



MURRAY

STATE UNIVERSITY

SCHOLARS WEEK

Program Booklet

April 14-18, 2014

Updated: 4/14/14

13th Annual
Scholars Week
Program and Abstracts

Table of Contents

Welcome Messages	03
Undergraduate Research and Scholarly Activity Advisory Board & Staff	
Program	
Monday, April 14	05
Tuesday, April 15	09
Wednesday, April 16	10
Thursday, April 17	19
Abstracts	22

A Welcome from the Undergraduate Research and Scholarly Activity Advisory Board and Staff

On behalf of the Undergraduate Research and Scholarly Activity Advisory Board and staff, welcome to our thirteenth annual *Scholars Week* celebration.

The work displayed in this year's *Scholars Week* program represents thousands of hours of effort on behalf of Murray State's students and faculty. To our students, you are to be commended for your dedication and effort! Your efforts will be rewarded when you apply to graduate school or when you look for that first job. To the faculty, you are helping our students succeed and this is among our greatest rewards.

Please join the URSA Advisory Board and staff in celebrating the accomplishments of our students by attending as many of the *Scholars Week* events as possible. Our scholars need your continued support!

Advisory Board and Staff:

Dr. Terry Derting
Biological Science

Dr. Daniel Hepworth
Criminal Justice

Dr. Zbynek Smetana
Art

Dr. Meagan Musselman
Education

Dr. Joyce Shatzer
Education

Dr. David Pizzo
History

Dr. Terry Holmes
Business Administration

Dr. David Ferguson
Agriculture

Summer Cross
Nursing

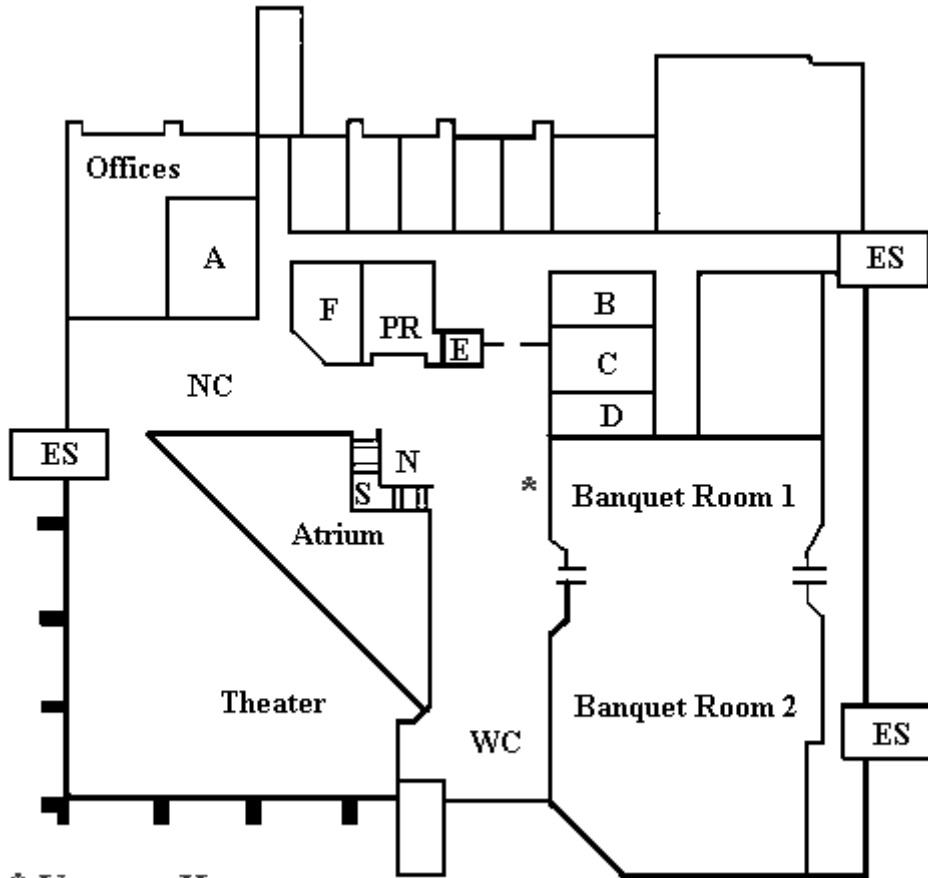
Dr. Pat Williams
Agriculture

Dr. Wafaa Fawzy
Chemistry

Dieter Ullrich
Library

Dr. David Eaton
Economics/URSA

Jody Cofer Randall
URSA



*** You are Here**

- | | |
|-----------------------------|------------------------------|
| A – Barkley Room | E – Elevator |
| B – Ohio Room | F – Tennessee Room |
| C – Mississippi Room | N – Crow’s Nest |
| D – Cumberland Room | PR – Public Restrooms |
| S – Center Stairs | ES – Emergency Stairs |
| NC – North Concourse | WC – West Concourse |

Scholars Week Schedule

Monday, April 14, 2014

Poster Session

Sigma Xi Poster Competition

Large Ballroom, Curris Center

Session Chair: Dr. Maeve McCarthy

9:00 a.m. – 12:00 p.m. Poster Set-Up

12:00 p.m. – 4:00 p.m. Poster Judging

* *Undergraduate*

** *Graduate*

Drew Feldhaus Adams * - Nursing

The Role of the Nurse Clinician in International Aid

Miranda Bailey * – Geoscience/Art

Remote Sensing during World War II Compared to Remote Sensing Today

Jared Batts * - Environmental Geology

Prediction of Potential Sinkhole Danger Zones Using Remote Sensing

Quintin Bergman * - Wildlife and Conservation Biology

Impacts of Habitat Degradation and Interspecific Interactions on Riparian Animal Populations

Christian Brown * – Conservation Biology

An Analysis of Tiger Salamander (Ambystoma tigrinum nebulosum) Survival Based on Body Size and Other Covariates

Chesika Crump * – Biological Science / Pre-Med & Kaitlyn Whitewood * – Pre-Veterinarian

The Experimental Analysis of the Effects of Pet Therapy on the Blood Pressure and Stress Levels of First-year College Females

Victoria Darling *, Kayla Stringfield *, & Savannah Bell * – Biological Science

*The Relationship Between Ambient Temperature, Growth and Survival of the Tropical Termite *Nasutitermes acajutlae**

Morgan Dillard * – Agriculture

Soil Types in Hickman County, Kentucky

Landon Gibbs * - Horticulture

Infiltration Rate and its Related Soil Properties in Various Land Management Systems of Western Kentucky

Jennifer Haas * – Geoscience/Environmental Geology

Mining Space: The Role of Spectral Analysis and Remote Sensing in the Mineral Exploration of Near-Earth Asteroids

Zachary Harris * – Chemistry

Chemical Characterization of Bioburner Emissions: Preliminary Observations

Bradley Hartman * - Aquatic Biology

A Cost Efficient Method, in Conjunction with EPA Method 7474, of Detecting Mercury Contamination in Fish Tissues

Kristina Herrera * – Chemistry

Monitoring Chemical Methylation of Peptides with LC-MS/MS and Microchip Electrophoresis

Jonathan Huether * – Biological Science

An Analysis of Nightly Bat Activity in Relation to Lunar Cycles

Derrick Jent * – Biological Science

A Fungal Pathogen of the Cellar Spider, Pholcus phalangioides

Emily Knoth ** - Geosciences

Change Detection of the Carbon River: A Case Study at Mount Rainier National Park, WA

