in Dr. Burgess' Conservation Genetics class. The identifications and DNA were then rechecked for accuracy using GenBank and taxonomic keys. The data was then submitted to the University of Georgia's invasive species tracking program called EDD Maps. In total, Oxbow Meadows has at least 8 invasive species that have now been reported. The DNA barcoding data is being prepared to be submitted to the International Barcode of Life Initiative.

*Will Borin*

*Faculty mentor:*

*Dr. Kevin Burgess*

*Department of Biology*



## **Bridging the Gap: A Pakistani Cultural Perspective**

*Kayla Brown* In 1999, due to a military takeover of the Pakistani government, the Dharani family decided to move to the United States. They came to the United States on vacation, but the military coup quickly changed their plans. This family's struggles and experiences of adapting to a new land gave

*Faculty mentor:*  
*Dr. John Studstill*  
*Department of Earth & Space*  
*Science* insight into their culture, their character and into multicultural aspects of our own (U.S.) culture. Through the use of the participant observation method in studying the Dharani family, I listened to their stories and interacted with them on a personal level. I was able to learn about the struggles that the Dharani family faced while adapting to the U.S. sociocultural system which included: language barriers, differences in socioeconomic status, different teacher expectations in the educational system, and differences in teacher/student relationships. This study can help broaden one's perspectives about diverse cultures and ways of life in our country that are different from one's own.

## **Ratemyprofessors.com: User - Nonuser Differences**

In the present research, we sought to determine the proportion of students who had used the Rate My Professor(RMP) site, assessed for differences in demographics between users and nonusers and assessed for user - nonuser differences in beliefs relating to the site and its use. Mean age of our sample (N = 197) was 22.6. The sample was 77% female and predominantly white (48%) and African American (43%). In addition to detailed demographics, the survey contained 19 questions relating to RMP (nonusers completed only a subset of these). The majority of our sample (81%) had visited RMP.

Chi square analyses indicated the following. No user - nonuser differences were observed for the variables of gender, ethnicity, academic year, or self-reported academic success. Regarding age, users tended to be younger (M=22.03) than nonusers (M=24.87) but this difference was only marginally significant  $t(154,41)=1.89, p=.07$ . A second set of chi square analyses indicated the following. RMP users believed that faculty were more accepting of the site ( $p=.001$ ). Compared with nonusers, RMP users felt the information provided by the site was more accurate( $p=.005$ ). RMP users expressed less concern than did nonusers with use of the site possibly being wrong, unethical, or even a form of cheating, though this difference was only marginally significant ( $p=.07$ ). Also worth noting, though not statistically significant, RMP users tended to be more technologically oriented than non-users. Results suggest that a large majority of students are actively using RMP. Users may be younger and more technologically oriented than nonusers. Our users were more likely to think that faculty are accepting of RMP. RMP users were more likely to perceive higher accuracy of the information on RMP than non-users. And, users expressed less concern than did nonusers with use of the site possibly being wrong or unethical. The rapid and continued growth of RMP suggests continued and more in depth research into the ways in which students utilize the site.

*Jordan Child*

*Faculty mentors:  
Dr. Harvey Richman  
Department of  
Psychology*

## **Solar Observations Utilizing the Coca-Cola Space Science Center's Mead Observatory**

*Zachary Edwards  
Truman Williams  
Cameron McCarty  
John Hood*

*Faculty mentor:  
Dr. Rosa Williams  
Michael Johnson  
Department of Earth & Space  
Science*

By studying the solar weather we can begin to understand our sun and its interactions with Earth. One of the main components of the Columbus State University's Coca-Cola Space Science Center (CCSSC) is the Mead Observatory, which is primarily used for solar imaging, and intended specifically for reaching out to the community. All observations are taken with the Meade 16" LX 200 Schmidt-Cassegrain Telescope on an equatorial open fork mount which is housed in this observatory. It is dedicated during most daylight hours to a solar observing project that began in 2001. Observations to date have largely been limited to the study of prominences and sun spots, though recordings have been taken of some of the large flares that have taken place this semester. In previous years the Sun was in at minimum activity during these observations. Recently, the Sun is going back to its maximum solar activity thus making these observations more spectacular. Most notably, various X-class (highly energetic) flares have taken place since January 2012. The Solar Observatory is a two part project: solar imaging and public outreach. For the scope of this presentation we will focus on only solar imaging by presenting various solar images and videos.

