UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

APRIL 29, 2008

UNDERGRADUATE RESEARCH SYMPOSIUM

WELCOME

I am delighted to welcome you to the inaugural University of Illinois Undergraduate Research Symposium. Nearly 40 percent of our undergraduate students participate in research or creative activities outside the classroom during their studies. Students report that these experiences profoundly enrich their education, allowing them to deepen knowledge within a field of study and sharpen skills in areas such as critical thinking and writing. Students also tell us that planning and conducting research, scholarship, and creative work beyond the classroom allows them to work closely with faculty leaders, and strengthens their sense of self-confidence in their potential for success in graduate studies. Over the next five years, we aim to involve greater numbers of undergraduates in research and creative endeavors under the leadership of faculty mentors. As an institution where research, innovation, and creative activities flourish, we strive to make involvement in such activities a hallmark of the Illinois undergraduate experience.

This symposium creates an opportunity to showcase our finest undergraduate research and creative efforts, and highlights the impressive achievements of our highly capable student population. I extend my sincere appreciation to the students participating in this inaugural symposium and to the faculty mentors who served as guides in carrying out the work that we celebrate today. Special thanks to members of the *ad hoc* committee that planned this event, especially Professor Wojtek Chodzko-Zajko, who chaired the committee. Your vision and energy made this new event possible. I look forward to this symposium and to the many to follow in the years ahead.

Linda Katehi

Provost

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SESSION A

ILLINI UNION ROOM 314 A/B

A1. Collective Decision-making in Nest Relocation in Argentine Ants and Odorous House Ants

Daniel Scholes, Sr., Integrative Biology, LAS
Faculty Mentor: Andrew Suarez; Entomology and Animal Biology

ABSTRACT

When settling on a territory or when nest relocation becomes necessary, it is important for any organism to efficiently evaluate potential nest sites in order to choose the one most suitable under current conditions. However, if time is limiting species may experience a speed versus accuracy trade-off when searching for a new home. I examined nest site selection under duress (in the form of flooding) in two species of ants, Linepithema humile and Tapinoma sessile. Flooded colonies were presented with new nest chambers that were either higher, lower, or at the same elevation as their current nest. I also tested if their ability to efficiently choose a new site was influenced by the rate of flooding. If ants are able to assess and evacuate to the most suitable location, then ant colonies should move to a higher elevation relative to their current nest site in response to flooding. However, their ability to do so efficiently may be compromised if they do not have enough time to assess the relative quality of available nest sites. I found that both species moved their nests to the higher nest chamber when faced with rising flood waters. Moreover, both species always moved their entire nest to the same chamber. However, when the drip rate was doubled, ants were less likely to move into the higher nest and T. sessile was more likely to split their nests into two of the available chambers. These results provide a framework for future opportunities to study evacuation response and ant colony adaptability to disturbance.

A2. Creation and Tomographic Reconstruction of Pseudoradial Polarizaton States

Trent Graham, Jr., Physics, LAS
Faculty Mentor: Paul Kwiat, Physics

ABSTRACT

In recent years much attention has been given to optical beams that have radially oriented polarization vector over the profile of the beam. These states, known as radial polarization states, may be focused to a significantly smaller spot than other polarization states. Many optical techniques relying on small beam spots therefore might significantly improved if smaller spot sizes could be achieved through use of radial polarization states. Such techniques include photolithography, confocal microscopy, and two-photon imaging.

Unfortunately, it is difficult and expensive to create 'pure' radial polarization states; however, it recently has been shown that pseudoradial polarization states, approximations of radial polarization states, may be focused to spots nearly equivalent in size to those of pure radial polarization states. Unlike pure radial polarization states, pseudoradial polarization states can be easily created by rotating the polarization of a linearly polarized input beam with a specific configuration of several half-waveplates. To characterize focused pseudoradial polarization states, a custom beam profiling technique, based on many commonly used profiling techniques, was designed to measure focal spot sizes by slowly moving an annular beam block through the focal plane of the focused beam. The intensity of the transmitted light is recorded as a function of the annulus position. By taking the derivative of this intensity function over the diameter of the beam, one obtains a one-dimensional intensity profile of the beam. Since pseudoradial polarization states are not radially symmetric, one needs to measure one-dimensional profiles at many different angles in order to determine the beam profile accurately. The set of these profiles can be identified as the Radon transform of the two-dimensional intensity profile of the focal spot. There exists an inversion algorithm for the Radon transform ('filtered back-projection'), which may be used to reconstruct the two-dimensional intensity profile from the set of one-dimensional profiles.

A3. Risk and Resiliency Factors Influencing Latino Adolescent Functioning: Insights from Patent and Youth Focus Groups

Bernice Fuentes, Sr., Psychology, LAS
Fadya Manasra, Sr., Psychology, LAS
Krystina Briones, Fr., Psychology, LAS
Brenda Rodrigues, Fr., English, LAS
Faculty Mentor: Michelle Cruz-Santiago, Department of Psychology

ABSTRACT

Latino youth have been found to be at high risk for mental and behavioral problems such as substance abuse and school failure. Researchers have suggested that the acculturation gap between parents and youth impacts this risk. However, this hypothesis has rarely been examined using qualitative methods that allow Latino families to express the challenges and successes in their relationships and to specifically weigh in on the relevance of acculturation gaps. Another limitation of this literature is that it has paid little if any attention to the contexts (e.g., neighborhoods) in which these processes unfold. This study used focus groups to understand the relevance of Latino family values, acculturation, and neighborhood factors on parent-child relationships. Furthermore, Latino families living in two distinct communities were sampled in order to examine the relevant of the local social context.

A4. Maximizing the Potential of the Virtual Water Trade

Kimberly Parker, Fr., Earth Systems, Environment and Society, LAS
Faculty Mentor: Professor Murugesu Sivapalan, Departments of Geography and Civil and Environmental Engineering

ABSTRACT

Virtual water is defined as the amount of water invested in the production of an agricultural commodity, and the virtual water trade is then defined as the movement of virtual water from exporters to importers. It can function on many scales, from locally to globally. On all of the scales, the virtual water trade has the potential to save water in two senses. First of all, water is saved by the importing region as it no longer needs to put water towards the production of the agricultural goods that it imported. This can be very beneficial when the trade flows from water-rich nations to water-scarce nations. Secondly, a net amount of water can be saved globally if the exporting nation is more efficient in its water use than the importing nation. The exporter produces the same amount of crop that the importing nation would have, but with less water. In this way, the virtual water trade can contribute to overall water savings.

Until recently, the virtual water trade has gone unrecognized as a tool for policy. This is not to say that it has not alleviated some of the stress of water scarcity. Indeed, the virtual water trade has contributed to real, though moderate, water savings. Incorporating the virtual water trade into policy decisions at many levels could increase the amount that is saved and the amount of water that reaches water-scarce regions. This trade would function through the economic concept of comparative advantages. Countries that have large volumes of water or the technology necessary to increase water productivity have an advantage over countries that don't, and trade should follow accordingly. By giving water a price equivalent to what it is actually worth, this principle could be harnessed, leading to water savings and some alleviation of the global water crisis.

A5. The Role of Coilin on Intranuclear Trafficking on snRNPs to Cajal Bodies

Caesar Arturo, Jr., Molecular and Cellular Biology, LAS
Faculty Mentor: Michel Bellini, Department of Molecular and Cellular Biology

ABSTRACT

Cajal bodies are discreet nuclear organelles which exist in all Eukaryotic cells and are thought to function in snRNA maturation. A dominant negative effect on intranuclear trafficking of snRNPs to Cajal bodies was sought in an attempt to understand if Cajal bodies are necessary for snRNP maturation. A cDNA of Coilin's N and C termini was subcloned into the pGEX-4T-2 vector inframe

with a GST tag, HA tag, and NLS, then expressed in DH5and#945; Escherichia coli cells as a fusion protein. Coilin termini were purified using Glutathione beads and microinjected into Xenopus laevis oocytes to fluorescently examine the effect on intranuclear snRNP trafficking to Cajal bodies. Overexpression of Coilin N terminus is expected to block snRNP targeting to Cajal bodies by competing with full length coilin over Cajal body binding sites. Overexpression of Coilin C terminus is expected to block snRNP targeting to Cajal bodies by binding and sequestering immature snRNP molecules in the nucleoplasm instead of the Cajal body. Under the hypothesis that Cajal bodies are critical for snRNPs to become competent in splicing, nucleoplasmic accumulation of snRNPs and no localization to chromosomes is expected.

A6. Environmental Effects on Pig Growth and Development

Tara Baxter, Jr., Animal Science, ACES
Faculty Mentor: Lawrence B. Schook, Department of Animal Science

ABSTRACT

The purpose of this project is to reconstruct the ancestral origin of the porcine RUNX21 gene to examine the single nucleotide polymorphisms (SNPs) that contribute to craniofacial elasticity associated with the domestication process and feral pigs. This project will examine selection signatures in the RUNX2 gene that plays an important role in differentiation of osteoblasts and ultimately in bone structure and formation. The number and variation in the repeats of this sequence have been studied in dogs and show a correlation between amino acid composition and facial length and dorsal-lateral flare. While dogs have a much longer domestic history with more intense exploitation of the limitations of variance through domestication and selective breeding, we believe the RUNX2 gene will also be a good model in the pig to examine the signatures of middle stage domestication.

Further study of the regulatory capacity of this region and its impact on porcine craniofacial morphology will help us to understand the genetic history of domestication on the animal skull and understand how the environment (nutritional and exposure) result in changes in the pig skull. This project will also provide a model to compare skeletal and facial morphology of other domestic animals of a similar domestication length such as the cow, the sheep, and the horse. Additionally, further research on the RUNX2 gene can help expand research on craniofacial deformations in both animals and humans. A mutation in RUNX2 contributes to a human disorder called Cleidocranial Dysplasia. Based on studies by Greger Larson and colleagues, pig domestication occurred in multiple locations. These centers of domestication should be reflected within the porcine genome and potentially within the RUNX2 gene that will offer an explanation of the effect of phylogeography on variation in domesticates.

A7. Spurlock Museum Ancient Seal Project

Joshua Nelson, Jr., Mathematics, LAS
Rebecca Bott, Sr., History, LAS
Kevin Gartski, Sr., Antropology and History, LAS
Matt Tedeschi, Sr., Religious Studies, LAS
Faculty Mentor: Wayne Pitard, Director of the Spurlock Museum

ABSTRACT

This is an ongoing, collaborative undergraduate research project involving the University of Illinois's Program for the Study of Religion, Spurlock Museum, and Institute for Computing in Humanities, Arts, and Social Science (ICHASS), and the University of Southern California's West Semitic Research Project. It involves digitally documenting ancient Mesopotamian cylinder seals using state-of-the-art cameras, analyzing the seals, and publishing them online. Additionally, new impressions of the cylinder seals are being rolled in a soft clay. The ultimate goal of the project is to develop a large-scale, web-based catalog of the cylinder seals held in various collections around the globe, greatly enhancing the accessibility of cylinder seals to scholars. The first stage of the project, researching and cataloging the Spurlock Museum's sixty-two cylinder seals, is nearly complete.

Despite their small size, cylinder seals are an important Ancient Mesopotamian art form. Until the advent of this project, cylinder seals were published inadequately, mostly due to the limitations of technology. Past publications of cylinder seals were usually comprised of life-size black-and-white images of impressions of the seals. Our new cameras are able to create images of these seals that are truly useful to scholars.

The first round of photography of the seals was done at USC, where two innovative cameras were developed. The first camera includes a 360° panoramic digital camera with a rotating platform; it is used to produce a flat image of the cylindrical face of a seal. The second camera uses Polynomial Textural Mapping (PTM) technology, which allows images to be taken from thirty-two different lighting positions, and may be used to construct three-dimensional digital models of the objects photographed. This camera set-up is used to photograph the impressions of the cylinder seals. The Spurlock Museum is obtaining a set of these cameras to allow future imaging to be done here.

A8. Undergraduate Research in the Writers Workshop

Yolanda Green, Soph., English, LAS
Aneesha Bahl, Soph., Division of General Studies
Sarah Brook, Sr., Psychology, LAS
Ed Hahn, Sr., English, LAS
Faculty Mentor: Libbie Morley, Center for Writing Studies

ABSTRACT

Our brief video will illustrate the results of our research into aspects of writing center theory and practice. Each segment will showcase the work of one consultant.

Sarah: In my segment of the video I will highlight the part of my research that explained similar techniques between counseling and consulting (tutoring). I will film a consultation with a writer who feels distraught because his teacher marked up his paper and is convinced that he is a bad writer. The counseling technique of empathizing with the writer and even saying something as simple as, 'I can see that you feel upset by this,' can be a way to help the writer feel more confident about the paper.

Will: I will show a video of a demonstration of tutoring writing using instant messenger with a close up of a computer screen. I will discuss the pros and cons of online tutoring that I learned in my research. The sample session will pan back and forth between consultant and writer with a voiceover to describe what is happening and the effects of using instant messaging.

Aneesha: I will enact a case of a tutoring session which employs both directive and non-directive techniques. I will target the strategies used by the Writers Workshop staff and give outsiders a perspective of the way tutors adapt strategies to specific writers.

Ed: I will show some of the different models of group work that I observed by enacting meetings of three groups with the same assignment and provide a short analysis of the way each group assigned roles and completed their project.

Yolanda: My part of the video will demonstrate some of the subtle and unconscious ways a writing center can demonstrate racist attitudes, particularly in expectations and attitudes about dialect. I will also suggest ways these attitudes can change.

SESSION B

ILLINI UNION ROOM 210

B1. Building Green: Spatial Distribution of LEED-Certified Buildings

Alex Beata, Soph., Geography, LAS
Faculty Mentor: Julie Cidell, Department of Geography

ABSTRACT

Common sense would suggest that green buildings, and the criteria fulfilled to achieve certification, would vary across the country. This project sought to explore this knee-jerk reaction using spatial analysis, statistical testing, and geovisualization. More specifically, the six general LEED certification

categories are considered, as are eleven spatial-specific subcategories. Variation between categories is determined, as is variance between regions of the United States, as defined by the US Environmental Protection Agency.

Generically, the statistics showed less variation among the six general categories than among the eleven spatial-specific categories, as one would expect. Nevertheless, when concentration of activity is calculated, one sees a breakdown among the six categories, Sustainable Sites, Water Efficiency, and Energy/Atmosphere often clustered together and Materials/Resources, Indoor Environmental Quality, and Innovation/Design clustered together. The findings suggest that the first three categories are more sensitive to local sites and environments while the other three are somewhat more aspatial.

B2. Change and Continuity in 20th Century Papua New Guinea Art

Rebecca Chan, Jr. Anthropology, LAS
Alexa Wirth, Jr. Anthropology, LAS
Faculty Mentor: Janet Dixon Keller, Department of Anthropology

ABSTRACT

Our initial concern in working with the Tobin collection of artifacts was to understand the significance of these objects in their original contexts in Papua New Guinea while also revealing the implications of the mid-twentieth century aesthetics for contemporary contexts in the country. One task was to select only 40 items for exhibit. In the process of research we developed 4 themes relevant to this selection process and the interpretation of the objects. Each of the themes is exemplified by particular objects that will be displayed. One of the first themes that emerged was the issue of how gender influences both production and use of objects. This theme led to a consideration of objects for everyday use versus objects with spiritual significance. As we came to recognize the place of objects in their regional context, we began to identify processes of recent change. This led us to consider the roles of tourism and globalization in that change. Tourism constitutes a significant aspect of the economy, particularly through the sale of art objects and the production of art for outsiders influences local aesthetics. Additionally the influx of globally circulating ideas and objects stimulates further change. Our exhibit will examine these processes of change as well as important forces for continuity. The goal of the exhibit is to use these themes to challenge Western stereotypes of Pacific Islanders and their cultures as exotic and static and to challenge the idea that globalization results in worldwide homogenization.

B3. Diversity Reconsidered: Focusing on the Needs of the "Invisible Minority"

Patrick Hale, Sr., Sociology and Gender and Women's Studies, LAS
Faculty Mentor: Jane Desmond, Gender and Women's Studies/Anthropology

ABSTRACT

When campus administrators, faculty, staff and students talk about diversity, the sentiment is often given that it is appropriate to be inclusive and affirming to people with varying differences, that diversity is a 'good' thing. The drawback is that when we often think about diversity, it seems that it is ineffective of addressing the climate needs of all parties within the University system. In particular, diversity tends to focus on race and gender issues on predominantly white campuses more than salient issues that are just as significant to the lived experiences of marginalized individuals, especially when access to the educational experience is at stake.

My goal is to discuss these other salient identities that tend to get ignored when diversity isues get discussed. In particular, I wish to focus on the context of the lived experiences of lesbian, gay, bisexual and transgender students, staff and faculty to design a parallel between this and other various marginalized communities based on categories including, but not limited to, class and ability. I wish to provide suggestions for how institutions of higher learning can effectively instill policies that provide equitable access and eliminate barrier to the academic experience of all invested in the higher education experience.

B4. From Chicana to Chica: The Cultural Politics of Sexuality, Home and Women's Solidarity in Works by Sandra Cisneros and Alisa Caldes-Rodríguez

Sonia Rodriguez, Jr., English, LAS
Faculty Mentor: Richard T. Rodriguez, Department of English

ABSTRACT

This project simultaneously engages in close readings of literary texts while situating the works in wider social, political, and cultural contexts. While I closely examine the cultural politics depicted in works which compromised the new genre of "Chica Lit" by authors such as Alisa Valdes-Rodriguez, Michele Serros, and Sofia Quintero, I also compare and contrast this body of work to that of a previous generation. This previous generation consists of Chicana writers such as Sandra Cisneros, Ana Castillo, and Denise Chavez, for example, who helped to define the "Latina Literary Boom" of the 1980's and 1990's. This project is fundamentally concerned with the ways Chicana/Latina feminism is articulated as a means of resistance in light of market demands and cultural commodification. The following research question is the foundation for this study: How are Chica Lit and Chicana Literature necessarily interlinked in the unfolding genealogy of U.S. Latina Literature? In order to answer this question I am analyzing The House on Mango Street by Sandra Cisneros and The Dirty Girls Social Club by Alisa Valdes-Rodriguez using discourse analysis and close reading as methodologies and Chicana feminist

theory as a critical lens. As a result, the parallel themes that link Chicana literature and Chica Lit include sexuality, home, and women's solidarity.

B5. Leisure and Arthritis among Older Adults

Dina Izenstark, 1st year Masters, Recreation, Sport and Tourism, AHS
Faculty Mentor: Megan Janke, Department of Recreation, Sport, and Tourism

ABSTRACT

Research has shown that physical activity plays a direct role in alleviating arthritis pain and symptoms in older adults. The purpose of this paper was to explore how the physical and social health of individuals affects their participation in leisure-time physical activities when living with arthritis. This study examines the role of marital status, social activity, length of diagnosis with arthritis, and dexterity and mobility in performing household tasks (i.e. turning a key in a lock) in predicting engagement in leisure-time physical activity. Results indicated a significant relationship between the following three constructs: health satisfaction and physical activity, health satisfaction and mobility, and dexterity and physical activity. Findings suggest three different themes: arthritic individuals who reported less difficulty with physical activity had higher life satisfaction, participants who had more difficulty with dexterity had more difficulty performing physical activities, and individuals who reported more difficulties with dexterity reported having more difficultly engaging in physical activities.