Jennifer Martin ** - Geosciences

Mineral Exploration using AVIRIS Remotely Sensed Data

Santiago Martin ** – Biological Science

Summer Bat Demographics In Kentucky Remain Stable Through The Early Years Of White-Nose Syndrome

Tim Martin * – Geo-Archeology

Detecting Erosional Patterns in an Archaeological Site Located in a Lacustrine Environment Using Remote Sensing

Virginia McClure * – Geology/GIS

Mapping Hydrothermal Features of the Norris Geyser Basin in Yellowstone National Park Using Satellite Imagery

Ronald Merrick * - Environmental Geology

Change Detection of the Lower Little River Watershed, Kentucky, From 1988 to 2013 Using Landsat Imagery

Samantha Moore ** – Clinical Psychology
Introversion, Social Support, and Depression Risk

Md Niaz Morshed ** – Geosciences
Land-use and Land-cover Change in Dhaka City, Bangladesh: A GIS and Remote Sensing Approach

Michael Pate ** - Geoscience
The Retrieval of Glaciers in Mt. McKinley

Grace Porter ** - Watershed Science
The Effects of Levee Building on Tree Growth in a Bottomland Hardwood Forest

Melanie Reason * - Environmental Geology
Land Cover and Water Quality in Land Between the Lakes, Kentucky

Zachary K. Reeder * - Chemistry
Imidazolium-Containing Polyurethanes: Deciphering the Relationship between Structure and Thermal Properties

Stephanie Rexing ** – Agronomy
Evaluation of Seed Treatment for Soybean Production in Western Kentucky in 2013

Bradley Richardson ** – Biological Science
A Dietary Comparison of Four Sympatric Relatives: Alligator Gar, Longnose Gar, Shortnose Gar, and Spotted Gar

Hannah Robbins * - Agronomy
Soil Carbon, Nitrogen, and Aggregate Stability Associated with Common Agroecosystems in Western Kentucky

Colten Stafford * - Environmental Geology
Mapping Effects of Natural Resource Exploitation Around Theodore Roosevelt National Park Using Remote Sensing

Mike Stonewall ** - Geoscience
An investigation of the Chickamauga Dam and Surrounding Terrain Using Light Detection and Ranging (LiDAR) Data

Ben Tumolo ** - Aquatic Ecology
*Diet Analysis of Silver Carp (*Hypophthalmichthys molitrix*) in Two Large Embayments of Kentucky Lake, A Reflection of Availability or Selectivity?*

Cammie Underwood * - Environmental Geology
Estimation of Deforestation Rate in McLean County, KY Using Multi-temporal Landsat Imagery

Sara Wallace * – Psychology
Personality Traits and Greek Organization Interest

Kaitlyn Whitewood * – Pre-Veterinarian
Effects of Pet Therapy on the Stress Levels of Therapy Dogs

Carli Whittington * - Biological Science & Lucas A. Daily * – Chemistry
Linear and Covalently Crosslinked Polyesters Containing a Pendant Imidazolium Group: Synthesis and Thermal Properties

Oral Session

Agricultural Science and Pre-Veterinary Medicine Session

Ohio Room, Curris Center
Session Chair: Dr. William Dewees
2:30 p.m. – 3:30 p.m.

Chelsie Allen - Agribusiness
International Agricultural Equipment Export: An Index

Jessica Bishop - Pre-Veterinary Medicine/Animal Health Technology
Increased Utilization of Veterinary Technicians and Technologists Increases Clinic Revenue

Claire Crocker - Pre-Veterinary Medicine
Survivability in Neonatal Pigs

Hannah Robbins - Agronomy
Soil Carbon, Nitrogen, and Aggregate Stability Associated with Common Agroecosystems in Western Kentucky

Other

The Second Shepherds' Play

Dance Studio, Carr Health
7:30 p.m.

Brittany Alsup
Salar Ardebili
Kristopher Cole
Kayleen Covert
Terry Kirk
Karl Wimmer
Kristopher Cole – TV Production Major – Filming Performance
Bernard Lewis – Instructor and Performer

Tuesday, April 15, 2014

Oral Sessions

STEM Session

Ohio Room, Curris Center

Session Chair: Dr. Chris Trzepacz

2:30 p.m. – 3:45 p.m.

Rebecca Cunningham - Biomedical Sciences

The Behavior of Embryonic Neural Stem Cells

Nhan Huynh – Biological Science

Characterization of Tudor Protein Complex in Drosophila Germline Stem Cells

Michael George Hyatt – Chemistry

A Series of Metallomesogens with Branched Bipyridine Ligands and Transition Metal Complex Mechanochemical Synthesis

Kristen Mills – Math

Rational Trigonometry

Modern Languages Senior Colloquium

Barkley Room, Curris Center

Session Chair: Dr. Janice Morgan

3:30 p.m. – 6:30 p.m.

Zona J. Ascensio – Spanish

From Ethnography to Magical Realism: Fathoming Other Worldviews through Literature

Mackenzie Paige Chandler – Japanese & TESOL

The Conflicition Between Public and Private Identities; An Analysis on Japanese Culture using Satoshi Kon's Film Perfect Blue

Lee Darnell - German & Japanese

The Understanding between Two Cultures: Yoko Tawada's Poetic Experiences Abroad

Aida De La Fuente – Spanish & Economics

Miedo, oscuridad y misterio: la literatura gótica en Cristina Gracias Las hermanas Agüero

Dylan Gerlach – Spanish & Biology

The Search for Identity in Esmeralda Santiago's "El Sueño de América"

Nathan Graves – Japanese
Abe Kōbō: The Mirror Called Identity

Samantha Green – Biology & Japanese
The Glass Box Which Separates Individuals: An Analysis of Haruki Murakami's Themes in Contemporary Short Stories

Ashlyn Herke – Spanish
Chico y Rita: A Historical Revolutionary Musical

Terry Allen Kirk – Spanish
Los de Abajo: The History of the Novel; The Novel of History

Joan Rodriguez - Spanish
Social Commentary in the Poetry of Nicolás Guillén and Luis Palés Matos

Other Sessions

Awards Recognition Reception

Faculty Club
4:30 p.m. – 5:30 p.m.
(Faculty & Staff Only)

2014 Recipient of the University Distinguished Mentor Award, 2014 Recipients of the Alumni Association's Emerging Scholar Award, 2014 Recipient of the Alumni Association's Distinguished Researcher Award, and 2014 Recipient of the Presidential Research Award

Sigma Xi Banquet

Large Ballroom, Curris Center
Contact: Dr. Lara Homsey
6:00 p.m. – 8:00 p.m.
(For Sigma Xi Members, Competition Participants, and Invited Guests Only)

Dr. Kevin Miller, Assistant Professor, Department of Chemistry
Experiential Learning in Undergraduate Research

Wednesday, April 16, 2014

Poster Session

General Poster Session

Large Ballroom, Curris Center
10:00 a.m. – 11:30 a.m.
Students will be with their posters from 10:30 a.m. to 11:30 a.m.
*** Sigma Xi Poster Competition Participant*

*** *Service Learning Poster*
~ *Service Poster*

Drew Feldhaus Adams ** - Nursing
The Role of the Nurse Clinician in International Aid

Kelli Baier – Nutrition & Dietetics
Xylitol: The Perfect Sugar Alternative?

