

3-31-2007

## 37th Annual WKU Student Research Conference

Student Research Council, Western Kentucky University  
*Student Research Council, Western Kentucky University*

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# *37<sup>th</sup> Annual WKU Student Research Conference*

**Saturday, March 31, 2007  
Mass Media and Technology Hall**

## *Welcome and Acknowledgements*

The organizers would like to thank everyone involved with putting this celebration together. We want to especially thank all of the students that have decided to present and display their scholarly work at the conference, and the faculty that supervised them.

This conference is a collaborative effort, and is sponsored by College of Education and Behavioral Sciences, the College of Health and Human Services, the Gordon Ford College of Business, the Potter College of Arts and Letters, the Ogden College of Science and Engineering, the Honors Program, the local chapter of Sigma Xi, the Office of Research and Economic Development, and the Provost's Office through a Provost's Initiatives for Excellence grant.

### Organizing Committee

Larry Snyder, Co-chair

Bruce Kessler, Co-chair

Farley Norman

Craig Cobane

Kay Gandy

Nancy Rice

Robert Reber

Sadiq Shah

Carol Evans

Cathy Abell

Stuart Burris

## Schedule of Events

- 7:30 – 8:00 **Registration and Continental Breakfast**  
Lobby, MMTH
- 8:00 – 8:20 **Welcome from the Organizers and President Gary Ransdell**  
Auditorium, MMTH
- 8:30 – 12:00 **Student Presentations and Posters**  
MMTH 118, 232, 236, 344,  
Posters in the Lobby, MMTH
- 12:00 – 1:00 **Box Lunch (provided)**  
Lobby, MMTH
- 1:00 – 1:45 **Research Experience: A Differentiation in The Global Job Market**  
– Dr. William Carroll, Jr., Vice-President of Occidental Chemical Corporation  
Introduction by Provost Barbara Burch  
Auditorium, MMTH
- 1:45 – 2:15 **Panel Discussion on Student Engagement**  
Steven Wininger, Cathy Abell, Bill Davis,  
Larry Snyder, Kevin Williams
- 2:30 – 5:45 **Student Presentations and Posters**  
MMTH 118, 232, 236, 344,  
Posters in the Lobby, MMTH
- 6:00 – **Awards Banquet (provided)**  
Garrett Ballroom  
Music by the TrebleMakers

Notice to presenters: All presenters should check in at the registration desk by no later than 8:00. Poster presenters should set up posters before 9:00, and be present at their posters to answer questions from 9:30-12:00. Computers with PowerPoint and projectors will be provided in presentation rooms. Presenters should make arrangements to bring their presentations on a CD-ROM or USB drive. All presentations for a given session should be loaded onto the computer in the appropriate room prior to the beginning of the session; technical delays will cause a presentation to be skipped in order to maintain the session schedule.

### Session 1: Engineering and Robotics Room 118, 8:45 – 12:00

- 8:45 *Mercury Detection in a Power Plant Stack*  
Edward Brandon Hesson\*, Lou Anne Kirby, Jason Kondracki,  
Walter Collett†, Stacy Wilson†, Mark Cambron†
- 9:00 *Design of Automated Film Thickness Calibration System*  
Jimmy Ray Sandusky\*, David Brown, David Kleinholter, Chris Byrne†
- 9:15 *CNC Fabric Cutting Device*  
John Neal Walton\*, Adam Marshall, Joel Lenoir†
- 9:30 *Finite Element Analysis of a Unique Transformer Design*  
Adam Jason Thomas\*, Maksim Karavayev, Walter Collett†
- 9:45 Break
- 10:00 *Development of an Industry Scale Furnace*  
Ryan James Farris\*, Matt Siebert, Chris Byrne†
- 10:15 *Water Filtration System*  
Kyle William Ketterman\*, Josh Nash, Kevin Schmaltz†
- 10:30 *Centrifugal Pump Demonstration Bench*  
Luis Fernando Villalpando\*, Mary Elizabeth Baker, Elizabeth Schmale, Joel Lenoir†, Robert Choate†
- 10:45 *Remote Controlled Robotics Applications*  
Aaron James Knapp\*, Brent Askins†
- 11:00 Break
- 11:15 *Washing Machine Transmission Redesign for MTD*  
Joshua Anthony Petrino\*, Juan Figueroa, Joel Lenoir†
- 11:30 *ChargeMasters Refrigerant Heating System*  
Adam Pape\*, Juan Silva, Joey Traughber, Kevin Schmaltz†
- 11:45 *Bio-Generated Heating System for Greenhouse*  
Russell Joseph Wimsatt\*, Adam Tabor, Kevin Schmaltz†

\* Presenter

† Faculty Supervisor

Session 2: Chemistry and Geology  
Room 232, 8:30 – 11:00

- 8:30 *Managing Stormwater in Urban Karst Settings*  
Jeremy Goldsmith\*, John All†, Pat Kambesis†
- 8:45 *Toward Creating Nanoscale Patterns for General Protein Sensors*  
Winston Maupin\*, Stuart Burris†
- 9:00 *Testing the Concept of Impedance-Based General Protein Sensors*  
Michael Daugherty\*, Stuart Burris†
- 9:15 *Effect of Loss on Ignition and Particle Size on the Concentration of Trace Elements in Fly Ash*  
Jacob Adam Vervynck†, Bianca Casenas, Jason Cheng, Wei-Ping Pan†
- 9:30 *Factors Affecting the Rate of Reaction of Platinum Anticancer Drug Models with DNA and Protein Targets*  
Becca M. Davis-Sandlin\*, Kevin Williams†
- 9:45 Break
- 10:00 *Strontium Isotope Analysis of Lavas From the Chilean Andes Utilizing Thermal Ionization Mass Spectrometry*  
Robert Moore\*, Andrew Wulff†
- 10:15 *Wastewater Treatment Using Sunlight and Titanium Dioxide Nanocrystals*  
Nathan Roberts\*, Leslie Van Hoose, Tabatha Bowlin, Tingying Zeng†, Andrew Ernest†
- 10:30 *Identification of Accessory Mineral Species in Carbonatite Lavas from Magnet Cove, Arkansas*  
Benjamin Campbell\*, Andrew Wulff†
- 10:45 *Anionic Exchange Membrane with Surfactant Immobilization for Extraction of Doxepin*  
Jason James Weiner\*, Shi-Ming Hong, Shing-Yi Suen, Eric Conte†

\* Presenter

† Faculty Supervisor

Session 3: Physics, Astronomy, and Theater  
Room 236, 8:45 – 12:00

- 8:45 *Determining Standard Stars for Use in Optical Variability Monitoring*  
Jeremy D. Maune\*, Michael Carini†
- 9:00 *The Effect of Nuclear Cross-Section Data on the Measurement of Elemental Densities in Explosives Threat Analysis*  
Matthew E. Nichols\*, Ivan Novikov†, Phillip Womble†
- 9:15 *Fast Multi-Channel Analyzer Based on Free-Running Digital Signal Processing*  
Christopher John McGrath\*, M. E. Nichols, Jeremy Board, Jon Paschal, Phillip Womble†, Alexander Barzilov†, Ivan Novikov†, Doug Harper†
- 9:30 *A Low Cost Theater Control System Using Wireless Technology*  
James Lewis Lodmell\*, Shannon Miller, Jon Paschal, Phillip Womble†
- 9:45 Break
- 10:00 *Validation of the Epistemological Belief Assessment for Physical Science*  
Samuel Dave Kessler\*\*, Scott Bonham†
- 10:15 *A Method to Determine the Neutron Flux for 2.5 and 14 MeV Neutrons*  
Eric Thomas Houchins\*, Lindsey Hopper, Phillip Womble†, Alexander Barzilov†
- 10:30 *Repair and Update of a D-Max B X-ray Machine*  
Ian Alexander Rice\*, Doug Harper†
- 10:45 *RLEAKS: A Pressurized Tank Car Inspection System*  
Jeremy Shane Board\*, Jon Paschal, Lindsey Hopper, Christopher Davenport, James Lodmell, Robert Hernandez, Phillip Womble†, Alexander Barzilov†, Ivan Novikov†
- 11:00 Break
- 11:15 *Low Cost Semi-Autonomous Vehicles for Explosives Neutralization*  
Christopher Davenport\*, Jon Paschal, James Lodmell, Robert Hernandez, Kyle Moss, Phillip Womble†, Alexander Barzilov†
- 11:30 *Practical Applications of the Monte Carlo N-Particle Transport Code*  
Joshua James Pearce\*\*, Jeremy Board, Jon Paschal, Phillip Womble†, Alexander Barzilov†
- 11:45 *Fixed and Dynamic Sensor Networks Using Wireless Technology*  
Kyle Thomas Moss\*, Jon Paschal, Jeremy Board, Phillip Womble†, Alexander Barzilov†, Doug Harper†, Ivan Novikov†

\* Presenter

† Faculty Supervisor

\*\*Honors Student Presenter

Session 4: (Graduate) Psychology, Communications, Public Health, and Religious Studies

Room 344, 8:45 – 12:00

- 8:45 *The Effects of Intensity Level and Expertise on Attentional Focus During Exercise*  
Diana Gieske\*, Melissa Abo, Dustin Strupp, Steven Winingert\*
- 9:00 *Group Production Manipulations Influence Decision Criteria in Group Brainstorming*  
Bryan Thomas Hall\*, Brandy Johnson, Martin Bink\*
- 9:15 *Methodology of Tapping Worker's Perception of Worksite Factors Influencing Physical Activity and Nutritional Habits*  
Jagdish Khubchandani\*, Crissy Rowland, Cecilia Watkins\*
- 9:30 *Dishonorable Treatment: Workplace Incivility and Cultures of Honor*  
Matthew Scott Kelley\*, Kathi Miner-Rubino\*
- 9:45 Break
- 10:00 *Prevalence of Fungi in a South Central Kentucky School Building With a History of Moisture and Indoor Air Quality Problems*  
Sameer Valsangkar\*, Luke Bramblett, Anne Britt, Emmanuel Iyiegbuniwe\*
- 10:15 *Roots in the Egyptian Desert*  
Anthony Dale Lucas\*, Shannon Schaffer\*
- 10:30 *Creating Conflict: Antecedents of Workplace Incivility*  
Megan Preston\*, Kathi Miner-Rubino\*
- 10:45 *Aging and the Perception of Slant From Patterns of Optical Texture*  
Charles E. Crabtree\*, J. Farley Norman\*
- 11:00 Break
- 11:15 *The Collegiality Climate Scale (CCS): A Psychometric Investigation*  
Christopher Charles Brady\*, Michael Seigel, Kathi Miner-Rubino\*
- 11:30 *Motor Interference on Memory Tasks*  
Brandy Nicole Johnson\*, Martin Bink\*
- 11:45 *People Like Me: Analyzing Universal Themes of the Holocaust Through a Culture-Specific Lens*  
Jennifer Ann Corum\*, Cecile Garmon\*

\* Presenter

† Faculty Supervisor

Session 5: Psychology and Education

Room 232, 11:15 – 12:00, 2:30 – 3:15

- 11:15 *Aging and the Revision of Causal Beliefs*  
Anthony Ray Atchley\*, Leslie Plumtree, Sharon Mutter\*
- 11:30 *The Civil Rights Movement in Kentucky's Middle School Classrooms*  
Adriane Beth Hardin\*\*, Patricia H. Minter\*
- 11:45 *Perception of Purpose on Course Evaluations and the Effect on Responses*  
Andrew Jefferson Caudill\*, Steven Winingert\*
- 12:00 Lunch
- 1:00 Plenary Speaker and Panel
- 2:30 *Beyond Face to Face: Workplace Incivility in Organizational E-mail*  
Ron Brassell\*\*, Kathi Miner-Rubino\*
- 2:45 *Sport Team Identification*  
Alana Catherine O'Bryan\*, Rick Grieve\*
- 3:00 *Examination of Future Time Perspective, Self-Determination Theory, and Self-Talk as Correlates of Exercise Behavior*  
Thomas Marvin DeSena\*, Steven Winingert\*

\* Presenter

\*\* Honors Student Presenter

† Faculty Supervisor

Session 6: Biology  
Room 118, 2:30 – 5:30

- 2:30 *Applications of DNA Fingerprinting to the Study of the Lepidoptera*  
Timothy H. Shehan\*, Jeffery Marcus<sup>‡</sup>
- 2:45 *Localizing Mutations in Chlamydomonas Mutants Defective in Circadian Transcription*  
Daniel James Byrd\*, Sigrid Jacobshagen<sup>‡</sup>
- 3:00 *Sound Production on Loricariid Catfish*  
Amanda Lynn Webb\*\*, Michael Smith<sup>‡</sup>
- 3:15 *Site-Directed Mutagenesis of a Highly Conserved Cysteine Residue in the Beta-Prime Subunit of E. coli RNA Polymerase*  
Christopher Stephen Pendleton\*, Rodney King<sup>‡</sup>
- 3:30 Break
- 3:45 *Testing the Linear Threshold Shift Hypothesis in Tone-Exposed Goldfish*  
Ronald Reagan Gilley\*\*, Michael Smith<sup>‡</sup>
- 4:00 *Dung Beetles of Ghana*  
Brian Fredrick Payne\*, Keith Philips<sup>‡</sup>
- 4:15 *Voluntary Exercise in Wild Type C57/B16 Mice*  
Ashley Marie Medford\*\*, Nancy Rice<sup>‡</sup>
- 4:30 Break
- 4:45 *Molecular Phylogeny of Water Penny Beetles (Coleoptera: Psephenidae)*  
Jennifer Forbes Stovall\*, Karen Bell, Keith Philips<sup>‡</sup>
- 5:00 *RNA Interference Gene Silencing to Study the Circadian Clock in Chlamydomonas reinhardtii*  
Matthew Clifton Young\*, Sigrid Jacobshagen<sup>‡</sup>
- 5:15 *Localization of NOS III Expression and NO Mediated Apoptosis*  
Jameson Kyle Mattingly\*, Nancy Rice<sup>‡</sup>