B6. La Liaison: Generalizations of Anglophone Learners of French

Meryl Delshire Garrison, Sr., French Studies, LAS
Faculty Mentor: Annie Tremblay, Department of French

ABSTRACT

Liaison is a linguistic phenomena in French by which a latent word-final consonant is pronounced as the onset of the following word when the latter is vowel-initial. For example, in les amis 'the friends' pronounced as [le.za.mi], the word-final consonant of les (i.e. the plural [z]) is realized as the onset of the word amis. Native French speakers have unconscious knowledge of the constraints governing the use of liaison, including which phonemes can be liaison consonants (e.g., [z]), what morphological status they may have (e.g., plurality), between which syntactic phrases they can occur (e.g., between a determiner and a noun), and what role prosodic phrasing plays on their occurrences (e.g., when the first word is monosyllabic rather than when it is multisyllabic). To date, very few studies have examined the production of liaison consonants by second language learners of French, and those which have done so limited their investigation to second language learners' suppletion of these consonants in obligatory versus optional contexts.

My research is different in focus: it proposes an investigation into the phonemic, morphosyntactic, and prosodic generalizations that non-native French speakers have developed for the production of these consonants in optional contexts. Specifically, the participants are asked to read aloud a text in which optional liaison contexts have been manipulated on the basis of three factors:

1. the liaison consonant itself (e.g., [z] vs. [t]);
2. the morphological status of the liaison consonant manipulated through its occurrence in different syntactic contexts (e.g., between a noun and an adjective vs. between two verbs); and
3. the effect of prosodic phrasing on the production of liaison consonants (e.g., with the first word being monosyllabic vs. trisyllabic)

As I have just recently been granted IRB approval for this project, data collection is underway, and the results will be available in April.

B7. Media Production in a Digital Age

Derek Klein, Sr., Media Studies, COM
Marc Morin Jr., Sr. General Engineering, ENG
Faculty Mentor: Dr. Amy Aidman, Associate Dean of the College of Media

ABSTRACT

In this day and age Internet video websites as Youtube.com are becoming a popular source of entertainment. What once used to stay hidden away in personal journals is now being broadcast across time and space to anyone who wishes to look for it in the form of a personal video web log.

It was this model that the creators of One Fine Day! chose to emulate in their series, structuring each of the six original episodes as if they were a personal web log of one of four resident advisers in the campus residence halls. The goal was to create a form of entertainment that was a hybrid between the television episodic format and this new Internet video entertainment.

One Fine Day! is still currently being produced and distributed over the Internet, and it was picked up in the fall of 2007, by a multi-campus network known as the Open Student Television Network for broadcast to its 3,500 member campuses. It is currently in what the producers consider its second season.

This presentation will examine both the creative processes involved with designing the series and producing it, as well as the limitations that the project faced due to financial restraints, technological restraints, creative restraints of the university, and the ability to market it to other campuses and networks for broadcast. It will also include clips from episodes and a trailer for the series as evidentiary examples.

B8. Homonormativities' Stake in State Projects of Legibility

Bess Van Asselt, Sr., Gender and Women Studies, LAS
Faculty Mentor: Jane Desmond, Department of Anthropology

ABSTRACT

After 9/11 queer spaces in New York City have drastically altered due to increased surveillance and policing. Both homonormativity and neoliberal processes are implicated in the changing queer spaces. Homonormativity is the movement towards queer identity as consumption and the attachment to neoliberal codes of conduct. Neoliberalism is the process by which capital has become privatized in order to create free markets and free trade to insure the liberation of an individual's right to be an entrepreneur. Both of these structures maintain themselves through the utilization of repressive state structures such as prisons, police, military, marriage and tourism. People that embody and abide by neoliberal/homonormative politics have become the key components of violently altering queer spatial formations. By studying the changing spaces of Greenwich Village, Jackson Heights and Christopher Street Piers, I will attempt to map the changing attitudes towards queers of color and/or queers of lower classes, as white, liberal, private capital moves into the once historically radical queer spaces. I will also propose a new kind of radical politics and include a brief synopsis of resistance to neoliberal/homonormative processes in New York City. My work is predominately informed by such theorists as Martin Manalansan, Jasbir K. Puar and Michel Foucault.

SESSION C

ILLINI UNION ROOM 314 A/B

C1. Predicting the Ductility of Transition Metal B2 Alloys Using Mesoscale Dislocation Theory and First-Principles Calculations

Ruoshi Sun, Sr., Materials Science and Engineering, ENG
Faculty Mentor: Duane D. Johnson, Department of Materials Science and Engineering

ABSTRACT

It has been reported recently that rare earth transition metal alloys with the B2 crystal structure show significant ductility, contrary to other B2 alloys. We have performed first-principles calculations on three types of B2 compounds, the ductile YAg, YCu, YIn, and YRh, the non-ductile alloys, and the CsCl-type ionic compounds. To classify the slip modes of these alloys, the calculated structural parameters and the planar <111>{110}

and <111>{112} defect energies are used to construct a stability map. We also derive a criterion of <111> slip versus <100> slip. It is found that the ductile alloys possess bistability of antiphase boundary (APB) <111>{110} and <111>{112}, wheras non-ductile compounds do not.

C2. Automatic Acquisition of Pragmatic Knowledge Using Similes

Nigel Ray, Jr., Computer Science, ENG
Faculty Mentor: Roxana Girju, Linguistics Department

ABSTRACT

Many Artificial Intelligence (AI) applications require world knowledge to support reasoning. However, despite many recent advances, construction of such inference-capable knowledge bases remains a major bottleneck in AI.

This project deals with the automatic acquisition of pragmatic knowledge through the use of linguistic devices of comparison such as similes. The use of the hedge words 'like' or 'as' marks simile as a different figure of speech, which does not ascribe category membership, but which draws attention to certain shared properties. For example, 'I fly like an eagle in the sky: I spread my wings wide.' merely enjoins us to look for common properties of eagles in the sky (e.g., that they fly and spread their wings wide). These properties cannot be inferred from the semantics of the phrase 'eagle in the sky', nor are they encoded in existent knowledge repositories. This information, however, is very useful in image generation when the position of the eagle is very important (e.g., eagle in the sky vs. eagle in the nest). Thus, the fairly explicit nature of simile makes it an excellent knowledge-acquisition device for pragmatic knowledge base creation.

C3. Illini Cycler: A Polymerase Chain Reaction

Kimberly Heinecke, Soph., Agricultural and Biological Engineering, ENG
Shotaro Yatsu, Soph., Agricultural and Biological Engineering, ENG
Brad Stoll, Sr., Technical Systems Management, ENG
Mark Hull, Soph., Agricultural and Biological Engineering, ENG
Faculty Mentor: Dr. Luis F. Rodriguez, Agricultural and Biological Engineering

ABSTRACT

Rotational grazing programs for cattle are gaining acceptance among beef and dairy producers as environmentally responsible management tools. However, planning effective rotation schedules require considerable time and expertise. Here, a number of different grazing parameters were researched and connected through a grazing program impact matrix. JAVA-based software was then developed to model actual cattle grazing movements based on several of these parameters. The simulation model will track cattle using specialized GPS technology, and simulation data will be analyzed using

a genetic algorithm (GA) to find an optimal parameter solution set. The graphical user interface is shown here with a sample set of GPS data and the resulting simulation data after application of the GA. The interface allows users to visually manipulate and display data. A brief overview of genetic algorithms is given, along with an introduction to the particular GA used for this model. It is anticipated that this simulation will allow producers to experiment with rotation schedules quickly and easily, encouraging more intensive grazing management for greater land and animal stewardship.

C4. Black Start Service Marketability

Tsong-Yu Chan, Jr., Electrical Engineering, ENG
Faculty Mentor: George Gross, Department of Electrical and Computer Engineering

ABSTRACT

The restruction of the U.S. electric utility industry provides competitive markets for ancillary services in addition to thus far the MWh commodity. A critical ancillary service is called black start capability which is required to restore the system after a blackout. Currently, the black start service plans vary for different independent system operators (ISOs). This research concentrates on investigating the black start service in the competitive electricity markets. We describe the black start and discuss the roles of generators that provide this service. We provide a comparative analysis of the definitions and requirements for black start capability in the five main ISOs: ISO-NE, CAISO, NYISO, PJM and ERCOT. We discuss the key commonalities and major differences in the black start generator compensation plans in the 5 ISOs, and we focus on the payment received for the service and compare how a generator fares in the different ISOs. We conclude with a summary of the most critical aspects in the provision of and payment for black start capability.

C5. Debris Characterization and Mitigation from an Extreme Ultraviolet Light-producing Z-pinch

Bob Lofgren, Sr., Nuclear, Plasma, Radiological Engineering
Faculty Mentor: Prof. David Ruzic, Department of Nuclear, Plasma, and Radiological Engineering

ABSTRACT

Extreme ultra-violet light (EUV) producing sources is the next step in nanolithography used in computer chip manufacturing. These sources utilize discharge or laser produced plasma that can produce the multiply ionized levels necessary to produced 13.5nm light. Because 13.5 nm light is absorbed by nearly everything, the use of a simple pellicle is no longer applicable to this technology, and as such debris mitigation techniques are necessary to remove the energetic ions and neutrals, which can now impend upon expensive focusing mirrors. Many preventive measures are being researched at the

University of Illinois's Center for Plasma Material Interactions. These include using a radio frequency coil near the pinch area for confinement, biased parallel plates to defer ions, and the study of neutrals. These methods include the use of a buffer gas between the mirrors and the debris source, the use of pulsed power plates to deflect ions, as well as the use of a radio frequency (RF) driven inductively coupled plasma near the source. These methods incorporate several different physics techniques to reduce the energetic ion and neutral debris. In order to quantify the amount of debris reduction, an electrostatic spherical energy sector analyzer has been built to measure energetic ions from 1 to 14 keV. A similar system has also been created to measure neutral debris created from the source. These two measurement techniques not only quantify the effectiveness of debris mitigation efforts, but also enlighten EUV source manufactures of ways to optimize their systems to produce the most amount of light with the least amount of debris

C6. Assessment of Peer-Led Team Learning in an Engineering Course for Freshmen

Brett Robbins, Sr., Electrical Engineering, ENG
Faculty Mentor: Michael C. Loui, Department of Electrical and Computer Engineering

ABSTRACT

At Illinois, ECE 110 is required for freshmen majoring in electrical engineering or computer engineering. Carrying four semester hours of credit, the course introduces topics in circuits, electronics, and digital systems, all directed toward the design of an autonomous vehicle in the laboratory. In ECE 110 in Fall 2007, we organized optional supervised study sessions to implement peer-led team learning (www.pltl.org), a pedagogy that had previously been used in science courses but apparently not in engineering courses. Each session met for 90 minutes per week under the supervision of undergraduate and graduate teaching assistants, and undergraduate volunteers; they served as team leaders and kept individual reflective journals. Of the 297 students in the course, 142 elected to participate in the sessions, and they were randomly assigned to permanent learning teams of six to nine students. In the sessions, the learning teams worked on difficult problems selected from examinations given in previous semesters. We obtained ACT-Math scores and implicit consent from 208 students, 43 of whom attended sessions regularly six or more of the eleven sessions. The regular attendees scored significantly higher on the final examination than the other students (average 76.4% vs. 71.0%, $p < 0.0145$ on t-test), even though their ACT-Math scores were slightly lower (average 33.0 vs. 33.7, $p < 0.0973$ on Mann-Whitney test). Among electrical and computer engineering majors, regular attendance did not affect decisions to remain in electrical or computer engineering (odds ratio 1.002). Regular attendees reported that in the study sessions, they improved their understanding of the material, and they made new friends.

Progressing on Perry's model of intellectual development, some students began to see peers as helpful sources, in addition to the team leaders. The team leaders identified benefits to themselves such as understanding differences in group dynamics and learning to lead engineering teams.

C7. Visualization of the Crack Damage in Self-Healing Composites

Rajaprakash Ramachandramoorthy, Jr., Aerospace Engineering, ENG
Faculty Mentor: Scott White, Department of Aerospace Engineering

ABSTRACT

Self-healing concept is based on the simple chemistry of polymerization. In this composite system, as the crack propagates, it ruptures the embedded microcapsules and releases the healing agent, dicyclopentadiene (DCPD) into the crack plane. This propagating crack also exposes the embedded Grubbs' ruthenium catalyst inside the wax microspheres. As the DCPD comes in contact with the Grubbs' catalyst, polymerization takes place and it bonds the crack faces together.

The first part of the project presents an investigation on the visualization of healed material. Visualization of the healed material is vital to understanding the ability to heal cracks. This was achieved using a fluorescent dye, perylene, to selectively mark the healed material. This selective marking is accomplished by incorporating the perylene dye in wax microspheres.

The second part of the project focuses on evaluating the ability of wax microspheres to protect the Grubbs' catalyst from being deactivated by amine curing agents. This is accomplished by incorporating a pH sensitive dye, acridine orange. This method is also used to investigate a possible method to improve catalyst protection by polymerizing a urea-formaldehyde shell over the wax encapsulated Grubbs'.

C8. Action Research Seminar: The East St. Louis Project

Johanna Contreras, Jr., Recreation, Sport and Tourism, AHS
Ashley Hooks, Sr., Urban and Regional Planning, FAA
Dee Kaiser, Jr., Recreation, Sport and Tourism, AHS
Joseph Altshuler, Jr. Architecture, FAA
Mari Gordon, Jr., Geology and Environmental Studies, LAS
Jessica Howe, Sr., Aerospace Engineering, ENG
Wendy Kniepp, Jr., Business
Faculty Mentor: Bruce Wicks, Department of Recreation, Sport, and Tourism

ABSTRACT

This presentation will describe how a new undergraduate research methods class, FAA 391 Action Research Seminar, combines hands-on

research with a student civic engagement experience. The course is one component of the East St. Louis Action Research Project, a partnership between the University of Illinois and the community of East St. Louis, IL. Through this course, an interdisciplinary group of students becomes skilled at applying Participatory Action Research Methods to tackle the enduring issues suffered by the residents of East St. Louis. The central principle of Participatory Action Research is the importance of conducting research that results in positive community outcomes. In this vein, students apply methods such as conducting interviews, administering surveys, preparing inventories, and hosting public meetings with the purpose of facilitating improvements in the community. This semester, the students' projects focus upon enhancing the quality of services provided by the East St. Louis Park District. The specific goals are to secure grants for the installation of an Outdoor Fitness Park and organize residents to implement an Adopt-a-Park Program, both of which were ideas provided by East St. Louis Residents at a community summit conducted by the students of the previous semester. Students travel to East St. Louis to partake in field research and service projects, as well as to present findings to local stakeholders 3 times each semester. Significantly, the course has a high rate of repeat enrollment, with one current student taking the course for the 3rd semester in a row and 3 others who are enrolled in the course for a 2nd semester.

SESSION D

ILLINI UNION ROOM 210

D1. Never Stop Exploring Urbana-Champaign

Natalya Namts, Sr., Advertising, COM
Faculty Mentor: Kim Graber, Department of Kinesiology

ABSTRACT

My group's mission statement is "to promote wellness in the lives of Adult Day Care patrons by introducing them to new settings and promoting activity." Goals are set as: enhancing the wellness in these patrons' lives through the use of the environment and stimulating indoor settings; and encouraging social interactions and hope to include youth to our program. 'Never Stop Exploring Champaign-Urbana' is a series of field trips with the patrons of the Champaign County Nursing Home Day Care Center. Places we have gone to include: The Busey Woods, Champaign Park District Prairie Farms, Meadowbrook Farms, Curtis Apple Orchard, Spurlock Museum, Krannert Art Museum, Arboretum, Lake of the Woods, and Memorial Stadium. We often receive tours and attempt to incorporate all aspects of wellness. Physical wellness and environmental wellness are addressed because we are getting the patrons to walk around outside, even if it's not very far. Intellectual wellness is fulfilled when learning about Busey woods or artifacts in a museum.

We incorporate social wellness every time we visit because the patrons are able to interact with each other as well as our group members, and while spiritual wellness is not directly used, the patrons are able feel as one with the environment or at least part of a bigger thing. We hope to improve emotional wellness so that the patrons are able to laugh and put themselves in a better mood than they would be going to the same building three times a week. This program is a completely free program for all those who participate.

D2. Disability + Relevant Design

Stephen Diebold, Soph., Industrial Design, FAA
Teddy Lu, Soph., Industrial Design, FAA
Erica Roberts, Soph., Industrial Design, FAA
Mayela Mujica, Soph., Industrial Design, FAA
Faculty Mentor: Deana McDonagh, Department of Art

ABSTRACT

Through empathy and shared understanding, undergraduate designers collaborated with DRES registered students to enhance quality of life through relevant design outcomes. After a 10-week period of design students researching fellow students with disabilities, based on their increased awareness and insight, they each generated design outcomes that offered high impact with low technology solutions. This presentation will illustrate the empathic journey taken by the undergraduate designers and demonstrate the design concepts from this research project.

D3. Ethnicity and Medicine: Barriers to Healthcare in Guatemala

Anita Chary, Sr., Anthropology and Chemistry, LAS
Sarah Messmer, Sr., Engineering Physics, LAS
Flora Chacon, Sr., Spanish, LAS
Faculty Mentor: Bruce Michelson, Department of English; Director, Campus Honors Program

ABSTRACT

A glance at demographic data of the Western Hemisphere reveals Guatemala's high mortality rates and minimal socioeconomic development in comparison to other countries. This largely reflects the suffering of the nation's majority indigenous population, which has faced discrimination for centuries due to a colonial legacy and recent political turmoil. Unfortunately, the country's medical system is one institution that perpetuates indigenous oppression through devaluation of Mayan culture.

This project examines how ethnicity affects healthcare accessibility in Guatemala through analysis of several barriers to adequate medical care for indigenous Mayans. Government-sponsored medicine is supposed to be free for all Guatemalan citizens, and all villages and towns are

supposed to have an easily accessible health center or post. However, this is rarely the case. In addition to geographic and economic obstacles, culture and language prove to be important factors restricting Mayan use of biomedicine. Guatemalan medical practitioners rarely speak indigenous languages and are often disrespectful to indigenous patients. Furthermore, diagnostic neglect is rampant, as government clinics tend to be understaffed, managed by individuals with minimal medical training, and unequipped with resources to deal with common illnesses.

Communicating with patients in indigenous languages, conducting traveling clinics to bring healthcare to patients' homes, and providing herbal and allopathic medicines free of cost all greatly impacted management of common health problems and diseases. Thus, several aspects of Guatemalan healthcare inaccessibility could be addressed.

D4. Factors Affecting the Quality of Life of Latino Residents of Urban Immigrant Gateways

Juan Carlos Acevedo, Sr., Management Information Systems, Recreation, Sport and Tourism, AHS
Faculty Mentor: Monika Stodolska, Department of Recreation, Sport, and Tourism

ABSTRACT

The objective of this study was to examine how residence in ethnically-enclosed immigrant gateway communities affects the quality of life of local population. The study was based on four focus groups, conducted during the summer of 2007, with 26 Latino residents of two Chicago immigrant communities (Little Village and East Side). The findings show that the most important factor affecting the quality of life of local residents was safety. Many public places were considered a gang territory and were often subject of territorial fights among competing gangs. Gang members were involved in selling drugs and the mere presence of gangs made people stay home in the evening hours and pay close attention to their own dress patterns and places they visited. Police response to crime-related incidents was slow and many interviewees believed that the local authorities deliberately avoided having to address with the crime problem. Another theme was the lack of sense of community in immigrant gateway neighborhoods. Frequent mobility of the population, crime, and overpopulation, created feelings of mistrust toward newcomers and lack of responsibility for public resources. Lastly, lack of open public spaces suitable for family recreation (Mexican zócalo) had a negative effect on immigrants' quality of life. Moreover, the existing public spaces were poorly maintained, unsafe, overcrowded, and not well-integrated within the local communities. Simultaneously, gentrification led to creation of recreation spaces to which access was limited to upper-middle-class Anglo newcomers, leaving local Latinos with the perception of not being welcome in sections of their own neighborhoods.