Miranda Bailey ** – Geoscience/Art
Remote Sensing during World War II Compared to Remote Sensing Today

Jared Batts ** - Environmental Geology
Prediction of Potential Sinkhole Danger Zones Using Remote Sensing

Alex Beatty, Jordan Brock & Annalee Schuette ~ – Nonprofit Leadership
First Annual Beard and Mustache Contest

Quintin Bergman ** - Wildlife and Conservation Biology
Impacts of Habitat Degradation and Interspecific Interactions on Riparian Animal Populations

Abby Bert - Dietetics
The Effects of Substituting Sucrose with Artificial Sweeteners to Lower the Calories and Glycemic Index of Blueberry Muffins

Cheyenne Bourland - Psychology
Working Memory and Environmental Stimuli

Dylan Bragg - Marketing
Which Survey Based Company Will Best Fit CFSB's Needs?

Jayme Brandenburg – Youth & Non-Profit Leadership
Housing Resources for Adults with Severe Mental Illness in Western Kentucky

Courtney Brasher - Communication Disorders
Kentucky Speech-Language Pathologists' Cultural Competence in Professional Assessment and Service Delivery to Culturally and Linguistically Diverse Populations

Carmela Broderick - Dietetics
The Effect of Milk Varieties with Various Milk Fat Contents as Acceptable Replacements for Heavy Whipping Cream in Rice Pudding

Christian Brown ** – Conservation Biology
*An Analysis of Tiger Salamander (*Ambystoma tigrinum nebulosum*) Survival Based on Body Size and Other Covariates*

Megan Bryant - Nutrition
Hemp Milk Substitution in Chocolate Pudding

Nick Calhoon, Erica Gallagher, & Michelle Goodman ~ - Nonprofit Leadership
Fall Frenzy

Kara Campbell, Kelli Fechtig, and Erin McCallon ~ – Nonprofit Leadership
Hickory Woods Project

Fallon Carpenter - Music
Arranging Music for Flute Trio

Taylor Chaddock
A Conceptual Framework For Studying Millenials' Attitudes Toward Advertisements For Children

Melanie Crosman, Ryan Miller, Ji eun Son, Carla Suga, & Patsy Pierce - Marketing
Student Perceptions, Rules, and Realities of Murray State University's Student Life Policies

Chesika Crump ** – Biological Science / Pre-Med & Kaitlyn Whitewood ** – Pre-Veterinarian
The Experimental Analysis of the Effects of Pet Therapy on the Blood Pressure and Stress Levels of First-year College Females

Victoria Darling **, Kayla Stringfield **, & Savannah Bell ** – Biological Science
*The Relationship Between Ambient Temperature, Growth and Survival of the Tropical Termite *Nasutitermes acajutlae**

Morgan Dillard ** – Agriculture
Soil Types in Hickman County, Kentucky

Landon Gibbs ** - Horticulture
Infiltration Rate and its Related Soil Properties in Various Land Management Systems of Western Kentucky

Mary E. Goeke - Psychology
The Effect of Team Identification and Dysfunction on Superstition Among Sport Fans

Jennifer Haas ** – Geoscience/Environmental Geology
Mining Space: The Role of Spectral Analysis and Remote Sensing in the Mineral Exploration of Near-Earth Asteroids

Zachary Harris ** – Chemistry
Chemical Characterization of Bioburner Emissions: Preliminary Observations

Bradley Hartman ** - Aquatic Biology
A Cost Efficient Method, in Conjunction with EPA Method 7474, of Detecting Mercury Contamination in Fish Tissues

Lori Henry & Nicole Schmittou – Nutrition & Dietetics
The Acceptability of Cashew Cream as a Fat Replacer to Increase Quality of Fat in Ice Cream

Kristina Herrera ** – Chemistry
Monitoring Chemical Methylation of Peptides with LC-MS/MS and Microchip Electrophoresis

Jonathan Huether ** – Biological Science
An Analysis of Nightly Bat Activity in Relation to Lunar Cycles

Anne Jablinski – Animal Science
Biomass - Green Energy for the Future of Agriculture

Derrick Jent ** – Biological Science
A Fungal Pathogen of the Cellar Spider, Pholcus phalangioides

Rachel Jones & Meagan Miller – Food Service Management
The Effects on Viscosity and Acceptability When Substituting Different Variable Fats in Cookies to Improve Nutritional Value

Kaitlynn Kessinger - Dietetics
Improving Nutrition in Banana Bread by Replacing Oil with Fat-Free Substitutions

Emily Knoth ** - Geosciences
Change Detection of the Carbon River: A Case Study at Mount Rainier National Park, WA

Benjamin Linzy – History & Criminal Justice
Conflicts in Sudan: How Did We Get Here?

Jennifer Martin * - Geosciences
Mineral Exploration using AVIRIS Remotely Sensed Data

Santiago Martin ** – Biological Science
Summer Bat Demographics In Kentucky Remain Stable Through The Early Years Of White-Nose Syndrome

Tim Martin ** – Geo-Archeology
Detecting Erosional Patterns in an Archaeological Site Located in a Lacustrine Environment Using Remote Sensing

Virginia McClure ** – Geology/GIS

Mapping Hydrothermal Features of the Norris Geyser Basin in Yellowstone National Park Using Satellite Imagery

Ronald Merrick ** - Environmental Geology

Change Detection of the Lower Little River Watershed, Kentucky, From 1988 to 2013 Using Landsat Imagery

Samantha Moore ** – Clinical Psychology

Introversion, Social Support, and Depression Risk

Hunter Morgan - Dietetics

Improving the Nutritional Quality of Pudding with Chia Seeds

Md Niaz Morshed ** – Geosciences

Land-use and Land-cover Change in Dhaka City, Bangladesh: A GIS and Remote Sensing Approach

Matthew Oliver - Engineering Graphics and Design

Gravity Power

Kiersten Owen - Nutrition

The Effects of Avocado and Greek Yogurt as Fat Substitutions in Chocolate Cake

Michael Pate ** - Geoscience

The Retrieval of Glaciers in Mt. McKinley

Allison Petterson, Patrick Brazelton, Luke Miller, & Derek Hinsey – Marketing

Murray State University Students Perceptions of University Tobacco Policies

Grace Porter ** - Watershed Science

The Effects of Levee Building on Tree Growth in a Bottomland Hardwood Forest

Victoria Ramlose – Equine Science

Management of University Equitation Horses and its Effect on Soundness

Melanie Reason ** - Environmental Geology

Land Cover and Water Quality in Land Between the Lakes, Kentucky

Shannon Reed - Dietetics

The Acceptability of a Healthier Pizza Crust in Which Flour Is Replaced with Cauliflower

Zachary K. Reeder ** - Chemistry

Imidazolium-Containing Polyurethanes: Deciphering the Relationship between Structure and Thermal Properties

Stephanie Rexing ** – Agronomy

Evaluation of Seed Treatment for Soybean Production in Western Kentucky in 2013

Bradley Richardson ** – Biological Science

A Dietary Comparison of Four Sympatric Relatives: Alligator Gar, Longnose Gar, Shortnose Gar, and Spotted Gar

Hannah Robbins ** - Agronomy

Soil Carbon, Nitrogen, and Aggregate Stability Associated with Common Agroecosystems in Western Kentucky

Lindsey Schapker, Jessica Felden, & Mark Weaver - Nutrition

NTN 432 Class Project

Rachel Slone & Kinsi Norrington - Dietetics

Effect of Oats as a Replacement Extender for Breadcrumbs in Meatloaf

Jaime Staengel – German & Economics

Conceptual Cornerstones for Examining Millennials' Attitudes Toward Organic Food

Colten Stafford ** - Environmental Geology

Mapping Effects of Natural Resource Exploitation Around Theodore Roosevelt National Park Using Remote Sensing