\* Presenter

\*\* Honors Student Presenter

<sup>‡</sup> Faculty Supervisor

Session 7: Religious Studies, Philosophy, and Anthropology  
Room 232, 3:30 – 5:45

- 3:30 *The People Make the Nation: A Question Concerning Plato's Democracy vs. Modern Notions*  
Eric Martin Isbell\*, Judith Szerdahelyi<sup>‡</sup>
- 3:45 *Group Structure in a Pagan Microculture*  
Jennifer Ashley Wright\*, Kate Hudepohl<sup>‡</sup>
- 4:00 *Who Do You Say That I Am? Analyzing African Christology*  
Kathleen Elisabeth Smallwood\*, Bella Mukonyora<sup>‡</sup>
- 4:15 *A Comparison of Heroes*  
Jesse Taylor Alexander IV\*, Joseph L. Trafton<sup>‡</sup>
- 4:30 Break
- 4:45 *Our Protection: An Ethnographic Study of a Campus Police Department*  
Calli Elizabeth Waltrip\*, Kate Hudepohl<sup>‡</sup>
- 5:00 *The Spirit Molecules and the Isaic Mysteries*  
Alex J. Hargrove\*\*, Shannon Schaffer<sup>‡</sup>
- 5:15 *Critique of Cultural Influence on Biomedicine*  
Brandi Nicole Sullivan\*, Ted Hovet<sup>‡</sup>
- 5:30 *Aristotle's Theory of Knowledge*  
Noah Warren Kapley\*, Cassandra Pinnick<sup>‡</sup>, Arvin Vos<sup>‡</sup>

\* Presenter

\*\* Honors Student Presenter

<sup>‡</sup> Faculty Supervisor

Session 8: English, History, and Art History  
Room 236, 2:45 – 5:30

- 2:45 *H. G. Wells: Modernism and Socialism*  
Jason Edward Sloan\*\*, Deborah Logan†
- 3:00 *The Federalist Party Leaders and the Alien and Sedition Acts*  
Jeffery Lewis Stanley\*, Andrew McMichael†
- 3:15 *A Proposal of a Cinematography for a Fictional Documentary on the  
Semiological Manifestation of a Place Called Death Valley*  
Emmett Barton\*, Ted Hovet†, Dale Rigby†
- 3:30 Break
- 3:45 *From the Shadows Into the Light*  
Sarah Lynn Ritter\*, Sandra Hughes†
- 4:00 *From Hillbilly Heaven to Music City USA: The Transformation of  
Downtown Nashville's Country Music Scene*  
Blake William Jones\*, Eric Reed†
- 4:15 *Poe's "Hop Frog" Interpreted as a Justification of Slave Rebellion*  
Jeffery Lewis Stanley\*, Sandra Hughes†
- 4:30 Break
- 4:45 *Synthesizing Gauguin: A Comparative Look at Cultural Contexts and  
Gauguin's Tahitian Works*  
Joanna Justine Miller\*\*, Heather Pulliam†
- 5:00 *Smokey the Bear: The Evolution of an Environmental Icon*  
Emily Katherine Gibson\*, Anthony Harkins†
- 5:15 *Children's Literature of the Victorian Age and the Modern Era*  
Alex Gregory Hall\*, Sandra Hughes†

\* Presenter

\*\* Honors Student Presenter

† Faculty Supervisor

Session 9: (Graduate) Biology, Chemistry, Computer Science,  
Geography & Geology  
Room 344, 2:30 – 5:30

- 2:30 *Anomaly-Based Intrusion Detection Model for DNP3 Protocol*  
Amr S. Yassien\*, Mostafa G. Mostafa†
- 2:45 *The Synthesis and Characterization of Cyclopenta[c]thiophenes Using  
Grignards*  
Amber Joy Bell\*, Chad A. Snyder†
- 3:00 *Spatio-Temporal Variations of Observed Soil Moisture in Nebraska*  
Ashley Littell\*\*, Rezaul Mahmood†
- 3:15 *Effects of Body Condition Score on Blood Glucose and Insulin  
Concentration of Grazing Horses*  
Ashley Elizabeth Monfort\*, Charles Anderson†, Elmer Gray†
- 3:30 Break
- 3:45 *Carbon Dioxide Capture Using Activated Carbon From Chicken Waste*  
Yan Zhang\*, Wei-Ping Pan†
- 4:00 *A New Algorithm for Circadian Rhythm Analysis*  
Christa F. Gaskill\*, Sigrid Jacobshagen†, Claire Rinehart†, Bruce  
Kessler†
- 4:15 *Web Content Mining*  
Dipesh Sharma\*, Zhonghang Xia†
- 4:30 Break
- 4:45 *Impact Property of Rubber Toughened Plastic*  
Ganesh Latta\*, Wei-Ping Pan†
- 5:00 *Component Integration Metrics and Their Evaluation*  
Prapanna Tamarapu Parthasarathy\*, V. Lakshmi Narasimhan†
- 5:15 *Late Holocene Geomorphic History of the Upper Green River Inferred  
From Alluvial Deposits*  
Juan Sebastian Herrera\*, Stephen Kenworthy†

\* Presenter

† Faculty Supervisor

**Undergraduate Posters**  
**Lobby, 9:30 – 12:00**

Art

*In/Dwelling*  
Megan J. Kelley\*\*, Yvonne Petkus<sup>‡</sup>

Biology

*Constructing Single-Copy Antitermination Reporter Gene Constructs by  
Recombineering*  
Andrew Joseph Ebelhar\*, Rodney King<sup>‡</sup>

*Tonotopic Representation in the Goldfish Sacculle*  
Brian D. Rogers\*, Julie Schuck, Reagan Riley, Michael Smith<sup>‡</sup>

*Constructing Single-Copy Antitermination Reporter Gene Constructs by  
Recombineering*  
Andrew Joseph Ebelhar\*, Rodney King<sup>‡</sup>

Chemistry

*Fluorescence Quenching Studies of Quinine Sulfate by KCl and TiO<sub>2</sub> in Water*  
Caitlyn E. Abell\*, Thandi Buthelezi<sup>‡</sup>

*Cyclophanes as a Means for Removal of PAHs From Solution*  
Christopher W. Davies\*, Thandi Buthelezi<sup>‡</sup>

*Arsenic Retention by Limestone Based Material With Cement Stabilization*  
Morgan Jones\*\*, Josh Haines, Katie Harwood, Cathleen Webb<sup>‡</sup>

*Reaction of Cisplatin Analogs With Selenomethionine*  
Rebekkah P. Lively\*, Kevin Williams<sup>‡</sup>

*Quantum Dots Sensitized Nanoscale Solar Cells*  
Jordan Norris\*, Christopher Poteet, Tingying Zeng<sup>‡</sup>

*Synthesis and Purification of Cyclopenta[c]thiophene Precursors*  
Paul J. Orosz\*, Jessica Wilson, Chad Snyder<sup>‡</sup>

*Comparisons of Chlorophyll From Spinach and Chlorophyllin Spectra Using  
Fluorescence and Raman Spectroscopy*  
Mayme M. VanMeeveren\*, Thandi Buthelezi<sup>‡</sup>

*Indium Phosphide Quantum Dots Sensitized Solar Cells*  
Trevor W. Veatch\*, Jordan Norris, Tingying Zeng<sup>‡</sup>

*Mercury Bioaccumulation in the Bat Population at Mammoth Cave National Park*  
Erica Whitehouse\*, Lindsey Clark, Gretchen Grover, Cathleen Webb<sup>‡</sup>

*Admicelle Extraction of Phenols Using Cationic Surfactants in the Hydroxide  
Form*  
Sarah Beth Vied\*\*, Kali Pickering, Chris Perrin, Eric Conte<sup>‡</sup>

Engineering

*ICC Fish Robot*  
Phillip Clark\*, Paul Lancette, Stacy Wilson<sup>‡</sup>, Mark Cambron<sup>‡</sup>

### Geography

#### *The Kentucky Snowfall Impact Scale*

Brian M. Biache\*, Kylie Batson, Nick Rodgers, Ronnie Leeper, John Walker, Mary Johns, Petrina Smith, Greg Goodrich†

#### *Flash Floods in the Appalachian Region*

William Nicholas Rodgers\*, Rezaul Mahmood†

#### *Temporal Shifts in Seasonal High (Peaks) and Low (Dips) Diurnal Temperature Range*

Nicholas Curtis Lawalin\*, Rezaul Mahmood†, Stuart Foster†

### Graphic Design

#### *Gigposters*

Matthew Scott Barnes\*, Matthew Tullis†

#### *Inventors and the Toys/Games They Designed*

Crystal Bond\*, Matthew Tullis†

#### *Film Poster*

Laura Katherine Caffey\*, Matthew Tullis†

#### *Fashion and Its Artists Poster Series*

Laura Katherine Caffey \*, Matthew Tullis†

#### *Screenprinters*

Larisa Elena Chavarria-Smith\*, Matthew Tullis†

#### *Designers Choice*

Christine Lee Downs\*, Matthew Tullis†

#### *Photojournalism and Candid Photography*

Angel Elaine Griffin\*, Matthew Tullis†

#### *Production Designers*

Kenneth Michael Hall\*, Matthew Tullis†

#### *Famous Cartoonist*

Antoine LaShaun Lindsay\*, Matthew Tullis†

### Graphic Design (continued)

#### *Every Generation Needs Regeneration*

Jonathan Lawrence Merklings\*, Matthew Tullis†

#### *Designing for Corporate America*

Darren Frank Mowrer\*, Matthew Tullis†

#### *Men of the Gun*

Wes Joel Nolen\*, Matthew Tullis†

#### *WW2 Propaganda Series*

Greg Roy\*, Matthew Tullis†

#### *Screenprinters*

Kelly Marie Scheurich\*, Matthew Tullis†

#### *Architects*

Derek Sears\*, Matthew Tullis†

#### *Language of Design*

Kelly Nicole Smith\*, Matthew Tullis†

#### *Three Famous Designers*

Aaron Hamilton Upton\*, Matthew Tullis†

#### *Squirrels, Squids, and Sea Turtles: The Illustrations and Gig Posters of Three Screen Printers*

Heidi Brooke VanZant\*, Matthew Tullis†

Psychology

*Differences in Attentional Focus Across Gender, Distance, and Stroke in Collegiate Swimmers*

Laura Marie Graves\*, Dustin Strupp, Steven Wininger†

*Examination of the Professional Preparation of High School Coaches*

Jessica Meredith Hale\*, Dustin Strupp, Steven Wininger†

*Difference in Patterns of Collaborative Inhibition*

Brittany Sears\*, Martin Bink†

*Motor Interference on Memory Tasks*

Nicholas Terry\*, Brandy Johnson, Martin Bink†

*Effects of Overexcitabilities on the Social Self-Concepts of College Students: An Analysis of Gender and Ability Level*

Ryan Andrew Wallace\*, Kayla Smith, Anne N. Rinn†

Recreation

*Appalachian Trail Hikers and Self-Reported Outdoor Ethics Practices*

Joe Cleinmark\*, Tammie Stenger-Ramsey, Fred Gibson, Raymond Poff†

Student Engagement

*Student Engagement: Bowling Green Community College Health Days*

Daniel Wesley Rogers\*, Lisa Stewart, Daltrey Tyree†, Carol Evans†, Lora Moore†

\* Presenter

\*\* Honors Student Presenter

† Faculty Supervisor

**Graduate Posters  
Lobby, 9:30 – 12:00**

Chemistry

*Synthesis of Cyclopenta[c]thiophenes via Activated Methylene*

Vineet Karambelkar\*, Chad A. Snyder†

*Extraction of Quercetin Using Surfactant-Immobilized Cation Exchange Membranes*

Kali Rae Pickering\*, Candace Guerrero, Eric Conte†, Shing-Yi Suen†

Genetics

*Statistical Studies of the Human Sex Ratio (HSR)*

Archana Lakkaraju\*, Elmer Gray†

Geography

*Vegetation and Climate Variability in Kentucky*

John Walker\*, Heather Williams, John All†

Nursing

*Online Education: Is It Making a Difference? A Review of the Changing Paradigm in Nursing Education*

Demara Andrea Goodrich\*, Donna Blackburn†

Psychology

*The Effects of Attentional Focus and Expertise Level on Self-Selected Exercise Intensity*

Melissa Mary Abo\*, Diana Gieske, Dustin Strupp, Steven Wininger†

*Action and Intention: Motor Enactment Interferes With Prospective Memory Performance*

Chad Albert Carroll\*, Martin Bink†

*Aging and the Depth of Binocular Rivalry Suppression*

Kristina Fugitte Pattison\*, M. Jett Taylor, Katherine E. Goforth, J. Farley Norman†, Hideko F. Norman†

## Public Health

*A Look at Preparedness for Possible Avian Influenza Outbreak*  
Janie Cambron\*, Vijay Golla<sup>‡</sup>

*Factors Influencing the Health Behaviors of International Students at Western Kentucky University*  
Divine Ebele Odonwodo\*, Sandeep Mishra, Chitalu Chitalu, Andrew Chafatelli, Grace Lartey<sup>‡</sup>

\* Presenter

<sup>‡</sup> Faculty Supervisor

## Abstracts

*Fluorescence Quenching Studies of Quinine Sulfate by KCl and TiO<sub>2</sub> in Water*  
Caitlyn E. Abell\*, Thandi Buthelezi<sup>‡</sup>

The interaction of quinine sulfate dissolved in 0.5 M H<sub>2</sub>SO<sub>4</sub>(aq) solution with either Cl<sup>-</sup> or TiO<sub>2</sub> was investigated. Fluorescence quenching of quinine sulfate by Cl<sup>-</sup> and TiO<sub>2</sub> was measured at room temperature using fluorescence spectroscopy and excited state lifetime measurements. Results indicate that the quenching process is dynamic and TiO<sub>2</sub> is an effective quencher than Cl<sup>-</sup>.