D5. Illini Sports: Explore More

Lindsey Carstens, Sr., Kinesiology, AHS
Molly Prendergast, Jr., Kinesiology, AHS
Adam Latarski, Sr., Kinesiology, AHS
Colin Quinn, Sr., Kinesiology, AHS
Faculty Mentor: Kim Graber, Department of Kinesiology

ABSTRACT

The purpose of this session is to describe a wellness-related research project that involved bringing elderly adults to University of Illinois athletic facilities. The facilities included Assembly Hall, Ubben Basketball Center, Golf Facility, Track and Soccer Stadium, and Illinois Baseball Field. It was hypothesized that the undergraduate research team could improve social wellness by encouraging participants to talk to one another, engage in conversations with athletes, and make an effort to get to know others better. Our aim was to improve physical wellness by providing walking tours around the facilities. At certain facilities, they were able to engage in the sports, such as swinging a golf club and kicking soccer balls. We believed that we could enhance intellectual wellness by encouraging them to remember past sports experiences and learning new information about University of Illinois athletics. We also believed that we could improve wellness by introducing them to new facilities and getting them out of their normal surroundings. Tours took place weekly on Friday afternoons. The nursing home provided transportation to and from the facilities. In order to evaluate the effectiveness of the project data were collected. For example, interviews and observations were conducted prior to, during, and at the conclusion of the project.

D6. From Literacy Tests to Felony Disenfranchisement: A Historical Analysis of Black Male Voting

Alana Mbanza, Sr., Psychology, LAS
Faculty Mentor: Jennifer Hamer, African American Studies and Research Program

ABSTRACT

Possessing the right to vote does not simply involve the physical act of casting a ballot. It is a symbolic demonstration of citizenship. It allows an individual to exercise his or her right to participate in the political processes that directly and indirectly affect their lives. The current state of Black America demands that this population maximize its ability to vote. The goal of this project is to provide a historical context with which to understand and analyze the voting experience of contemporary African American males. More specifically, this paper will use secondary sources and census data to compare historical methods of disenfranchisement during the

post Civil War era, to modern-day policies and legislation. Though blatant discriminatory laws have been, for the most part, dismantled; I argue that latent effects of contemporary policies disproportionately impact African American men's ability to participate in the electoral process.

D7. Characteristics of Clients Using a Low Income Health Center

Dhara Patel, Jr., Community Health, AHS
Bhanupriya Sirandas, Jr., Community Health, AHS
Jennifer Byelick, Jr., Community Health, AHS
Faculty Mentor: Steve Notaro, Department of Community Health

ABSTRACT

Currently in the United States it is estimated that approximately 47 million Americans lack health insurance and possibly even more are underinsured. This has a negative impact on the health of the uninsured. Conditions may go undiagnosed, and even if diagnosed, many ailments go untreated in those that lack access to services or the ability to pay. The problem of the uninsured also has a negative impact of the health care system and health care costs. It is believe that many of the uninsured use the emergency departments of hospitals as their primary source of healthcare, leading to overcrowding of these departments. These visits can be for acute conditions that possibly could have been avoided by earlier treatments and for chronic conditions, as some uninsured are forced to manage conditions such as diabetes and asthma by using emergency departments. This research provides insight on the population that utilize a free health clinic and the impact on their health and the health care system. This study analyzes the characteristics of clients utilizing a free health center to provide a better understanding of the population that access this type of service. This description includes the gender, ethnicity, income, and family structure of the clients. Additional information provided includes the frequency of emergency room visits and previous health conditions that required emergency room care. Emergency utilization is compared to general population. This offers insight on how the insured use the already overcrowded emergency department to manage their health. Thus, these findings will provide key information that may help determine if free health centers may increase the level of health of the uninsured, and reduce emergency room overutilization and therefore reduce total health care costs. Data where obtained from self-reported surveys that were developed, administered, and collected by the health center.

D8. Success of Undergraduates with Illinois Business Consulting

Stephanie Jones, Sr., Chemical and Biomolecular Engineering, LAS
Trent Folkens, Sr., Marketing, BUS

Daniel Wenhold, Jr., Finanace, BUS
Zach Bielasco, Sr., Accounting, BUS
Faculty Mentor: John Clarke, Hoeft Technology and Management Program, College of Business

ABSTRACT

IBC is the largest student-run, project-based consulting firm in the nation. Every year, we perform 40 projects for real clients, addressing real business situations.

Students work for a wide variety of clients, including: Fortune 500 companies, medium to small businesses, UIUC and startup companies. Students are self-managed and receive guidance from fulltime faculty members.

IBC is comprised of 40% undergraduate and 60% graduate students, from a variety of backgrounds, including business, engineering and life sciences. Undergraduates join IBC to differentiate their UIUC experience through real work, mentorship, network expansion, advanced training and professional development.

Every semester undergraduates make significant contributions to their clients. Last semester two of our projects were particularly successful, the Bissingers Gourmet Candy Marketing Plan and the Abraham Lincoln Commision Ecommere Strategy.

Trent Folkens was a Senior Consultant on the Bissingers project. Trent leveraged the Business Economics Library to analyze trends and competitors in the gourmet candy industry. He combined qualitative and quantitative data to develop a marketing plan. Through mentoring from his project manager, Trent learned to be a leader. The project taught him the importance of owning a task and taking on an initiative. Trent developed professionally and is now better prepared to enter the workforce upon graduation. Trent's efforts resulted in Bissingers requesting additional support and being promoted to project manager.

Daniel Wenhold was a Consultant on the Lincoln project. Daniel developed an online store selling Abraham Lincoln memorabelia. He studied established online-based businesses to develop an end-to end business plan. Daniel leveraged his analytical skills and IBC's advanced training to create a financial model and subsequently present it to the client. By developing an ecommerce business strategy, he improved his business acumen through direct industry exposure. Daniel's efforts resulted in the commission requesting additional support and being promoted to senior consultant.

HISTORY SHOWCASE

ILLINI UNION ROOM 210 12-1PM

H1. Post-Soviet Russian Diplomacy in the First Bosnian war of 1992-1995

Alexandra Katzman, Sr., History, LAS
Faculty Mentor: Diane Koenker, Department of History

ABSTRACT
My presentation will highlight my senior year honors thesis, which is a critical look at Russian foreign policy in the first Bosnian War. The focus will be on three different aspects: Blocs conceptualized by the Russian Media, the pragmatic side of the foreign policy, and the more ideological side of the foreign policy. I will also consider the change in the foreign policy that took place over the course of the war.

H2. "To Spille My Housbands Blood": Social Order and Gender Relations in Early Modern England-From the Courtroom to the Kitchen

Megan MacDonald-McGinnis, Sr., History, LAS
Faculty Mentor: Dana Rabin, Department of History

ABSTRACT
Current historiography of early modern England tends to present women as victims rather than perpetrators of violence. Though it is true that typically a minority of violent offenders were female, these incidents of women and their deviant behavior within early modern society should not be excluded from the public record. More and more proof suggests that women were more than just passive victims of criminality. While representations of murderous wives emphasize the apprehension, condemnation, and execution of the offenders, they also present violent resistance as one means by which women could be constituted and recognized as subjects in the early modern period.

Accounts of petty treason- when a wife murdered her husband- represent married women's subjectivity both as agency and self-awareness within the realm of male anxiety. In killing their husbands, early modern women transgressed cultural boundaries that were supposed to delimit their subjectivity. Legal records, broadside ballads and pamphlets publicly represented women's actions and transgressions, therefore, worry the relationship of the female gender, subjectivity, and violence that such crimes enact and that threaten domestic and gender relations. By purposefully excluding women from legal and social records, men were able to silence acts of rebellion and deviance from within their communities and even their homes. By juxtaposing women's agency- both in self-awareness

and societal deviance- I reveal the patriarchal layering of law, social order and female subjugation through the eyes of the anxious male.

H3. Examining Genetics, Scientific Racism and Human Subjects via the Epidemiology of Hepatitis B

Jennifer Rush, Sr., History, LAS
Faculty Mentor: Rayvon Fouche, Department of History

ABSTRACT

My question is to examine how scientific racism and other forms of scientific discrimination has influenced science, and affected science development and the lives it has impacted as a result. Additionally, I wanted to know how the practice of science that created "normal" vs. "deviant" categories has affected our interactions with each other in society.

H4. Bricks, Blockades, and Brutality: Race, Class, and Labor During the 1905 Teamsters Strike of Chicago

Matthew Filter, Sr., History, LAS
Faculty Mentor: James Barrett, Department of History, LAS

ABSTRACT

In May of 1905 in Chicago, a strike by the Teamsters threatened the city's peace. Initiated out of sympathy for another union and to address working-class grievances, the Teamsters quickly shut down the city's commerce by blocking roads with their wagons and building blockades. With the importation of African-American strikebreakers by the city's business elite, the conflict quickly became violent and racial as class-consciousness skyrocketed. Pickets, mobs, and protests became city-wide. Nearly two-dozen were killed.

Using the bloody and brutal Teamsters Strike of 1905 as a case study, this presentation examines the intersection of race into labor/class while scrutinizing the role of the working-class community. The presentation will argue that the city's whites and ethnics used the event, along with past experiences and the current economic situation, to shape notions of inclusion/exclusion by redefining "who was a member of the working class." This process excluded blacks by definition and helped to foster extreme racial animosity during 1905 and in future racial conflicts in Chicago.

PERFORMANCES

COURTYARD CAFÉ 1-3PM

P1. A Night in Spain: My Journey into Spanish Song

Sara Lloyd, Soph., Vocal Performance, FAA
Faculty Mentor: Ricardo Herrera, Voice Faculty, School of Music

ABSTRACT

This past year for my James Scholar project, I prepared a recital of classical Spanish repertoire featuring works from influential Spanish composers including Manuel de Falla, Xavier Montsalvatge, Joaquin Nin, García Lorca, Gerónimo Gimínez, Federico Chueca and Joaquín Valverde. For this recital, I collaborated with classical guitarist, Jason Mitchell, pianist Casey Dierlam, and my teacher professor Ricardo Herrera. In addition to preparing the music, I also translated the texts for all of the songs, researched the composers, librettists, and the historical background surrounding the pieces, wrote the program notes for the recital and organized publicity. I also had the special privilege of preparing and performing two duets with my professor, Ricardo Herrera.

The idea of an all-Spanish recital first came about during my trip to Italy last summer, where I was participating in the Daniel Ferro Vocal Program. I was interested in working on a piece or two from a set of songs by Manuel de Falla and wanted his opinion as to which song I should learn. He thoughtfully paged through the book, turned to me, and said "I think you should learn all of them!?" Thus began my adventure into Spanish song that would become my James Scholar honors project for the 2007-2008 school year.

I had the opportunity to give two performances of this recital, once on Sunday, March 16, 2008, at alma mater, Lake Zurich High School, and once on campus, which will be held on Saturday, April 5th, 2008, in Smith Memorial Hall. It has been a joy to study this music. I have learned a great deal about the different styles and genres of Spanish music, researched a number of popular Spanish composers, experienced a taste of Spanish history, and have even learned a little Spanish in the process!

P2. Harp Performance

Keturah Bixby, Sr. Harp Performance Major, School of Music, FAA
Faculty Mentor: Dr. Ann Yeung, Associate Professor of Harp and Chair of String Division

ABSTRACT

The Impromptu was composed by Gabriel Fauré as the 1904 test piece for the harp class at the Paris Conservatoire. One of only two solo pieces Fauré wrote for the harp, the Impromptu was later transcribed by Alfred Cortot and

approved by Fauré as his sixth piano Impromptu. I compared the Impromptu for harp with the piano transcription, and also looked at the work in the harmonic and stylistic context of Fauré's other five piano Impromptus. During a period of political and musical suppression in Hungary, György Ligeti wrote Musica Ricercata, a set of eleven short pieces for piano. Each piece uses one more pitch class than the previous (a pitch class comprises all pitches with the same name). The first composition begins with only two pitch classes (the most hilarious dominant preparation in the repertoire) and No. 11 uses all twelve. I transcribed No. 4 and No. 8 for harp. No. 4 uses five pitch classes (F#, G, G#, A, and Bb), introducing the fifth pitch (G#) in gripping fortissimo bass octaves in the middle of the piece, and imitates a barrel organ. No. 8 uses nine pitch classes (F, G, G#, A, B, C, C#, D, and E) in a lively dance.

P3. Inner Voices Social Theatre

Aisha Boyd, Sr., Speech Communication, LAS
Brittany Baker, Sr., Political Science, LAS
Taylor Moore, Fr., Jazz Studies, FAA
Faculty Mentor: J.W. Morrissette, Theatre

ABSTRACT

The theatre offers us many forms for addressing social issues. What is does not readily offer we create as a new form of theatre. With theatre we can challenge boundaries, educate and raise awareness, give voice to those silenced, invert social paradigms and turn center stage over to those who are marginalized. All this while we continue to expand the scope of what typical audiences might consider possible through live performance.

This performance, offered by participants in the Inner Voices Social Issues Theatre program here at the University of Illinois, will be presented in order to share the ways of writing, creating and utilizing theatre that we are exploring to addresses social issues on this campus. We will pay particular attention to the role that humor and form play as we look at the task of presenting difficult material theatrically. Additionally, the incorporation of audience discussions into the presentation of social issues theatre productions will be addressed.

This performance will share excerpts from our three shows created for the Spring 2008 semester: Open Season, Endangered Black Girls, and Breaking the Silence. These three shows deal with issues surrounding LGBTQA concerns, Race/Ethnicity and Identity concerns, and Sexual Assault Awareness respectively. These excerpts would serve to provide examples of the intensive work we've done through research, dramaturgy, writing, rehearsals, actor/peer facilitator development and other aspects of original theatre production.

P4. Selections by Marvels and Jolivet

Jamie Murphy, Jr., Instrumental Performance, FAA
Jennifer Garrett, Piano Performance, Graduate School of Music, FAA
Faculty Mentor: Dr. Jonathan Keeble

ABSTRACT

Marin Marais composed in the late seventeenth and early eighteenth centuries. Les Folies d'Espagne falls under the category of a theme and variations. The theme, stated at the outset, is short, simple, and unornamented. Following is a series of variations that elaborate the theme into different musical ideas. Some are slow and lyrical, while others are faster; all variations contain the same structure of the theme. The theme is again heard at the end without alteration, just as it was presented at the beginning.

The work by Andre Jolivet provides a striking contrast to the Marais. Though both pieces were written by French composers, the Jolivet was composed much later (1944), giving it a very different sound. The harmonies in Chant de Linos are much less recognizable to the ear, and the work also exhibits a more complex rhythmic structure. In this single-movement work, the listener will hear loud and shrill moments, soft and singing sections, and even sections that resemble a dance, which all add up to an exciting 'roller coaster' of a piece.

The two compositions are a major portion of my upcoming Junior Recital, which has been my research focus during the current academic year.

POSTERS

MORNING SESSION (PM) 10AM-12PM

PM1. The Individual Tax Evader: Toward a Psychological Profile

Jenna Meints, Sr., Accountancy, BUS
Faculty Mentor: Brent W. Roberts, Department of Psychology

ABSTRACT

Between July and September of 2007, 900 United States taxpayers responded to a 250+ question online survey that assessed personality traits, social cognition, and tax evasion behaviors. We measured the following items: Multi-Language Seven, facets of conscientiousness, manipulativeness, impulsivity, social responsibility, pro-evasion attitude, pro-evasion personal and social norms, and 25 tax evasion behaviors.

We found significant correlations between tax evasion behavior and manipulativeness, impulsivity, social responsibility, reliability, conventionality, pro-evasion attitude, pro-evasion personal norm, and pro-evasion social norm. These associations indicate that tax evaders are more similar to blue-collar criminals, who are traditionally low in conscientiousness and high in psychopathy, than similar to white-collar criminals, who have been shown in past studies to have higher levels of conscientiousness. The strength of these correlations suggest an hierarchical structure where personality traits are distal determinants

of taxes evaded and social cognitive units are proximal determinants. We tested this structure by bootstrapping the data through a multiple mediator model and discovered that pro-evasion attitude fully mediates all of the effects of personality traits on tax evasion behavior, except for conventionality. This result suggests that pro-evasion attitude is the most significant, influential determinant of tax evasion behavior in the presence of all other personality traits and social cognitive units of analysis.

In the past, only a handful of studies have explored the relationships between personality and/or social cognition and tax evasion behavior. These studies have used limited measures for each of personality, social cognition, and tax evasion behavior, and no study has tested a mediational relationship among the three. Consequently, our results offer substantial insight into the psychological profile of tax evaders as well as the hierarchical nature of personality, social cognition, and behavior.

PM2. Design of an Amperometric Biosensor

Ridhima Handa, Jr., Actuarial Science, LAS
Faculty Mentor: Kenneth Gentry, Department of Bioengineering

ABSTRACT

Products for diabetics have been improving exponentially recently, less painful and non-invasive technologies are now in the market, but almost all the advanced meter are based on the amperometric biosensor concept with improvements in the electrode efficiency, the time efficiency, and the further digital processing.

The suggested electronic map for this project provides an efficient system that detects the change in oxygen level at the cathode of a chemical cell. The drop in oxygen concentration is an indication of the rate of reaction of glucose with its substrate (the oxidase in the membrane).

The design not only includes a detection system, it also takes into consideration the need to maintain a constant potential drop within the system, this is ensured through the addition of feedback control. The design accounts for any fluctuation in the surrounding environmental conditions such as temperature increase.

The proposal concludes with an emphasis on the significance of such a design experiment within the lab structure; Enriching the theoretical background of students, and supporting the cooperation among the different fields of engineering. The sensor to-be-built is also considered very flexible for future modifications and further improvements.

PM3. Neuroeconomics and Risk

Laura Zahn, Jr., Actuarial Science, LAS
Faculty Mentor: Rick Gorvett, Actuarial Science Program

ABSTRACT

This poster session describes the emerging field of neuroeconomics and, more generally, behavioral economics ' and its potential to advance our understanding of risk and the risk management process. The session provides a summary of the current state of behavioral economics, including the identification and demonstration of specific 'fallacies' and cognitive inconsistencies, e.g., framing effects, the availability fallacy, etc.

The session also summarizes our research into the impact of such issues on the evaluation and management of risk. The current sub-prime mortgage and credit crises in the financial markets demonstrate the importance of realistic and accurate identification, quantification, and management of risk. Our session provides examples of possibly serious problems with the risk management process that can emerge from behavioral and cognitive issues.

Finally, visitors to our session are provided with an opportunity to respond to some selected risk-related questions and scenarios. These questions provide visitors with additional insight into behavioral issues, and will also provide the researchers with additional data on risk and behavioral issues to examine and analyze.

PM4. A Break In the Chain: A Look at Communication Between Resident Advisors the Resident Life Employees Above Them

Rachael Levine, Sr., Anthropology, LAS
Faculty Mentor: Nancy Abelmann, Department of Anthropology

ABSTRACT

Through past experiences and observations of resident advisors (RAs), resident directors (RDs), and the administrative staff of the Residential Life Department, I have noticed a break in the communication between RAs and Housing Administration. The organization of Residential Life is very similar to that of many large departments: employees are hierarchically organized and policy is set in a hierarchical fashion as well. Policies that affect residents are made by administrators (starting with a director) and implemented by the resident advisors. This is where communication appears to be absent. While information is quick to travel from the 'top-down,' there is very little opportunity for the resident advisors to give feedback as to how the reality of the situation is playing out on the hall floors. This break in communication appears to be a stressor and source of frustration for many RAs who are working with the residents on a daily basis and see nothing of the administration.

The intent of this proposed research is to determine the existence, cause, and possible solutions for this 'disconnect.' The cause of this 'disconnect' is something very worthy of investigation. Without determining the cause, any solution will likely be restricted in its influence. I hypothesize that it may

be a break in age, education, values and goals, and/or daily experiences between the administrators and resident advisors. To investigate this issue, I plan to utilize interviewing and visual representation task methods. It would be beneficial to many people for this apparent stress to be investigated and alleviated in this prominent department on campus.