## **What Attributes do Children Use to Sort Geometric Shapes?**

The research question our group choose to investigate was, which attributes do children use to classify or sort different shapes? Our motivation behind choosing this topic was to see how children define different shapes and categorize them according to their properties. To conduct this research our class interviewed sixteen children from ages preschool to fifth grade. The children were given pictures of twenty-six different shapes ranging from quadrilaterals, pentagons, circles, triangles, hexagons, and convex & concave figures. As a result of completing these interviews, our group found that children both young and older used the number of sides a shape has to label it and categorize it. A majority of the students had difficulty recognizing the concave figures and the obtuse triangles. No children could correctly name these particular figures. All of the children generally sorted the shapes and labeled them by basic figures such as triangles, circle, oval, square, rectangle, and star. All of the children tended to only recognize the typical regular polygons and were confused figures that did not fit into that category that they were used to seeing. Additionally, the children often compared the shapes to many real-life examples such as “Hershey kiss,” “Easter Eggs,” and “baseball bats.” Additional findings will be presented in our poster.

*Brittney Folds  
Jenna Plott  
Jessica Todd  
Kersten Charles  
Scherry Daigle  
Amanda Dusse*

*Faculty mentor:  
Dr. Cindy Henning  
Department of  
Mathematics & Philosophy*

## **Best Practice for Increasing Blood Pressure in Symptomatic Patients**

*Sherry Fulmer  
Emily Hunt  
Sherry Simpson  
Catherine Stouffer  
Amy Votary*

*Faculty mentor:  
Dr. Elizabeth Frander  
School of Nursing*

The Trendelenburg position, a supine position with the patient inclined at a head-down tilt of a 45 degree angle, has been commonly used to increase venous return and elevate blood pressure among health care professionals since the early 20th century. As with any nursing intervention, this practice needs to be evaluated for its efficacy. Research was framed within a PICOT (Population Intervention Comparison Outcome Time) question as to whether the Trendelenburg position helps increase blood pressure in symptomatic hypotensive patients. After a comprehensive search of eight reputable databases for current guidelines, no such standards were found. Research was conducted using the most up-to-date journal articles and nursing textbooks since 2002, yielding several results, including a randomized control trial. Five multi-disciplinary professionals within the region were also consulted for their expert opinions. All research concluded with little to no effect using the Trendelenburg position or its modified version, leg elevation, and emphasized a call for further research. Most importantly, the contraindications highlighted in the research suggested that use of this intervention can pose serious health hazards to populations with common medical conditions. With advancements in technology and pharmacology, the future use of this intervention needs to be carefully consider

## **Educational Communication and SNS**

Since their introduction, social network sites (SNS) have been integrated into the daily lives of millions. University students are some of the most enthusiastic users of SNS yet, despite these facts, many universities continue to use email as their main means of communication with students. By applying the Uses and Gratification Model, this paper attempts to address the appropriateness of SNS as a university communication tool. Results reveal that both information seeking and socializing are related to positive student perceptions about the use of SNS in education. Results are discussed as they pertain to this university's current efforts and to academia as a whole.

*Hayley Henderson  
Shane Hancock  
Julie Mulch  
Christopher Mulch*

*Faculty mentors:  
Dr. Danna Gibson  
Dr. Youngrak Park  
Department of  
Communication*