*The Effects of Attentional Focus and Expertise Level on Self-Selected Exercise Intensity*  
Melissa Mary Abo\*, Diana Gieske, Dustin Strupp, Steven Winger<sup>‡</sup>

The purpose of this study was to compare the effects of intentionally focusing on bodily sensations versus positive self-talk on self-selected exercise intensity. Participants were novice, recreational, or expert exercisers, and came into the lab twice to exercise on a treadmill. During one session, instructions were to focus on their bodily sensations, and during the other session positive self-talk; order was counterbalanced. The dependent variables were intensity, enjoyment, and pain/exertion reports. Intensity was measured by the distance walked/ran in 20 minutes and the average percentage of the heart rate maximum. Results indicated that level of expertise moderated the dependent variables.

*A Comparison of Heroes*

Jesse Taylor Alexander IV\*, Joseph L. Trafton<sup>‡</sup>

The paper will be a comparison between Sirach 44-50 and Hebrews 11:1-12:3. These sections are about important people in the Jewish faith. It will give a general overview of Sirach 44-50 and Hebrews 11-12:3. It will show who the important people in the faith were according to the authors. It will then compare the two lists of people. It will also see what inferences can be made about why these people were important and compare each list. Lastly it will show how these two sections fit into the greater Second Temple body of works.

*Ageing and the Revision of Causal Beliefs*

Anthony Ray Atchley\*, Leslie Plumlee, Sharon Mutter<sup>‡</sup>

Age differences in causal beliefs were investigated using a food allergy prediction task. Younger and older adults completed baseline cue ratings, compound, then single cue training, test cue ratings, and compound cue recognition. Baseline ratings were consistent across age and both groups showed equal learning of cue-outcome associations during training. However, younger adults revised their causal beliefs about absent cues during single cue training, while older adults did not. In addition, older adults remembered the compound cues less effectively. These results suggest that while older adults learn associations between cues and outcomes, they are less able to learn associations between causal cues. As a result, they cannot use these associations to retrospectively revalue cues in light of new causal information.

*Gigposters*

Matthew Scott Barnes\*, Matthew Tullis<sup>‡</sup>

Posters are over, Print Mafia, Rob Jones and Aesthetic Apparatus and how these designers influence my personal concept of poster design.

*A Proposal of a Cinematography for a Fictional Documentary on the Semiological Manifestation of a Place Called Death Valley*

Emmett Barton\*, Ted Hovet<sup>‡</sup>, Dale Rigby<sup>‡</sup>

To begin with, in a documentary about Death Valley from the perspective of Death Valley, there is lack. A marriage, often discordant, between sound and image will assert associations between something and nothing. The conception, however, of nothing is proved abortive. "Death" and "Valley" wed in a paradox of physical matter: if a valley is a low point, a depression, between more altitudinous geography-awaiting fulfillment-how can it be filled with "death?" Like darkness, an absence of life, a nothingness crystallized in language and given an improbable weight. Already, emotions veil the space, a relief is made in one continuous draping attitude towards nothing. Something is formed out of the non-thing. Of what substance this non-thing?

*The Synthesis and Characterization of Cyclopenta[c]thiophenes Using Grignards*

Amber Joy Bell\*, Chad A. Snyder<sup>‡</sup>

This seminar involves the synthesis and characterization of cyclopenta[c]thiophenes and their precursors using an efficient Grignard route. These compounds show promise in the field of polymer and catalysis chemistry. Cyclopenta[c]thiophene synthesis, although difficult, should prove a valuable compound for polymerization. These polymers would be an extension of the known polythiophene polymers. Polythiophenes are an important class of conjugated polymers that form some of the most environmentally and thermally stable materials that can be used as electrical conductors, nonlinear optical devices, polymer LEDs, electrochromatic or smart windows, photoresists, antistatic coatings, sensors, batteries, electromagnetic shielding materials, artificial noses and muscles, solar cells, electrodes, microwave absorbing materials, memory devices, nanoswitches, optical modulators, and transistors.

*The Kentucky Snowfall Impact Scale*

Brian M. Biache\*, Kylie Batson, Nick Rodgers, Ronnie Leeper, John Walker, Mary Johns, Petrina Smith, Greg Goodrich†

While not thought of as a snowy state, Kentucky will occasionally experience a crippling snowstorm that can shut down commerce and close schools for several days. While people can debate which snowstorm was the worst, there is no formally recognized methodology to determine which historical snowstorm was the most disruptive. In this study, we adapt a snowstorm ranking methodology originally developed to rank snowstorms in the northeastern United States and apply it to Kentucky. We also examine patterns of low-frequency variability in the atmosphere known as teleconnections to determine if major Kentucky snowstorms occur more frequently during specific teleconnective patterns.

*RLEAKS: A Pressurized Tank Car Inspection System*

Jeremy Shane Board\*, J. Paschal, L. Hopper, C. Davenport, J. Lodmell, and R. Hernandez, P. C. Womble‡, A.Barzilov‡, D. Harper‡, I. Novikov‡

Pressurized rail tank cars transport various fluids throughout the country. These materials have the potential to cause damage to both the environment and local populations. We are developing a trackside system, mounted on a tower, consisting of six acoustic sensors, three video cameras, and a radiological sensor that work together to inspect tank cars as they pass. The data is collected and stored on a PC which is connected to the Internet via WiFi (IEEE 802.11). While the system location is in Bowling Green, KY, it may be monitored anywhere in the world. Acknowledgements: This work is supported in part by the Applied Research and Technology Program of Western Kentucky University and the Department of Homeland Security.

*Inventors and the Toys/Games They Designed*

Crystal Bond\*, Matthew Tullis†

A design series of three posters that highlights the life and works of three different inventors. These inventors have created toys that have been popular for many years example the Barbie doll and the Monopoly game, etc.

*The Collegiality Climate Scale (CCS): A Psychometric Investigation*

Christopher Charles Brady\*, Michael Seigel, Kathi Miner-Rubino†

This study focuses on the development and validation the collegiality climate scale (CCS), which was developed to provide a positively-focused measure of the workplace environment. 1,300 law school faculty members (52% male) completed a survey packet containing the CCS and nine additional scales used in the assessment of validity. Results found that the CCS has good convergent, concurrent, and discriminate validity. Findings also demonstrated that the CSS accounts for unique amount of variance in a number of work-related outcomes (e.g., job satisfaction, turnover intentions), above that accounted for by other often used measures for workplace interaction.

*Beyond Face to Face: Workplace Incivility in Organizational E-mail*

Ron Brassell\*, Kathi Miner-Rubino†

In recent years, much research has been conducted examining the consequences of demeaning behavior in the workplace, such as workplace incivility. This research has mostly been based on face to face incivility; very little research has examined incivility in electronic communication. Recent data are starting to suggest that organizational employees using electronic mail for communication purposes may be more inclined to communicate in ways they would not ordinarily. In the present study, I examine the extent to which electronic mail is reportedly used as a tool to fuel uncivil behaviors in the workplace. As such, the present study represents the first attempt to document the frequency of hostile, uncivil electronic mail communication and the common targets of such communication.

*Localizing Mutations in Chlamydomonas Mutants Defective in Circadian Transcription*

Daniel James Byrd\*, Sigrid Jacobshagen†

The output pathway of the circadian clock in plants can be studied by creating mutants with defects in circadian expression. This study uses Chlamydomonas reinhardtii to locate activators or repressors of the rhythmically expressed gene LHCB-1. Insertional mutagenesis was used with the pSP1245 plasmid into the Carni-1 strain which has a reporter gene fused to the promoter of LHCB-1. PCR and DNA sequencing was used to verify the presence of the insert. 10 mutants were verified of the 13 available with PCR. So far, only mutant #1 has been verified by sequencing. Further DNA sequencing will locate the insertion points.

*Film Poster*

Laura Katherine Caffey\*, Matthew Tullis†

It is a film festival poster. The film festival poster should have stopping power and should be a attention grabber.

*Fashion and Its Artists Poster Series*

Laura Katherine Caffey\*, Matthew Tullis†

The series of posters highlights the life and work of each different individual. Each poster shows visual communication using typography and collage imagery.

*A Look at Preparedness for Possible Avian Influenza Outbreak*

Janie Cambron\*, Vijay Golla†

Avian influenza is caused by a strain of flu that affects migrating fowl and domestic birds. H5N1 does not usually infect humans, however exposure can occur through direct contact during bird handling and poultry production. With increased commerce, travel, and urbanization, the threat of a pandemic is real. As of February 2007, 280 people were affected and 169 have died of this disease. With this being a potential environmental and epidemiological challenge, the question is how to be adequately prepared. If an estimated % of the working population is paralyzed as a result of an outbreak, the basic necessities, along with business, communication, and other infrastructure in the community may be seriously affected with a significant decline in public health services and quality of life.

*Identification of Accessory Mineral Species in Carbonatite Lavas from Magnet Cove, Arkansas*  
Benjamin Campbell\*, Andrew Wulff\*

Samples of carbonatite magmas found in Magnet Cove, Arkansas are rich in accessory mineral phases which may yield insights into the petrogenetic processes responsible for producing these odd lavas. Minerals were separated and examined using SEM-EDS, and found to contain high concentrations of barium, phosphorous, various LILE, and silver. Compositionally zoned micas exhibit alternating brown and green zones, characterized by varying elemental ratios. Different styles of compositional zoning serve as indicators for processes prevalent in the magma chamber. Zoning in micas from the Magnet Cove lavas is examined relative to models for magma mixing and near-static conditions at subdued temperatures.

*Action and Intention: Motor Enactment Interferes with Prospective Memory Performance*  
Chad Albert Carroll\*, Martin Bink\*

Prospective memory is remembering to carry out intended actions at an appropriate point in the future. The present experiment investigated the influence visuospatial interference and motor interference on prospective memory encoding processes. Through manipulations of encoding conditions it was possible to establish a relation between spatial processing and prospective memory encoding. The research results supported an action-encoding explanation of prospective memory. When visuospatial resources were available, prospective memory performance was high and when resources were restricted, performance suffered.

*Perception of Purpose on Course Evaluations and the effects on Responses*  
Andrew Jefferson Caudill\*, Steven Wininger\*

The purpose of this research was to examine several factors on students' midterm evaluations of teaching. Factors examined were perceptions of success/failure, attributions about success/failure, and purpose of the midterm evaluation; three different sets of directions were used. The testing instrument was the Student Instructional Report (SIR) II which consists of both Likert-type questions along with two open-ended questions. Results revealed that the lowest ratings were given by students who received the "improvement for the rest of the semester" directions whereas the highest ratings were given for the directions noting that the purpose was for "tenure, promotion and salary decisions." Expected grades and attributions about grades were significant predictors of ratings and accounted for more variance in ratings as compared to directions/purpose.

*Screenprinters*

Larisa Elena Chavarria-Smith\*, Matthew Tullis\*

The objective of this series of posters is to create a persuasive visual communication about the research made in an area of interest of three separate yet related subjects to create a series.

*JCC Fish Robot*

Phillip Clark\*, Paul Lancette, Stacy Wilson†, Mark Cambron†

This project was presented, as phase II, to design and test a robotic fish, using a microcontroller card previously developed in phase I of the robotic fish project. Several designs were constructed to test for water tightness and address issues concerning buoyancy, resistance to water, and durability. From these test results, a final body design and material was selected for production of the robotic fish. Methods for the construction of the fish body were researched and a production method was finalized based on the fulfillment of several requirements. The completion of the robotic fish was the conclusion of this project.

*Appalachian Trail Hikers and Self-Reported Outdoor Ethics Practices*

Joe Cleinmark\*, Tammie Stenger-Ramsey, Fred Gibson, Raymond Poff†

104 Appalachian Trail (AT) hikers (41 overnight, 33 section, and 30 thru-hikers), completed questionnaires about Leave No Trace (LNT) Outdoor Ethics Principles including: 1) Plan ahead and prepare, 2) Travel and camp on durable surfaces, 3) Dispose of waste properly, 4) Leave what you find, 5) Minimize campfire impacts, 6) Respect wildlife, and 7) Be considerate of other visitors. Results skewed toward appropriate behavior as prescribed by LNT principles. The responses to principles 4, 5, and 6 more closely follow recommended LNT practices, while others were considerably dispersed. These differences may be attributed to the AT's unique mix of backcountry setting, front country access, culture, and established practices.

*People like me: Analyzing Universal Themes of the Holocaust Through a Culture-Specific Lens*

Jennifer Ann Corum\*, Cecile Garmon†

Sustained academic and popular interest in the Holocaust depends largely on the ability of educators to communicate its universality. At Holocaust memorials around the world, educators make strategic rhetorical choices in pursuit of this imperative. However, as communicators present narratives, documentation, and visual rhetoric at memorials, they filter each message through a unique cultural lens. This unavoidable human tendency raises questions concerning the degree to which culture shapes Holocaust narratives. Given that Holocaust memorials may offer pivot insights into modern and future genocides, cultural influences on Holocaust rhetoric seem worthy of renewed evaluation.

*Aging and the Perception of Slant From Patterns of Optical Texture*

Charles E. Crabtree\*, J. Farley Norman†

A single experiment compared younger and older observers' ability to judge slant from natural patterns of optical texture. The observers monocularly viewed four differently textured planar surfaces that were presented at four different slants (20, 35, 50, & 65 degrees from fronto-parallel). The observers made their judgments by adjusting the slant of a palm board until it matched the perceived slant of the textured pattern. In general, all of the observers' perceived slants were close to the actual slants. The overall results indicate that the ability to perceive slant from optical texture remains relatively intact with increases in age.