PM5. Functional analysis of a Lactobacillus gasseri PTS transporter

Julia Willett, Jr., Biochemistry LAS and Human Nutrition ACES
Faculty Mentor: Dr. Michael J. Miller, Department of Food Science and Human Nutrition

ABSTRACT

The human gastrointestinal system contains a multitude of different bacterial species, many of which are lactic acid bacteria (LAB). LAB are a group of related organisms that produce lactic acid through carbohydrate fermentation. LAB can utilize a variety of carbohydrates, which reflects the nutrient availability in their respective environments. A common LAB in the human gastrointestinal tract, Lactobacillus gasseri, was selected for further study. The currently available annotation of the L. gasseri ATCC 33323 genome describes numerous putative genes involved in carbohydrate utilization, yet the specific functions of many of these genes remain unknown. The ability to utilize a specific carbohydrate requires a transport system to import the carbohydrate into the cell. The primary carbohydrate transporters in LAB are phosphoenolpyruvate-dependent phosphotransferase system (PTS) transporters. Bioinformatic analysis identified 15 PTS transporters in L. gasseri. Of these 15 PTS transporters, PTS 9 (orf 500-501) was predicted to be a lactose transporter due to a high amino acid sequence similarity (60% identity) to a known lactose PTS in L. casei. However, data from our lab demonstrate that PTS 9 gene expression is not induced in the presence of lactose. Our objective is to identify carbohydrates transported by PTS 9. Initially, a PTS 9 knockout in L. gasseri will be created. The carbohydrate utilization profile will be compared between the wild-type and the PTS 9 knockout L. gasseri. Carbohydrates that support growth of the wild type but not the PTS 9 knockout are potential carbohydrates transported by PTS 9. The ability of the selected carbohydrates to induce expression of PTS 9 will be analyzed using real-time PCR. This study will demonstrate the danger in relying on bioinformatic analysis to identify sugars transported by a specific PTS transporter.

PM6. Edyrolhc Lylla - ChBE 431

Stephanie Jones, Sr., Chemical and Biomolecular Engineering, LAS
Julia Gregg, Sr., Chemical and Biomolecular Engineering, LAS
Anuradha Biswas, Sr., Chemical and Biomolecular Engineering, LAS

Faculty Mentor: Marina Miletic, Department of Chemical and Biomolecular Engineering

ABSTRACT

Opportunity: With the growth of the allyl chloride market, Edirolhc Lylla has proposed to begin building a new facility to produce this chemical.

Concept: Recognizing the demand, design engineers at Edirolhc Lylla have developed an efficient design for the production of allyl chloride. To compete, this new facility will generate 1000,000 metric tons/year of 99.5 wt. % of the chemical and will run 335 days/yr for a period of ten years.

Sources of Revenue: All other four chemicals produced during the reaction of chlorine and propylene (allyl chloride; 2-chloropropene; propane; hydrogen chloride) generates $2,777,623,893 in revenue.

Financial Overview:

- NPV: $10.85 B
- DCFROR: 172%
- PVR: 2.3
- DPBR: < 1 month

Even with high equipment costs, this process is still profitable. With a positive NPV, a PVR greater than one, DPBP of less than a year, and a DCFROR well over 100%, the project is a good investment and would generate $10.85 B for Edirolhc Lylla. Management should immediately move forward with development of the facility.

Technical Strategic Advantages: Proprietary Process- Edirolhc Lylla has developed an optimized process flow diagram (PFD) which illustrates a new process to synthesize allyl chloride via a reaction of 90% propylene and 100% chlorine.)

Efficient Use of Raw Materials- The propylene leaving the bottoms of last distillation column in the separation system is completely recycled back to the beginning of the design, resulting in an annual cost reduction of $1,559,122 on raw materials alone.

Inherently Safe Process: The process runs at a pressure of 1.1 atm. The temperatures of the process stream are very low, and the effluent streams from both reactors are highly regulated with insulation. Environmentally Friendly Process:There is no purge stream emitting unwanted chemicals so there is no waste.

Recommendation: Begin building allyl chloride facility immediately.

PM7. Temperature Independent Lead Sensing Based on a Fluorescent DNAzyme

Jenny Wu, Soph., Chemical and Biomolecular Engineering, LAS
Faculty Mentor: Dr. Yi Lu, Department of Chemistry

ABSTRACT
In previous studies, an in vitro-selected deoxyribozyme was found to specifically bind to lead; this discovery helped to develop a metal-specific sensor. The lead sensing system (+5_17E) was found to detect lead efficiently at room temperature, but the efficiency decreased significantly at lower temperatures. However, when a single mismatch on the enzyme strand was introduced, the system was able to detect lead efficiently at 4°C. Therefore, we have been able to successfully detect lead from 4°C to 25°C. This mutant DNAzyme sensor was labeled with a fluorophore and a quencher, and fluorescence-based experiments were carried out for studying its activity and its lead dependence. Polyacrylamide gel assays have also been carried out to better understand the activity of the DNA sensor.

PM8. Effects of Showerhead Design on Plasma Flow in an Oxygen Plasma Reactor

Brandon Reizman, Jr., Chemical and Biomolecular Engineering, LAS
Faculty Mentor: Edmund Seebauer, Department of Chemical and Biomolecular Engineering

ABSTRACT
Fabrication of microelectronic devices uses silicon wafer and hundreds of processing steps (e.g., thin film deposition and removal) to yield the final chip. Plasma etching is widely used for removing deposited polymer layers, also known as photoresist, from the silicon wafer surfaces. Increasing demand for computing devices caused manufacturers to use large silicon wafers, up to 300 mm in diameter. Increasing wafer size brought challenges to etching equipment because it is imperative to have the uniform distribution of plasma across entire photoresist-coated wafer. Redistribution of plasma through a showerhead is a common method for creating desirable flow patterns in the reactor. By testing several different showerhead designs, it is possible to find an optimal showerhead configuration. However, this trial-and-error experimentation is time consuming and expensive. Fortunately, recent advances in computing allow reliable simulation of fluid flows in the processing equipment. Available computational fluid dynamics (CFD) software provides a faster and cheaper alternative to experiments in the laboratory. This new method can be very useful for studying the effects of various showerhead designs on plasma flows in the reactor.

This project focused on using CFD software for simulating plasma flow in the oxygen plasma reactor. Variations in showerhead geometries can be correlated to changes in the plasma flow patterns. Based on observed trends, the showerhead with the most uniform plasma velocity near the sample surface is chosen for future experimental tests. The results of this work will be used to manufacture a prototype and evaluate its performance in the experimental plasma reactor.

PM9. Kinetic Study of Temperature Programmed Desorption (TPD) of Oxygen from TiO2

Xiaoyu Chen, Sr., Chemical and Biomolecular Engineering, LAS
Faculty Mentor: Edmund Seebauer, Department of Biomolecular and Chemical and Biomolecular Engineering

ABSTRACT

Titanium dioxide is a metal oxide semiconductor that will become reduced when annealed in an environment deficient in oxygen. The reduction of oxygen occurs through diffusion of oxygen defects in the bulk titania to the surface and then desorption of oxygen from the surface. Temperature Programmed Desorption (TPD) is a common technique used to study surface reactions and kinetics. In the following work, desorption of oxygen out of bulk titanium dioxide is studied to gain an understanding into the desorption process of oxygen leaving titania. A titania sample is heated over a steady temperature ramp in ultra high vacuum (1E-8mTorr). The change in oxygen pressure with respect to temperature indicates reaction kinetics of the respective desorbate.

Due to difficulty in manually maintaining the linear temperature ramp, a program was created in LabView in order to implement a control visual interface to carry out the experiment in a simple and a regulated manner. The program allows user to input temperature ramp rate, and will then automatically monitor temperature and pressure changes while relaying current signals to establish a steady temperature ramp. Upon conclusion of each run, the program outputs time elapsed pressure and temperature graphs, as well as the pressure versus temperature graph . Experiments performed utilizing the automated program shows linear temperature ramp with little deviation from user defined ramp rate. Initial temperature programmed desorption graphs were obtained.

PM10. Antimicrobial Silver Nanoparticles HS-Lab

Matt Ragusa, Sr., Chemistry, LAS
Faculty Mentor: Joseph Muskin, Department of Mechanical Science and Engineering

ABSTRACT

Integrating silver nanoparticles into materials to generate antimicrobial surfaces is becoming prominent in several new products. Products include silver nanoparticles being integrated into fabrics to prevent clothes from developing foul odors, doorknobs that have silver nanoparticles embedded in their surfaces, even silver nanoparticle treated pacifiers. A quick search of the website 'project on emerging nanotechnologies' at http://nanotechproject.org/44 currently shows over 100 consumer products that have silver nanoparticles. With

hundreds of new products claiming antimicrobial properties we thought it might be appropriate to put silver nanoparticles to the test.

With a quick, simple, and safe procedure to make silver nanoparticles, students can design their own experiments to test the effectiveness of these silver nanoparticles. The nanoparticles can be created in under thirty minutes by mixing a few readily available solutions on a hotplate. Students can generate their own experiments to test the 'antimicrobial properties' of the silver nanoparticles they make by growing bacteria in the absence or presence of the silver nanoparticles. Through a range of teacher modifications, students can design an experiment that is appropriate for a wide range of ability levels making it appropriate for advanced chemistry or biology classes yet still remain suitable for an introductory biology or general science classes.

PM11. Sonic Spray Ionization

Josh Lasinski, Sr., Chemistry, LAS
Faculty Mentor: James Lisy, Department of Chemistry

ABSTRACT

My research is concentrated in the development and optimization of Sonic Spray Ionization for use with mass spectrometry. This technique can provide better resolution than previous ionization methods, while also providing large ion clusters. In order to achieve this resolution, however, there are many factors that need to be optimized.

The nature of ionization in sonic spray is the flow of an inert gas, in this case nitrogen, at such a velocity to produce ions when passed over a flowing liquid sample. This introduces the two key variables in optimizing the apparatus. My research has shown that the resolution and signal generated increase with both the gas and liquid flow rate, seemingly without bound. However, there are practical considerations. Too fast a flow of the sample can make running experiments tedious, as the sample would have to be continuously refilled. Also, creating a very fast flow rate of nitrogen can be difficult in itself, not to mention costly. I have settled on conditions of 100psi for the nitrogen flow rate, and 55 microliters per minute for the sample flow rate. These conditions allow for a very strong integrated signal,nearing two million counts per second.

Another important variable is temperature. The object is to form solvated ion clusters, but this requires a specific range of temperature to encourage the hydrogen bonding interactions of the solvent and ions. Other variables to consider are the alignment of the apparatus, and the settings of the mass spectrometer. All of these variables, and the results of the optimization will be compared to another means of ionization, primarily Electrospray.

PM12. Stabilizing Discrete Folded States of RNA Macromolecules using DNA Constraints

JP Gerdt, Sr., Specialized Chemistry, LAS

Faculty Mentor: Scott K. Silverman, Dept. of Chemistry

ABSTRACT

Over the past 25 years, scientists have come to respect the catalytic power of RNA. As with proteins, the key catalytic functions of RNAs depend on their three-dimensional structures, which are complicated to predict and study. Unlike proteins, which have 20 different amino acids of vastly different polarities, charges, and geometries, RNAs are made of only four nucleotides that are chemically similar. This small language of residues causes unique misfolding problems. RNA macromolecules can adopt several folded states that are close in energy, including their native, lowest-energy states and many misfolded states. DNA constraints can help elucidate how RNAs interconvert among these states; i.e., how RNAs fold.

A DNA constraint is made of two complementary DNA strands, each covalently attached to a separate position on the RNA macromolecule of interest. The attachment positions are chosen in a way that allows the DNA constraint duplex to form while the RNA is in one folded state, but not in other states. Thus, the folded state that is compatible with the constraint duplex is thermodynamically stabilized by a magnitude approximately equal to the free energy of DNA duplex formation.

Previously, DNA constraints have only been used to destabilize RNA, creating unknown misfolded states. Our efforts are directed to the long-term goal of rationally stabilizing specific, known misfolded states. As a proof-of-principle experiment, we are first stabilizing the well-known native state of the P4-P6 domain of the Tetrahymena group I intron at low Mg2+ concentrations, where the native state is not normally favored. Our ability to stabilize the native state will offer the exciting potential of stabilizing misfolded structures for subsequent use in folding kinetics studies. Ideally, DNA-constrained RNAs will populate specific misfolded conformations. Then, the constraints will be quickly removed, e.g., via photocleavage, allowing one to monitor how RNA macromolecules traverse their folding landscapes from various misfolded starting points.

PM13. Working in Dining Services: Just a Paycheck

Sha'Donna Woods, Sr., English, LAS
Faculty Mentor: Dr. Priscilla Fortier, Educational Policy Studies

ABSTRACT

What do students who work in EBR Dining Services gain from the experience' From personal experience I know that EBR Dining Services has a high turn over rate. There is a select group of students however who choose to work at EBR on a long term basis. I define long term as having worked at EBR Dining Services for four semesters or more. I want to know why these students choose to continue working at EBR rather than quitting within

one or two semesters like other workers. Sub-questions designed to help me answer my main research question are as follows: are there noticeable ethnic, gender, or class trends amongst long term workers? What are some of the rituals associated with the student worker culture at EBR? How are relationships amongst the full-time (Champaign-Urbana resident) workers and the student workers? I predict that through ethnographic observations and interviews I will discover that student workers gain much more than a paycheck from their work experience at EBR. I am assuming that the workers are gaining a meaningful interpersonal experience on the job as well, similar to what they might encounter in a close-knit club or organization.

PM14. The Sonju Lake Intrusion: Formation and Analysis of a Layered Basalt Body and Overlying Granite

Kayla Ireland, Jr., Geology, LAS
Faculty Mentor: Craig Lundstrom, Department of Geology

ABSTRACT

The Sonju Lake Intrusion (SLI) is a 1200-meter thick intrusion of basaltic magma of approximately 50 percent SiO2 content near the town of Finland, Minnesota. This intrusion is geologically interesting because the equally large Finland granite, of 70% SiO2 content, directly overlies the SLI. The two intrusions appear to be related for many reasons, two of which being mineralogical compositions and amounts smoothly grade into each other and that the two intrusions have identical ages. In an igneous intrusion, 1 part granite should form for every 20 parts of mafic rock, however it is impossible to form the 1:1 ratio seen in the SLI. And so, while the two intrusions have traits indicating they are co-genetic, they simply cannot be based on standard models of igneous processes. My work on the SLI-Finland provides another important piece of information, isotopic composition. Strontium isotope ratios are often used to trace the 'magma source' of two rocks and can be measured with a mass spectrometer, such as the one used in the isotope geochemistry lab of Professor Craig Lundstrom. If 2 ratios are identical, it is likely that the rocks came from the same source. My analyses show the Finland granite and the SLI have distinct strontium ratios indicating distinct sources. Yet near their boundary the ratios oscillate between sources. Another notable finding is that the strontium ratios appear to correlate with the crystal fabric of the different rock layers in the SLI. My poster presents my research focused on understanding the relationship between the two rock bodies and how the traits indicating co-genetic behavior evolved.

PM15. Coupling into Single Photon Detectors

Darcy Barron, Sr., Engineering Physics, ENG
Faculty Mentor: Paul Kwiat, Department of Physics

ABSTRACT

We have been working on improving efficiencies of single photon detectors. High efficiency single photon detectors with low error probabilities are necessary for optical quantum computing and communication. Conventional photon detectors like photomultiplier tubes have low quantum efficiencies and cannot be improved to the efficiency levels needed, so we use visible light photon counters (VLPCs) and solid-state photomultiplier (SSPMs). These detectors have very high quantum efficiencies, above 90%, but measured values are lower due to coupling losses. We are attempting to optimize the coupling of desired photons while filtering the background photons into these high efficiency single photon detectors so that we can achieve extremely high single-photon detection efficiencies (>90%) and simultaneous photon number resolution. We reduce background blackbody radiation photons by cryogenically cooling the detector setup. By modeling the thermal distribution of the setup and cooling the incoupling optical fibers, we are attempting to minimize the background photon contribution and increase detector efficiencies.

PM16. Laboratory Simulations of the Mount St. Helens Lateral Blast

John Kolinski, Sr., Math and Engineering Mechanics, LAS, ENG
Faculty Mentors: Susan Kieffer, Geology; Joanna Austin, Aerospace Engineering

ABSTRACT

On Sunday, May 18th, 1980, the north flank of Mount St. Helens sheared away from the magmatic chamber beneath, unleashing a powerful lateral blast, which leveled everything in its path for over 500 square kilometers. Probing the interior conditions of such blasts is impossible in the field, and difficult even in laboratory simulations. Schlieren imaging provides the capability to capture high-resolution information about the flow field. In an effort to determine the dynamics of the blast, including the extent of internally supersonic flow, a shock tube experiment has been constructed. A high-pressure reservoir models the magmatic chamber, a diaphragm models the shearing flank, and a test chamber models the earth's atmosphere. The extent of the supersonic zone is defined by the barrel and Mach disk shocks. As a part of this work, a schlieren system has been designed and successfully constructed. We are able to discern fine-scale shocks in an air hose jet used as an analogue to the eruption experiment. The features of the jet are clearly visible with the schlieren system, and the system requires little adjustment to accommodate the experimental blast apparatus.

PM17. Antibiotic Resistant Gene Impact on Microbial Communities in Agricultural Soils and Ground Water

Shazan Ahmed, Jr., Molecular and Cellular Biology, LAS
Faculty Mentor: Anthony Yannarell, Department of Animal Sciences

ABSTRACT

This study corresponds to the use of antibiotics on swine farms and the spread of antibiotic resistant genes and/or bacteria seeping through soil and groundwater. Samples from swine waste treatment lagoons, nearby groundwater wells, and soils fertilized by swine manure were analyzed for the presence of seven tetracycline resistance genes [tet(O), tet(Q), tet(W), tet(M), tet(H), tet(T), tet(Z), tet(C)]. The analysis was conducted through soil DNA extractions and then CTAB clean up, which removes soil containments from the isolated DNA. Following the cleanup, we performed PCR amplification, which created several million copies of the DNA strand we wanted to examine. Lastly a gel electrophoresis was conducted for our amplified DNA, which physically showed us whether there were tetracycline remnants in our samples. Further analysis of TRFLP will yield whether these genes are resulting from the origin of the gastrointestinal tract in the swine, or whether horizontal gene transfer has occurred and new bacteria have taken up these resistance genes. This study's end result will help determine the long-term impact of swine gastro intestinal bacteria on microbial communities in agricultural soils and ground water.

PM18. The Impact of Medical Ethics Course on the Students' Perceptions of the Important Health Care Issues

Maulik Sheth, Sr., Molecular and Cellular Biology, LAS
Faculty Mentor: Stephen J. Notaro, Department of Community Health

ABSTRACT

Many topics in contemporary medical ethics are prevalent in everyday American society. These topics range from end of life issues including physician assisted suicide, to reproductive issues, to research involving stem cells and more. College age students present an interesting challenge in understanding these issues. Recently reaching age of majority, the college student is now an autonomous decision-maker. In addition, these young people will become policy makers in setting the agenda for the country in the near future. This study analyzes the impact of a college course in medical ethics on students' perceptions of the importance of critical issues in healthcare. The course is an introductory course in more than 20 topics of contemporary issues in medical ethics. This class is taught in a lecture discussion format and reviews opposing views of each selected topic. To determine the impact of students' perceptions

on topics in medical ethics, a survey was administered using a pretest/posttest survey in the spring and fall semesters in 2007 to approximately 250 students. This research reviews how students' perceptions are changed on key selected topics after a semester long course. Student responses were reviewed by race, gender, number of credit hours, and major area of study. Students were asked to report what they believed to be the five most important topics at the beginning of the semester and again at the end of the semester to determine any change. In addition, students were asked on a five point scale how important they perceived each individual topic to be covered at the beginning and end of each semester. An analysis of the results yields important information on what topics college students feel most important, and the influence that a semester long college course has on their perceptions.