## How do Children Classify Triangles?

*Hailey Hinson* How do children classify triangles? The van Heile Model of thinking  
*Megan Parker* defines five levels of thinking among students throughout their  
*Kristan Mumpower* learning which are not characterized by age, but by level of  
*Jillian Tankersly* understanding. Level 0 and Level 1 were the two levels looked at in  
*Melissa Dickens* this research study. Level 0 pertains to students in grades pre-school  
*Reilly Abshire* to second grade and level 1 pertains to those students second grade to  
fifth grade. Using the van Heile model as the framework, research  
was conducted to determine what attributes of shapes children at  
different ages utilize to classify or define a triangle. Columbus State  
*Faculty mentor:* University students interviewed sixteen children in the community  
*Dr. Cindy Henning* between the ages of three and ten. Each child was asked to sort  
*Department of* twenty-six figures. The figures included acute, obtuse, right and  
*Mathematics &* scalene triangles, while others were various polygons and three-sided  
*Philosophy* figures with curved sides. The goal for the research project was

to see how the students sorted the certain shapes and to elicit conversations about how they defined triangles. The researchers observed how children sorted the shapes and then asked how the student sorted all objects. Our research found in the younger age range of three to eight, that many of the non-triangle shapes “tricked” the students into thinking they were triangles. Some used the definition of “a triangle has three points” to classify shapes as “triangles” even when the shape was constructed with curved edges. For the older group, ages eight to ten, a fewer students sorted non-triangular shapes as triangles, and most defined a triangle as a shape with three sides and straight lines. In conclusion, students in the older grades could classify the triangles using more attributes; however, some were still tricked. They defined a triangle as having “three sides, straight lines, and pointy ends.”

## **A Field Guide of Common Plants in the Tropical Rainforest and Coastal Area of Belize**

This project was performed by two students, Bolivia Hurtado de Mendoza and Emily Husted, to fulfill an honors course requirement. The goal was to create a field guide of the common plants found in both the tropical rainforest (Blue Creek Field Station) and beach area (South Water Caye) in Belize. The aim of the project was to provide a helpful field guide to students who go on future trips to Belize. Information in the field guide will help with plant identification during the trip, as well as serve as a study tool upon return from the trip. The common names of the plants and their uses were lectured to them by Herald, the Mayan tour guide during an ethnobotany walk in the rainforest. The information about the plants on the cayes was provided by Dr. Kevin Burgess during their stay at South Water Caye. The guide will contain the following for each plant: a picture, common name, scientific name, description, and its common uses. The pictures were taken during their trip to Belize, in March, so flowering and fruiting times reflect this time of year.

*Emily Husted*

*Bolivia Hurtado de Mendoza*

*Faculty mentor:*

*Dr. Kevin Burgess*

*Department of Biology*



## **Influence of Food Preference versus Direction on Hermit Crab Feeding**

*Emily Husted  
Bill Tomkiewicz*

*Faculty mentor:  
Dr. Julie Ballenger  
Department of Biology*

This project was conducted as part of a study abroad class to Andros Island, Bahamas in May 2011. The goal was to determine if hermit crabs would be attracted to a specific food type or if they would instead move in a specific direction irrespective of food choice. The hermit crabs were given four food choices: bread, cheese, turkey lunch meat, or an apple slice. Each piece of food was placed at a different cardinal direction and rotated until each food type had been positioned at north, south, east and west. Hermit crabs were changed out with each trial. Our findings were that hermit crabs preferred to move south (inland), but they also preferred bread over any of the other food choices.

## Procedurally Creating 3-D Glyphs Using Unity Game Engine

Visualization is a helpful part of understanding what data has to tell us. The aim of this research is to procedurally create geometry using the Unity Game Engine in order to produce a three-dimensional glyph that represents a collection of data. The overall goal is to be able to explore, manipulate, and break apart the glyph into smaller sub-collections of data that can be represented by the same glyph. There are many other tools that one could use to accomplish this goal and they include: OpenGL, VTK. So, why use a game engine? When considering OpenGL even the base functionality will have to be built from the ground up and everything else built off of that. VTK is a useful step up but is geared towards having modules that will present the data in a specific way; this will require more additions in order to make the glyphs interactive and create special effects. With these goals in mind it makes the most sense to use a game engine with such functions built in. Unity is a good tool where existing knowledge of the engine and computer graphics will make the process much faster. The next decision is choosing to procedurally create geometry for the glyph as opposed to modeling a base glyph in a 3-D software, dropping it into Unity, and then modifying it based upon the given data set. Since anything created in a 3-D software is static this will make it much harder to manipulate. Unity has a built in Mesh class that provides the structure for geometry. One can create vertices, normals, and UV's based upon the data set and store them into their respective places in the data structure in order to create the geometry at runtime. This will provide the basis for future activity in data visualization of glyph.