Mike Stonewall ** - Geoscience

An investigation of the Chickamauga Dam and Surrounding Terrain Using Light Detection and Ranging (LiDAR) Data

Ben Tumolo ** - Aquatic Ecology

*Diet Analysis of Silver Carp (*Hypophthalmichthys molitrix*) in Two Large Embayments of Kentucky Lake, A Reflection of Availability or Selectivity?*

Cammie Underwood ** - Environmental Geology

Estimation of Deforestation Rate in McLean County, KY Using Multi-temporal Landsat Imagery

Kristen Walker & Haley Tubbs ~ – Nonprofit Leadership

Gobble Til Ya Wobble

Sara Wallace ** – Psychology

Personality Traits and Greek Organization Interest

Kaitlyn Whitewood ** – Pre-Veterinarian

Effects of Pet Therapy on the Stress Levels of Therapy Dogs

Tiffany Whitfill - Public Relations & Psychology

We've Got Spirit, How About You: An Examination of the Sport Fandom of University Sponsored Spirit Groups

Carli Whittington ** - Biological Science & Lucas A. Daily ** – Chemistry

Linear and Covalently Crosslinked Polyesters Containing a Pendant Imidazolium Group: Synthesis and Thermal Properties

Cash Willis - Manufacturing Technology

Bipedal Robots: What are the Main Issues with Dynamic Bipedal Movement in Robots?

Oral Sessions



Research Symposium

Barkley Room, Curris Center

Session Chair: Dr. Howard Whiteman

9:00 a.m. – 12:30 p.m.

Listed in alphabetical order – not in order of presentation.

Tom Anderson – Biological Science

Summertime Abundance of Larval Competitors Predicts the Abundance of Overwintering Mole Salamanders (Ambystoma talpoideum)

Kaylin Boeckman - Watershed Studies

Diet Composition of Ambystoma tigrinum nebulosum Larvae in Degraded and Non-degraded Portions of a Western Colorado Stream

Derrick Jent – Biological Science

A Fungal Pathogen of the Cellar Spider, Pholcus phalangioides

Jennifer Martin - Geosciences

Reconstructing the Geologic Environment at Tigre Dorado, a Pliocene Fossil Location in Southwestern Kansas

Santiago Martin – Biological Science

Summer Bat Demographics In Kentucky Remain Stable Through The Early Years Of White-Nose Syndrome

Michael P. Moore – Watershed Science

Sex Machines: Evaluating the Reproductive Strategies of Alternate Morphotypes in a Salamander

Scot Peterson - Watershed Science

Drought Effects on Benthic Macroinvertebrate Recolonization in a Degraded Stream: Implications for Restoration and Management

Grace Porter - Watershed Science

The Effects of Levee Building on Tree Growth in a Bottomland Hardwood Forest

Bradley Richardson – Biological Science

A Dietary Comparison of Four Sympatric Relatives: Alligator Gar, Longnose Gar, Shortnose Gar, and Spotted Gar

Carla Rothenbuecher - Watershed Science

Does Degradation Affect Ecosystem Function in Streams

Ben Tumolo - Aquatic Ecology

*Diet Analysis of Silver Carp (*Hypophthalmichthys molitrix*) in Two Large Embayments of Kentucky Lake, A Reflection of Availability or Selectivity?*

Whitney Wallett - Biological Science

*Factors Influencing *Aristida stricta* Distribution, Dominance, and Performance at Local and Regional Spatial Scales*

College of Education: Student Teacher Eligibility Portfolios

Large Ballroom, Curris Center

Session Chair: Ms. Jeanie Robertson

10:00 a.m. – 11:30 a.m.

Makayla Bensen

Business and Marketing

Alexandria Creekmur

Elementary Education

Haley Harrington

Music Education/Instrumental

Jessica Holder

Learning and Behavior Disorders/Middle School English

Akeisha Peek

Interdisciplinary Early Childhood Education

Toree Rogers

Middle School Education, Math/Social Studies

Haley McCuiston Sonnek

Mathematics and Spanish

Politics in Its Many Guises Session

Ohio Room, Curris Center
Session Chair: Dr. Ann Beck
2:00 p.m. – 5:00 p.m.

Bailey Boyd - English Literature & Spanish
Achy Breaky Hearts: Exploring Petrarchan Lover Stock Character Variations in Drama and Country Music

Christian Cox – Political Science
The Incumbent Disadvantage

Dylan Darnell - International Affairs
The Roma in Germany: a Benefit or Burden to the German Welfare System?

Autumn Denton – International Studies
The American Experience: Perspectives of Middle Eastern Students after Studying Abroad in the US

Jessica Fry – Political Science
Improving Quality of Children's Lives

Danielle Geier - Secondary English Education
Of Monsters and Men

Brenton Hereford – International Studies
U.S Sugar Subsidies: For Better or Worse?

Hunter Hogan – Political Science
Feasibility of Complete Conversion to Natural Gas-Fueled Heavy-Vehicles in the United States

Caitlin Isbell – Political Science
To What Extent of Women Profession Occupational Attainment Affect Their Likelihood of Gaining the State Political Office?

Taylor Miller – Political Science
Latinos for Latinos

Alyssa Peek – Political Science
Producing Highly Qualified State Judges: Three Perspectives

Jennifer Ratajczyk – Political Science
The Effects of Active Military Combat Experience on Decision Making during Armed Conflict

Matthew Richardson - Journalism

Going Pro in Something Other Than Sports: Comparing Graduation Rates of the Student Body and Student-Athletes

Shaun Strawser - Sociology

Fracking and Activism in Appalachia

Danielle Thomas – Pre-PA

Eugenics in the States: The Origin and Intention

Master's in Economics Session

Mississippi Room, Curris Center

Session Chair: Dr. Martin Milkman

2:15 p.m. – 3:30 p.m.

John Albert - Economics

Unemployment and Crime: An Econometric Analysis of State-Wide Data from the 1990-2012 Period

Sarah King - Economics

The Education Levels for Women Joining the Labor Force

Sgoff Oliver - Economics

The Effect of Government Spending on the US-Economy in a VAR-model

Caitlin Thomas - Economics

State Merit-Aid – Preferences Rather than Enrollment Evidence from New Mexico's Legislative Lottery Scholarship Program

Joseph White - Economics

The Skilled Labor Market, Growth, and Income Inequality: A Theoretical and Empirical Analysis

Thursday, April 17, 2014

Oral Sessions

Occupational Safety & Health Session

Room 146, I & T Building

Session Chair: Dr. Tracey Wortham

11:00 a.m. – 12:15 p.m.

Amber Higgins, Kathryn McAllister, & Desmond Etheridge – Occupational Safety & Health

Hospital Food Service Ergonomic Assessment

Brandon Hoehn, Meghan Cavins, & Blake Jones - Occupational Safety and Health
Ergonomic Assessment of Profiles Salon and Spa

Amber Miller, Scott Duckworth, Dan Wang, & Ziling Zhou - Occupational Safety & Health
Ergonomic Case Study: Clothing Distribution Center

Michael Holloway, Jeremy Turner, & Kent Sumner - Occupational Safety and Health
Ergonomic Research Study: City of Murray Operations

Conservation Biology Service Learning Symposium

Barkley Room, Curris Center

Session Chair: Dr. Howard Whiteman

1:30 p.m. – 5:30 p.m.