PM19. Expression of the Anti-apoptotic Peptide Trefoil Factor 3 Distinguishes SW480 Colonic Adenocarcinoma Cells and the Isogenic SW620 Cell Line, Established from a Lymph Node Metastasis of the Primary Tumor

Grace Maloney, Jr., Molecular and Cellular Biology, LAS
Faculty Mentor: Rex Gaskins, Department of Animal Sciences

ABSTRACT

Trefoil factor 3 (TFF3), a member of the cysteine rich trefoil family proteins, is expressed by intestinal goblet cells and plays a key role in epithelial protection. However, aberrant TFF3 expression in several human cancers including the stomach, thyroid, breast and prostate is associated with a negative prognosis for patients. We are examining TFF3 expression in two adenocarcinoma cell lines (SW620 and SW480) derived from the same patient but differing in metastatic ability. The use of these isogenic cell lines minimizes extraneous variables except those contributing to the metastatic and cancerous characteristics of the cells. We hypothesize that upregulation of secreted TFF3 may aid metastatic cells in evading the immune response by means of its cysteine residues. Specifically, disulfide bonds between C21-C36, C31-C48, and C11-C37 may serve as free radical scavengers thereby diminishing oxidative destruction of invasive cells.

A previously reported microarray study demonstrated a 3-fold increase in Tff3 expression in SW 620 cells relative to SW480 cells. For comparison, we conducted an independent study using QPCR methods, which indicated 93-fold greater expression of Tff3 in SW620 as compared to SW480 cells. Additionally, upregulation of Tff3 occurred within each cell line in response to the pro-oxidant hydrogen peroxide (H2O2). Following a 24 hour treatment with 10 and#956;M, 50 and#956;M, and 200 and#956;M H2O2, a cell viability study was conducted using flow cytometry. SW620 cells exhibited increased resistance to H2O2 relative to SW480 cells with

lower Tff3 expression. TFF3 was demonstrated previously to exert anti-apoptotic effects. The present data are consistent with the working hypothesis that the relative resistance of metastatic SW620 cells to cell death by apoptosis in response to H2O2 may be mediated by TFF3.

PM20. Mental Health Needs and Perspectives of Foster Children of Methamphetamine Abusers

Kimberly Brown-Riley, Sr., Psychology, LAS
Faculty Mentor: Wendy Haight, School of Social Work

ABSTRACT

This study's purpose is to understand the mental health needs of rural foster children whose parents' abuse methamphetamine. To date, studies on the mental health outcomes of children whose parents abuse substances have focused predominately on alcohol abuse. In the National Association of Counties survey, 40 percent of child welfare officials reported parent's methamphetamine abuse as a reason for the increase in the number of children entering foster care, especially on the West Coast and in rural areas. This study investigates methamphetamine abuse, specifically. Participants were 29 children, ranging in age from 6 to 16, with a mean of 9.79 years. The research design is case-based and descriptive. This report is based on Standardized Assessment of Psychological Functions (including Child Behavior Checklist (CBCL) and Trauma Symptoms Checklist (TSCC) and record reviews (including demographic variables, children's placement history, mental health and criminal history of parents). The results from the CBCL and TSCC indicate a high level of trauma symptoms and behavior problems. Implications for intervention are discussed.

PM21. The Effects of Newcastle Virus Vaccine on Formation of Stones in the Reproductive Tract of Roosters

Joseph Esch, Sr., Animal Science, ACES
Faculty Mentor: Dr. Janice M. Bahr, Animal Sciences

ABSTRACT

Roosters vaccinated against Newcastle virus have no epididymal calcium stone formation in the epididymis, and have increases in testosterone and semen concentrations similar to nonvaccinated roosters. Our objective was to determine if vaccination with Newcastle live virus vaccine caused epididymal calcium stone formation in the rooster. Specific pathogen free roosters were divided into two groups: nonvaccinated (NONVAC, n=9), and vaccinated (VAC, n=6). Roosters were vaccinated at 2, 7, and 12 weeks of age and the epididymis and testis were observed following euthanasia at 30 and 33 weeks of age. No evidence of epididymal stones

was observed. Testosterone and semen concentrations were elevated in NONVAC roosters when compared to VAC roosters. As a result we conclude that Newcastle virus vaccine does not result in epididymal stone formation in roosters. It is suggested that Newcastle virus vaccine may actually increase testosterone concentrations and semen concentrations in the rooster.

PM22. Building bridges through an action research approach; program description and evaluation

Roselia Banuelos, Jr., Psychology, LAS
Faculty Mentor: Michelle Cruz Santiago, Department of Psychology

ABSTRACT

The majority of the students at the Booker T. Washington after-school learning program are Latino recent immigrants who are facing a number of economic hardships and obstacles. The most pressing needs identified by the parents are securing homework help for the children and teaching the parents how to help their children succeed academically. We are currently responding to those needs via an after-school program. Using the community funds of knowledge approach, our program provides homework and academic assistance to the children who are at risk of school failure. In addition, we incorporate activities that highlight the existing strengths and resiliency in the children, their families, and their communities. The purpose of this presentation is two-fold:1) describe the community funds of knowledge theory and how it influences the structure of the after-school program; and 2) provide a detailed account of the ways in which we are building relationships with the families and communities of these children and how these relationships are enhancing the program.

PM23. Genome Size in Miscanthus

Joseph Crawford, Sr., Crop Science, ACES
Faculty Mentor: John Juvik, Department of Natural Resources and Environmental Sciences

ABSTRACT

Miscanthus x giganteus is an interspecific hybrid of Miscanthus sinensis and Miscanthus sacchariflorus. M. sinensis is most likely the diploid parent (2n= 38 chromosomes) and M. sacchariflorus the tetraploid parent (4n=76) that generated this hybrid. At some point in the past the gametes from these two plants most likely formed the original triploid Miscanthus x giganteus which has since been clonally propagated. Miscanthus x giganteus has a total chromosome number of 3n=57. We have utilized flow cytometry to determine the amount of DNA in the nuclei of different accessions of Miscanthus. There is variation within the Sinensis and Sacchariflorus species that could lead to difficulty in breeding.

PM24. Expectations, Needs and Segmentation of Drinkable Yogurt Consumers

Joseph Kreger, Sr., Food Science and Human Nutrition, ACES
Faculty Mentor: Soo-Yeun Lee, Department of Food Science and Human Nutrition

ABSTRACT

Drinkable yogurt products have been one of the fastest growing food or beverage categories in the world since 2006. Speculated reasons for the growth are twofold, including convenience and health benefits. The objective of this study was to measure the impact of these factors on purchase intent of yogurt products utilizing a concept analysis technique called conjoint analysis.

An initial focus group was done to identify attributes, or elements, pertaining to yogurt products. The 20 chosen elements fell under four categories: types of probiotic strains and benefits associated with them, sensory characteristics, packaging and convenience attributes, and health benefits. Using the Ideamap online application, a survey was distributed to 383 participants who were presented with descriptions of conceptual yogurt products made up of several elements. Participants were asked to rate purchase intent of 20-25 concepts, as well as open ended and demographic questions.

The winning concept was a compilation of all the highest scoring elements from each category for the entire sample population. This was a conceptual yogurt product that had high calcium for strong bones and teeth, contains Bifidus Regularis plays a beneficial role in your intestinal ecosystem, had a creamy texture, and is in a resealable container. The losing concept was a product that was made with all organic ingredients, contains L. reuteri - Fights Bacteria and Disease Associated with Gastrointestinal Disease, Fizzy Due to Added Carbonation, and No Refrigeration Required.

The Ideamap program also segmented the participants into four segments based on trends in their purchase intent. All segments had at least one category of elements that gained significant interest, leading to a conclusion that there is enough variation in the yogurt market for many types of consumers. Many drinkable yogurt products have a unique set of attributes that have appealed to several segments, explaining recent growth.

PM25. Maternal Diet Programs Muscle GLUT4 Expression in Rat Offspring

Michelle Unander, Jr., Food Science and Human Nutrition, ACES
Faculty Mentor: Yuan-Xiang Pan, Department of Food Science and Human Nutrition

ABSTRACT

The main goal of the present study was to investigate effects of a low-protein diet with a range of folate supplements during the gestation period on the

glucose transporter 4 (GLUT4) gene expression in skeletal muscle of offspring rats. Timed-pregnant SD rats were assigned into four diets: control (180g/kg casein, 1mg/kg folate), LP1 (90g/kg casein, 1mg/kg folate), LP3 (90g/kg casein, 3mg/kg folate) and LP5 (90g/kg casein, 5mg/kg folate). At birth, all mothers received a standardized lactation diet. Pups were weaned from mothers at day 21 and the skeleton muscle was collected when they were 35 days old. Methylation sensitive PCR was performed to analyze methylation levels of the putative CpG islands at promoter regions of GLUT4. Our results indicated that maternal low protein intake significantly diminished DNA methylation at the GLUT4 promoter region in male offsprings, which is inversely correlated with their increased mRNA expression. In contrast, DNA methylation levels at the promoter of GLUT4 in female pups increased with maternal low protein intake. Within folate supplement groups, the growing levels of DNA methylation were detected both in male and female offspring rats in response to increased folate concentration. These data suggested that low protein intake during the pregnancy programs GLUT4 gene expression in skeleton muscle of offspring. Folate supplement may modulate this effect in a dose-dependent manner.

PM26. Reconstituting Bioactive Cellulose and Corn Zein Films from Ionic Liquids

Daria Zelasko, Jr., Bioengineering, ENG
Faculty Mentor: Mary-Grace Danao, Department of Agricultural and Biological Engineering

ABSTRACT

The stability and dissolution properties of ionic liquids (ILs) identify them as prime, environmentally friendly solvents for biosensing applications in place of traditional volatile organic media. These solvents have been demonstrated to successfully dissolve a variety of organic species and may be used to encapsulate enzymes during the dissolution process. The introduction of enzymes to such biosourced and biologically compatible support systems results in the formation of thin membranes with the potential for sustained enzyme activity. This investigation aimed to determine the preliminary solubility and thermal processing parameters of cellulose and corn zein in a variety of ILs including 1-butyl-3-methylimidazolium chloride and deep eutectic solvents (DES) such as choline chloride-urea and choline chloride-ZnCl2. DES exhibit similar stability and dissolution properties as ILs. The entrapment of laccase from Trametes versicolor and horseradish peroxidase in reconstituted cellulosic and zein films made from an IL dissolution and regeneration process was explored. Fiber-optic UV/VIS spectroscopy was utilized to collect intensity measurements at and#955;555 nm and the corresponding laccase activities were calculated following incubation in a reduced syringaldazine-buffer solution. Horseradish peroxidase activity was similarly quantified via a colorimetric 2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) assay at and#955;420 nm. Enzyme leaching experiments

were conducted following the film regeneration process to account for losses in enzyme activity. Evidence of successful membrane bioactivity confirmed the processing merits of this biosensing study. The physical encapsulation of biomolecules in cellulose or corn zein matrices eliminated the need for time-consuming chemical functionalizations or direct covalent attachments.

PM27. Potential Applications of Choline Chloride-Urea Mixtures in Biosensing

Wiktor Stopka, Jr., Bioengineering, ENG
Angela Hsieh, Jr., Bioengineering, ENG
Faculty Mentor: Mary-Grace Danao, Agricultural and Biological Engineering

ABSTRACT

Deep eutectic solvents (DES) are solvents formed when two solid compounds are heated and the resulting mixture has a lower melting point than those of its components while remaining in the liquid state at room temperature. DES exhibit similar properties as ionic liquids (ILs), salts with melting points below 100°C that have negligible vapor pressure, are non-flammable, thermally and chemically stable, and variably miscible with water and organic solvents. Both DES and ILs are capable of dissolving organic, inorganic, and polymeric materials. One of the most common and easy-to-synthesize DES is a 1:2 molar mixture of choline chloride and urea. In this study, we investigated the effect choline chloride-urea on HRP activity using a colorimetric 2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) (ABTS) assay. Absorbance measurements were taken at and#61548;405 nm at varying percentages of DES. Enzyme activity was proportional to the oxidation of ABTS, which was easily observable as a color change from pale green to dark green. The reaction rate was taken as the slopes of these absorbance curves. A notable decrease in reaction rate (smaller slope) was observed with increasing concentrations of DES, though the exact mechanism by which DES inhibits HRP activity is still an open avenue of study. Our second objective was to use DES to extract cobalt chloride (CoCl2) from an aqueous solution using UV/VIS spectroscopy. Anhydrous CoCl2 appears blue, but once it is hydrated to CoCl2 and#61655; 6H2O the compound turns into a deep rose color. Calibration curves were generated by preparing CoCl2 solutions in DI water and DES at varying concentrations and measuring their absorbances at different wavelengths. DES was pipetted through a cuvette of dissolved CoCl2 and the absorbance spectrum of the solution was then recorded. The concentration of remaining CoCl2 in the solution was then calculated using the above calibration curves.

PM28. Computing Application Performance Enhancement Through the Use of Hardware Accelerators

Yohannes Kifle, So, Electrical and Computer Engineering, ENG

Faculty Mentor: Deming Chen, Electrical and Computer Engineering

ABSTRACT

Digital computing has become ubiquitous in every aspect of everyday life; whether it is at work carrying out financial transactions or at home watching DVD on the PC. Most of the times, the computation involved in these applications is run on a programmable processor that is suitable for a wide range of applications. At the same time reconfigurable integrated circuits (e.g. FPGAs, Field Programmable Gate Array) are becoming more and more popular as their capabilities continue to expand. The objective of this work is to explore the issues and tradeoffs involved in the leveraging of the customizable hardware resources of an FPGA chip in accelerating relatively complex applications. Different system architecture options that include both general purpose cores and custom cores are explored. We used a software (SW) implementation of the MP3 decoder ported onto NIOS-2 as a baseline for the design metrics (e.g. performance, power and cost). The SW implementation was profiled and the most critical operations were highlighted. Based on the profiling analysis we tested different ways of optimizing the NIOS-based audio decoder by means of custom hardware acceleration. An efficient MP3 decoder was implemented on an Altera DE2 board with a Cyclone-2 FPGA. Our initial results show significant increases in performance and energy efficiency of execution. This work will serve as a basis for further study on hardware-software co-design for the implementation of efficient computing systems in terms of performance and power.

PM29. Typing from the Top of Your Head

Serena Liou, Jr., Electrical and Computer Engineering, ENG
Mukta Vaidya, Sr., Electrical and Computer Engineering, ENG
Cyrus Oman, Sr., Computer Science, ENG
Faculty Mentor: Todd Coleman, Electrical and Computer Engineering

ABSTRACT

The original P300 Brain-Computer Interface, as proposed by Farewell and Donchin in 1988, is a 6x6 character display that flashes through the letters in random order and for a set number of times. The interface utilizes an electroencephalogram (EEG) to detect the electric potential that occurs when the anticipated letter flashes. This signal is a deflection that occurs 300 ms after the character of interest appears, called the P300 signal. Using the original method, the time it takes to produce a sentence is constant.

Students of the group have attempted to develop an optimization for speed and accuracy of the P300 speller. Since the time it takes to specify a character is proportional to the number of characters that are available, the fewer characters available there are to choose from the shorter the selection process should be. Using dynamic programming and probability analysis of the possible letters following the previous

character choice, the group has been able to create a version of the P300 speller that shows significant improvement in both the accuracy of spelling words as well as the time it takes to produce a sentence.

PM30. Design of an Amperometric Biosensor

Tala Haddad, Sr., Electrical and Computer Engineering, ENG
Faculty Mentor: Kenneth Gentry, Department of Bioengineering

ABSTRACT

Products for diabetics have been improving exponentially recently, less painful and non-invasive technologies are now in the market, but almost all the advanced meter are based on the amperometric biosensor concept with improvements in the electrode efficiency, the time efficiency, and the further digital processing.

The suggested electronic map for this project provides an efficient system that detects the change in oxygen level at the cathode of a chemical cell. The drop in oxygen concentration is an indication of the rate of reaction of glucose with its substrate (the oxidase in the membrane).

The design not only includes a detection system, it also takes into consideration the need to maintain a constant potential drop within the system, this is ensured through the addition of feedback control. The design accounts for any fluctuation in the surrounding environmental conditions such as temperature increase.

The proposal concludes with an emphasis on the significance of such a design experiment within the lab structure; Enriching the theoretical background of students, and supporting the cooperation among the different fields of engineering. The sensor to-be-built is also considered very flexible for future modifications and further improvements.

PM31. Fluorescence Imaging of Self-Healing Composites

Eleanor Good, Soph., Engineering Mechanics, ENG
Faculty Mentor: Nancy Sottos, Materials Science and Engineering

ABSTRACT

In applications ranging from electronics to adhesives, polymers suffer from the effects of microcrack damage that is difficult to detect and correct. The goal of an autonomic materials system is to produce materials that can heal these microcracks without human intervention. The matrix of the polymer is embedded with microspheres containing healing agent. As the crack propagates, the microspheres rupture to release this healing agent, which reacts with catalyst in the epoxy matrix to polymerize and reseal the crack site. A specific system of E-glass/epoxy fiber-reinforced composites is damaged locally so that when it is hooked up to a vacuum

pump, air can leak through. Samples that have been created with the healing chemistry are left to sit, and then tested again to look for evidence of healing. After these tests, composites are cut in cross-section at the damaged position. Fluorescent dye is then inserted into the cracks so they can be imaged using fluorescence microscopy to qualitatively demonstrate a difference in crack distribution and quantity between the control and healed samples. The current work involves optimizing this imaging process so that it is repeatable and the resulting images are of high quality and accurately represent the microcrack damage present in the samples.

PM32. Mesh Generation for Modeling of Heterogeneous Microstructures

Brendan O'Rourke, Sr., Engineering Physics, ENG
Faculty Mentor: Philippe Geubelle, Aerospace Engineering

ABSTRACT

The first step in finite element analysis is to discretize the geometry by defining a collection of connected nodes and elements called a mesh. Many software tools have been developed to partially automate the process of mesh generation, but in general, modeling of a new structure requires human interaction to ensure that the mesh is sufficiently simple to be analyzed while still accurately reflecting the physical properties of the structure. The process can be time consuming, especially if many meshes are required. Human intervention also makes the process of mesh production less systematic, and thus less reproducible.

The tool presented here was created to eliminate the need for human interaction in the process of mesh generation for some simple microstructures. Beginning with simple user specifications, such as domain size and a distribution of particle diameters, it is capable of generating high-quality meshes which model particulate or fibrous materials in two dimensions as circular disks in a continuous matrix. The same tool can also be used to model granular materials as adjacent polygons. Several existing applications and software libraries were used, including ROCPACK for packing particles or grains, and T3D for mesh generation. The computational geometry library CGAL was used to to manage geometric information. CGAL was also used to compute Voronoi diagrams, which define the geometries of grains in a granular materials and which bound an irregularly shaped periodic representative volume element for particulate composites.

Several examples are given showing how meshes produced by the generator can be used in the calculation of the stresses in a material under an imposed strain. The general way in which geometries are handled within this tool make it a valuable resource in analyses of heterogeneous materials, allowing the discretization of particulate, fibrous, void-filled and granular microstructures.

PM33. Assessment of Fracture Properties of Heterogeneous Adhesives using Multiscale Cohesive Analysis

Anthony Lovero, Sr., General Engineering, ENG
Faculty Mentor: Professor Philippe Geubelle, Aerospace Engineering

ABSTRACT

Heterogeneous adhesives play an important role in a variety of engineering applications. Since adhesive layers are often considered as the weak link in bonded structures, heterogeneities are primarily introduced to add fracture toughness. Examples include epoxy adhesives reinforced with carbon nanotubes or rubbery micro-particles. Also, silver or copper flakes are also added to polymeric adhesives to improve the thermal and/or electrical conductivity of bonded joints in satellite applications. More recently, heterogeneous adhesives with self-healing capability have been developed to increase the fatigue life of bonded systems. These systems involve the combination of an epoxy matrix, an encapsulated healing agent and an embedded living catalyst.

