ABOUT THE CAS JUNIOR FACULTY SUMMER RESEARCH AWARD PROGRAM

The College of Arts & Sciences Junior Faculty Summer Research Awards program was initiated in the 2005-2006 academic year to support selected junior faculty as they develop their research and creative projects during their probationary period, a critical time in their careers. The program provides summer salary support to junior faculty for the purpose of advancing their research and creative projects and scholarship. Recipients are selected on a competitive basis.

A total of 105 awards have been made since the program’s inception, with 13, 17, 13, 11, 15, 11, 16 and 9 awards being made in 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013, respectively.

ACKNOWLEDGMENTS

Sincere thanks are due to members of the College Research & Faculty Development Committee for their diligent work in reviewing the applications and selecting the recipients. We are also indebted to Mrs. Dana Kears and Ms. Roxann Sumner, the Dean’s office staff who worked meticulously in handling the logistics involved in the application review process, award management, and the setting up of the poster presentation session. Last but not least, our gratitude goes to award recipients and all applicants for making the junior faculty summer research program the success that it is.

PROGRAM

Date: November 19, 2013
Location: First Floor Lobby, Roark Building (Refreshments served)

8.00 - 8.30 am   Set up
8.30 - 8.35 am   Opening remarks, Dr. John Wade, Dean
8.35 - 9.10 am   Poster session
9.10 - 9.30 am   Clearing

FURTHER INFORMATION

For further information please contact:

Dr. Tom Otieno
Associate Dean for Administrative Affairs & Research

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ABSTRACTS

1

“Young Oxford on Parade”: Masculinity and the English University during the Victorian and Edwardian Ages

Brent Shannon
Department of English & Theatre

The English university novel was a once-popular subgenre of literature, with over 110 titles depicting life in Oxbridge (Oxford and Cambridge Universities) published during the Victorian and Edwardian periods (1837-1910). While many early Oxbridge novels treat university life comically by highlighting drinking, outlandish pranks, and reckless debt, many later works portray the undergraduate years as a vitally formative time in which young men develop lifelong fraternal bonds, achieve the emotional maturity necessary to enter marriage, and test their mettle through athletic competition, the harrowing exam process, and struggles with debt. By examining these shifts in tone and subject matter, I seek to reveal the growing reputation of the British universities through the Victorian and Edwardian ages as well as their rising importance to the formation of British manhood among the ruling classes.

During a two-week research trip to the British Library in London and the University of Oxford, I examined Victorian/Edwardian-era primary sources, including unpublished memoirs of former Oxbridge students, undergraduate diaries, letters to family and friends, student account books and expenditure rosters, college boat club minute books, and student photo albums. All of these materials have provided me with an extraordinary insight into Oxbridge student life and equipped me with the necessary perspective to evaluate how fictional portraits of undergraduate life compare to the realities of the university experience.

University fiction directly confronted the long-held belief that Oxbridge students were elitist, idle, and dissolute and instead offered middle-class morality tales in which young protagonists face and overcome serious challenges that transform them into men. Athletic competition (particularly rowing) was celebrated for endowing young men with the teamwork and discipline necessary in their future careers. Studying and exam-taking were similarly portrayed as an exhausting and tortuous process that tested a student’s manly stamina as much as his knowledge. Student debt and the attractions of conspicuous consumption tested students’ moral fiber, and those who were able to avoid or resolve their debts responsibly demonstrated their readiness to assume the head of a British household.
In Our Midst

Nancy Jensen
Department of English & Theatre

In Our Midst is the current working title of a novel-in-progress about a German-American family, the Austs, who, in the days following the attack on Pearl Harbor, are arrested by the FBI and interned at camps established by the United States Government for the wartime detention of people considered dangerous enemy aliens. Like most of the German-Americans who were detained in these camps, Nina and Otto Aust and their teenaged sons Kurt and Gerhard are the innocent victims of unfounded rumors and outright lies, growing out of wartime hysteria and propaganda. The novel focuses on the Austs, tracing the impact of their arrest and imprisonment on their relationships with each other, with their friends, with their community, and with America itself.