*Jessica Kennemore*

*Faculty mentor:  
Dr. Rodrigo Obando  
TSYS School of  
Computer Science*

## **Building A Departmental Website Presence**

*Amber Liggin* According to the Social Information Processing (SIP) Theory, interpersonal relationships can develop through online interactions; however those interpersonal relationships require more time to develop than do their face-to-face relationship counterparts. This study sought to add to existing research and literature by using the Social Information Processing Theory as a framework for investigating the interaction between computer-mediated communication (CMC) and usage of the Department of Communication's website. Research was conducted to find the correlation and implications of usage of the communication department website and the participants' perception of CMC; the correlation between usage of the communication department website and the participants perception of the website; and how the Department of Communication's website affects student decisions to become communication majors. The results show that there is a significant correlation between the variables tested which supported the research hypotheses.

*Faculty mentor:*  
*Dr. Danna Gibson*  
*Department of*  
*Communication*

## **Demonstration: Electrolysis of Water Using Acid-Base Indicator on a Jelly Board**

Experiments involving the electrochemical half-cell reaction are a common practice in the undergraduate chemistry laboratory. However, the educator is faced with the challenge of conveying the science of chemical processes while also appealing to the visual and creative sides of students. This demonstration serves to both educate water electrolysis half-cell reactions and allow students the creative freedom to “draw,” while learning important chemical principles. Because of the multifaceted learning approach this demonstration can be made suitable for undergraduate, high school, and even middle school students. The adaptation of the chemical half-cell begins with the preparation of a jelly board. The jelly board is a polycarbonate board drilled with a grid of many tiny holes set in gelatin. The gelatin serves as a salt bridge between cells. The anode well is filled with an electrolyte solution, while a grid of cathode wells are filled with an electrolyte plus indicator solution. Platinum electrodes attached to a 9-volt battery are utilized to apply electric current to the cells. The positive electrode is immersed in the anode cell, and the negative electrode is held in hand. When the instructor is ready to demonstrate the electrolysis, the negative electrode is immersed into a cathode cell, and the resulting production of hydroxide ions causes the basic solution to change color. By continuing the action of immersing the negative electrode in subsequent cells, students can create an artistic design across the jelly board.

*Jacqueline M. McGuire  
Eunhye Cho*

*Faculty mentor:  
Dr. Rajeev Dabke  
Chemistry*

## What role does age have in children's understanding of geometric shapes?

*Crystal Mercado*  
*Kathryn Thompson*  
*Shannon Sims*  
*Meghan Davis*  
*Kammy Oliver*

Our research was to understand the role age has in a child's understanding of geometric shapes and ideas. According to the literature used in the research, the age is important in a child's geometric understandings. Children ages 4 to 5 were more inconsistent in sorting or identifying geometric shapes than children who were 6 years of age or older. This indicates that the children have a deeper understanding of what characteristics are needed to identify particular shapes (ex. A square must have four equal sides) as they progress in age. The younger children, whom participated in the studies featured in the literature, were able to identify shapes by using vocabulary more suitable to their ages (ex. A square has four straight lines), but were unable to further discriminate the characteristics of the shapes to sort them into smaller categories. Our research project hoped to confirm these findings by interviewing sixteen children in our community. The children were given twenty-six geometric shapes and asked to sort them in any way they could. The interviewer would ask each child to explain why they placed each shape into a specific category. Upon review of the data taken during the research, we were able to determine that as the age of the child increased, their ability to identify geometric shapes and categorize them on a more consistent and correct basis also increased. We will discuss in our poster how age impacted the children's use of shape attributes in sorting.