*Testing the Concept of Impedance-Based General Protein Sensors*

Michael Daugherty\*, Stuart Burris<sup>‡</sup>

Electrochemical impedance spectroscopy (EIS) was used with planar gold electrodes and commercial interdigitated array sensors of platinum, gold, and chrome to test the concept of general protein sensors. EIS data for bovine serum albumin and bovine hemoglobin were compared to a potassium phosphate buffer with offset voltages ranging from +1.00 V to -1.00 V. Both proteins exhibited similar data patterns, depending on which conductor/offset voltage combination was used. However, their responses differ somewhat in the  $\tan(\delta)$  versus log frequency representation of the data.

*Low Cost Semi-Autonomous Vehicles for Explosives Neutralization*

Christopher H. Davenport\*, Jon Paschal, James Lodmell, Robert Hernandez, Kyle T. Moss, Phillip C. Womble<sup>‡</sup>, Alexander Barzilov<sup>‡</sup>

Improvised explosive devices (IED's) are an important concern to coalition forces in Iraq. IED's can be made from things such as standard military ammunition and detonated with electronics such as cell phones, and garage door openers. There is a great need for a cost-effective solution to neutralize these IEDs. We are building a single function disrupter robot whose only purpose is to neutralize these IED's. We are modifying the controls of a toy remote control car and controlling it wirelessly using Wi-Fi (IEEE 802.11). Also the robot will be equipped with a high velocity disrupter to neutralize the IED as well as a video camera for inspection and aiming purposes. This robot utilizes commercial-off-the-shelf (COTS) components which allow a relatively low cost.

*Cyclophanes as a Means for Removal of PAHs from Solution*

Christopher W Davies\*, Thandi Buthelezi<sup>‡</sup>

Host-guest interactions in the cyclophane-PAH systems—where the PAHs are benzene derivatives—have been investigated in dichloromethane. Absorption and fluorescence spectroscopy have been the means of investigation of these cyclophane-PAH systems. Using the Shimadzu spectrofluorometer and spectrophotometer, interesting insight to how these systems interact has been found. Preliminary <sup>1</sup>H NMR data on molecular interactions of the system in solution are presented. Results reveal that the binding of the guests is favored by the cyclophane, but further investigation needs to be done on determining structural orientation of the guest within the host molecule's cavity. Future work includes temperature dependant studies focusing on the chemical shift changes and broadening of the peaks upon complexation.

*Factors Affecting the Rate of Reaction of Platinum Anticancer Drug Models with DNA and Protein Targets*

Becca M. Davis-Sandlin\*, Kevin M. Williams<sup>‡</sup>

NMR spectroscopy has been used to observe the effects of ligand bulk and hydrogen bonding on the rates of reaction of platinum complexes, which are analogs of the anticancer drug cisplatin, with DNA and protein residues. We have studied reactions with guanosine, guanosine 5'-monophosphate (5'-GMP) and N-acetylmethionine (N-AcMet). The nonbulky platinum complex favors reaction with 5'-GMP, a representative DNA target, because of hydrogen bonding; the bulky platinum complex favors reaction with 5'-GMP because of unfavorable steric clashes in the reaction with N-AcMet. Thus, the presence of some bulk could result in an increased reactivity with the desired DNA targets.

*Examination of Future Time Perspective, Self Determination Theory and Self-Talk as Correlates of Exercise Behavior*

Thomas Marvin DeSena\*, Steven Winger<sup>‡</sup>

The purpose of this study was to examine relationships among Future Time Perspective (FTP), Self-Determination Theory, and Self-talk with exercise behavior. Participants consisted of 317 undergraduates. This study assessed participants' exercise behavior, Stage of Change, use of self-talk, FTP, and eight subtypes of exercise motivation. Stage of Change moderated self-talk usage; participants in higher Stages were more likely to use self-talk. Self-talk was used most often to sustain exercise duration. Participants in higher Stages of Change had higher FTP scores, lower amotivation scores, and higher intrinsic motivation scores. Numerous significant correlations were observed among FTP, motivation subtypes, and exercise behaviors.

*Designers Choice*

Christine Lee Downs\*, Matthew Tullis<sup>‡</sup>

To design a series of three posters on Frank Olinsky, Sean Adams, and Chip Wass. These posters will each highlight the life and work of these individuals.

*Constructing Single-Copy Antitermination Reporter Gene Constructs by Recombineering*

Andrew Joseph Ebelhar\*, Rodney A. King<sup>‡</sup>

All members of the Lambda phage family share a similar genetic organization and control early gene expression by suppressing transcription termination; this process is called antitermination. The mechanism of transcription antitermination in the lambdaoid phage HK639 differs greatly from its relatives. The HK639 antitermination system is mediated by an RNA molecule, whereas that of other lambdaoid phages is mediated by a phage-encoded protein. To better understand this unusual mechanism of antitermination, the putative antiterminator element was identified and cloned. Here, we report the construction of single-copy reporter constructs in the genome of *Escherichia coli* by employing a relatively new technique called "Recombineering". Antitermination activity will be evaluated by monitoring the level of gene expression from the chromosomally located reporter constructs.

*Development of an Industry Scale Furnace*

Ryan James Farris\*, Ryan Farris, Matt Seibert, Chris Byrne<sup>‡</sup>

A team of senior engineering students from Western Kentucky University is conducting a project which involves the development, design, and verification of a highly controlled, industrial size carbonization furnace for the production of porous carbons used to make carbon polymer composites. Major goals of the design include: wood loading efficiency, shape control, which includes limiting warping and cracking, uniform heat zone, control over furnace atmosphere such that air is excluded, control of furnace temperature with time, capture of pyrolysis by-products, and cycle capability of several days with lifetime greater than 10 years. Engineering calculations and simulations that have been conducted to verify that key attributes are met will also be presented.

*A New Algorithm for Circadian Rhythm Analysis*

Christa F. Gaskill\*, Sigrid Jacobshagen<sup>†</sup>, Claire Rinehart<sup>‡</sup>, Bruce Kessler<sup>§</sup>

Our research is concerned with the elucidation of photoreceptor function in the circadian clock of *Chlamydomonas reinhardtii*. This is most easily studied using phase and period data generated by automated phototaxis measurement. A new algorithm utilizing the Mathematica program allows us to analyze our phase and period data more accurately and efficiently than the manual analysis method.

*Smokey the Bear: The Evolution of an Environmental Icon*

Emily Katherine Gibson\*, Anthony Harkins<sup>†</sup>

In 1950, Albert Staehle created the image of Smokey the Bear for the Cooperative Forest Fire Prevention Program advertising campaign giving birth to the longest-running public-service campaign in U.S. history. Because of his seminal role in popular culture, a close analysis of the changing message and appearance of Smokey the Bear advertisements throughout history reveals larger societal shifts in environmental awareness and the corresponding change in forestry policy from fire prevention to fire management. My paper will deconstruct these images of Smokey the Bear from the 1950's through the present and analyze their connection to public environmental consciousness.

*The Effects of Intensity Level and Expertise on Attentional Focus during Exercise*

Diana Gieske\*, Melissa Abo, Dustin Strupp, Steven Wininger<sup>†</sup>

Attentional focus (AF) during exercise is one casual factor with regard to exercise adherence. AF has traditionally been defined as associative (exercise-related focus) or dissociative (non-exercise related focus). We developed a new AF model with six categories. This study examined how these six categories of AF are affected by both expertise of the exerciser and exercise intensity. Participants consisted of 145 undergraduates tested on two separate days. The results showed there was a main effect for intensity across most categories of AF, a main effect for expertise for self-talk, and an interaction between intensity and expertise level for bodily sensations.

*Testing the Linear Threshold Shift Hypothesis in Tone-Exposed Goldfish*

Ronald Reagan Gilley\*, Michael E. Smith<sup>†</sup>

Fishes exposed to intense sound lose auditory hair cells which leads to a reduction in hearing ability. Using hearing loss data from fish exposed to white noise, a recent model (Linear Threshold Shift hypothesis) was developed to predict hearing loss in fishes. To test the validity of this model, we exposed groups of six goldfish (*Carassius auratus*) to one of four pure tones at 176 dB for 48 hrs. Hearing tests were performed on each fish immediately following noise exposure using auditory brainstem response. Fish exposed to lower frequency tones exhibited greater threshold shifts at lower frequencies, while high-tone exposure led to hearing loss at higher frequencies. In general, this supports the Linear Threshold Shift Hypothesis. This frequency-dependent hearing loss will be discussed.

*Managing Stormwater in Urban Karst Settings.*

Jeremy Goldsmith\*, John All\*, Pat Kambesis<sup>†</sup>

By-Pass Cave is an resurgence cave with flows that have been dye traced to the Lost River Cave system stream that eventually flows into the Barren River. The cave runs directly under several businesses and US 31-W. The cave has a history of flood flows and poor water quality. As part of the Clean Water Act's Phase II implementation of stormwater programs, a structural water quality device was added to limit the stormwater pollution entering this stream. Water quality samples were taken prior to implementation in order to create a pollution baseline. Samples subsequent to the BMP installation reveal that in karst areas, structural BMP's at cave stream mouths are of limited utility in removing contaminants from cave systems and other management strategies are needed.

*Online Education: Is It Making A Difference? A Review Of The Changing Paradigm In Nursing Education*

Demara Andrea Goodrich\*, Donna Blackburn<sup>†</sup>

The nursing shortage has accelerated the need for efficient, cost-effective classes in all levels of nursing education. The purpose of this poster is to examine the literature and determine whether online and web-based teaching enhances or improves nursing education in comparison to traditional classroom methods. Overall, the research supports that there is no significant difference in cognitive learning and student satisfaction between online learning and traditional classroom education. Regardless of the medium through which education is taught, the pedagogy used is often the key to success. Development of a strong theoretical framework is imperative to the advancement of web-based learning.

*Differences in Attentional Focus Across Gender, Distance, and Stroke in Collegiate Swimmers*

Laura Marie Graves\*, Dustin Strupp, Steven Wininger<sup>†</sup>

The purpose of this study was to investigate usage characteristics of six attentional focus strategies during swimming. Sixty-one collegiate swimmers completed surveys after their specialized event. Characteristics examined for each category of attentional focus included usage, valence, exemplars, and percentage estimates. Results revealed females engaged in significantly more self-talk and less task-relevant thoughts compared to males. Differences among distances were also found; 50 meter swimmers employed more self-talk. Examination of valence ratings revealed first place finishers rated bodily sensations as neutral in contrast to swimmers placing 5-7th, who rated them negatively. Implications of these findings and prospective research are discussed.

*Photojournalism and Candid Photography*

Angel Elaine Griffin\*, Matthew Tullis<sup>†</sup>

My main objective for this project was to position myself as a research specialist in the field of three separate yet related subjects and to communicate this newfound knowledge through the visual communication of poster art. The area of interest for my posters are photojournalists, particularly based in the timeframe of 1920-1950. My research was based on the black and white photography of three photographers: Alfred Eisenstaedt, Dorothea Lange, and Robert Capa.

*Examination of the Professional Preparation of High School Coaches*

Jessica Meredith Hale\*, Jessica Hale, Dustin Strupp, Steven Winger†

The focus of our research is to examine the content and extensiveness of high school coaches' training. In addition, demographics, sources of performance feedback, job satisfaction, and attributions about coaching success/failure will be assessed. Targeted participants are coaches of the major boys and girls sports in 14 different high schools in Kentucky. Training questions were generated using the National Standards for Sport Coaches (2006). Descriptive statistics will be reported along with examination of differences among gender and sports.

*Children's Literature of The Victorian Age and The Modern Era*

Alex Gregory Hall\*, Sandra Hughes†

"Alice's Adventures in Wonderland" is a classic novel for children and adults alike; however, there were several facets of children's literature that emerged in the Victorian period besides fantasy. Works by Eliza Cook and Heinrich Hoffman as well as a sketch by Charles Darwin confirm that interest in serious literary endeavors and psychoanalysis of children increased during this era. However, most authors chose to write happy tales of innocent characters; Lewis Carroll did not. He wrote a novel that demonstrated that children liked to be frightened. This terror factor is also demonstrated with the modern success of Harry Potter.

*Group Production Manipulations Influence Decision Criteria in Group Brainstorming*

Bryan Thomas Hall\*, Brandy Johnson, Martin Bink†

While examining the phenomenon of unconscious plagiarism, both group composition and idea production were manipulated in a group brainstorming paradigm. When participants generated ideas individually, there was a higher occurrence of plagiarism when the ideas were generated aloud. Those in a group tended to plagiarize more when ideas were written as opposed to said aloud.

*Production Designers*

Kenneth Michael Hall\*, Matthew Tullis†

The purpose of this project is to research the works of three artists, in this case, television and film production designers, and create a collage poster design for each designer incorporating their work in the overall poster design. The posters are presented in such a way as to promote a mock speech in an artist lecture series.

*The Civil Rights Movement in Kentucky's Middle School Classrooms*

Adriane Beth Hardin\*, Patricia H. Minter†

In an effort to better understand how Kentucky's middle school social studies teachers incorporate the Civil Rights Movement and its many themes into their curriculum research was conducted in different geographic regions of the state. Research conducted showed that schools in more urban areas of the state (i.e. Louisville) tend to incorporate more of the Civil Rights Movement and its themes into their curriculum as opposed to more rural areas (i.e. Metcalfe County Schools). It was also evident that students in rural areas had an increasing amount of questions about diversity because of an increasing number of Hispanic students in their school district.

*The Spirit Molecules and the Isaac Mysteries*

Alex J. Hargrove\*, Shannon Schaffer†

This paper attempts to shed light on the mystique surrounding the Greco-Roman mystery cults by reviewing the known research compiled by religious scholars in light of recent discoveries that have been made in the fields of psychology and neurology. My theory is that the profound experiences reported by those who underwent the Isaac cult's initiation ceremony were not fantastical dreams, nor delusions resulting from a deep belief in mythology, but instead, the product of a well organized ritual, a culture steeped in mythology, and a psychedelic plant which allowed the initiate to enter into an altered state of consciousness.