Cohesive modeling, which is based on an explicit relation between the cohesive tractions acting on the two adherents and the resulting displacement jumps, has often been the method of choice in macroscopic failure simulations of bonded structures. The complexity of the failure processes occurring in heterogeneous adhesives calls for a new approach in the extraction of the cohesive failure model. A multiscale cohesive approach that enables prediction of the macroscopic failure properties of heterogeneous adhesive layers is presented. The proposed multiscale scheme relies on Hill's energy equivalence lemma and allows relating the complex damage evolution taking place at the microscale to the macroscopic traction-separation law. We solve examples of soft particles embedded in a stiff epoxy matrix to demonstrate the ability of the method to compute physically-based macroscopic cohesive properties. Special emphasis is placed in this study on the extraction of the size of a representative volume element for the adhesive, and the effect of the particle/matrix interface on the failure process.

PM34. Robust Encapsulation Using Microfluidics

Alissa Cote, Soph., Materials Science and Engineering, ENG
Faculty Mentor: Jennifer Lewis, Materials Science and Engineering

ABSTRACT

The microfluidic assembly of hollow colloidal granules of varying shell thickness and size is described. First double emulsion drops are formed by a coaxial flow of a concentrated colloidal microsphere-acrylamide suspension around an immiscible silicone oil phase with concomitant shear of the coaxial flow by an external silicone oil continuous phase using

a microcapillary device. At the point of intersection for all three fluids, there are instabilities arising from interfacial tension effects that result in simultaneous drop breakup of both the colloidal suspension and inner silicone oil fluid, resulting in a silicone oil drop residing within a colloidal suspension "shell" within a continuous phase silicone oil fluid. By varying the relative flow rates of the three fluids, the thickness of the shell is tuned. Next, photopolymerization is carried out shortly after drop breakup to preserve the morphology. Representative wet and dried granules are characterized using optical and scanning electron microscopy, respectively. Our approach offers a facile route for assembling hollow colloidal granules.

PM35. Self-Healing of Intra-Composite Interfaces

Brett Beierman, Sr., Materials Science and Engineering, ENG
Faculty Mentor: Nancy Sottos, Department of Materials Science and Engineering

ABSTRACT

A steel wire in a poly(dimethyl siloxane) (PDMS) matrix is used to simulate a wire or fiber within a composite. In order to heal the interface between PDMS and steel, the steel wire is coated in a two-part microcapsule system. The two microcapsule types contain 1.) low MW (liquid) PDMS, and 2.) liquid cross-linking agent. A tensile load is applied to debond and partially remove the 'virgin' coated steel wire. The shearing stress induced at the steel-PDMS interface is intended to rupture the microcapsules and release liquid healing agents. The debonded and partially removed wire is then allowed to 'heal' for the polymer's standard cure period. The same test as was used for the virgin system is run on the healed samples. By analyzing the stress-strain behavior of the virgin and healed trials we can measure healing, or lack thereof, via the failure shear stress of the wire and the slope of the elastic region before failure.

PM36. Nanoparticle Removal from Lithographic Masks by Plasma Assisted Cleaning by Electrostatics

Colin Das, Jr., Aerospace Engineering, ENG
Faculty Mentor: Wayne Lytle, Center of Plasma Material Interactions

ABSTRACT

Particle contamination on mask surfaces used in extreme ultraviolet lithography (EUVL) present a significant technical obstacle to the development and implementation of this next generation lithography. Contamination from nanoparticles can create significant distortions in the patterning and reflectivity ability of the individual mask blanks. The Plasma Assisted Cleaning by Electrostatics (PACE) experiment, which has been developed and patented here at the University of Illinois at Urbana-

Champaign, works towards effective and efficient nanoparticle removal on the mask blanks through the use of a high density plasma process.

This process is a dry cleaning method and removes contamination perpendicular from the surface instead of rolling or sweeping the particles off the surface, a benefit when cleaning patterned surfaces where contamination can be rolled or trapped between features. Also, an entire mask can be cleaned at once because the plasma can cover the entire surface, thus there is no need to focus in on specific areas and is more efficient. A sophisticated particle contamination detection system utilizing a high power laser, called DEFCON, has been developed to analyze the particle removal after the PACE cleaning process. PACE has shown greater than 90% particle removal efficiencies for 30 - 220 nm polystyrene latex (PSL) particles on ruthenium capped quartz. Removal results for quartz surfaces show similar removal efficiencies.

Results of cleaning 80 nm PSL particles from Si as well as a damage assessment of the sample EUVL mask material will be presented.

PM37. Helping Hands

Kerra DiVincenzo, Sr., Kinesiology, AHS
Josh Ellis, Sr., Kinesiology, AHS
Erin Frommeyer, Sr., Kinesiology, AHS
Natasha Ratajczak, Sr., Kinesiology, AHS
Dan Stebel, Sr., Kinesiology, AHS
Jacquelyn Sweedroe, Sr., Kinesiology, AHS
Faculty Mentor: Kim Graber, Department of Kinesiology

ABSTRACT

The purpose of this project was to positively influence participants self esteem, self confidence, and quality of life by engaging adult day care participants from the Champaign County Nursing Home in service projects throughout the Champaign-Urbana area and in conjunction with undergraduate students from the University of Illinois. Through various service events such as donating baked goods, a canned food drive, writing letters to the troops, and gardening, elderly participants benefited in six different areas of wellness. To evaluate the effectiveness of the project, data were collected through informal interviewing, observations, and a photograph analysis. The results of the study will be presented at the symposium.

AFTERNOON SESSION (PA) 1-3PM PINE LOUNGE

PA1. Predator-Prey Models and their Applications to Finance and Economics

Paul Pelock, Sr., Actuarial Science, LAS
Faculty Mentor: Rick Gorvett, Actuarial Science Program

ABSTRACT

This poster session explores some potential mathematical applications of predator-prey models to business and risk management issues. Traditionally, predator-prey models also known as Lotka-Volterra equations have been used by population biologists and ecologists to reflect the dynamics of species populations, for example with respect to a closed ecology in which predator and prey species compete for limited resources and interact with each other. In our research, we employ such mathematical models to examine several financial and economic phenomena. One topic of interest is the nature and causes of business cycles within certain industries; we look at the underlying characteristics and interactions of firms within an industry in a predator-prey framework, and examine hypothetical firm parameter values and their impacts on cyclical industry performance and profitability over time. Another specific industry characteristic we attempt to explore is the competitive relationship of firms in a market in particular, whether relative market share positions of firms in an industry can be modeled by predator-prey dynamics. On-site computer simulations of predator-prey dynamics will be incorporated into this poster session.

PA2. Power Laws and the Structure of the Insurance Market

Cristie Labus, Sr., Actuarial Science, LAS
Faculty Mentor: Rick Gorvett, Actuarial Science Program

ABSTRACT

This poster session describes "power laws" and their applications to various areas of finance and economics. Power laws have been found to nicely represent from a mathematical standpoint the distributions of a variety of phenomena (starting with the observation by Vilfredo Pareto in the 19th century of a power law distribution for individuals' levels of wealth).

In particular, our research examines the use of power laws for improving our understanding of the competitive market structure of the insurance industry. Enhancing our understanding of an industry's structure and dynamics may serve to improve the regulatory environment of, and public policy regarding, the industry. It may also serve to improve an individual firm's strategic and operational planning and decision-making in a competitive environment.

In our poster session, we summarize the mathematical underpinnings of

power laws, and provide a number of examples of such descriptions. We present our specific findings and implications relating to the insurance industry.

PA3. Systems Biology: Metabolic Reconstruction and Analysis to Enhance Butanol Production

Azeem Zafar, Jr., Biochemistry, LAS
Faculty Mentor: Dr. Nathan Price, Chemical and Biomolecular Engineering and the Institute for Genomic Biology

ABSTRACT

A great endeavor in systems biology is to quickly discern the integral components and sub-networks of a 'system' required to bolster specific traits (e.g. butanol production) in a lesser characterized organism (e.g. Clostridium beijerinkii), as compared to well-characterized model organisms such as E. coli and S. cerevisiae. One of the primary goals of this project is to engineer a hyper-producing butanol Clostridium beijerinckii strain with the aid of systems biology and metabolic engineering approaches. C. beijerinkii is an ideal bacterium to produce an economically competitive liquid biofuels since it naturally produces butanol as a byproduct of its metabolism and can co-ferment pentoses and hexoses. A butanol producing organism is of great interest because, as compared to the ubiquitous ethanol substitute for liquid fuels, butanol is a higher alcohol alternative, with higher energy potential and lower vapor pressure.

The driving force of this project is the formulation and use of genome-scale computational models as a guide in designing organisms to achieve engineering goals. In this effort, our project entails reconstructing and integrating metabolic and regulatory networks to generate mathematical simulations that accurately reflect the organism and predict its responses to novel perturbations. This research project will unveil the dynamic structure and information-processing abilities of sophisticated molecular networks. As a result, predictive cell-scale models, the desired fruit of this project, will nourish and mobilize the movement of recasting rational design of cells as an interdisciplinary engineering problem.

PA4. Parameter Optimization for Interface-Based Defect Engineering

Katherine Thurman, Sr., Chemical and Biomolecular Engineering, LAS
Faculty Mentor: Dr. Edmund G. Seebauer, Chemical and Biomolecular Engineering

ABSTRACT

Transistor fabrication introduces impurities (also known as dopants) into the silicon crystal in order to alter the electrical properties in the desired regions. Impurity embedding is currently achieved via ion implantation. Ion

implantation collides accelerated dopant ions with silicon crystal. Such collisions bury most of the ions in the desired location, but considerable amount of silicon atoms are displaced from their lattice sites. These displaced atoms, also known as interstitials, cause dopant to diffuse away from the desired location during subsequent heat treatment, thus worsening device performance. Therefore, unwanted interstitials must be removed.

The Seebauer group recently showed that an atomically clean surface had dangling bonds that were able to reduce impurity diffusion by absorbing silicon interstitials from the bulk material. Many industrial processes, however, deposit a layer of oxide on the top of silicon bulk before implantation, and the oxide prohibits absorption of interstitials. Nonetheless, an additional ion implantation step can be used to disrupt the bonds at the silicon-silicon oxide interface. Then the disrupted interface can act as a clean surface and absorb undesirable interstitials. This project is focused on using a dynamic Monte Carlo simulator (TRIM) for determining optimal implantation parameters for disrupting atomic bonds precisely at the silicon-silicon oxide interface. Optimal parameters will then be used in experiments aimed at characterizing how well the interface with disrupted bonds can absorb interstitials and reduce dopant diffusion in the silicon bulk.

PA5. Structure-Function Relationship of 2′-oxoalkylresorcylic acid synthase

Anuradha Biswas, Sr., Chemical and Biomolecular Engineering, LAS
Faculty Mentor: Huimin Zhao, Department of Chemical and Biomolecular Engineering

ABSTRACT

Polyketides are secondary metabolites found in various species. These natural products possess significant structural diversity and have useful biological and pharmacological properties such as antibiotic, antifungal, and insecticidal activity. Type III polyketide synthases (PKSs) are enzymes that produce polyketides via a complex set of reactions including priming of a starting substrate, decarboxylative condensation of extender substrates, and cyclization of the linear polyketide chain. Type III PKSs have been found extensively in plants and bacteria but one was recently found in the sequenced genome of the fungus Neurospora crassa. This was a novel type III PKS which catalyzed synthesis of 2′-oxoalkylresorcylic acid from a long-chain fatty acid CoA ester and four molecules of malonyl-CoA. As a result, this enzyme was named ORAS (2′-oxoalkylresorcylic acid synthase). ORAS is the first reported fungal type III PKS and the first characterized type III PKS to synthesize a pentaketide alkylresorcylic acid in all species. In the current study, the structure-function relationship of ORAS is explored. Residues important to the synthesis of pentaketide alkylresorcylic acid were deduced by aligning ORAS with other plant and bacterial enzymes of the type III

PKS family. The role of various amino acids was investigated by introducing mutations and characterizing the resulting variants. This project includes site-directed mutagenesis to create two specific mutations (M189W and M198G), purification of the mutant proteins, and conducting assays to determine the activity, substrate specificity, and product profile for each mutant.

PA6. The Copper Binding Properties of Nitrous Oxide Reductase

Shirley Tan, Soph., Chemical and Biomolecular Engineering, LAS
Faculty Mentor: Professor Yi Lu, Department of Chemistry

ABSTRACT

Nitrous oxide reductase (N2OR) is the terminal electron acceptor in anaerobic respiration. It is a multicopper protein with two copper active sites: a binuclear CuA site, and a tetranuclear CuZ site. The two copper atoms in CuA are bridged by two cysteine residues. The two cysteine ligands bridge both copper atoms to form the 'diamond core' structure, and each copper is additionally bound by a histidine to give a trigonal geometry about each copper. CuA displays an intense purple color. The copper binding properties of N2OR were investigated. N2OR was grown and purified, and copper was added at various pH. It was observed that only the CuA site bound copper, and that binding was pH dependent. Various intermediate copper sites were observed before the thermodynamic CuA site was formed. A mechanism for copper binding is proposed where the binuclear site can bind two different types of copper, and that they convert to CuA.

PA7. Expression and Purification of a Thermophilic Protein for Studying Macromolecular Crowding

Tripta Mishra, Soph., Specialized Chemistry, LAS
Faculty Mentor: Martin Gruebele, School of Chemical Sciences

ABSTRACT

Protein folding has been traditionally studied in dilute buffers in vitro, typically at concentrations less than 10 g/L. However, in living cells, proteins fold under very different conditions, with solute concentrations being as high as 200 - 400 g/L. This high concentration of biological macromolecules is referred to as macromolecular crowding and is predicted to have significant effects on the stability and dynamics of proteins. One way to study the effect of crowding on folding is to put a low-melting protein in a matrix of a high-melting protein. For this purpose, this project aimed at expressing and purifying large quantities of Sub L, the matrix protein. High level expression of Sub L in E. coli was achieved, and a heat purification scheme was used in conjunction with affinity chromatography to obtain very high-purity protein. Low-resolution electrospray-ionization mass spectrometry

and fluorescence measurements were used to confirm the purity of the protein. Preliminary crowding results obtained by Sharlene Denos show that a low-melting protein embedded in Sub L indeed undergoes a shift in stability. However, Sub L itself undergoes precipitation at high temperatures and high concentrations, thus limiting its applicable temperature range.

PA8. NMR Studies of the cAMP-regulated phosphoprotein endosulfine-alpha

Daniel Ladror, Sr., Chemistry, LAS
Faculty Mentor: Chad Rienstra, Physical Chemistry

ABSTRACT

Endosulfine-alpha (ENSA) is a known substrate for cAMP-regulated kinase, and a naturally occurring sulfonylurea. Sulfonylureas are used to treat type II diabetes, as they bind to the sulfonylurea receptor proteins (SUR) of ATP-dependent potassium channels (KATP), which triggers the secretion of insulin independently of the KATP's sensitivity towards glucose concentration (Bataille et al., 1999). Although ENSA is a naturally occurring example of a sulfonylurea, its individual structure and biological function are unknown.

Through a collaborative project with the George group, we have utilized a novel phage display approach to screen binding partners of helical alpha-synuclein, a protein of unknown function involved in Parkinson's disease; ENSA was discovered to interact with synuclein. We have utilized solution NMR to study the free and membrane-bound states of ENSA as well as its protein complex with alpha-synuclein. We present here the chemical shift assignments of these states. We also show preliminary secondary structure analysis based on these assignments as well as isothermal titration calorimetry data examining the interaction between ENSA and alpha-synuclein. This work represents the first steps towards a 3D structure of both free and membrane-bound ENSA, and could enable an improved understanding of the role that ENSA plays in vivo as well as the native function of alpha-synuclein.

PA9. Exploring the diversity of microgastrine parasitoid wasps (Hymenoptera: Braconidae) from the Area de Conservación Guanacaste, Costa Rica

Stephanie Laurusonis, Sr., Integrative Biology, LAS
Faculty Mentor: Josephine Rodriguez (PhD student), Department of Entomology

ABSTRACT

Parasitic Hymenoptera comprise one of the most species-rich animal groups on earth, with approximately 6.5-20% of the world's insects and estimates of total diversity ranging from 170,000-6,000,000 species. This project utilizes the largest parasitoid rearing survey ever conducted, at the Area de

Conservación Guanacaste (ACG) (Costa Rica), focusing for the first time in the Neotropics on the species diversity of one of the most diverse and ecologically dominant parasitoid wasp groups, the Microgastrinae (Braconidae). Microgastrines attack essentially the entire biological spectrum of immature Lepidoptera, which are the principal herbivores in plant ecosystems.

Our study includes ~2,800 reared and Malaise trap caught microgastrines, and uses the following measures to explore wasp diversity: (1) numbers of species and number of individuals, (2) species accumulation curves, (3) estimated total species richness and (4) complementarity or distinctiveness between different tropical forest ecosystems. Our results indicate that depending on genus of wasp, accumulation of species varies from steady to rapid, with the diversity of some genera expected to continue to increase with additional sampling. There is also considerable species turnover of microgastrine wasps between tropical dry, rain and cloud forest ecosystems.

This study advances our understanding of the diversity of the microgastrine braconids in the context of the 30-year NSF funded Inventory of the Lepidoptera larvae and parasitoids of a tropical dry forest, cloud forest, and rainforest has generated the largest dataset on the biology of caterpillars, their parasites, and host plants in the world. The extraordinary species richness of the Microgastrinae is of exceptional interest to current studies of Neotropical biodiversity and tropical ecology, and continued collaboration with the inventory is expected to discover many additional microgastrine species.

PA10. High Protein Diet Impacts Fecal Microbial Populations in Growing Kittens

Beth Dalsing, Jr., Molecular and Cellular Biology, LAS
Faculty Mentor: Dr. Kelly Swanson, Department of Animal Sciences and Division of Nutritional Sciences

ABSTRACT

Although the intestinal microbiota of the human gut has had considerable attention as of late, very little is known about life in the feline intestinal tract. Intestinal microbiota of the growing kitten is even more of an obscurity. Thus, our objectives were to investigate the intestinal microbiota of growing kittens fed moderate- or high-protein diets using molecular qualitative and quantitative techniques. Kittens consuming a high-protein (HP; 7 male kittens from 2 litters) or moderate-protein (MP; 10 male kittens from 4 litters) diet were evaluated. Kittens were weaned at 8 weeks of age and consumed the same diet as their dams. Fresh fecals were collected at 8, 12, and 16 weeks of age and stored at -80°C. Fecal DNA was extracted using the QIAamp DNA Stool Mini-Kit (Qiagen). DNA purity and concentration were determined using a ND-1000 NanoDrop spectrophotometer. Quantitative PCR was used to quantify four microbes (Bifidobacterium genus, Lactobacillus genus, Clostridium perfringens, and E.coli) previously determined to be

prevalent in felines. Mixed models of SAS were used to analyze qPCR data. Qualitative analysis was performed on each sample using denaturing gradient gel electrophoresis (DGGE) using a 29% to 48% gradient to separate amplicons. Bands of interest were excised from the gel, extracted using the QIAquick Gel Extraction Kit (Qiagen), and sequenced with an ABI PRISM bigDye Terminator Cycle Sequencing Ready Reaction Kit using an ABI 3730XL capillary sequencer. Sequences were searched and matched to known sequences in the GenBank database. 16SrRNA sequences were subject to BLAST search (GenBank) for identification. Presence of Bifidobacteria and Lactobacillus was affected by diet, with kittens fed HP having lower ($P<0.05$) counts than those fed MP. Microbial differences in growing kittens due to diet suggest that prebiotic supplementation may be beneficial in high-protein diets due to decreased Bifidobacteria and Lactobacillus populations.