*Faculty mentor:*  
*Dr. Cindy Henning*  
*Department of*  
*Mathematics &*  
*Philosophy*

## **Best Practice for Critically Ill Patients Receiving Continuous Enteral Feedings**

Each year thousands of patients on enteral feedings aspirate. Between 40,000 to 70,000 people die each year from complications of aspiration pneumonia. In critically ill patients receiving continuous enteral feeding, does maintaining the head of bed (HOB) at 30-45° elevation prevent aspiration versus keeping the bed lowered? Nineteen research studies and articles spanning years 2003-2011 were consulted to answer this question. These sources included randomized controlled trials, practice guidelines, hospital protocols, and expert opinions. Synthesis of the evidence provides that keeping the HOB elevated during continuous enteral feeding significantly reduces the incidence of aspiration and pneumonia when paired with other interventions. These other interventions include insertion of the enteral feeding tube into the distal small bowel and measuring gastric residual volume (GRV) every four hours. For the patient who is unable to tolerate the Semi-Fowlers position (HOB elevated 30-45°), the reverse Trendelenburg position can be used to reduce the risk of aspiration. In performing these interventions as the standard of care, healthcare providers and nurses can collaborate and achieve better outcomes for patients receiving continuous enteral feedings.

*Breanna Miller  
Jennifer Miley  
Carmen Miller  
Amber Lewis  
Abby Wall*

*Faculty mentor:  
Dr. Sheri Noviello  
School of Nursing*

## Rapid Response Teams

*Clayton Peck*  
*Lindsey Bailey*  
*Caitlin Dorough*  
*Dawitt Butta*  
*David Ellison*

*Faculty mentor:*  
*Dr. Sheri Noviello*  
*School of Nursing*

Every year thousands of patients die of cardiopulmonary arrest in inpatient settings outside the ICU. It is thought that rapid response teams reduce deaths and unnecessary ICU transfers. Therefore, having a rapid response team in a hospital has the potential to save many lives at no long term additional cost to the institution. The purpose of this study was to determine if the implementation of RRTs could be the best practice for a wide variety of hospitals in numerous settings. The research question is, for patients experiencing cardiopulmonary arrest, does the presence of a RRT versus not having a team in place provide for less mortality? For this study we examined articles from 2006-2011 including professional opinions, a randomized-controlled trial and a meta-analysis synthesizing the evidence into a guideline that was presented to St. Francis Hospital regarding team makeup, activation protocols, and general nursing activities while awaiting the RRT. The evidence that was acquired showed that having RRT in place does have a higher survival rate and less mortality as it relates to cardiopulmonary arrest patients.

## **Best Practice for the Treatment of Hyperbilirubinemia in Infants**

Many babies are born every year with jaundice that need to be treated with phototherapy. We researched which phototherapy system would be the best option for treatment and compared the NeoBlue and Wallaby System versus the Bilibed. We found our information in multiple randomized control trials and a meta-analysis. After compiling all of our research our team found that the Wallaby and NeoBlue system was far superior to the Bilibed. The NeoBlue and Wallaby phototherapy system showed decreased hospital stay time, promoted parent infant bonding, reduced hospital costs in treatment, and allowed for a greater coverage of infant body surface area. Our team developed a guideline and proposed to change treatment methods within the hospital, which will allow them to reduce hospital costs and more efficiently treat hyperbilirubinemia in infants. Further research still needs to be done on how to implement the change and incorporating cost-effectiveness and re-training for the employees in the plan.

*Jones Shang  
Melinda Curtis  
Kelli Fields  
Chelcie Kaluzny  
Ashley McCorkle*

*Faculty mentor:  
Dr. Cheryl Smith  
School of Nursing*



## **A Service-Learning Study of the Columbus Community Psychosocial Programs for Treatment of Mentally Ill Offenders against Recidivism**

*Jessica Shelton* There are three community treatment programs in the Columbus, Georgia area that are designed to help non-working, newly released, mentally ill offenders. More than a third of offenders return to prison in three years, and more than half are reincarcerated due to mental illness (BJS Statisticians). There is a growing concern in the community about the lack of availability of programs that work off this sliding-pay scale, as well as the accessibility and awareness of such programs to the people that need them. Despite attempts to address