*Late Holocene Geomorphic History of the Upper Green River Inferred From Alluvial Deposits*

Juan Sebastian Herrera\*, Stephen Kenworthy†

This research describes the alluvial deposits and late Holocene geomorphic evolution of the Upper Green River in South Central Kentucky. Sediment samples from boreholes and bank exposures were collected and sieved to determine grain size distributions and stratigraphic patterns. The deposits are predominantly medium to coarse silt overlying sands and gravels. Stratigraphic sections and geomorphic observations suggest the existence of three distinctive paleoterraces at elevations between 158 and 182m that could be correlated with Pleistocene aged passages of Mammoth Cave System. Radiocarbon dating of buried organic material (~ 1750A.D) implies postsettlement sedimentation rates of 1.7 cm/yr to 2.2 cm/yr.

*Mercury Detection in a Power Plant Stack*

Edward Brandon Hesson\*, Lou Anne Kirby, Brandon Hesson, Jason Kondracki, Walter Collett†, Stacy Wilson†, Mark Cambron†

The objective of this project is to design and construct a system capable of extracting a flue gas sample from a power plant stack and use Laser Induced Breakdown Spectroscopy (LIBS) to test the sample for mercury. The design consists of five key components: 1) activated carbon filter, 2) vacuum pump, 3) two solenoid valves, 4) two manual valves, and 5) power system and control unit. The system will be used by power plants to monitor their mercury emissions levels.

*A Method to Determine the Neutron Flux for 2.5 and 14 MeV Neutrons*

Eric Thomas Houchins\*, Lindsay Hopper, Phillip Womble†, Alexander Barzilov†

To measure neutron source strength, a material of fixed mass and shape is irradiated. The material is chosen which 1) can be activated by neutrons of a specific energy 2) has a half-life which is both long enough to achieve high counting statistics but short enough that the experiment only requires a few hours of measurement. By activation, we mean creating induced radioactivity in the foil, preferably gamma rays. Then using a gamma detector to determine the activity of the foil after irradiation it is possible to back calculate to the total flux of the neutron source. Acknowledgements: Support provided by the Applied Research and Technology Program of Western Kentucky University.

*The People make the Nation: A question concerning Plato's Democracy vs. Modern notions.*  
Eric Martin Isbell\*, Judith Szerdahelyi†

The paper that I have written has to do with what Plato wrote around 2600 years ago. What I am going to argue is concerning Plato's example that he set in the Republic: Is a democracy the best form of government out of the three that he mentioned? With this, I am going to analyze some of the problems associated with a democratic government, and why it's nearly impossible to gain a government which meets the example that he spoke. But, the question I truly seek to answer is what was proposed by Meno: "Who Guards the Guardians?" I hope to display what a democracy actually is to the people, and if our current view of a democracy is for the better or the worse.

*Motor Interference on Memory Tasks*  
Brandy Nicole Johnson\*, Martin Bink†

Dissimilar tasks interfere with one another when performed at the same time. Previous research focuses on factors that influence divided attention, such as age, difficulty of task, and practice effects. The present study examined whether a simple motor task would interfere with encoding a word list of nouns and verbs. The results showed motor interference on memory for verbs and not for nouns. This indicates the involvement of the motor system in processing action-related concepts.

*From Hillbilly Heaven to Music City USA: The Transformation of Downtown Nashville's Country Music Scene*  
Blake William Jones\*, Eric Reed†

As country music gained popularity in the late 1960s, the Grand Ole Opry, the center of Nashville's music scene, fled to the suburbs from the central city. The result was a decline in not only downtown Nashville's country music scene, but in the downtown area as a whole. However, with the country music boom of the early 1990s, the downtown investments of Gaylord Entertainment Corporation, and the downtown revitalization efforts of Mayor Phil Bredesen, Nashville's downtown was booming once again. This project examines the relationship of country music itself and the music business to the downtown music scene, demonstrating that there is a link between their fortunes, but a link that is much weaker than what it once was.

*Arsenic Retention by Limestone-Based Material with Cement Stabilization*  
Morgan Jones\*, Josh Haines, Katie Harwood, Cathleen Webb†

This project is focused on the retention of arsenic in limestone. Limestone is low in cost and readily available; therefore, this research will help develop an inexpensive way to remove arsenic from rural water sources. One objective that will be addressed during this project is the examination of the potential combination of the waste product and cement. Cement will be combined with different measurements of arsenic and the peak load will be examined. A second objective is the long term stability of arsenic absorbed into limestone. A microscopic study will be done to examine how arsenic and limestone bound.

*Aristotle's Theory of Knowledge*

Noah Warren Kapley\*, Cassandra Pinnick†, Arvin Vos†

My thesis is that Aristotle's theory of knowledge is explained by key concepts in the *Metaphysics*, *Nicomachean Ethics*, *Posterior Analytics*, and *De Anima*. Aristotle's theory of knowledge is unlike Plato's use of the forms. Aristotle is thoroughly rooted in experience, discusses the different kinds (and fallacies) of knowledge, and explores first causes in the search for knowledge. He provides a general metaphysical and epistemological framework in an effort to explain how humans know.

*Synthesis of Cyclopenta[c]thiophenes via Activated Methylene*  
Vineet Karambelkar\*, Chad A. Snyder, Chad A. Snyder, Ph.D.†

This presentation involves the proposed synthesis of cyclopenta[c]thiophenes and their precursors using an activated methylene. Cyclopenta[c]thiophene compounds show promise in the field of polymer and catalysis chemistry. Cyclopenta[c]thiophene synthesis, although difficult, should prove a valuable compound for polymerization. These polymers would be an extension of the known polythiophene polymers. Polythiophenes are an important class of conjugated polymers that form some of the most environmentally and thermally stable materials that can be used as electrical conductors, nonlinear optical devices, polymer LEDs, electrochromatic or smart windows, photoresists, antistatic coatings, sensors, batteries, electromagnetic shielding materials, artificial noses and muscles, solar cells, electrodes, microwave absorbing materials, memory devices, nanoswitches, optical modulators, and transistors.

*Dishonorable Treatment: Workplace Incivility and Cultures of Honor*

Scott Matthew Kelley\*, Kathi Miner-Rubino†

Workplace incivility is defined as rude and discourteous behavior that takes place in a work setting. However, the impact of workplace incivility differs from person to person. One variable that may play a role in how workplace incivility affects an individual is U.S. region and whether or not they are located in a culture of honor. In cultures of honor, such as the Southern U.S. region, small disputes or actions become competitions for reputations and social status. Using archival data from a national sample of law school faculty members (N = 1,300), this study will examine the effect of workplace incivility on employees who are located in Southern regions compared to employees located in northern regions.

*In/Dwelling*

Megan J Kelley\*, Yvonne Petkus†

Dwelling becomes an intimacy as one lives not only within the boundaries of buildings but within the built frame of one's own body, society, and perceptions. "In/Dwelling" is a presentation of artwork exploring the dynamic architecture of our own bones and the internal spaces created within our organic homes.

*Validation of The Epistemological Belief Assessment for Physical Science*

Samuel Dave Kessler\*, Scott Bonham\*

The Epistemological Beliefs Assessment for Physical Science (EBAPS) is a multiple-choice instrument used to examine the epistemology of students in introductory science classes on several sub-scales. The validity of the instrument is being evaluated by comparing the multiple-choice answer with student explanations. Introductory astronomy students were asked to give free response reasoning to 2 of the 30 questions explaining why chose their answer. Student responses were coded whether the response was epistemological, its sub-scale, and the epistemological sophistication. Approximately two-thirds of the questions showed a good correlation between epistemological reasoning and multiple-choice response. The remaining questions will be revised.

*Water Filtration System*

Kyle William Ketterman\*, Josh Nash, Kevin Schmaltz†

Due to EPA regulations on water distribution, the WKU WATERS Lab and Mechanical Engineering are providing a solution to the regulation. The EPA requires that water facilities perform tests monthly for the presence of bacteria. One method is to ship ten gallons for filtering. Our project provides a more economical solution. At the October 2006 inception of the testing WKU had a manual solution available through the WATERS Lab. The WATERS Lab requested that an automated solution be designed. This system is to provide a much higher level of user interaction, while also providing a much more standardized test procedure.

*Methodology of Tapping Worker's Perception of Worksite Factors Influencing Physical Activity and Nutritional Habits*

Jagdish Khubchandani\*, Crissy Rowland, Cecilia Watkins†

Innumerable studies have been conducted to understand the epidemiology of the obesity epidemic in United States and globally. Our approach explores the perspective of the working adult population to understand their perception of factors influencing physical activity and nutritional habits. Focus groups were conducted in an industrial setting and workers from all strata of the workforce were randomly selected for the focus groups. Six focus groups, with eight participants in each group, were conducted. This formed a broad spectrum of participants ranging from labor class to administrative executives, each voicing their opinions. The opinion of all the participants was restructured into an instrument for assessing worker's perception of the influencing factors of obesity in the worksite.

*Remote Controlled Robot Applications*

Aaron James Knapp\*, Brent Askins†

This project is to look at new or different ways to use a Remote controlled robot to pick up a PVC pipe and return it to a particular point. This robot shall use current technology to make the robot work and complete its task; I used scientific method and research to complete its task. There are many different applications for a robot and using an arm or other pickup apparatus is one aspect. This robot idea is on a small scale, but robots of larger size pick up raw materials all day long repeatable.

*Statistical Studies of the Human Sex Ratio (HSR)*

Archana Lakkaraju\*, Elmer Gray†

As the fourth study over a span of 40 years, this study further characterizes the HSR of families of Western students. Results permitted testing the effect of HSR of existing children on ultimate family size, the association of sexes of successive children within families, and the expression of population genetics principles. Finds included: average family size decreased during periods of study, families including both sexes of children were significantly less likely to increase and the most desired family consisted of two children with one of each sex and the male born first.

*Impact Property of Rubber Toughened Plastic*

Ganesh Latta\*, Ganesh Latta, Wei-Ping Pan†

The effect of type of rubber, filler size and filler content on the impact behavior of rubber toughened plastic was investigated. Notched Izod impact tests were conducted on samples with different formulations. The impact strength of these rubber toughened plastics appears to be a function of rubber and filler dispersion, type of rubber, rubber content and filler size. Light optical microscope was used to see the dispersion of rubber in plastic matrix. The sample was cryo-fractured in liquid nitrogen and studied by using Scanning Electron Microscope (SEM) for filler dispersion, type of filler and filler size in plastic matrix. Dynamic Mechanical Analysis (DMA) was used to obtain the storage modulus, loss modulus and tan delta for each sample.

*Temporal Shifts in Seasonal High (Peaks) and Low (Dips) Diurnal Temperature Range*

Nicholas Curtis Lawalin\*, Rezaul Mahmood†, Stuart Foster†

The DTR has two maximums and two minimums and displays a pattern. It peaks in the early spring because of increasing solar radiation, but very little evapotranspiration. In the summer the DTR dips because of evapotranspiration, in the fall it peaks again because of diminishing evapotranspiration and in the winter it dips because of significant daily cloud cover. We are proposing that these maximums and minimums have been "shifting". We tracked the DTR using United States Historical Climate Network data, smoothed the data and tracked the DTR over several decades to discover when these peaks and dips were occurring. The spring DTR can be used to estimate the start of "spring."

*Famous Cartoonist*

Antoine LaShaun Lindsay\*, Matthew Tullis†

To create a persuasive visual communication using hierarchy of typography and collage imagery of three famous cartoonist. The three cartoonist collage set is a visual solution that relate to one another as a group.

*Spatio-Temporal Variations of Observed Soil Moisture in Nebraska*

Ashley Littell\*, Rezaul Mahmood†

Soil moisture is a measure of the water content in a soil that is dependent upon precipitation, evapotranspiration, runoff, drainage, and irrigation. Nebraska is one of the few states that measures soil moisture in an extensive network that records weather variables on a daily basis. Daily soil moisture observations are collected from depths of 10, 25, 50, and 100 centimeters and analyzed in this research. Data from these stations are evaluated on the spatial and temporal scales using spatial interpolations, time series analysis, and the cross-correlation function to better understand the variations of soil moisture in the Northern Great Plains.

*Reaction of Cisplatin Analogs With Selenomethionine*

Rebekkah P. Lively\*, Kevin M. Williams<sup>‡</sup>

Analogs of the platinum anticancer compound cisplatin have been reacted with the nonstandard amino acid selenomethionine (SeMet). SeMet was found to react faster than methionine (Met) with a representative platinum complex; however, over time, equal amounts of the SeMet and Met products were observed. Thus, both SeMet and Met products have similar thermodynamic stabilities, but SeMet is kinetically faster to react. Thus, while only a subset of proteins have selenium-containing amino acids, platinum complexes could target them kinetically. Additionally, the presence of SeMet was found to greatly increase the rate of displacement of trans ligands on the platinum.

*A Low Cost Theater Control System Using Wireless Technology*

James Lewis Lodmell\*, Shannon Miller, Jon Paschal, Phillip C. Womble<sup>‡</sup>

The Applied Physics Institute and the Department of Theatre and Dance are designing a cost effective integrated wireless control system that will allow a single user control multiple technical tasks from a single computer system. The system (Using WiFi, IEEE 802.11x) will allow easy control of lighting, sound, and stage effects. The challenge is to develop low-cost systems which rival the complexity of large control boards and wherein a single operator can provide the same functionality as large groups of operators. This integrated system is a feasible solution to the complex high cost theater systems that will allow for more functions while incorporating more control capabilities. Acknowledgements: This work is supported in part by the Applied Research and Technology Program of Western Kentucky University.