PA11. Initial Response to a Psychostimulant Drug as a Predictor of Impulsivity

Randi Burns, Sr., Molecular and Cellular Biology, LAS
Faculty Mentor: Dr. Joshua Gulley, Department of Psychology

ABSTRACT

Impulsive behavior and initial response to psychostimulant drugs are considered to be major factors contributing to drug addiction. Previous studies indicate rats can be classified as either low or high cocaine responders (LCRs or HCRs, respectively) depending on their locomotor response to cocaine. The objective of this research was to investigate the relationship between initial response and impulsivity in animal models. The specific goal was to determine if the differences in initial drug exposure predicted impulsivity differentially in LCRs and HCRs. Adult, male Sprague-Dawley rats (n=8) were injected with 10mg/kg cocaine and placed in an open-field arena to determine if they were LCRs or HCRs. They were then trained in an operant task where rats were given a choice of immediate, small food rewards or those that were delayed, but larger. The choice of immediate rewards, which is a strategy that results in less food being earned, is considered to reflect impulsivity. Rats were injected with saline, d-amphetamine (0.3, 0.6 and 1.0 mg/kg) or 8-OH-DPAT, a serotonin receptor agonist, (0.3, 0.6, and 1.0 mg/kg) and then allowed to perform the operant task. Results show rats can be categorized as LCRs or HCRs based on a acute dose of 10 mg/kg cocaine and this characterization can predict their impulsivity; LCRs tend to choose the large reinforcer more often than HCRs, indicating HCRs are more impulsive than LCRs. AMPH decreased choice of the large reward in LCRs, but did not alter choice in HCRs. Impulsive choice was increased in both phenotypes following 8-OH-DPAT, with LCRs exhibiting changes across a wider range of delays. Our results suggest that differential sensitivity to cocaine-induced locomotion is predictive of impulsivity and the potential neurobiological differences in LCRs and HCRs may provide insight into mechanisms contributing to vulnerability for chronic drug use and/or dependence.

PA12. Impaired glucocorticoid negative feedback in fragile X syndrome

Staci Vanderjack, Sr., Molecular and Cellular Biology, LAS
Faculty Mentor: Dr. William T. Greenough, Department of Psychology

ABSTRACT

Fragile X Syndrome (FXS) is the most common form of inherited mental retardation. The FXS phenotype is further characterized by abnormally elevated glucocorticoid levels following a stressful experience (Hessl et al., 2002). The Fragile X Mental Retardation Protein (FMRP), an mRNA binding protein, is absent in FXS. Miyashiro and colleagues demonstrated the binding of FMRP to the mRNA for the glucocorticoid receptor (GR) and the reduction of GR expression from neuronal dendrites in the hippocampus in the mouse model of FXS, the Fmr1 knockout (KO) mouse (2003). This has been linked to the findings of Markham and colleagues which demonstrate a protracted return to baseline corticosterone levels following acute restraint stress in Fmr1 KO mice (C57/Bl6 background strain) (2006). Both of these findings are consistent with the hypothesis of impaired glucocorticoid negative feedback in FXS. To directly evaluate the hypothesis that impaired glucocorticoid negative feedback occurs as a result of the absence of FMRP expression, in the present study, the dexamethasone suppression test was administered to Fmr1 KO and wildtype (WT) control mice. Dexamethasone is a potent synthetic glucocorticoid and a specific GR agonist. In WT animals, dexamethasone activates glucocorticoid negative feedback and prevents the release of additional corticosterone. Our data demonstrate that this negative feedback process functions less effectively in Fmr1 KO mice. At a dose of 5 g dexamethasone per 100g body weight, Fmr1 KO mice had significantly higher ($p<0.05$) corticosterone levels than WT mice. These data serve as a link between an FMRP-binding mRNA (GR mRNA) and a functional phenotype of FXS (impaired glucocorticoid negative feedback). The anxiety-related and cognitive symptoms of FXS may manifest in part as a result of the impairment of the negative feedback mechanisms that normally function to limit the intensity and duration of the stress response.

PA13. Social Consequences of Youth Depression

Lilyana Ortega, Sr., Psychology, LAS
Faculty Mentor: Karen Rudolph, Department of Psychology

ABSTRACT

Youth depression is a common psychiatric disorder with dramatic increases in onset as youth progress through adolescence. This six-month longitudinal study examined the social consequences of depression in early adolescents. Fifth- and sixth- grade participants (N = 586) completed the Children's Depression Inventory. Adolescents' social behavior and experiences in the peer group were assessed though self- and teacher-report

questionnaires. Questionnaires were administered at two time points that were approximately six months apart. The results indicated that depression predicted compromised social functioning over time. Specifically, depression predicted heightened social disengagement, as reflected in more helpless and withdrawn behavior along with less prosocial behavior, as reported by teachers. Depression also predicted subsequent lower social preference within the peer group, more disruption within friendships, and higher levels of dependent peer stress. These results add to the growing literature focusing on the consequences of adolescent depression. These findings suggest that the social consequences of adolescent depression should be given high priority when developing treatment and prevention programs.

PA14. Emotions and Psychological Needs

Steffen Eric Olsen, Sr., Psychology, LAS
Faculty Mentor: Howard Berenbaum, Department of Psychology

ABSTRACT

Psychological needs are a broad concept used to describe and distinguish between multiple facets of human motivation. The goal of this study was to explore the relationship between certain psychological needs and specific types of emotion experience. Four hundred undergraduate students filled out a series of self-report questionnaires that assessed their need for control over events in their life, their need for safety in a range of different situations, their need for predictability in their life pursuits, and their general experience of anger and fear. In addition, participants recruited friends and family members to provide peer accounts of their general experience of anger and fear. We anticipated that individuals with a higher need for control would experience higher levels of anger. This is because these individuals are likely to believe that unpleasant events or failures are able to be prevented by themselves or others, and the identification of an agent as being responsible for frustration of one's goal pursuits is sufficient to elicit anger. We anticipated that individuals with a greater need for safety would experience higher levels of fear. This is because fear is elicited when an individual identifies an environment as being dangerous or unsafe, and these individuals require more safety cues in an environment in order to satisfy this need. Finally, we anticipated that individuals with a greater need for predictability would experience higher levels of both anger and fear. We expected this because these individuals desire as little unexpected environmental influence on their goal pursuits as possible, and are therefore more likely to identify unanticipated events as frustrations or obstacles in their goal pursuits, which subsequently elicits unpleasant emotions such as anger and fear. Both self-report and peer-report data were found to support these hypotheses.

PA15. Microbial Ecology of the Chattooga River: Anthropogenic Impacts and Implications for Human Health

Zachary Bayne, Sr., Speech Communication, LAS
Faculty Mentor: Angela Kent, Department of Natural Resources and Environmental Sciences

ABSTRACT

Staphylococcus skin infections are a chronic problem among whitewater rafters on the Chattooga River in the southeastern US, however very little is known about the source of such infections. While the river's 'Wild and Scenic' status is designed to protect environmental quality in the river and riparian zone, the water quality can be negatively impacted by tributaries that are not protected by federal guidelines. Stekoa Creek is a major tributary to the Chattooga River that flows through the city of Clayton, Georgia. Water quality in Stekoa Creek is degraded by sediment that runs off from construction sites near the creek, as well as bacterial contamination from the wastewater treatment facilities in Clayton. Degraded water quality may impact the health of visitors recreating on the river, as well as recreation industry workers. This study addresses the hypothesis that Stekoa Creek impacts water quality and microbial community composition in the Chattooga River, and may be the source of Staphylococcus skin infections experienced by whitewater raft guides. In addition, this study also seeks to correlate the incidence of skin infections in recreational workers with degraded water quality in the lower reaches of the Chattooga River (below Stekoa Creek), and to determine if concerns about environmental quality have altered recreation activities on the Chattooga River. Among recreational workers, attitudes about environmental quality appear to be shaped by the incidence of skin infection. The public is becoming increasingly aware that microbial populations play an important role in environmental quality and public health.

PA16. Mentoring undergraduate researchers: turning curiosity into scientific inquiry

Angela Kent, Professor in Department of Natural Resources and Environmental Science, Faculty-mentor

ABSTRACT

Mentoring of undergraduate researchers is an activity that integrates teaching and research. My goal in all teaching activities is to provide an environment where I can share my excitement about the microbial world, and where students can be active participants in their education. Learning is enhanced when students have the opportunity to construct their own understanding of a topic, and the undergraduate research experience is an exemplary model of 'active learning'. My goal for each undergraduate researcher is to allow them

to gain the satisfaction of asking a critical question, considering how to answer that question, and carrying out the research that generates the data to answer the question; to personally experience the scientific method. To support that goal, my approach to the mentoring of undergraduate researchers is to carefully consider the projects offered to each student, and to tailor each to the interests, experience, and preparation of the student. The 'journey' toward answering a research question involves learning new techniques and acquiring new information to integrate into an existing framework of knowledge gained in science-related coursework. Undergraduate researchers are accompanied on this journey by fellow travelers in their research community graduate students who gain experience with their own budding mentoring skills while supporting their undergraduate colleagues.

Laboratory research experience is not limited to undergraduate science majors. Anyone can express curiosity about the world around us! Activities such as the Environmental Fellows program allow us to engage non-science majors in scientific inquiry. Involving non-science majors in the scientific method enhances their scientific literacy, and broadens the impact of our research and teaching activities.

PA17. Characterization of endophytic nitrogen-fixing bacteria in biofuel crops

Neil Gottel, Jr., Integrative Biology, LAS
Faculty Mentor: Angela Kent, Department of Natural Resources and Environmental Sciences

ABSTRACT

Sustainable production of biofuel crops requires low anthropogenic inputs in order to maximize the net energy gain, as well as minimize greenhouse gas emissions. Nitrogen is typically the most limiting nutrient for plant growth, and inputs of N fertilizer account for a major portion of fossil fuel use in agricultural systems. Diazotrophic bacteria, which are capable of fixing atmospheric nitrogen for plant use, play a role in relieving nitrogen demands in plants, thereby reducing or eliminating the need for fertilizer application. C4 grasses such as maize, Miscanthus, and switchgrass harbor bacterial endophytes that can colonize most plant tissues and enhance plant growth without causing disease. We have isolated several bacterial endophytes from the roots and stems of Miscanthus x giganteus and Panicum virgatum with nitrogen-reducing capabilities based on the presence of the diagnostic gene for nitrogen fixation, nifH. These isolates may be responsible for the low nitrogen requirements of these biofuel crops. To optimize this beneficial plant-microbe interaction, we are exploring the ecological drivers that govern colonization and activity of endophytic nitrogen-fixing bacteria in candidate biofuel crops. Culture-independent DNA 'fingerprinting' approaches have been employed to compare bacterial communities associated with M.

giganteus and P. virgatum plots that differ in soil type, moisture, nutrients, and other environmental conditions. Plant-associated microbial communities were also compared over the growing season in order to examine the response of endophytes communities to the physiological state of the plant.

PA18. Efficacy of Glycerol as a Replacement for Lactose in Calf Milk Replacer

Rebecca Ebert, Jr., Animal Science, ACES
Faculty Mentor: James K. Drackley, Department of Animal Sciences

ABSTRACT

Over the summer of 2007, a trial was carried out to determine the feasibility of replacing 15% of the lactose in dairy calf milk replacer with glycerol. The purpose was to explore this method as a more economical approach to feeding calves in the dairy production industry. Six heifers and six steers were put on each of two diets, a control and a 15% glycerol diet, and observed, weighed, and measured for 8 weeks. The trial determined that the calves on the glycerol diet were as healthy and grew as well as the control calves, but this method of feeding is not very feasible for most production operations because of the additional labor involved in adding the glycerol, as it cannot at this point be incorporated into the powdered milk replacer.

PA19. Effects of Spaying on Food Intake, Weight Gain, Activity, and Body Composition in Cats Fed a High- Versus Moderate-Protein Diet

Stacey Sutter, Sr., Animal Science, ACES
Faculty Mentor: Kelly Swanson, Department of Animal Sciences

ABSTRACT

High-protein diets in cats have been used to promote weight loss, but use after spaying to maintain weight has yet to be determined. The objective of this study was to evaluate cats fed a high (52.9% CP DMB) - or moderate (34.3% CP DMB)-protein diet following ovariohysterectomy. Food intake, body weight gain, body composition, and activity level were measured in 8 cats (4 cats/treatment). Adult cats underwent ovariohysterectomy on wk 0 and were fed ad libitum for 24 wk. Food intake was measured daily, and body weight was measured weekly. Activity was measured for 6 consecutive days prior to wk 0, 12, and 24. Body composition was determined by DEXA at 0, 12, and 24 wk. Food intake and body weight were markedly changed ($P<0.05$) over time in all cats and tended to be increased ($P<0.10$) in cats fed a high-protein diet. Total activity, measured using Actical activity collars, decreased ($P<0.05$) from wk 0 to wk 12 and 24. Body composition did not change due to diet, however, body fat percentage increased ($P<0.05$) over time. Lean tissue (g) showed a curvilinear ($P<0.05$) effect of week, but percent lean tended ($P<0.10$) to decrease over time. Bone mineral content (g) was increased ($P<0.05$) at wk 12

in cats fed the high-protein diet. This was likely to support the increased body weight, due to the large increase in food intake early after spaying in the cats fed the high-protein treatment, which may be due to the high palatability of this diet. Based on these data, feeding a diet ad libitum after spaying, regardless of protein level, may increase the incidence of obesity in cats.

PA20. The Presence and Quality of Childrens Friendships: Associations with Later Behavioral Development

Nicole Lasky, Sr., Human Development and Family Studies, ACES
Faculty Mentor: Nancy McElwain, Human and Community Development

ABSTRACT

Friendships play an important role in young children's development. Current studies show that friendships provide clear benefits for personal development such as building cooperation, self-esteem, respect, understanding, and compassion. The purpose of this research was to compare three groups of kindergarten children (no friends, low quality friendships, and high quality friendships) on levels of internalizing and externalizing problems in first and third grades.

Results indicated that friendship group status was associated with mother- and teacher-reported internalizing and externalizing behaviors. On average, children in the 'low quality friendship' group exhibited the highest levels of internalizing and externalizing behaviors, while children in 'high quality friendship' group exhibited the lowest levels of problem behaviors.

PA21. The effect of simulated gastrointestinal digestion on proteins and bioactive peptides from soybean genotypes

Pauline Ie, Sr., Food Science and Human Nutrition, ACES
Faculty Mentor: Elvira de Mejia, Department of Food Science and Human Nutrition

ABSTRACT

Soybean consumption has been increasing annually. Soybean is also recognized to have health benefits that can be attributed to a number of compounds it contains. One of the major components in soybean is soy protein, which is digested in the body upon consumption producing peptides and amino acids. These small peptides showed nutritional benefits as well as biological functions, such as activity against cancer cells. Due to its prominence in human's health, an understanding in the protein and peptide profiles becomes necessary. This study was conducted to provide analysis supporting a further research of the peptides bioactivity on leukemia cancer cells.

Soy proteins were extracted from soybean flour and digested into smaller peptides in a condition that mimics our digestive system. Both of the original soy flour and the peptides were analyzed for their protein content and molecular size. Some anti-cancer compounds in the peptides were detected and evaluated using a method called the Western Blot.

The objectives of this research were (i) to extract soy proteins from seven soy genotypes and analyze their protein content and molecular weight profiles, and (ii) to produce soy peptides from the soy proteins and evaluate their protein content, molecular weight profiles, and lunasin and Bowman Birk Inhibitor (BBI) presence. The results show that simulated gastrointestinal digestion effectively broke down soy proteins to small peptides. Strong bands were observed at 5.7, 9.9, and 25.5 kDa. Anticancer peptides, lunasin and BBI, were still detectable after digestion, indicating a potential of physiological availability.

PA22. Moderation of Flood and Wind Damages to Residential Structures. A hypothetical analysis of technical, siting, programming, and design recommendations.

Jose Marques, Sr., Architecture, FAA
Faculty Mentor: Michael J. Andrejasich, School of Architecture

ABSTRACT

The intensive and severe 2005 hurricane season along the Gulf coast of the United States has tremendously impacted the lives of thousands of local residents. The outcome has been an increased awareness of the imperative for mitigation recommendations to reduce the impact and damages of combined forces such as wind and flood on residential structures. This hypothetical study seeks to consider and integrate technical information, primarily from engineering databases such as David Wickersheimer's Windstorm Mitigation Manual, collectively with the Federal Emergency Agency Management (FEMA) recommendations for site evaluations and books on improved programming to develop a dwelling design accommodating the lifestyles of a subject family with health and safety concerns in mind. This investigation will review precedent technical data to observe the performance of some of the most recent practice of the light-wood frame construction and materials. Additionally, this study will explore the daily activities of specific residents to arrange their dwelling spaces in the best possible manner that satisfies their needs. The resulting design will be based on an inclusive evaluation of economy, structural stability and aesthetics that successfully regards siting, programming, and construction of residential structures at a feasible cost.

PA23. Anthropometric Human Hand Models for Tracking

Catherine Wah, Sr., Electrical and Computer Engineering, ENG
Faculty Mentor: Thomas Huang, ECE

ABSTRACT

The goal of this project is to understand the intrinsic variations of human hand shape with the intention of building a module for a vision-based gesture recognition system. This includes parameters such as lengths of phalanxes and position of joints. In order to accomplish this task, we investigate various linear and nonlinear dimension reduction techniques, including generalized principal component analysis (GPCA), isometric feature mapping (Isomap), locally linear embedding (LLE), and maximum variance unfolding (MVU), to compactly represent the natural variation found in human hands. Each technique uses a different algorithm to arrive at the low dimensional representation.

Implementing the module requires us to reconstruct higher-dimensional parameters from the low dimensional models. For Isomap, LLE, and MVU, we apply radial basis function interpolations for this task and evaluate each technique. We found that Isomap, a relatively inexpensive technique for dimension reduction, achieved the most robust reconstruction with the lowest error. Future work will involve integrating our results into a vision tracker and observing improvements in tracking results.

PA24. Separation and Purification of Nanoprobes using Agarose Gel Electrophoresis

Margie Mathewson, Jr., Bioengineering, ENG
Faculty Mentor: Dr. Rohit Bhargava, Department of Bioengineering

ABSTRACT

Vibrational spectroscopy, which includes both infrared and Raman spectroscopy, provides useful fingerprint vibrational information highly specific to the chemical bonds in molecules. The compatibility of Raman spectroscopy with aqueous samples makes it especially suitable for analyzing biological samples. However, the inherent low cross sections limit the sensitivity of the technique. Probes based on surface enhanced effects increase the vibrational response to the single molecule level by creating intense electromagnetic fields.

Nanoparticles have tunable optical properties and are an ideal choice to enhance signals from biological samples. Imaging capabilities in infrared and Raman spectroscopy would be greatly improved if stable and easily reproducible nanoparticle structures were developed. Our intention is to develop methodologies to fabricate nanoscale colloidal probes based on different materials. These probes are based on assembling colloidal particles at nanoscale using oligo linkers. We intend to achieve a controllable way of organizing nanostructures with optimized optical response.

To attain controllability and maximize yield of fabricated probes in aqueous suspensions, it is necessary to devise a technique to separate nonspecifically bound particles and linkers from specifically bound ones. Gel electrophoresis is a separation modality typically used by biologists to separate biomolecules, specifically oligonucleotide sequences, of different lengths. We use this procedure to separate the smaller, unbound nanoparticles and free oligo sequences from the larger assembled aggregates.