Savannah Bell - Aquatic Biology
Improving Kentucky Lake Habitat with the Kentucky Department of Fish and Wildlife

Christian Brown & Justin Doss – Conservation Biology
Ecological Restoration: Managing Recovering Agricultural Land for Wildlife

Samantha Green – Biology & Japanese
Every Little Bit Helps: Reducing Impacts on the Environment and an Apartment Household's Wallet

James Cory Groover – Biological Science
Patterning Litter Accumulation on Kentucky Lake

David K. Livingston - Wildlife Conservation
Gin Creek WMA Restoration

Lindsey Scaggs - Zoological Conservation & Ryan Johnson - Wildlife Conservation
Destroying the Ozone: One Mower at a Time

Marcie Siders & Carly Rekosh - Conservation Biology
Kentucky Rain

Whitney Walleth - Biological Sciences
A Prescription for Prairie: Developing a Restoration Plan for Hancock Biological Station's Demonstration Prairie

Other

Faculty Recognition Banquet

Large Ballroom, Curris Center

Contact: Ms. Donna Miller

6:00 p.m. – 7:30 p.m.

(Faculty and Professional Staff Only)

Drew Feldhaus Adams - Nursing**Mentor: Jessica Naber*****The Role of the Nurse Clinician in International Aid***

The responsibilities of the nurse as a clinician have expanded immensely over the past 20 years. Modern nurses regularly perform duties once thought to be solely within the realm of the physician. The ability to anesthetize patients, suture wounds, oversee clinics, and prescribe medications have become commonplace for the advanced practice nurse. This increase in scope of practice has allowed nurses to serve in ever-expanding capacities in the hospital setting and beyond. The expanding territory of their clinical space presents a unique opportunity: As clinicians, advanced practice nurses can assume roles in aid organizations (such as Doctors Without Borders, the Red Cross/Red Crescent) that were formerly reserved for physicians. This is especially true in the Certified Registered Nurse Anesthetist (CRNA), a highly trained and clinically adept advanced practice nurse. Utilizing APRNs means accessing a much larger pool of healthcare professionals and adept clinicians that may represent a significant cost savings to budget-minded nonprofits. Cost savings in such groups would translate to additional care given to people who are desperately in need. Many studies exist that explore the expanding role of the nurse; however, studies that explore the benefits of that role in international aid remain sparse. For this research, completed using information from Doctors Without Borders, recommendations have been made regarding the economic, health, and social benefits of engaging the full clinical capacity of the modern nurse in administration of health care around the world.

John Albert - Economics**Mentor: Martin Milkman*****Unemployment and Crime: An Econometric Analysis of State-Wide Data from the 1990-2012 Period***

In this research paper, the topic of interest is the relationship between unemployment and crime. Many macroeconomic texts commonly state that unemployment is a contributing factor to aspects of social unrest, including crime. This is a plausible assumption, as a drop in personal income due to unemployment could provide incentive to undertake criminal endeavors as a way to recoup lost income. While plausible however, this assumption ignores a great number of “other factors” that may influence crime as well. In an attempt to gain a more complete picture of crime and its determinants, state-level data from 1990-2012 for crime and several relevant variables will be taken and analyzed to gain estimates for the effect these variables have on crime. In essence, the purpose of this paper is to find sufficient evidence to support or disprove the hypothesized positive relationship between unemployment and crime. While there is already a sufficient amount of theoretical discussion and speculation on the matter of unemployment and crime, this paper will be mostly concerned with the econometric and statistical methods associated with analyzing the results of the data analysis, and testing to determine the validity of the analysis.

Chelsie Allen - Agribusiness

Mentor: Michelle Santiago

International Agricultural Equipment Export: An Index

The past several years have seen an expansion in the number of large, used agricultural machinery (tractors, combines, planters, sprayers, etc.) on the lots of equipment dealerships throughout the United States. In many regions there is a maximum capacity that can be sold to local customers. Despite increased efforts to wholesale equipment to other dealers throughout the nation, aged equipment inventories have continued to raise. This excess inventory has led many domestic equipment dealers to explore international markets on which to unload aged and high-houred pieces of machinery. As countries look to advance their use of more technical agricultural equipment in order to improve production yields they are willing to import equipment from the US that is generally not more than a few years old. However, there are many important factors firms consider when looking at exporting options including possible market size, government regulations, and shipping specifications among others. By analyzing data from various countries and creating an index we can attempt to determine an equipment dealerships success in that foreign market.

Tom Anderson – Biological Science

Mentor: Howard Whiteman

Summertime Abundance of Larval Competitors Predicts the Abundance of Overwintering Mole Salamanders (*Ambystoma talpoideum*)

The expression of alternative phenotypes by mole salamanders (aquatic, gilled paedomorphic adults and terrestrial metamorphic adults) can depend on many biotic and abiotic factors including larval competitor density. The majority of support exists from experimental studies, however, necessitating field data to verify experimental findings. I sampled fifteen populations of mole salamanders (*Ambystoma talpoideum*) during May, July and December 2013 in wildlife ponds within Land Between the Lakes National Recreation Area, KY. I tested whether the larval density of conspecifics or a heterospecific competitor, the spotted salamander (*Ambystoma maculatum*), at three time points would predict the occurrence of overwintering paedomorphic adults. I captured 184, 141, and 273 mole salamanders at each time point, respectively, and in all 15 ponds with few captures of paedomorphic adults. I also captured spotted salamanders in 13 of 15 ponds, totaling 1295 and 621 larvae in May and July, respectively. Larval densities of both species were positively correlated in May and July, indicating high quality ponds were good for both species. The number of gilled mole salamanders caught in December was predicted by the density of conspecific larvae in May and July, but the correlation was stronger for the latter sampling date. The abundance of spotted salamanders at each time point also predicted the abundance of mole salamanders in December, indicating overall larval density may be more important than species identity. Further analyses are required to determine whether additional abiotic or biotic factors also influence the abundance of overwintered larvae or paedomorphs.

Zona J. Ascensio – Spanish

Mentor: Mike Waag

From Ethnography to Magical Realism: Fathoming Other Worldviews through Literature

How does one comprehend and explain the worldview of a culture outside one's own? This question has been explored by scholars in both the social sciences and in the humanities with increasing vigor since the late 19th century, a time of heightened ethnological interest in the indigenous cultures of Latin America. This paper compares two approaches to the topic, the scientific approach and the literary approach, and demonstrates that Magical Realism, a Latin American literary genre that treats the supernatural world as part of the natural world, developed in conjunction with a greater anthropological interest in the region. This paper further argues that, by allowing readers to experience worldviews that contrast with the Western perspective, Magical Realism fills the gaps in understanding left by ethnography which typically relies on Western scientific concepts inadequately convey Non-Western worldviews.

Kelli Baier – Nutrition & Dietetics

Mentor: Beth Rice

Xylitol: The Perfect Sugar Alternative?

Xylitol is an alternative sweetener derived naturally from either birch bark or corn. Although it belongs in the sugar alcohol family, its sweetness is nearly identical to sugar and it is an equal measure in baking. Because xylitol does not require insulin to be metabolized by the body; that means it is a low glycemic sweetener appropriate for most individuals who struggle with high blood sugar levels. In addition to its benefits as a low glycemic sweetener, research suggests that it has many other benefits including reducing inflammation associated with acute otitis media, to strengthening tooth enamel, to increasing bone density. We will explore the various benefits xylitol, although the research experiment will be focused on its use as a sweetener. The research will explore texture differences, detectability, and changes in consistency of the product. This article will explore the many usages of Xylitol as an effective sweetener as well as the many health benefits. This research will demonstrate how indistinguishable Xylitol is in comparison to sugar in baked goods compared to other sweeteners.