*Faculty mentor:*  
*Dr. Florence Wakoko*  
*Department of Criminal Justice*  
*& Sociology*

this concern by several civic organizations, information regarding the nature of the programs and the extent to which they provide psychosocial treatments to reduce recidivism is not documented. This study describes the community-based treatment programs in Columbus. It explores their mission, methods of treatments, accessibility to mentally ill offenders, and identifies areas needed in the existing methods to reduce recidivism. The study is based on the author's Service Learning experience at (New Horizons-CASA). Information was gathered through content analysis, participant observation, and informal-un structured discussions with the site coordinator, administrators of the community programs, a board member of the National Alliance of Mental Illness in Georgia, and the psychiatrist on duty at the local county jail. Findings reveal strong differences, and uncoordinated efforts in the availability of treatments, psychosocial treatments, and methods used to create awareness, and reduce recidivism. This poses a need for service agencies, policy makers and the local civic organizations to synergize resources through a tripartite model that would provide sustainable service in psychiatric and well as community-based counseling. New state mental hospital in lieu of future incarcerations of mentally ill patients is also proposed.

## **Wagner's Ideas, Innovations, and Der Ring Des Nibelungen**

The purpose of this research is to further explore Richard Wagner's philosophy on opera, his compositional styles, and how their unification in his opera cycle "Der Ring des Nibelungen" form a gesamtkunstwerk, a "total work of art". Wagner's essays on the art of his time and his concept of a perfect artwork were implemented into his compositional styles, which were highly innovative and multifarious. Upon examining his compositional styles, his use of orchestration and motivic associations by the use of leitmotifs are the most prominent in "Der Ring des Nibelungen". The origins of the composition are in accordance to his concept of gesamtkunstwerk and the ideas presented in his essays. This research highlights Wagner's revolutionary philosophies and compositional styles that are reflected in "Der Ring des Nibelungen". These findings do not exist as a definite and complete research project. The information presented is a basis for more in depth research on the matter.

*Brandon Smith*

*Faculty mentor:  
Dr. Andréé Martin  
Schwab School of  
Music*

## **Best Evidence Based Practices to Prevent Catheter-Associated Urinary Tract Infections**

*Nicole Turner*  
*Teresa Thompson*  
*Joseph Cavitt*  
*Laura Branan*  
*Nora Colondres*

Due to rising numbers in the occurrence of catheter associated urinary tract infections, patient hospital stays are prolonged and healthcare facilities are compensating for the costs of treating patients who acquire these infections during their inpatient stays. Contraction of a urinary tract infection costs hospitals \$589 daily per patient on average. Many of the infections are caused by Escherichia Coli and can be reduced by following a few simple but important concepts. So, what are the most beneficial practices that promote optimal patient outcomes and increase cost effectiveness for healthcare facilities?

*Faculty mentor:*  
*Dr. Cheryl Smith*  
*School of Nursing*

Gathered data, including peer-reviewed, randomized controlled trials and a systemic review, suggests that many methods can contribute to the prevention of these infections in catheterized patients. All articles reviewed offered evidence from the past 5 years of research. Three different criteria were formulated to be used for reduction of catheter associated urinary tract infections. Indwelling catheters should only be used for defined conditions, a nitrofurazone catheter is the preferred selection and with daily assessments, the early removal of catheters can be indicated.