Our goal is to devise a methodology of this separation technique using agarose gel electrophoresis for different sizes of nanoparticles. In order to achieve this, we have to determine the various parameters, such as the time steps of elution, the optimal voltage, the run distance, and the gel concentration. We do this by calibrating the experimental setup and optimizing various parameters. We validate the controllability of fabrication using transmission electron microscopy (TEM) and Vis absorption spectroscopy.

PA25. Fabricating Gold Nanoparticle Constructs Using Microfluidic Channels

Megan Koop, Jr., Engineering Mechanics, ENG
Faculty Mentor: Dr. Rohit Bhargava, Bioengineering

ABSTRACT

Gold nanoparticles possess tunable optical and electronic properties. The constructs made of gold nanoparticles yield huge optical and electric field enhancement for the biomolecules embedded in the interstices. Our research focuses on developing methodologies to fabricate nano-scale colloidal probes for biomolecular detection. We intend to achieve a controllable fabrication method for aggregation of these nanoparticles as probes in aqueous suspensions. By studying the kinetics of surface functionalization of gold nanoparticles with thiol groups and the binding kinetics of thiolated gold particles of different sizes, we can improve the yield of probes obtained in the suspensions. We believe that by using microfluidic channels and monitoring the diffusion, we can model the reaction kinetics of solutions of thiolated molecules and gold nanoparticles of different sizes. Fourier Transform Infrared (FTIR) spectroscopy provides unique structural and chemical information.

The infrared response of thiolated molecules bound to gold nanoparticles and embedded between gold nanoparticles is enhanced due to the electromagnetic scattering effects. We use an FTIR imaging setup to monitor the binding kinetics based on observing such enhancement of the IR signal. As a proof of concept of aggregation we present Vis absorption spectroscopy measurements. This project will aid as an important step in realizing a reproducible chemical procedure for controlled aggregation of gold nanoparticles.

PA26. Mechanical Testing and Characterization of Mechanically Activated Color-Changing Polymers

Jillian Franke, Jr., Materials Science and Engineering, ENG
Faculty Mentor: Nancy Sottos, Materials Science and Engineering

ABSTRACT

Polymers containing mechanically activated linkers, or mechanophores, have the potential for diverse functionality in such material applications as mechanical adaptation, damage detection, and recovery. The material studied is composed of a spiropyran linker centrally located in a polymethacrylate (PMA) hydrocarbon chain. When the chain is extended, the spiropyran undergoes a chemical change that manifests itself visibly as a change in color. Characterizing the mechanical conditions under which this change is effected is not only important for understanding the current material system, but will also be useful for other mechanophores that might introduce new functionalities in the future.

A protocol was developed for manufacturing solid-state PMA samples for mechanical testing. The raw material was molded into a dog bone-shaped sample using a hot-press. Mechanical tests triggering the color change were developed to examine the response of the mechanophore to the applied load. It was found that cyclic loading of the sample in tension until failure initiates a quantifiable color change. The sample was imaged after each cycle for the post-experimental color change analysis. To track the color change in the sample during testing, the average intensity from each channel of an RGB color camera was extracted from the pictures of the sample. It was found that the green channel intensity decreased as the spiropyran was mechanically activated.

Using the established protocol, the mechanical conditions under which spiropyran is activated in a polymethacrylate chain were elucidated. As new mechanophores with different functionalities are developed, this same technique can be applied to characterize their activation.

PA27. Comparison of Coherent Backscatter and Airglow Images from Equatorial Plasma Depletions

Shawn Adderly, Soph., Electrical and Computer Engineering, ENG
Faculty Mentor: Jonathan J. Makela, Electrical and Computer Engineering

ABSTRACT

Global Positioning System (GPS) navigation accuracy and availability has become of paramount importance with more modes of transportation depending on the system for reliable positioning data. In order to assure this accuracy it is important to explore the causes of GPS navigation errors. The largest source of error is caused by the Earth's ionosphere. Although it is known that instabilities map efficiently from the equator

down the field lines into the northern and southern hemisphere, the relationship between backscatter is observed by the radar and signatures observed in an airglow imager have not been well characterized. We demonstrate that there appears to be a direct correlation between radar backscatter and its intensity in the middle of the plasma bubble.

PA28. Cardiac Perfusion Imaging: An Investigation of a Model-Based Approach

Elaine Wah, Sr., Electrical and Computer Engineering, ENG
Faculty Mentor: Zhi-Pei Liang, Department of Electrical and Computer Engineering

ABSTRACT

Dynamic magnetic resonance (MR) cardiac imaging is a powerful tool that is utilized for the noninvasive study of cardiac tissue and function. Due to practical limitations of magnetic resonance imaging (MRI), the necessary spatiotemporal resolution is difficult to achieve.

This poster addresses two techniques which have been developed to address the speed limitations in MRI: model-based imaging and parallel imaging. Model-based imaging serves to interpolate non-Nyquist sampled data, while parallel imaging reduces scan time required to acquire one image by collecting less k-space data for a given spatial resolution.

Combining these two techniques demonstrates the existence of a k-t density trade-off. Simulations using a combination of these two techniques under certain conditions show a significant improvement in the image SNR.

PA29. Vector Paint

Brett Jones, Sr., Computer Science, ENG
Faculty Mentor: David Forsyth, Department of Computer Science

ABSTRACT

While manual interfaces for digital painting afford a high degree of control, the process is extremely time intensive. Automatic interfaces traditionally allow for fast results with minimal user interaction, but can result in limited artistic outcomes. We describe a new approach for the rapid authoring of digital paintings, where the user interfaces with a painterly based renderer. Paintings are generated from a segmented source image, allowing the user to specify brush stroke direction and size in a natural object oriented image space.

PA30. Neuroanatomical Specificity of Conditioned Responses to Cocaine versus Food in Mice

Zack Johnson, Jr., Integrative Biology and Neuroscience, LAS
Faculty Mentor: Dr. Justin Rhodes, Department of Psychology

ABSTRACT
Neural circuits implicated in drug conditioning, craving and relapse overlap extensively with those involved in natural reward and reinforcement. To determine whether specificity could be detected in conditioned brain responses to drugs versus food, male outbred HSD:ICR mice were conditioned to a common environment using either 20 mg/kg cocaine (ip) or a familiar food (under food restriction). The mice were then re-exposed to the same environment without the reinforcer and patterns of brain activation were compared using immunohistochemical detection of Fos. Conditioned place preference tests were conducted first to establish relative potency of each reward and facilitate analysis of correlations between Fos and motivation. Place preference was stronger for cocaine than food. Food- but not cocaine-paired cues increased Fos in the paraventricular hypothalamic nucleus whereas the opposite occurred for prefrontal, cingulate and piriform cortices. Individual differences in cocaine place preference were negatively correlated with Fos in the prefrontal cortex. One difference between drugs and natural reinforcers may be lack of feedback from the periphery for drugs which may circumvent control from the hypothalamus in the development of reinforcement circuits.

PA31. Shoulder Pain in Wheelchair Athletes: The Role of Gender

Jacob Segil, Sr., Mechanical Engineering, ENG
Faculty Mentors: Jacob Sosnoff and Kyle Ebersol, Department of Kinesiology

ABSTRACT
There are over 2 million manual wheelchair users (WCU) in the United States. Manual WCUs use their upper limbs for mobility and activities of daily living. The upper limbs, however, are not specialized for the repetitive loading required for wheelchair propulsion. The chronic load placed on the shoulder is misaligned with the joint' s anatomical design and may predispose a manual wheelchair user to development of upper limb pathology. Due to the central importance of the upper limb to activities of daily living and health-related exercise for WCUs, a loss of upper limb function will adversely impact a manual WCUs independence, mobility, and ability to maintain a healthy lifestyle. Although the majority of WCUs suffer from shoulder pain, female WCUs report increased incidence and severity. The purpose of this investigation was to quantify the presence of shoulder pain in physically active WCU's and examine whether the presence and level of shoulder pain varied across genders. In order to address this question, 55 manual wheelchair users (17 male, 38 female) who regularly participate in wheelchair athletics completed three separate surveys indexing the shoulder pain and difficulty performing functional activities. 54.5% of the respondents reported shoulder pain, 36% reported taking pain medication and only

7% received some form of therapy. There were no gender differences in the incidence of shoulder pain (58.8% of males and 52.2 % of females). However, female respondents reported more severe shoulder pain and difficulty during numerous activities of daily living. Most of these activities required significant amounts of muscular strength and/or were composed of significant internal and external shoulder rotation. The findings suggest that a gender disparity in shoulder pain severity, but not incidence persists in physical active wheelchair users. Further work is needed to understand the mechanisms that contribute to gender differences in shoulder pain severity.

PA32. Measuring Ion Energy Distributions from an Electron Cyclotron Resonance Source

Frederick Manley, Sr., Nuclear Engineering, ENG
Faculty Mentor: David Ruzic, Department of Nuclear, Plasma, and Radiological Engineering

ABSTRACT

Electron Cyclotron Resonance (ECR) sources create a plasma by ionizing a gas with microwaves, and directing the ion flow with electromagnets. As implied by the name, an ECR plasma produces high energy electrons that, as a result of the magnetic mirror effect, become trapped in a resonance zone, or 'magnetic bottle.' Due to electron acceleration caused by a gradient in magnetic pressure, electrons move from a region of higher field to lower field and their perpendicular velocity (to the field lines) is transferred to parallel velocity to conserve both energy and magnetic moment. As these high energy electrons are initially accelerated downstream, a large ambipolar field is created from the charge separation, trapping the electrons in a resonance zone. The quasi-static field created from this mechanism accelerates ions to high energies downstream of the plasma. Current research, conducted at Starfire Industries, studies the application of an ECR plasma source to plasma propulsion techniques. The goal of this research is to characterize the plasma and ion beams in order to address the feasibility of using such a source for small scale propulsion systems needed for both defensive and commercial satellites. A single tip Langmuir probe and RPA were mounted on a traverse to measure the electron temperature and ion energies, respectively, at different sections in the plasma. The argon gas pressure in the chamber and magnetic field strength were varied, while the power was held relatively constant by minimizing the reflected power on a magnetron source. The data suggests that by controlling the magnetic field strength and pressure, the energy of the ejected ions can be directly controlled and exceed 400 eV. Further research will study the effects of changing the input power in order to control the location of the resonance zone.

Frederick Manley, Brian Jurcyk, Robert Stubbers, David Ruzic

PA33. Methicillin Resistant Staphylococcus Aureau--Media and the Law

Tacarra Moore, Sr., Community Health, AHS
Faculty Mentor: Susan Farner, Department of Kinesiology and Community Health

ABSTRACT

In the past year (2007-2008) the problem of infections from MRSA has become more visible in the media. Many of this stories target certain populations. This study has looked at these media reports to determine if the actual prevalence of the MRSA infections has been presented in an accurate way. In addition, public health regulations have been put into place throughout the United States and particularly in the State of Illinois. These regulations and subsequent reports have been reviewed. The impact on the public health system and the reporting process are examined. The reported differences between urban and rural health facilities are examined.

PA34. GirlPOWERED Research Study

Rachel Hernandez, Sr., Recreation, Sport and Tourism, AHS
Faculty Mentor: Professor Julie Son, Department of Recreation, Sport and Tourism

ABSTRACT

The purpose of this interdisciplinary study, which is being conducted by faculty and students in RST, KCH, and Campus Recreation, is to gather baseline information from Caucasian, African American, and Latina freshman and sophomore women on their current health and recreational activities, as well as their preferences for Campus Recreation activities. By conducting several focus groups we hope to learn more about the participants' leisure time and physical activity constraints as well as their ideas for Campus Recreation programs. We have also developed a survey that will be taken by all participants. The survey will address issues regarding their health. We will then use this information to develop a pilot Campus Recreation program in the fall semester. We are still in the midst of collecting data. Therefore, I would like to take this opportunity to create a poster that will focus on the importance of including Latinas in recreation and health research, with a special emphasis on recruitment issues. I will explain the goals of the study, describe the survey and focus group measures we are using, highlight the specific strategies we have used for recruitment, and discuss lessons learned so far. I will also talk about how we will use this information to develop a pilot Campus Recreation program that is culturally sensitive.

PA35. International Reporting, "Destination: China"

Liz Reising, Jr., Journalism, COM
Faculty Mentor: Nancy Benson, Department of Journalism

ABSTRACT

China is the focus of world attention this year, when Beijing hosts the 2008 Summer Olympics. China has been building skyscrapers and refurbishing ancient sites in preparation for its unveiling as a country undergoing major transformation. While China will present a new physical face to the world this summer, it has been in the spotlight on the world business stage for more than two decades. Known mostly for low-cost labor and cheap goods, it is advancing economically at a faster pace than most other countries, including the United States. There are predictions that, barring social upheaval, which could slow economic growth, China is on course to overtake the U.S. economy in the next decade.

Because of its impact on the world in this age of globalization, it was inevitable that Professor Nancy Benson would choose China as a destination for students in the international reporting course she has been teaching since 2005. Her goal was to have the students report on the complexity of change within China, while providing the context needed to evaluate China's influence in the world.

Ten journalism students were selected from a pool of applicants. In preparation for the 15-day reporting trip to China, during which students would function as foreign correspondents, there were weekly lectures and discussion. Students were immersed in the history, culture, economy, and politics of China ? within the context of globalization. The students were challenged to understand the connections between China and the U.S. and examine how these two economic powerhouses interact with the rest of the world.

This is the second International Reporting course Professor Nancy Benson has taught. In 2005, she took ten journalism students on a reporting expedition to Peru.

PA36. News-Gazette Reporting Partnership

Troy Murray, Sr., Journalism, COM
Faculty Mentor: Rich Martin, Department of Journalism

ABSTRACT

A small group of UI journalism students participated in an experimental course in Spring 2007, in which each of them was paired with a reporter from The News-Gazette in Champaign, Ill., resulting in front-page stories.

The class offered a select number of news-editorial journalism students the chance to earn academic credit while working in a professional newsroom

to produce major in-depth projects during the semester. Students were teamed up with veteran journalists from The News-Gazette, and their projects were published at the end of the semester. Working with their mentors, the students were responsible for the bulk of the reporting and writing. The students also met in class weekly with Professor Rich Martin to discuss their progress and other issues connected with their assignments.

One of the projects, co-written by undergraduate Christine Won, was a three-part series that ran June 17-19, 2007, and explored how public schools in Champaign and Urbana are coping with an increase of Latino students in recent years. The series focused in particular on how the school systems dealt with the language and cultural differences between Spanish-speaking students and their English-speaking schoolmates and instructors. The series also took an indepth look at the challenges created by undocumented students.

Two other projects by undergraduates ran as single-day entries in The News-Gazette. Troy Murray's stories ran on June 10, 2007, and examined how rural school districts in East Central Illinois used school resource officers. Sam Miller's project ran on July 8, 2007, and investigated the rising cost of a college education and how students, parents and institutions of higher education were responding.

A second News-Gazette class is under way during the spring 2008 semester.

PA37. Changes in Hypothalamic alpha-MSH in Rats Fed a High Whole Milk Protein Diet

Kristy Heppner, Sr., Animal Science, ACES
Faculty Mentor: Lee Beverly, Department of Animal Sciences

ABSTRACT

The melanocortin system has been suggested to contribute to an increase in satiety associated with consumption of a high protein diet. To test this association, male Wistar rats were fed isocaloric diets containing either 14% (n=13) or 55% (n=8) whole milk protein (WMP) for two weeks. On day 14, food was removed during the light phase and returned at dark onset. Rats in lower protein group were provided with either the same diet (P14/P14, n=7) or the higher protein diet (P14/P55, n=6). All rats on the higher protein diet continued to receive that diet (P55/P55). Food intake was measured after 2 hr, at which time rats were euthanized and brains rapidly removed and frozen. Hypothalami were dissected and homogenized before measuring a-MSH and orexin by RIA. During the 14 day prefeeding period, food intake for P55 was 18% lower than P14 ($p<0.01$); however, the amount of food consumed the 2 hr prior to euthanasia was similar ($p=0.18$) for all groups. There were no differences among groups in orexin ($p=0.57$). a MSH concentrations (pg/mg protein) were also similar ($p=0.16$) among groups, though tended to be lower in rats fed the higher protein diet (P14/P14 = 36.5 : 2.7 vs. P55/P55 = 28.7 : 3.4) and intermediate in the P14/P55

group (33.1 : 1.2). These results do not support an increase in a-MSH activity contributing to greater satiety of a high protein diet when the protein source is WMP. Supported by the College of ACES James Scholar Honors Program.

PA38. Characterizing the Antimicrobial Activity of Water-Soluble Seed Exudates

Peter Conlin, Jr., Molecular and Cellular Biology, LAS
Faculty Mentor: Adam Houlihan, Department of Crop Sciences

ABSTRACT

The focus of my research is to further characterize antimicrobial compounds found in the seed exudate of two common types of weed: Kochia (Kochia scoparia) and Jimson Weed (Datura stramonium). Both of the respective exudates have been found to inhibit important plant pathogens; Jimson weed inhibits the bacterium Clavibacter michiganense subsp. Nebraskense which is the causative agent of bacterial canker of tomato and Kochia inhibits the fungi Colletotrichum graminicola and Taphrina deformans which cause corn anthracnose and peach leaf curl. This has been done by treating the exudate with various peptidases and proteases such as Pronase E, Proteinase K; and with an extensive study of the compound's lability to such treatments as heat, SDS, sonication, and different pH environments. In order to be sure of the seed exudate's antimicrobial activity it is important to check if surface colonizers exhibit antagonistic activity as well. Once the antimicrobial compound has been characterized the next step will be determining the compound's mechanism of action. Additionally, fungal and bacterial cultures will be treated with a variety of weed seed exudate types to expand the antimicrobial spectra of activity.

This research requires the use of such techniques as culturing and isolating bacteria and fungi from soils using selective media, and identifying them using 16S and 18S PCR amplification and sequencing, preparation and characterization of seed exudates, and treatment of seed exudates with various proteases and peptidases. Antimicrobial testing such as: minimum inhibitory concentrations (MIC), differed antagonism assays (zones of clearing around a disk), spectra of activity, and killing curves have been utilized.

PM39. An Innovative System for Bioremediation of Agricultural Chemicals for Environmental Sustainability

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ABSTRACT

Agricultural chemicals in drainage discharge from watersheds have raised concerns about the quality of surface water resources. For example, hypoxia in the Gulf of Mexico has been related to the nutrients discharging from agricultural watersheds in the Mississippi River Valley. Finding an efficient and cost effective solution to the nutrient problem is of utmost importance. The research team includes both graduate and undergraduate students from the departments of Agricultural and Biological Engineering, Chemistry, and Civil and Environmental Engineering. Experiments were conducted during September 2006 – present at the University of Illinois to determine the efficiency of various biomaterials for removing agricultural chemicals from drainage discharge.

The results show that a properly designed, naturally available biofilter can significantly reduce the amount of chemicals leaving agricultural fields. Hardwoods (in general), cocoa bean shells, and granular activated carbon materials perform exceptionally well for the reduction of nitrate, atrazine and alachlor. Granular activated carbon was expected to perform well, being a component of many conventional drinking water filtration systems. However, the discovery that biomaterials such as hardwood chips and cocoa bean shells can perform as well as, or better than, granular activated carbon could revolutionize water treatment technologies.

Based on the above laboratory findings, two field scale biofilters were installed this past year. They are identical in design except one contained exclusively hardwood woodchips while the other was filled with a hardwood/softwood woodchip mixture. These systems are currently being monitored to determine the effect of woodchip species on biofilter efficiency. Additional lab experiments were preformed to determine whether observed reductions were biological or physical in nature. Preliminary results suggest nitrate is reduced primarily via biological means while pesticides such as alachlor and atrazine physically sorb to the biofilter media. Phosphate removal is accomplished by both biological and physical processes.

Future efforts will focus on continuing monitoring of existing systems and the development of simple mathematical relationships between biofilter design parameters and chemical reductions.

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