*Roots in the Egyptian Desert*

Anthony Dale Lucas\*, Shannon Schaffer<sup>‡</sup>

The origin of the Egyptian Desert Fathers has been attributed to Judeo-Christian roots. This paper explores the possibilities of non-Christian influences on the Egyptian Desert Fathers.

*Localization of NOS III Expression and NO Mediated Apoptosis*

Jameson Kyle Mattingly\*, Nancy Rice<sup>‡</sup>

We are interested in understanding how NO is involved in regulating the growth and/or death of myofibroblasts. Myofibroblasts are contractile cells found in many organ systems involved in both tissue development and repair after injury. Nitric oxide synthase III (NOSIII), the enzyme responsible for NO production, can be regulated through various mechanisms including contraction and cellular localization. In myofibroblasts, NOS III activity appears to correspond with the translocation of the enzyme from nuclear to peri-nuclear regions. This movement can be induced in pulmonary myofibroblasts by varying growth conditions. In order to correlate locations of NOS III with changes in the contractility of the myofibroblasts, immunofluorescence microscopy was performed on cells grown either in the presence or absence of contraction inhibitors BTS or BDM.

*Determining Standard Stars for Use in Optical Variability Monitoring*

Jeremy D. Maune\*, Michael Carini<sup>‡</sup>

WKU's Bell Observatory has undertaken a study of a type of active galaxy known as Blazars by monitoring how their brightness (magnitude) varies with time. Non-varying standard stars are required for comparison to individual Blazars to accurately determine the object's variability. The fields of view for several Blazars monitored by Bell have not previously been examined for suitable standards. Several standard stars are now identified using data from the United States Naval Observatory sky survey. Light curves using these stars and data from Bell are reported, as well as the usefulness of the technique for upcoming spaced based astronomical missions.

*Toward Creating Nanoscale Patterns for General Protein Sensors*

Winston Maupin\*, Stuart Burris<sup>‡</sup>

Our ultimate research objective is to determine the identities of proteins in solution without relying specific binding interactions that would work for only one protein per test. We are attempting to accomplish this by leveraging the uniqueness of proteins' tertiary structures in anticipation of probing them with dielectric/impedance analysis. We are utilizing scanned probe lithography (SPL) techniques to craft patterns with feature sizes of 10 to 50 nanometers by about 500 nm. Commercially available sensors have feature sizes that are, at their smallest, 800 nm. With our SPL approaches we are able to create patterns on the order of two to fifteen times the size of most proteins.

*Fast Multi-Channel Analyzer Based on Free-Running Digital Signal Processing*

Christopher John McGrath\*, M. E. Nichols, J. Board, J. Paschal, P. C. Womble<sup>‡</sup>, A. Barzilov<sup>‡</sup>, I. Novikov<sup>‡</sup>, D. Harper<sup>‡</sup>

A new generation of neutron-based explosives detection systems is beginning to be built. However, these systems are handicapped by low through-put data acquisition systems. We are developing a faster data acquisition system using a continuously digitizing ("free running") analog to digital converter. In our method, the incoming electrical signals are processed directly from the anode output of the voltage divider chain on the photo-multiplier tube. The rise times of these signals are typically less than one hundred ns and their fall times are much longer (>5 ?s). Signal filters and signal amplitudes are calculated from the digital data stream without any front-end analog electronics. This will allow the faster investigation times and reduce risk to personnel and the public.

*Voluntary Exercise in Wild Type C57/B16 Mice*

Ashley Marie Mefford\*, Nancy Rice<sup>‡</sup>

We are interested in understanding the physiological and genetic adaptations that occur in the phosphorylase kinase (PhK) deficient I/LnJ mouse in response to exercise. PhK is involved in regulating glycogen breakdown which allows for blood glucose maintenance and energy production for muscle contractions. In this project, exercise performance for our wild-type mouse, C57/B16 is being reported. Ten mice were allowed to exercise for one, two, or five weeks. On average juvenile mice (4-6 weeks) ran 14.9 km/24h compared to adult mice (10-12 weeks) which ran an average 13.9 km/24h. Juvenile and adult mice ran 47.9 m/min and 43.3 m/min respectively. Finally, no significant changes in the heart mass to body mass ratio were found in age-matched mice with the equivalent exercise duration versus nonexercised controls.

*Every Generation Needs Regeneration*  
Jonathan Lawrence Merklings\*, Matthew Tullis†

*Synthesizing Gauguin: A Comparative Look at Cultural Contexts and Gauguin's Tahitian Works*

Joanna Justine Miller\*, Heather Pulliam†

Paul Gauguin's personality faults, extreme character, and uncouth motivations have become the concentration of much art history scholarship, leading, at times, to a misjudgment of his depiction of the Tahiti culture. This paper examines how Gauguin represented a foreign peoples and met the goals he pursued under Primitivism, Symbolism, and Synthetism by analyzing the cultural contexts of Fin-de-siecle France and Tahiti and the synthesis of these contexts into his paintings. A look at Manao Tupapa'u, Te Tamari no Atua, and O. Tahiti, can illustrate this synthesis, producing a unique and accurate depiction of Tahitian culture.

*Effects of Body Condition Score on Blood Glucose and Insulin Concentration of Grazing Horses*  
Ashley Elizabeth Monfort\*, Charles Anderson†, Elmer Gray†

Multiple blood samples from each of four: thin, moderately fleshy, and fat, grazing, adult quarter horses, were collected during a twelve hour period. Samples were analyzed to determine relationships between body condition score, blood glucose, and insulin concentrations. Blood parameter diurnal variation and test subject sex variation were also analyzed. Glucose and insulin concentration did not vary over time, or with sex. (.05) Glucose was not affected by body condition. (.05) Insulin concentration of thin horses was lower than that of fat horses (0.05) indicating excess condition may result in insulin resistance in the adult horse.

*Strontium Isotope Analysis of Lavas From the Chilean Andes Utilizing Thermal Ionization Mass Spectrometry*

Robert Moore\*, Andrew Wulff†

Strontium isotope ( $87\text{Sr}/86\text{Sr}$ ) data may be used with field and other geochemical data to interpret the petrogenesis of lavas comprising the Casitas shield of the Descabezados Grande-Cerro Azul volcanic complex in the Chilean Andes. Magma source compositions, and processes such as fractional crystallization, assimilation, magma mixing, and partial melting were considered. Lavas are medium potassium, primarily calc-alkaline, and range from basalt to high-silica andesite. Preliminary isotope data (via Thermal Ionization Mass Spectrometry) show a broader range (0.7035 - 0.7042) in  $87\text{Sr}/86\text{Sr}$  than is evidenced at the extensively sampled Tatara-San Pedro complex directly to the south, suggesting multiple sources of contamination.

*Fixed and Dynamic Sensor Networks Using Wireless Technology*

Kyle Thomas Moss\*, Jon Paschal, Jeremy Board, Phillip Womble†, Alexander Barzilov†, Doug Harper†, Ivan Novikov†

We have developed several sensor networks using wireless technology using Bluetooth (IEEE 802.15) and WiFi (IEEE 802.11x). For example, we developed a gamma ray detector whose data acquisition can be controlled and accessed using either radio standard. These radiation detectors can function as a single unit or be grouped to form detection networks, communicating data in real time to security personnel and subject matter experts. We have also developed a prototype system to monitor pressurized rail cars for threats. The WiFi-controlled system simultaneously uses small ultrasonic transducers to detect leaks, a radiation detector and video surveillance equipment for visual inspection. All of these systems are relatively inexpensive and in the case of the gamma-ray detectors, are small enough to be carried comfortably by security personnel.

*Designing for Corporate America*

Darren Frank Mowrer\*, Matthew Tullis†

Design a series of three posters based on personal interest and inspiration. These posters will each highlight the life and work of a different individual. The three designers I've chosen are: Paul Rand, Mike Samuel, and AdamsMorioka.

*The Effect of Nuclear Cross-Section Data on the Measurement of Elemental Densities in Explosives Threat Analysis*

Matthew E. Nichols\*, Ivan Novikov†, Phil Womble†

With the impending threat of terrorist attacks in the modern age, it is important to neutralize these threats as quickly and efficiently as possible. One critical means of doing this is to detect high explosives. Our research principally deals with the detection and quantification of the elements hydrogen, oxygen, nitrogen and carbon to differentiate between explosives and non-explosives and presents an effective means of detection via quantification of these elemental densities. Materials can be separated into innocuous and threat categories based on their elemental densities. However, for nuclear-based measurements, the nuclear cross-sections erode this segregation. We have been developing threat algorithms in which the nuclear cross-section has been coupled with the elemental density.

*Men of the Gun*

Wes Joel Nolen\*, Matthew Tullis†

This presentation, "Men of the Gun" consists of three historical gunfighters: Billy the Kid, Jessie James, and Doc Holiday. The poster series is constructed with numerous pictures, posters, maps, and illustrations documenting the lives of the three men from birth until death.

#### *Quantum Dots Sensitized Nanoscale Solar Cells*

Jordan Norris\*, Christopher Poteet, Tingying Zeng\*

Grätzel solid solar cell (GSSC) is a very promising new generation of photovoltaic devices. It has great potential to produce plastic photovoltaics due to its organic and inorganic hybrid nanocomposite construction. Our nanoarchitecture design and formation of GSSCs would form high performance photoactive films, so as to suppress the interfacial charge recombination for the GSSCs. Characterizations of the related nanomaterials and devices are extensively underway. In this presentation, we will present the extensive engagement activities of undergraduate students in our research group in this project. This research will help to bring about green power supply for our community near future.

#### *Sport Team Identification*

Alana Catherine O'Bryan\*, Rick Grieve\*

Several positive psychological benefits are associated with team identification. The sports team identification research looks at how closely an individual follows a team as well as how many teams he or she may follow. Our hypotheses were that an individual will follow more than one team, that the individual will follow few teams very closely while he or she will follow more teams less closely, and that the more closely the individual follows a team, the more identified with that team he or she will be. Our results generally supported our hypotheses.

#### *Factors Influencing the Health Behaviors of International Students at Western Kentucky University*

Divine Ebele Odonwodo\*, Sandeep Mishra, Chitalu Chitalu, Andrew Chafatelli, Grace Lartey\*

Each year, college campuses in America welcome an increasing and diverse population of international students. While the health status of these students is as diverse as the countries they come from, the new culture they find themselves in could lead to differences in their health behavior. The problems faced by these students and their unique health needs have traditionally been overlooked. This cross-sectional study focuses on three key areas: exercise behavior, nutrition, and use of health care services, to determine actual practices and perceptions of the benefits and barriers to good health behavior of international students at the Western Kentucky University. The study aims to identify key patterns, and provide recommendations for enhanced cultural capacity of institutions.

#### *Synthesis and Purification of Cyclopenta[c]thiophene Precursors*

Paul J Orosz\*, Jessica Wilson, Chad A. Snyder\*

This presentation involves the synthesis and purification of cyclopenta[c]thiophene precursors. These precursors have been shown to be difficult to purify according to the literature. Our research shows the successful techniques employed for the purity of these precursors. The purity of these precursors are invaluable to the synthesis of cyclopenta[c]thiophenes.

#### *ChargeMasters Refrigerant Heating System*

Adam Pape\*, Juan Silva, Joey Traughber, Kevin Schmaltz\*

The purpose of this project is to construct a prototype portable refrigerant heating system. This refrigerant heating system will allow HVAC field technicians to warm the charging tanks used to transfer refrigerant into the customer's air conditioning system in a safer, more expeditious and efficient way. The problem with transferring refrigerant is that the refrigerant equalizes in pressure with the air conditioning system and doesn't allow any refrigerant into the system. A team consisting of Joey Traughber, Adam Pape and Juan Silva, designated ChargeMaster, will conduct the project, with Comfort Tech and Dr. Kevin Schmaltz from Western Kentucky University.

#### *Aging and the Depth of Binocular Rivalry Suppression*

Kristina Fugitte Pattison\*, M. Jett Taylor, Katherine E. Goforth, J. Farley Norman†, Hideko F. Norman†

Two experiments were designed to examine the effect of aging upon the strength of binocular rivalry suppression. To produce rivalry, orthogonally-oriented sine-wave luminance gratings were presented dichoptically. The observers were required to either discriminate the spatial location of a probe spot presented to the dominant or suppressed eye's view or to detect the presence or absence of the probe. The observers in the younger and older age groups exhibited typical rivalry suppression for both tasks, but the magnitude of the suppression was significantly larger in the older observers. This increased suppression can be explained by Lehky and Blake's (1991) model.

#### *Dung Beetles of Ghana*

Brian Fredrick Payne\*, Dr. Keith Philips\*

Dung beetles (Scarabaeidae: Scarabaeinae) are being used to indicate and monitor ecosystem health in southern Ghana, one of 25 biodiversity hotspots with high species endemism and richness. We are comparing the species diversity in several localities of Upper Guinean Forest to see the effects of human induced environmental alteration. We are also comparing the diversity of dung beetles from the forested hills and adjacent savanna grasslands in the Shai Hills, and comparing these grasslands with and without the influence of nearby cattle farms. The dung beetle species diversity and ecology in West Africa is poorly known and these studies hope to rectify this situation.

#### *Practical Applications of the Monte Carlo N-Particle Transport Code*

Joshua James Pearce\*, Jeremy Board, Jon Paschal, Phillip Womble\*, Alex Barzilov\*

Monte Carlo N-Particle Transport Code (MCNP) is a powerful computer code used to simulate the motion and interactions of particles. A model of geometric objects containing elements ranging from Hydrogen to Californium can be used in which to test various particle sources of designated energy. The results of MCNP are generated as particles per area for designated cells and energies. Practical usage of MCNP allows the testing of experimental results, insurance of safety of experimenters, etc. Recently, MCNP was used to estimate the neutron flux from a shielded moderator assembly which covered a new type of neutron generator developed by Lawrence Livermore National Laboratory.