Miranda Bailey – Geoscience/Art

Mentor: Haluk Cetin

Remote Sensing during World War II Compared to Remote Sensing Today

Aerial photography was commonly used during World War II. Remotely sensed images including historical data are now available online. The purpose of this study was to examine how these images were obtained and how they were used which became a very important part of history. Today we use many other forms of remote sensing. By comparing remote sensing today and during World War II, we can clearly see an improvement in the technology. The study area selected for this study was Europe. This study has a comparison of aerial photographs and satellite images.

Jared Batts - Environmental Geology

Mentor: Haluk Cetin

Prediction of Potential Sinkhole Danger Zones Using Remote Sensing

Caves and mines are known to be danger zones for potential sinkholes; however, there are many undiscovered caves and forgotten mines that pose a potential threat if they continue to go undetected. Bringing together many different data sets has not been done before for this particular application. By combining many different types of data sets including remotely sensed data, patterns that are found in known sinkhole danger zones can then be applied to areas that need to be investigated. This information can help to predict potential sinkhole danger zones and used to prevent disasters.

Alex Beatty, Jordan Brock & Annalee Schuette – Nonprofit Leadership

Mentor: Roger Weis

First Annual Beard and Mustache Contest

We planned and strategically organized the First Annual Beard and Mustache Contest, and all proceeds benefitted CASA by the Lakes. Once we developed our event we began planning out the fine details. Then we started advertising by hanging up flyers, creating a Facebook event, mailing letters to family, the CASA director being interviewed on WKMS, and having the “Best Facial Hair” table in the Curris Center for one week, where people could purchase a ticket for the event or put money in the jar of their favorite facial hair. November 7th was the date of our event and we had approximately 30 audience members, 7 contestants, and 5 judges at the event. At the beginning of the event the CASA director explained in greater detail what CASA is, we had an introduction of both the contestants and the judges. The judges graded the beards and at the end of the evening the winners were announced. We are proud to announce that we were able to raise over \$750 for CASA by the Lakes.

Savannah Bell - Aquatic Biology

Mentor: Howard Whiteman

Improving Kentucky Lake Habitat with the Kentucky Department of Fish and Wildlife

For many years the Kentucky Department of Fish and Wildlife (KDFW) have been tirelessly working to improve the underwater ecosystem of Kentucky Lake to increase fish production and diversity. One of the many ways they accomplish this is through the strategic placement of artificial fish habitat, also known as fish attracters. This spring I have been able to assist in this ongoing project as well as be a part of the very beginning of some exciting new research. Every other spring on Kentucky Lake, workers from the KDFW take the leftover Christmas trees, donated to them by local stores, and use cement blocks to sink the trees into the lake. These trees soon become a utopia of algae, zooplankton, and fish life. The trees provide shelter and a concentrated food source for larval fish and the larval fish in turn attract other predatory fish. This year, in addition to setting out the usual tree habitats, I was able to assist in starting a new type of habitat that has been engineered to attract and support populations of *Lepomis microlophus*, the Redear Sunfish. The Redear Sunfish is a native local fish of high ecological and economical value. The new fish attracters, made of dense weighted brush, boost the Redear’s ability to compete with other Sunfish. These new attracters were placed various locations and it is our hope that this summer’s harvest of Redear Sunfish will provide valuable information on the effectiveness of the habitat type and locations.

Quintin Bergman - Wildlife and Conservation Biology

Mentors: Howard Whiteman & Scot Peterson

Impacts of Habitat Degradation and Interspecific Interactions on Riparian Animal Populations

Habitat degradation is a known driver of global biodiversity losses and is common in streams of the western U.S. Understanding the impacts of such degradation on biodiversity is an important goal, as stream and riparian zones are often keystone resources and provide important corridors between habitats. Kimball Creek, a 3rd-order stream located near De Beque Colorado at the High Lonesome Ranch, has been degraded by decades of poor management, including overgrazing by cattle and eradication of beaver. The upper reaches are less degraded than those further downstream. In an effort to provide baseline biodiversity data to evaluate a planned restoration of the stream, and to test the hypothesis that degradation (location and cattle presence) affects large mammal populations, we monitored camera traps during 2011-13. Cameras were placed along the stream corridor based on obvious animal crossings and natural landscape funnels. Large mammals, including native ungulates (mule deer and elk), carnivores (bear, cougar, coyote), and cattle, were captured in ~15% of >40,000 digital photographs. We are currently correlating the richness, relative abundance, and time budgets of these species with the presence of predators, cattle, and location (= degradation). Our preliminary observations suggest that cattle usage of the riparian zone negatively affects the diversity, abundance, and activity of native large mammals, and cattle presence is a more important factor affecting native large mammal biodiversity than stream degradation per se. This implies that successful restoration of stream environments may require careful management of historically and economically important ranching operations.

Abby Bert - Dietetics

Mentor: Beth Rice

The Effects of Substituting Sucrose with Artificial Sweeteners to Lower the Calories and Glycemic Index of Blueberry Muffins

The purpose of this experiment is to determine how the substitution of sugar with artificial sweeteners saccharin and acesulfame-potassium affects the outcome of blueberry muffins. A basic blueberry muffin recipe will be used to test the acceptability of saccharin and acesulfame-potassium as substitutions for sugar in baked goods. The control in this study will be the muffins made with sugar. The independent variables will be muffins made with saccharin and muffins made with acesulfame-potassium. The dependent variables will be the subjective evaluation of taste of muffins (sweetness, bitterness, aftertaste, overall taste), subjective measures of texture (moistness, doneness, overall texture), subjective evaluation of color, objective measure of viscosity of batter, objective measure of volume of baked muffins, and objective evaluation of moisture. This experiment is important because substituting sugar with artificial sweeteners can help people reduce calorie intake, save money, prevent dental cavities, and make foods diabetic-friendly.

Jessica Bishop - Pre-Veterinary Medicine/Animal Health Technology

Mentor: William DeWees

Increased Utilization of Veterinary Technicians and Technologists Increases Clinic Revenue

My thesis will demonstrate how employing a licensed veterinary technician/technologist increases the revenue of a veterinary clinic. I will compare veterinary assistants to veterinary technicians and technologists. I will include the salary differences and skills/requirements needed for each of those categories. I will show that increased utilization of veterinary technicians will increase clinic revenue and allow veterinarians more time to work on more complex tasks.

Kaylin Boeckman - Watershed Studies

Mentor: Howard Whiteman

Diet Composition of *Ambystoma tigrinum nebulosum* Larvae in Degraded and Non-degraded Portions of a Western Colorado Stream

In fishless systems, larval Arizona tiger salamanders (*Ambystoma tigrinum nebulosum*) feed heavily on invertebrates and have been shown to induce trophic cascades in lentic ecosystems. The role they play in lotic food webs is not well understood. In western Colorado, *A. t. nebulosum* are able to breed in streams in the absence of native Colorado cutthroat trout (*Oncorhynchus clarkii pleuriticus*). Degradation by beaver dam removal, irrigation and cattle grazing has made large portions of the stream unsuitable for trout. Understanding the role of anthropogenic habitat degradation on lotic systems is important in our increasingly degraded world. Stomach samples were collected by gastric lavage from young-of-year and 2nd-year larvae from beaver ponds across a range of degradation intensities. Prey diversity and abundance were determined from the stomach samples. Diet composition was compared between age classes and habitats. Information collected from this initial investigation will help further our understanding of how degradation affects aquatic food webs and will facilitate the design of mesocosm experiments aimed at testing the strength of salamander induced trophic cascades in lotic systems.