## Service Learning: CSU-One Columbus Diversity Conference

This project focuses on the inaugural Regional Diversity Conference jointly hosted by Columbus State University (CSU) and One Columbus (OC) on March 22 and 23, 2012. CSU has a strategic mission to “achieve recognition as a leader in community development, regional economic development, and public-private partnerships” ([http://www.columbusstate.edu/aboutus/strategic\\_plan.php](http://www.columbusstate.edu/aboutus/strategic_plan.php)) Within this mission, is the goal to promote a community environment that is inclusive of diverse people, ideas, views, and practices. Similarly, One Columbus aims to “create unity and respect within a diverse community ... promote and encourage multi-cultural dialogue among all sectors and at every level of the community” ([www.onecolumbus.org](http://www.onecolumbus.org)). Since 2004, CSU and One Columbus have collaborated in organizing Study Circles on CSU campus, and in the community to raise awareness about social justice, promote peaceful means of handling disputes, and foster unity among diverse groups. Despite these efforts, little is documented about CSU-OC collaboration, and the prospects for diversity inclusion remain a daunting task. The key questions are: What is the meaning of diversity for CSU-OC? What is the main goal of the diversity conference? What holds these two different institutions together? What achievements have been made? What interventions are needed? In my “participant observation” role as a student taking a Clinical Sociology course, I was able to identify gaps, and see how the two organizations interact, organize, and implement the program. This allowed me to gain some skills in project planning, organizational competencies, and leadership. As Columbus area continues to expand and student enrollments grow at CSU, *communiversity*-- partnerships between institutions of higher learning, -- the “Ivory Towers”, and the local community are necessary if economic development and social justice are to prevail and empower various groups including, racial minorities, religious minorities, immigrants, and women.

*James Tyler*

*Faculty mentor:*

*Dr. Florence Wakoko  
Criminal Justice &  
Sociology*

## **Community Interest in Advanced Foreign Language Classes: Communicating Availability and Benefits**

*Hannah Vongsavang* Dramatic budget cuts in the state of Georgia forced under-populated university programs into a position of being cut by necessity. One of the programs that was “officially” terminated and is in the process of being phased-out, is the French Major Track program at Columbus State University in Columbus, Georgia. Students involved in the program claim there is a community interest in keeping language programs in the University system, though administrators’ claims were that enrollment in this program wasn’t able to be raised in a timely manner. One hundred individuals were surveyed, completing ten questions to indicate interest in foreign language, commitment to learning a foreign language, and perceptions of importance in foreign language learning. Data seems to provide evidence of community interest, indicating a need for a stronger awareness campaign about language programs available to students and the public.

*Faculty mentor:  
Dr. Danna Gibson  
Department of  
Communication*

## **Species Diversity of Fishes on an Off-Shore Fringing Reef**

We observed different species of fish at Coconut Grove on Andros Island in the Bahamas. Our objective was to determine whether location on the inside or outside of a reef affects population size and occurrence of different fish species. We observed five different species including parrotfish, squirrelfish, grunts, angelfish, and butterfly fish. Four different locations along the reef were chosen as study sites. We recorded the number of individuals of each species at each of the four sites on the reef. We found a significantly higher number of fish outside the reef as compared to the inside. Further analysis of the results showed a significantly greater number of fish on the northern part of the reef.

*Sydney Worthy  
Elicia Walker*

*Faculty mentor:  
Dr. Julie Ballenger  
Department of Biology*

## **Best Practices for the Management of Obesity in School Aged Children**

*Jessica McMann* Did you know that Georgia ranks second in the United States for the rate of childhood obesity? Research was conducted using multiple  
*Tamara Becker* randomized controlled trials which measured the influence of school  
*Joanna Thomas* based nutrition and fitness programs in school aged children, resulting  
*Cassandra Harp* in increased physical activity and decreased obesity. A guideline was  
*Geneva Cooley* formulated to address the rising obesity rates using both school and community based interventions. Research findings indicated a statistically significant reduction in obesity by implementing interventions which include: increased physical activity, decreased sedentary time, nutrition classes, and education on healthy lifestyle changes. As obesity in the United States continues to escalate uncontrollably, there will be an increase of individuals requiring medical attention for diseases and conditions related to obesity. If these interventions are implemented successfully in the school and the community, children will be able to reach their optimal level of health.

*Faculty mentor:*  
*Ms.Noreen*  
*McDonough*  
*School of Nursing*

## **Submission to *Abstracts 2013***

Undergraduates at Columbus State University who engage in research, critique and scholarship during the academic year of 2012-13 are invited to publish an abstract of their work in next year's annual. Abstracts from all disciplines which have been published or presented at local, regional, national or international conferences during the Summer 2012, Fall 2012, and Spring 2013 will be included.

Abstracts that are approved by faculty mentors may be submitted electronically at <http://honors.columbusstate.edu/abstracts.php>. Students interested in submitting are encouraged to visit the site to review the full list of information required when submitting their abstracts.





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