*Site-Directed Mutagenesis of a Highly Conserved Cysteine Residue in the Beta-prime Subunit of E. coli RNA Polymerase.*

Christopher Stephen Pendleton\*, Rodney King†

RNA polymerase (RNAP) is the central enzyme in gene expression and is subject to a variety of regulatory signals. In prokaryotes, RNAP is composed of five different subunits; Beta, Beta prime, Alpha (two copies), Sigma and Omega. The Beta prime is the largest subunit and it is distinguished by a zinc-binding domain located near its amino terminus. This domain has been implicated in the control of transcription elongation and termination in the bacteriophage HK022. Four highly conserved cysteine residues coordinate the zinc atom. A fifth highly conserved cysteine is located 12 residues upstream of the zinc-binding cysteines. To investigate the role of this residue in the structure/function of the E. coli enzyme, we have replaced it with an aspartic acid residue by site-directed mutagenesis.

*Washing Machine Transmission Redesign for MTD*

Joshua Anthony Petrino\*, Juan Figueroa, Joel Lenoir†

For our senior project, we were given the task of redesigning a washing machine transmission for MTD. The main goals of the new design are to obtain better dynamic balancing which will then allow higher spin cycle speeds, improve the size of the transmission and to keep the torque seen by the output shaft to a minimum. The new design will convert pure rotational motion into pure translational motion. To complete this project, we must design, simulate, build and demonstrate the new transmission.

*Extraction of Quercetin Using Surfactant-Immobilized Cation Exchange Membranes*

Kali Rae Pickering\*, Candace Guerrero, Shing-yi Suen, Eric Conte†

In analyte extraction using cation exchange membranes, surfactants immobilized onto the membranes form a good hydrophobic SPE adsorbent. We have investigated the extraction of quercetin using glass fiber membranes and oppositely charged surfactant, dodecyltrimethylammonium hydroxide. Data will be presented for surfactant immobilization and quercetin adsorption and desorption.

*Creating Conflict: Antecedents of Workplace Incivility*

Megan Preston\*, Kathi Miner-Rubino†

Incivility is defined as rude and discourteous behavior or displaying a lack of regard for others. This study will identify possible antecedents (job governance, autonomy, interaction style, competition, and technological advances) of uncivil behaviors in the workforce and will examine how these factors relate to a climate of incivility. Data for the study was collected as part of a larger study conducted in 2004. Participants included a national sample of law school faculty (N =1,300) who were members of the Association of American Law Schools (AALS). They were asked to respond to an online survey to assess perceptions of the degree to which their workplace was uncivil and aspects of their organization.

*Repair and Update of a D-Max B X-Ray Diffractometer*

Ian Alexander Rice\*, Doug Harper†

The Applied Physics Institute has recently acquired a Rigaku D-Max B X-Ray Diffractometer (XRD) and has modernized its data acquisition, control, and analysis systems with modern electronics and software. The system is now controlled with LabVIEW based software which sets the position of the XRD goniometer and measures the intensity of the scattered X rays as a function of scattering angle. We have also developed new analysis software which allows users to identify a sample by comparing its XRD spectrum with records in the International Center for Diffraction Data PDF-1 database.

*From the Shadows into the Light:*

Sarah Lynn Ritter\*, Sandra Hughes†

Until the late 19th century, female characters in short fiction were nameless, insignificant figures hidden in the wallpaper like the woman in Gilman's "The Yellow Wallpaper." They were mere shadows in the stories of Poe and Irving, and they began to take shape in some of Hawthorne's works, but they did not come fully into the light until they were given a voice by writers like Chopin and a verisimilar personality by writers like James. Women finally found their place in short fiction after a long history of being minimized and ignored, so the story ends happily ever after.

*Wastewater Treatment Using Sunlight and Titanium Dioxide Nanocrystals*

Nathan Roberts\*, Leslie P. Van Hoose, Tabatha Bowlin, Tingying Zeng†, Andrew Ernest†

Titanium dioxide (TiO<sub>2</sub>) is cheap, non-toxic, chemically stable, harvesting sunlight in the ultraviolet range. Upon the absorption of sunlight, photon-induced electrons and holes are created, and transported to its nanoparticle surface. Substances, such as organic pollutants in wastewater can be decomposed to CO<sub>2</sub> and other small non-toxic mineral species once they interact with the electrons or holes due to the redox reactions. We successfully synthesized photoactive TiO<sub>2</sub> anatase nanocrystals, and used them to treat rural wastewater. Our research demonstrated the feasibility to effectively photodecompose organic pieces in the wastewater using the as-synthesized anatase nanocrystals under light illumination.

*Flash Floods in the Appalachian Region*

William Nicholas Rodgers\*, Rezaul Mahmood†

Flash Flooding is a major natural hazard in the United States. Dr. Mahmood and I are building a FF climatology for the whole Appalachian region. Currently we have completed this for 1993-2005, but are also working on compiling data from 1975 to 1992 as well. Our sources include the National Climatic Data Center (NCDC) and their electronic and hardcopy versions of Storm Data (1978-2005). Our other source is the National Climate Summary (1975-1977). Eventually, the research will extend back to 1950 or as far back as possible in order to better understand the temporal and spatial aspects of FF's.

*Student Engagement: Bowling Green Community College Health Days*

Daniel Wesley Rogers\*, Lisa Stewart, Daltrey Tyree\*, Carol Evans\*, Lora Moore\*

To enhance student learning, the Associate Degree Nursing Program has implemented a student engagement project titled BGCC Health Days. BGCC Health Days consist of WKU ADN students and faculty providing health education to students, faculty and staff of the Bowling Green Community College. This project started Fall 2006 and is ongoing. Health education topics that have been presented thus far include Folic Acid Deficiencies, Stress Management, Sexually Transmitted Infections, Obesity, Hypertension, Diabetes, First Aid and Burn Care, Cardiovascular Health in Women, and Smoking Cessation. BGCC Health Days provide ADN students opportunities to utilize teaching learning principles. Various presentational formats have been used including student developed pamphlets, health screenings, discussion, and technological presentations. BGCC students, faculty and staff benefit from these health promotional activities.

*Tonotopic Representation in the Goldfish Sacculle*

Brian D. Rogers\*, Julie Schuck, Reagan Gilley, Michael Smith\*

To investigate whether auditory hair cells (HC) of teleost sacculles possess tonotopic organization, we exposed groups of six goldfish (*Carassius auratus*) to one of four pure tones at 176dB for 48 hrs. Sacculles were phalloidin-labeled to visualize HC bundles. Bundles were counted at 19 points to determine HC loss. Auditory brainstem response hearing tests were performed on each fish immediately following noise exposure. All noise-exposed fish exhibited significant HC and hearing loss. Location of HC loss varied with frequency of noise exposure. Lower and higher frequencies damaged caudal and rostral regions of the sacculle, respectively. Low-tone and high-tone exposures produced threshold shifts at lower and higher frequencies, respectively. This data suggests that frequency discrimination in goldfish is partially driven by peripheral tonotopy in the sacculle.

*WW2 Propaganda Series*

Greg Roy\*, Matthew Tullis\*

*Design of Automated Film Thickness Calibration System*

Jimmy Ray Sandusky\*, David Brown, David Kleinholter, Christopher Byrne\*

BKS Automation will present the design of a device to insert polymer coating standards into the sensing beam on the finishing line at Logan Aluminum, Inc. in Russellville, KY. Most aluminum sheet manufactured is coated to prevent corrosion. The device will be used in the future as part of an automatic, on-line calibration system of material coating thickness. Design requirements include the ability to function at elevated temperatures, compliancy with IG 55 system in place and space constraints on the production line. Benefits of the design include reduced scrap material and potential polymer cost savings.

*Screenprinters*

Kelly Marie Scheurich\*, Matthew Tullis\*

The objective of this project is to create a visual project using collage and typography to make a triptych of three film animators.

*Difference in Patterns of Collaborative Inhibition*

Brittany Sears\*, Martin Bink\*

Collaborative inhibition is the memory phenomenon where the total memory output of interacting groups is lower than the memory output of individuals working in isolation. There are two main theories that explain this phenomenon. One theory suggests that, in interacting groups, an individual will use the memory output of the other as a retrieval cue. In the present experiment, this notion was tested by explicitly requiring participants to write the other person's memory output in interacting groups. This manipulation did cause memory interference, but not at the same level as not the same pattern as normally interacting groups.

*Architects*

Derek Sears\*, Mathew Tullis\*

A 3 series poster that shows 3 different architects and their most famous works.

*Web Content Mining*

Dipesh Sharma\*, Zhonghang Xia\*

The Internet provides access to numerous sources of useful information. The focus of our research is mainly on extraction of data from Web pages, such as product name, price, etc. This technique is known as Web mining. Web content is related to data mining because many data mining techniques can be applied in Web content mining. However, it is different from data mining because Web data are mainly semi-structured or unstructured, while data mining deals primarily with structured data. Web mining is also related to text mining because much of the web contents are texts and is different from it because of the semi-structure nature of the Web, while text mining focuses on unstructured texts. Web content mining thus requires creative applications of both.

*Applications of DNA Fingerprinting to the Study of the Lepidoptera*

Timothy H. Shehan\*, Jeffery Marcus\*

DNA fingerprinting techniques are widespread and have become standard laboratory protocols for the identification of criminal suspects as part of the forensic investigation of crime scenes. However, these techniques have many other applications in pure research situations as well. Randomly Amplified Fingerprints (RAF) is one such technique. RAF is a technique that produces a large number of genetic fragment "markers" scattered throughout the genome. We will also discuss two applications of these techniques to the study of genetics in the Lepidoptera. DNA fingerprinting techniques have much as of yet unfulfilled potential in the study of both genome architecture and population structure.

*H. G. Wells: Modernism and Socialism*

Jason Edward Sloan\*, Deborah Logan\*

In his autobiography, H. G. Wells stated that "No intelligent brain that passed through the experience of the Great War [World War I] emerged without being profoundly changed." Despite growing up and maturing in the Victorian Era, Wells' writings anticipated the Modern and post-Modern time periods. This paper discusses the Socialistic, sociopolitical literature of H. G. Wells and its relation to the epoch-forming First World War and post-Victorian literature.

*Who Do You Say That I Am? Analyzing African Christology*

Kathleen Elisabeth Smallwood\*, Bella Mukonyora\*

This paper explores the issue of African Christology. It analyzes three distinct discussions within African Christology: Jesus as the Greater Ancestor, based on traditional ancestral veneration; Jesus as healer, based on African views of holistic life and the nganga tradition; and Jesus as life giver, based on African holistic views of life and traditional creation myths. It demonstrates that no single argument for African Christology is unilaterally sufficient.

*Language of Design*

Kelly Nicole Smith\*, Matthew Tullis\*

I am presenting three separate graphic design artists but the group of three are related in subject area as well as communication of the three pieces into one series. The three designers C.S. Anderson, Neville Brody and David Carson are uniquely different but have obviously similar influences.

*The Federalist Party Leaders and the Alien and Sedition Acts*

Jeffery Lewis Stanley\*, Andrew McMichael\*

My article "The Federalist Party Leaders and the Alien and Sedition Acts" explores the motivation behind Alexander Hamilton's and John Adams' support for the Alien and Sedition Acts of 1796. I argue that Hamilton supported the acts out of concerns for internal defense as well as a desire to silence Republican opposition to Federalist programs, and that Adams supported the acts out of an apprehension of war with France and a general fear of French influence in the United States. I base my argument on the correspondence of Hamilton and Adams, and I support my claims with relevant secondary sources.

*Poe's "Hop Frog" Interpreted as a Justification of Slave Rebellion*

Jeffery Lewis Stanley\*, Sandra Hughes\*

My paper "Poe's 'Hop Frog' Interpreted as a Justification of Slave Rebellion" examines the position that the short story "Hop Frog" takes on slave uprisings. I argue that Poe creates a metaphor that compares the character Hop Frog to African slaves in the United States. Poe then turns Hop Frog's master into an unsympathetic character and makes Hop Frog himself into a character with whom the audience can easily sympathize. Indeed, Hop Frog remains a sympathetic character even after he completes his revenge on his master; therefore, the story attempts to legitimize slave rebellion against cruel masters.

*Molecular Phylogeny of Water Penny Beetles (Coleoptera: Psephenidae)*

Jennifer Forbes Stovall\*, Karen Bell, Keith Philips\*

Water penny beetles (Coleoptera: Psephenidae) are small generally riparian beetles (3-7mm) which are named for their flattened disk-like aquatic larvae. There are four subfamilies (Eubrianacinae, Eubriinae, Psepheninae, and Psephenoidinae), known worldwide. This study focuses on determining the phylogenetic relationships among various species of global Psephenidae using representative samples from Australia, Germany, Chile, Japan, Vietnam, Laos, Cambodia, China, Taiwan, Kentucky, and Alabama by using DNA sequence data obtained from mitochondrial 28s ribosomal RNA and nuclear 16s ribosomal RNA genes. All subfamilies are represented in this study.

*Critique of Cultural Influence On Biomedicine*

Brandi Nicole Sullivan\*, Ted Hovet\*

Exploration of the structure of Western biomedicine will be performed. Using analysis, I will elaborate on how biomedicine could benefit from other methodologies. However, I will acknowledge the nuances that would hinder their incorporation. The importance of examining the whole person versus the benefits of physical reductionism will be evaluated. Synthesis of the role of the doctor, how they are perceived by the patient, and symbols associated with them will be resolved. Conversely, the patient's role, and how the doctor views them will be investigated. Then, their relationship, interactions, and compliance to both requests will encapsulate their exchange.

*Component Integration Metrics and Their Evaluation*

Prapanna Tamarapu Parthasarathy\*, Lakshmi Narasimhan\*

Component based software engineering is currently the preferred approach to system design. However, there are no good metrics available to valid their effectiveness when components are integrated. This paper addresses the evaluation of a series of metrics based on complexity, criticality and dynamic behavior towards assessing their integration performance. Further, the metrics are also suitable towards calculating such factors as, reusability, size, testing time, maintenance and runtime. From the data collected through several benchmarks, several key inferences have been obtained, which includes the evaluation of quality of metrics. Future work will focus on a metric evaluation suite to assess the system's stability as a whole.