Cheyenne Bourland - Psychology**Mentor: Paula Waddill*****Working Memory and Environmental Stimuli***

In this particular study, I looked at the effects of environmental stimuli, specifically auditory stimuli on working memory. I asked participants to view a PowerPoint slide show that consisted of fourteen word sequences and fourteen digit sequences. After viewing each sequence, participants were asked to recall and write the words or digits in the order they just appeared on a sheet of paper. During this task participants (depending on what group they were in) would either hear a popular song in their native language (English), a foreign language (Spanish), the instrumental version of the song, or no music (control). The purpose of the project was to determine the difference in amounts of interference on working memory that would be caused by each different type of auditory stimuli.

Bailey Boyd - English Literature & Spanish**Mentor: Barbara Cobb*****Achy Breaky Hearts: Exploring Petrarchan Lover Stock Character Variations in Drama and Country Music***

Stock characters are almost universally recognized throughout literature and the media, and though they are often considered flat characters or foils to main characters, the variations of stock characters cause readers to consider their importance in illuminating the qualities and foibles of humanity in general as well as the specific traits they hyperbolize. This thesis will explore and analyze variations of the Petrarchan lover stock character in Italian Renaissance and Elizabethan drama, tying thematic elements together through modern country music. This thesis will show that stock characters, although they are supposed parodies and exaggerations of human emotion, are often the characters in whom readers see themselves; this thesis will highlight that, instead of exaggerations, stock characters are imitations of how humans react to love and its trappings. The Petrarchan lover stock character represents a collective human trait, and the repeated motif teaches us something important about ourselves.

Jayme Brandenburg – Youth & Non-Profit Leadership

Mentor: Jeffrey Wylie

Housing Resources for Adults with Severe Mental Illness in Western Kentucky

The purpose of this research project is to assess the placement availability and effectiveness of housing resources available to adults with severe mental illness in western Kentucky. We are surveying case managers from community mental health centers in mental health regions one, two, and three. We are trying to establish an estimate of the number of adult clients with S.M.I. who are homeless (and how many are homeless in each of seven situations listed in the survey definition of homelessness), and the number of adult clients with S.M.I. who are housed through each of six types of housing programs. We are also trying to establish placement availability (how easy or difficult it is to find placement for a client in the program) and effectiveness (with regard to helping homeless clients become stably housed) scores for each of 9 housing programs/resources. We hope that the findings will encourage increased funding for the most effective programs, so that placement availability through these programs can be expanded, resulting in an improved quality of care for adults with S.M.I. in western Kentucky. This research is not yet completed.

Dylan Bragg - Marketing

Mentor: Stefan Linnhoff

Which Survey Based Company Will Best Fit CFSB's Needs?

This project involves me working with CFSB to determine their needs for a survey company. This involved researching several survey based companies to find a few that might meet their needs.

Courtney Brasher - Communication Disorders

Mentor: Kristan Yates

Kentucky Speech-Language Pathologists' Cultural Competence in Professional Assessment and Service Delivery to Culturally and Linguistically Diverse Populations

The purpose of this research is to investigate Kentucky-based SLP's, knowledge, training, and experience with culturally and linguistically diverse populations. Over the past few decades, there has been a paradigm shift that recognizes the exponential increase of American cultural groups, which calls for cultural responsiveness and inclusion. As diverse populations continue to grow exponentially, the need for culturally and linguistically competent health professionals, particularly speech-language pathologists is vital. Therefore, this research is necessary because it will ultimately serve as a "self-check" as to how confident Kentucky speech-language pathologists are in serving CLD populations. I suspect that the results may potentially highlight deficits in pre-training and post-training, experience, assessment, and service delivery. If this is the case, this research will raise awareness and drive ongoing research concerning how to better serve CLD populations and/or encourage SLPs within the state of Kentucky to seek further pre-training and/or post-training concerning this subject matter.

Carmela Broderick - Dietetics

Mentor: Beth Rice

The Effect of Milk Varieties with Various Milk Fat Contents as Acceptable Replacements for Heavy Whipping Cream in Rice Pudding

This research project will aim to determine the usefulness of replacing heavy whipping cream in a rice pudding recipe with milk varieties containing various milk-fat contents. This experiment will be conducted in the foods lab of the Oakley Applied Science Building at Murray State University. The researcher will use a family recipe for rice pudding using metric measures for ingredient amounts. The control for this experiment will use heavy whipping cream. Milk varieties including whole milk, 2% milk, 1% milk, and skim milk will be used to substitute the heavy whipping cream in this recipe. The control recipe will consist of 720 mL of water, 190 g of short-grain rice, 2 fresh cinnamon sticks, 475 mL of half and half cream, 200 g of sugar, and 475 mL of heavy whipping cream. The researcher will follow the same procedure of the standard recipe for the control and the four variations. An objective line-spread test will be used to determine the viscosity of each rice pudding variation at hot and cold temperatures. Fifteen untrained participants will each perform a sensory evaluation and preference test of the rice pudding samples in order to determine consumer acceptability of appearance, flavor, texture, and mouthfeel. This experiment will replace heavy whipping cream in rice pudding with milk varieties of various milk fat contents in order to produce acceptable variations for consumers and improve the nutritional value of the product by reducing the amount of calories, fat, and cholesterol.

Christian Brown – Conservation Biology

Mentor: Howard Whiteman

An Analysis of Tiger Salamander (*Ambystoma tigrinum nebulosum*) Survival Based on Body Size and Other Covariates

Polyphenisms occur when populations exhibit alternative, discrete phenotypes in response to environmental variation, and are examples of phenotypic plasticity. This phenomenon is thought to be adaptive because it allows quicker response to environmental shifts than those that are genetically fixed. However, few studies have quantified the fitness consequences of polyphenisms. *Ambystoma tigrinum nebulosum* (Arizona Tiger salamander) inhabits montane ecosystems throughout Colorado, Utah, Arizona, and New Mexico. This species is polyphenic, in that genotypic variation coupled with environmental stimuli trigger two distinguishable adult forms (metamorphic and paedomorphic), which is termed *facultative paedomorphosis*. Using a capture-recapture database started in 1988, we analyzed survivorship of the Mexican Cut population to test hypotheses about how survival, one component of fitness, varies within this population. MARK was used to estimate survivorship of the salamanders based on parameters such as sex, morph, and size. To incorporate size, we used the ratio of mass to snout-vent length defined as body condition, which was categorized into four size classes. We found that the medium size class had lower survival than other size classes, irrespective of morph, and that neither morph nor sex appears to have a major impact on survival.

Christian Brown & Justin Doss – Conservation Biology

Mentor: Howard Whiteman

Ecological Restoration: Managing Recovering Agricultural Land for Wildlife

Habitat restoration has been a common practice in restoration ecology since its emergence in the late twentieth century. Ecological restoration involves the renewal of degraded habitats via active human intervention. This project was designed to restore wildlife habitat on a plot of land once used for agriculture in southern McCracken County, Kentucky. We observed many species of wildlife on the property ranging from game-birds, to bats, to a number of different amphibians and reptiles. With a focus on local, pond-breeding amphibians and the endangered Indian bat (*Myotis sodalists*), we created vernal pools and hung bat-boxes in strategic locations around the property. The pools provide habitat for amphibian breeding and larval development, as well as habitat for macroinvertebrates. The bat-boxes, hung in close proximity to the vernal pools, will provide summer roosting habitat for bats. Once macroinvertebrates colonize the vernal pools, they will serve as a source of energy for the bats roosting above the pools. In this way, the vernal pools and the bat-boxes will work cohesively to restore wildlife habitat nearly a decade after agricultural practices ceased on the property. The pools and boxes will be maintained by the tenants living on the property for the foreseeable future. We expect to see an increase in abundance of our focal taxa. In the future, we hope to manage for other wildlife observed on the property and eventually hope to protect the property via conservation easements.