Selection of Source Text Information and Overall Quality of Students’ Synthesis Writing

Cui Zhang
Department of English & Theatre

Synthesis writing, a type of essay based on the integration of information from source texts, is frequently assigned at the university level, and yet is a cognitively demanding task. It would benefit students if classroom instruction significantly improves students’ ability in writing synthesis essays. My dissertation research has suggested that five iterations of synthesis writing instruction and practice during one semester significantly increased the participating students’ holistic writing quality. In the search for contributors for this improved essay quality, I further analyzed data collected for my dissertation research to determine if the students used source text information in their writing differently. To answer this question, I conducted idea unit analysis, which divided the source texts into multiple idea units and assessed how these idea units were used by students in their synthesis essays.

Following previous research, I categorized idea units from each source text into three levels: Main Idea, Supporting Idea, and Detail/Example. A Main Idea is a major idea unit that is supported by further information. A Supporting Idea is a piece of information that supports the main idea and yet is supported by details and examples. It explains why a detail supports the main idea. Finally, a Detail/Example is the smallest piece of information in a text. After listing and categorizing idea units from source texts, a score was assigned to each idea unit according to their level of importance. A Main Idea was assigned 5 points, a Supporting Idea was assigned 3 points, and a Detail/Example was assigned 1 point. Each student essay was then analyzed to see what type of idea units were used, and a total score, as well as Main Idea, Supporting Idea, and Detail/Example scores, were calculated. The student essays were grouped based on whether they received synthesis writing instruction, and the two groups’ idea unit scores were compared using t-tests.

Results showed that students who received synthesis writing instruction used significantly more idea units from source texts as they had higher averaged total scores as a group. This difference
was made by their more frequent use of Supporting Ideas and Details/Examples, while these two groups used similar number of Main Ideas. In addition, the analysis found that topic familiarity has an influence on the students’ use of idea units. Students in general used more of their own experiences and less information from source texts on topics they are more familiar with.

4
Development of Prostate Cancer Target Specific Drug Delivery System

Margaret Ndnguri
Department of Chemistry

While many approved drugs are well-tolerated by most biological systems, numerous drugs could utilize advanced delivery systems to direct them where needed and minimize breakdown as they circulate through the body. We are exploring targeted delivery of various chemotherapeutics using Luteinizing hormone-releasing hormone (LHRH). Over expression of LHRH receptors in several malignant tissues like breast cancer, ovarian, brain, and prostate among others has made this receptor an ideal candidate for targeted drug delivery. LHRH can be modified using various linkers in many ways allowing for specific targeted delivery. The incorporation of modified linker group’s increases ease of attachment and incorporation of various chemotherapeutics that can be selectivity targeted against cancer cell lines that have LHRH receptors. Results on synthetic methods and optimal synthetic routes for the formation of platinated LHRH will be presented.
Electrochemistry and the Enhancement of Latent Fingerprints

David Cunningham
Department of Chemistry

Exploratory work was undertaken to study the formation of polymer coatings by electropolymerization on latent fingerprints on metallic surfaces. The common cyanoacrylate fuming method produces a white polymer that is not easily visible on shiny metal surfaces. In the present work, a solution containing small aromatic, organic molecules was placed over the metallic surface, and electrical current passed through the solution to produce a thin polymer coating. Several types of molecules known to produce intensely black colored coatings were evaluated including thiophenes, pyrrole, and analine. Electrochemical conditions were sought that produced thin films that filled-in the valleys of the ridgelines and left the peaks uncoated. Solutions of the organic monomers in various aqueous, non-aqueous and ionic liquids were evaluated. Preliminary studies demonstrated that dissolution of sebaceous prints in the monomer solutions was unimportant in the timeframe using for electropolymerization. Two ionic liquids, 1-ethyl-3-methylimidazolium ethyl sulfate (EMIES) and 1-butyl-3-methylimidazolium tetrafluoroborate (BMIBF₄), were shown to produce good images. The more hydrophobic of the two, BMIBF₄, produced the polymer at a lower potential and gave slightly better images. Dryright was also used to decrease the amount of current needed to form good images with two non-aqueous solvents. The current-voltage profiles of the electrochemical film formation were studied in chronopotentiometric and chronocoulometric procedures to identify key factors for successful enhancement. Additional work is proposed to further optimize this approach for visualization of fingerprints on metallic surfaces.

Capacity Limits of Pseudo-Random Channels in Deception Problems

Enping Li
Department of Computer Science

Supraliminal channels are introduced in 1998 as a solution of how to initiate the public key exchange in the presence of an active warden. No following work has been done until recent years. Based on our previous work, we summarize a general framework for coin flip channels, which employ, as one theoretical model for supraliminal channels, and we further formalize the derived capacity limit of the coin flip channel as the counter deception theorem. As opposed to traditional communication theory, the counter deception theorem shows that more redundancy leads to less robustness and the active warden can derail the public key exchange transmission with a small number of error bits.