*Motor Interference on Memory Tasks*

Nicholas Terry\*, Brandy Johnson, Martin Bink\*

Dissimilar tasks interfere with one another when performed at the same time. Previous research focuses on factors that influence divided attention, such as age, difficulty of task, and practice effects. The present study examined whether a simple motor task would interfere with encoding a word list of nouns and verbs. The results showed motor interference on memory for verbs and not for nouns. This indicates the involvement of the motor system in processing action-related concepts.

*Finite Element Analysis of a Unique Transformer Design*

Adam Jason Thomas\*, Maksim Karavayev, Walter Collett\*

This project involves the modeling of a unique transformer design using the finite element method. To calibrate this model, a similar model is made of a conventional transformer for which core loss values are known. Hitherto, the modeled core loss values for the conventional transformer compare to within three percent of the actual values. This indicates that other parameters are likely to be accurate as well. The tool used to accomplish this modeling, Ansoft Maxwell(r), is used to aid in the development and feasibility testing of new designs or improvement to existing designs.

*Three Famous Designers*

Aaron Hamilton Upton\*, Matthew Tullis\*

To create a visual communication using typography and collage imagery of three graphic designers: Saul Bass, Milton Glaser and David Carson. Each one representing a different period of the 20th century.

*Prevalence of Fungi in a South Central Kentucky School Building With a History of Moisture and Indoor Air Quality Problems*

Sameer Valsangkar\*, Luke Bramblett, Anne Britt, Emmanuel Iyiegbuniwe<sup>‡</sup>

An environmental assessment was conducted to determine the prevalence of fungal contamination in a school building with a history of moisture and air quality problems. Measurements were made for airborne viable and total bioaerosols over a two-year period and during two seasons: summer and winter. Fungal genera were enumerated, identified, and analyzed statistically. Variability in indoor fungal concentrations was compared across seasons, within and between buildings. The results show that the school indoor air presents an important environmental source of exposure for students, faculty and staff. Recommendations are made to minimize indoor fungal exposures through fixing water leaks, removing water-damaged materials and visible mold contamination.

*Comparisons of Chlorophyll From Spinach and Chlorophyllin Spectra Using Fluorescence and Raman Spectroscopy*

Mayme M. VanMeeveren\*, Thandi Buthelezi<sup>‡</sup>

Fluorescence spectra of chlorophyll and chlorophyllin have been measured in several solvents. The fluorescence of chlorophyll is quenched by the presence of titanium dioxide. No fluorescence signal was detected for the chlorophyllin molecule. Beer's plots for chlorophyllin in water and chlorophyll in acetonitrile will be presented. The raman spectra of chlorophyll in spinach and chlorophyllin are compared.

*Squirrels, Squids, and Sea Turtles: The Illustrations and Gig Posters of Three Screen Printers*

Heidi Brooke VanZant\*, Matthew Tullis<sup>‡</sup>

I designed a series of three posters based on my personal interest in screen printed rock posters. I chose three up and coming designers that inspired me and highlighted their life and work.

*Indium Phosphide Quantum Dots Sensitized Solar Cells*

Trevor W. Veatch\*, Jordan Norris, Tingying Zeng<sup>‡</sup>

In this poster presentation, we will present our recent work on indium phosphide quantum dots sensitized Grätzel solid solar cell (GSSC). It is a very promising new generation of photovoltaic devices. It has great potential to produce plastic photovoltaics due to its organic and inorganic hybrid nanocomposite construction. Characterizations of the related nanomaterials and devices will be included. Extensive engagement of undergraduate students in research of nanotechnology and in seeking of "green" power supply through project will be presented. This research will help to bring about green power supply for our community near future.

*Effect of Loss on Ignition and Particle Size on the Concentration of Trace Elements in Fly Ash*

Jacob Adam Vervynck\*, Bianca Casenas, Jason Cheng, Wei-Ping Pan<sup>‡</sup>

In the United States, there are over 500 power plants that emit trace metals in the combustion of fossil fuels. Many of these elements are toxic to humans, causing many health problems. To better understand the way fly ash acts, our research looked at the relationships between Loss on Ignition (LOI), Particle Size, and BET Surface Area for Arsenic, Selenium, and Mercury in fly ash samples. By analyzing ash of three coal types and four particle ranges, we were able to find several significant trends. The data suggests that as LOI values increase, Hg levels increase while as levels decrease. LOI values also seem to be directly related to BET surface area.

*Admicelle Extraction of Phenols Using Cationic Surfactants in the Hydroxide Form*

Sarah Beth Vied\*, Kali Pickering, Chris Perrin, Eric D. Conte<sup>‡</sup>

Phenols' acidic properties and varying polarities make them difficult to extract from aqueous media. However, using silica gel combined with cationic surfactants containing hydroxide counter ions have been shown to give very good phenol recovery. Surfactant coats the silica forming a bilayer. Then samples containing phenols are introduced and the hydroxide counter ion to the surfactant reacts with the acidic phenols through an acid-base reaction. Through this, phenols convert to the phenolate ion and are held to the cationic surfactant in the bilayer. The study also contains a comparison of parameters such as surfactant amount and sample volume versus percent recovery. Through the investigation of various water hardness samples, we have found that recovery is slightly affected by ionic strength unlike traditional cation exchange extractions.

*Centrifugal Pump Demonstration Bench*

Luis Fernando Villalpando\*, Mary Elizabeth Baker, Elizabeth Schmale, Luis F

Villalpando, Joel Lenoir<sup>‡</sup>, Robert Choate<sup>‡</sup>

CentriPump is designing, specifying, constructing and testing a multipurpose centrifugal pump demonstration bench. The bench will perform different Fluid Mechanics Laboratory experiments as permitted by the design. These experiments will compare similarity laws from the interactions between the multiple centrifugal pumps with having the ability to vary the speed and impeller size, and to test series and parallel configurations from a given characteristic curve that is previously defined. The major goals required in the design are for the pumps to run in series or parallel, have one pump on and one off, and have them operate at different speeds.

*Vegetation and Climate Variability in Kentucky*

John Walker\*, Heather Williams, John All<sup>‡</sup>

Climate change is predicted to have extensive impacts on agriculture and natural vegetation in the southern US but these changes are poorly understood. This project examines forest changes using NDVI AVHRR data from 1989-2000 in three federally protected areas in Kentucky and compares these changes to climate variables in order to offer some predictions as to the future condition of Eastern woodlands. The study sites were compared by indexing NDVI values for a given time period among the sites and comparing differing climate inputs to account for NDVI differences. Management practices and other outside impacts were considered. The federally protected sites can be compared private lands as they undergo differing management practices and climate impacts in future years.

*Effects of Overexcitabilities on the Social Self-Concepts of College Students: An Analysis of Gender and Ability Level*

Ryan Andrew Wallace\*, Kayla E. Smith, Anne N. Rinn<sup>‡</sup>

The current study focuses on the relationship between overexcitabilities and social self-concept, and the effects of gender and ability level on overexcitabilities and social self-concept. Overexcitabilities are heightened sensitivities to one's environment. Social self-concept involves one's feelings about his- or herself in a social setting. Participants included students from a comprehensive university in the south. Overexcitabilities were measured using the Overexcitabilities Questionnaire-Two (Falk et al., 1999). Social self-concept was measured with the Self Description Questionnaire III (Marsh, 1990). Data will be analyzed using a multivariate analysis of variance (MANOVA). Results and implications will be discussed.

*CNC Fabric Cutting Device*

John Neal Walton\*, Adam Marshall, Joel Lenoir\*

A team of Western Kentucky University Mechanical Engineering seniors designated Fabtech will design a computer numeric controlled fabric cutting machine. The machine will be used to supplement and/or take over a small business's cutting process or for personal hobbyists. The major goal of the system is to eliminate cutting fabric by hand and greatly speed up the cutting process. This project will hopefully enable small businesses to enter larger commercial markets. This will be made possible by designing and building a reprogrammable device that allows for faster production of cut pieces for sewing.

*Our Protection: An Ethnographic Study of a Campus Police Department*

Calli Elizabeth Waltrip\*, Kate Hudepohl†

This paper is an ethnographic study that was written with the goal of identifying the values, goals, and purpose behind individual police officers working in university police departments and police department as a whole. This paper will provide the audience with answers to and examples of these questions based on the information gained through interviews with one participating member of a university police department. More specifically, this paper will focus on crime prevention, training, programming and outreach, stereotypes and problems that officers face as a whole and in the university environment.

*Sound Production on Loricariid Catfish*

AmandaLynn Webb\*, Michael Smith†

Many families of catfish produce sounds via pectoral spine stridulation. Sound production capabilities and characteristics in the family Loricariidae have not been well examined. *P. gibbiceps* and *O. affinis* produce short, broadband clicks via pectoral spine stridulation. Duration of sound were shorter in *O. affinis* (2-12ms) than *P. gibbiceps* (20-100ms) Fundamental and dominant frequencies were 4000 and 8000 for *O. affinis* and 600 and 1200 for *P. gibbiceps*. Inter-ridge distances were 50 and 160 microns for *O. affinis* and *P. gibbiceps*, respectively. The ratio of the total fish length to inter-ridge distance was comparable between the two species. Relationships between spine inter-ridge distance, pulse duration, spectrum, and preliminary behavior studies will be discussed.

*Anionic Exchange Membrane with Surfactant Immobilization for Extraction of Doxepin*

Jason James Weiner\*, Shi-Ming Hong, Shing-Yi Suen, Eric Conte†

This study examined anionic surfactants that were immobilized onto anion exchange membranes to form a stationary phase for hydrophobic SPE (solid phase extraction). Surfactants of varying lengths were used at different feed concentrations, resulting in the immobilized surfactant capacity increasing with higher surfactant concentrations, decreasing chain length and NaOH preconditioning. Subsequently, successful surfactant immobilization led to batch adsorption experiments for doxepin, resulting in the adsorbed doxepin increasing with the use of a longer chain length surfactant. This indicates doxepin adsorption was subjugated by the hydrophobic interaction with the immobilized surfactant.

*Mercury Bioaccumulation in the Bat Population at Mammoth Cave National Park*

Erika Whitehouse\*, Lindsey Clark, Gretchen Grover, Cathleen Webb†

Mercury levels as a function of bat species, collection location, age, and gender were determined. Quality analysis and control was performed with human hair reference material. Hair from archived bats will also be analyzed and compared to current sample results. Results to date show a wide range of mercury accumulation in bats (1-10 ppm) with clear evidence of species, gender and age sensitivity. The Hg levels in adult male bats are typically greater than that of adult females and juveniles of the same species. The potential for Hg sample heterogeneity in an individual appears to be minimal.

*Bio-Generated Heating System for Greenhouse*

Russell Joseph Wimsatt\*, Adam Tabor, Kevin Schmaltz†

Dry Leaf Consulting plans to develop a system that will efficiently transfer heat directly from decomposing organic material to an insulated greenhouse free of traditional fuel burning energy sources. The team will also structure the design so a network of agricultural related bodies can efficiently build and maintain the system economically. By producing a working model of our design, interest may spark globally how we, as a society, look at waste management as an alternative energy source to the more traditional fossil-fuel burning systems.

*Group Structure in a Pagan Microculture*

Jennifer Ashley Wright\*, Kate Hudepohl†

A study on the structure of a group of pagans in the Warren County area, undertaken as part of Anthropology 399: Field Methods of Ethnography, in Spring 2007. The researcher analyzes the pros and cons of a loose structure (as compared to other hierarchical structures, such as covens.) In addition, the researcher will present preliminary information gathered in a second semester of research.

*Anomaly Based Intrusion Detection Model for DNP3 Protocol*

Amr S Yassien\*, Mostafa G. Mostafa†

The aim of this research is trying to enhance the security of the network infrastructure for SCADA systems. The proposed model tries to detect the unknown attacks using a compromised host(s) in a SCADA network. The research focuses on securing the DNP3 protocol which is used within this type of networks by analyzing traffic behavior over time and detecting any anomalies within this behavior.

*RNA Interference Gene Silencing to Study the Circadian Clock in Chlamydomonas reinhardtii*

Matthew Clifton Young\*, Sigrid Jacobshagen†

Organismal activities are regulated by a feature known as the circadian clock. It has been shown that defects in the circadian clock of humans may be responsible for certain forms of depression and sleep disorders. In *Chlamydomonas reinhardtii*, a photoreceptor that may be involved in the entrainment of the circadian clock is called "plant like cryptochrome." A cloning strategy is currently being carried out that will, through RNA interference, lead to the reduced expression of this photoreceptor in *C. reinhardtii*. The results of this research will lead to a better understanding of the circadian clock at the molecular level.

*Carbon Dioxide Capture Using Activated Carbon From Chicken Waste*

Yan Zhang\*, Wei-ping Pan†

Carbon Dioxide (CO<sub>2</sub>) emission from hydrocarbon fuel combustion is becoming a serious concern because it is the main contributor to greenhouse gas. Activated carbon sorbents have been used widely in various gas-phase and/or liquid-phase separation. Currently activated carbon (AC) is being investigated and developed for CO<sub>2</sub> capture. In this research, a series of activated carbon have been generated from chicken waste and coal in the lab scale reactor. The characteristics of these generated activated carbons, such as specific surface, thermal stability, structure properties were investigated and discussed. The CO<sub>2</sub> adsorption capabilities of these activated carbons were also studied in pure CO<sub>2</sub> system and CO<sub>2</sub>/H<sub>2</sub>O system. One of these activated carbons was modified using the acid treatment, which improved the CO<sub>2</sub> adsorption capacity by around 4 times.