The counter deception theorem presents a pessimistic result for the communicators. Does that mean it is not possible to achieve a covert key exchange through a coin flip channel? A key exchange protocol is presented to answer this question. The detailed analysis of this protocol indicates that even under the constraint of the capacity limits, which is provided by the counter deception theorem, the communicators still have chance to obtain a successful key exchange only
if they could keep transmitting different key datagrams again and again to a certain amount of transmissions.

Thus, the proposed protocol validates the feasibility of public key exchange through the coin flip channel even under the constraint of the counter deception theorem.

7

Toward Understanding Student Attitudes About Pedagogy in Studio-Style Physics Courses

Jon Gaffney
Department of Physics & Astronomy

Physics education research has led to many successful pedagogical reforms, including the studio-style instruction we have adopted for introductory physics classes at Eastern Kentucky University. However, the degree to which students “buy in” to those reforms is likely to have an appreciable effect on whether such reforms are sustainable. Indeed, faculty members cite student pushback as a major reason for abandoning reform efforts.

To understand student attitudes regarding the atypical pedagogies used in studio-based physics, we use an expectancy violation framework. This approach highlights how students’ activities may differ from what they expect in an introductory-level physics course. With this framework, we can investigate how students respond when they encounter unfamiliar pedagogy, and how opinions about what is done in class relate to students’ satisfaction and their performance in the course. This research will eventually lead to suggestions for how instructors can improve student buy-in and respond productively to student pushback.

To this end, a preliminary study of two sections of studio-style physics at EKU in Spring 2013 enabled us to revise our survey instrument and expand our study for the Fall 2013 semester. We utilized validation interviews with students, a factor analysis of student responses, and emergent themes in those responses. For example, we noted that students’ levels of approval of the amount of time spent in class on certain activities such as lecture were major predictors of their satisfaction in the course. We also found shortcomings in our first version of the survey. For example, we failed to track how students’ opinion of the amount of time spent on various activities changed over the course of the semester, and we revised the survey accordingly. Moving forward, we will validate the revised survey and continue investigating student attitudes.
Phylogenetic Supermatrix Analyses of the Flowering Plant Family Podostemaceae

Bradley Ruhfel
Department of Biological Sciences

Podostemaceae is the largest strictly aquatic flowering plant family. Their distribution is cosmopolitan in the tropics, though a few species occur in temperate regions, including one species native to Kentucky. Several species are critically endangered and all species are restricted to rivers, an environment that is currently experiencing major human impacts, especially in tropical areas through the expanded use of hydropower. Several recent molecular studies have sought to clarify relationships within Podostemaceae. Their results indicate that several genera are not monophyletic as currently circumscribed and several areas of the phylogeny are unresolved. However, data from these studies have not been combined in one comprehensive analysis and several taxa remain unsampled. Here we conduct supermatrix analyses of all currently available molecular data in a maximum likelihood framework. Approximately 170 species are included in a data set comprised of eight gene regions: six plastid regions (matK, ndhF, rbcL, rpoC1, rpoB-trnC, and trnL), one mitochondrial region (matR), and one nuclear region (ITS). Taxon sampling and resolution within the clade are greatly improved compared to previous studies and provide a strong basis for improving the classification of the family, which will directly aid conservation efforts. Results from this work will be used to guide ongoing monographic efforts in the Neotropical clade.
The Effect of Intergovernmental Associations on the Structure of Intergovernmental Networks Relations among Kentucky Cities

Matthew Howell
Department of Government

Although the benefits of networking among local governments are well described, and the mechanisms through which inter-governmental relationships work are often studied, the first step in interlocal cooperation is usually overlooked. Cities make interlocal agreements within a network context, but this network and its origins are mostly ignored. There are several possible origins for this network, including similarity of the jurisdictions and shared intergovernmental institutions. The repeated interactions of mayors within these institutions can also drive networking. Institutions which encourage personal interactions in turn improve networking. Data from a survey of Kentucky mayors’ networking was tested with exponential-family random graphs models (ergm) to explore these theories, and finds many antecedents of mayor networks, but repeated interactions through intergovernmental organizations are the largest effect. The implications for the understanding of local government networks and for policy are then discussed.