Megan Bryant - Nutrition

Mentor: Beth Rice

Hemp Milk Substitution in Chocolate Pudding

The purpose of the experiment is to substitute the fat content in the whole milk for a healthier product. This experiment will take a basic recipe of chocolate pudding and make it healthier and more nutritious. It is a very basic concept but finding what to use as the healthy substitute was the challenging aspect. While looking for options and new cutting edge options one finally popped out. Hemp milk, not a lot of research has been done on it but it has a lot of good qualities and nutritious aspects to it. Hemp milk has a lot of protein and is packed with vitamins and minerals that we need for everyday growth and enrichment. However, there is one hiccup with this “cutting edge” idea of using hemp milk. Not only is there almost no research on using this product it is almost impossible to find in commercial supermarkets. Only a handful of places are selling it on shelves without having to special order it.

Nick Calhoon, Erica Gallagher, & Michelle Goodman ~ - Nonprofit Leadership

Mentor: Roger Weis

Fall Frenzy

On November 7, 2013, YNL 350 students went the Murray-Calloway County Senior Citizens Center and hosted the first annual Fall Frenzy. The Fall Frenzy was an event to promote physical and emotional well-being among the participants. The members of the center competed in a corn hole tournament as well as chair volleyball. All participants were entered into a raffle for a chance to win door prizes. The event had around 20 participants and all had a wonderful time.

Kara Campbell, Kelli Fechtig, and Erin McCallon – Nonprofit Leadership

Mentor: Roger Weis

Hickory Woods Project

Our group first picked to conduct a program at Hickory Woods Senior Living Community because we all wanted to contribute to making them feel needed. We wanted to make them feel like they can still be a part of something. We wanted to make them feel like they were still a part of something, even if it is just an hour long program playing cornhole. Throughout the planning of this program, we provided a brief history of Hickory Woods including their purpose and career opportunities in the field of assisted living. We then provided reasoning for the development, description, and name for the program. Then, we determined that senior citizens can face a myriad of issues that can prohibit them from actively participating in everyday life. Thus, through our observations, research, and program planning/implementation we were able to pinpoint and identify these developmental needs, competencies, and values to specifically plan a well-executed program for the residents. Further results and planning of the program follow in the appendixes.

Fallon Carpenter - Music

Mentor: Stephanie Rea

Arranging Music for Flute Trio

I will be showing the arranging process and several editions of my flute trio arrangement of Claude Debussy's Petite Piece through a poster presentation. There will also be a recording of the final arrangement played by students here at MSU. This is a research project that I have been working on for the McNair Scholars Program.

Taylor Chaddock – Marketing

Mentor: Stefan Linnhoff

A Conceptual Framework For Studying Millennials' Attitudes Toward Advertisements For Children

In a society that is rapidly growing in fields of both media and technology, it only makes sense that a rapid increase in advertisements would follow. It is no surprise that controversy surrounds the idea of targeting children in various forms of television advertising. Because of these controversies, there are many possible areas of study for this investigation. Although research has already been conducted in this area, this specific research will aim to discover the Millennial Era's views on prospective parenting and how this will affect their children's exposure to and awareness of television and video advertisements specifically. This generation will reflect on their goals for future parenting, as well as their opinions of modern-day TV ads. Our research will be focusing on children ages five and under, and may take into account gender and social status, as well.

Mackenzie Paige Chandler – Japanese & TESOL

Mentor: Yoko Hatakeyama

The Confliction Between Public and Private Identities; An Analysis on Japanese Culture using Satoshi Kon's Film Perfect Blue

Using Satoshi Kon's animated film Perfect Blue I will apply themes to current problems in Japanese culture. In the film the main character Mimirin develops identity issues because she is being torn between staying a pop idol and becoming an actress. This reflects the problems that Japanese society puts on its youth by forcing them to decide early on what to do to act, and damages their self-identity. Japan has an extreme decrease in marriage and childbirth rates that is influenced by how the Japanese culture creates divides between men and women. Perfect Blue is a complicated film that shows every negative aspect of the Japanese culture that needs to change, and that is my focus.

Christian Cox – Political Science

Mentor: Ann Beck

The Incumbent Disadvantage

This research is attempting to measure the extent to which the incumbent advantage applies to women in the U.S. House of Representatives from 2008 to 2012. Using other scholarly data on this issue and also conducting original data will be the most effective way to go about explaining and measuring the incumbent disadvantage that women face in the United States House of Representatives.

Claire Crocker - Pre-Veterinary Medicine

Mentor: William Dewees

Survivability in Neonatal Pigs

This presentation would describe work done for an undergraduate honors thesis. The thesis will examine factors that contribute to the survivability of neonatal pigs and examine methods utilized to help limit the effects of factors that lead to piglet death. Special focus will be given to the evaluation of hypoglycemia and how it contributes to piglet mortality and morbidity, supporting experimental data evaluating the effect of tube feeding a colostrum primer as a technique to assuage the effects of hypoglycemia in farrowing groups will be included. Other factors that will be evaluated are maternal health, environmental temperature, weaning age, environmental exposure, and immunoglobulin transfer.

Melanie Crosman, Ryan Miller, Ji eun Son, Carla Suga, & Patsy Pierce - Marketing

Mentor: Terence L. Holmes

Student Perceptions, Rules, and Realities of Murray State University's Student Life Policies

Marketing 595 class research term project results.

Chesika Crump – Biological Science / Pre-Med & Kaitlyn Whitewood – Pre-Veterinarian

Mentor: Terry Derting

The Experimental Analysis of the Effects of Pet Therapy on the Blood Pressure and Stress Levels of First-year College Females

Students experience significant stress during their undergraduate studies. Universities provide counseling and activities to help students alleviate stress but more cost-effective approaches are needed. Recent research indicated that humans can gain stress relief through pet therapy. My objective was to determine if pet therapy had an effect on stress levels of first-year female undergraduates. My null hypothesis was that pet therapy did not affect first-year females' physiological and perceived stress levels. I recruited 27 first-year female students and 9 certified pet therapy dogs. Baseline measurements of blood pressure (BP), heart rate, respiration rate, salivary cortisol level, and perceived stress and arousal level were made. Participants were then randomly selected to participate in the dog group or the no-dog control group for 15 min. Afterwards, a second set of measurements was taken, and then participants switched groups for another 15 min, followed by a final set of measurements. There were no significant effects of pet therapy on diastolic BP, heart rate, and respiration rate. Arousal of participants was significantly higher after pet therapy, as indicated by higher systolic BP, cortisol, and perceived arousal measurements compared with the control period. Concurrently, perceived stress level was reduced. My results paralleled changes that occur during exercise where physiological stress increases and psychological stress decreases. Longer pet therapy sessions are needed to study their potential as a means of reducing psychological and physiological stress in college students.

Rebecca Cunningham - Biomedical Sciences

Mentor: David Canning

The Behavior of Embryonic Neural Stem Cells

Stem cells can differentiate into a variety of cell types. In the early chick embryo, neural stem cells are located in the neural plate, a broad region anterior to Hensen's node, which gives rise to the anterior and posterior nervous systems. The allocation of neural plate cells from surrounding epiblast cells and maintenance as progenitors is not well understood. The stem cell niche, formed by the extracellular matrix and the surrounding milieu, dictates the differentiation of stem cells. Chondroitin sulfate, a glycosaminoglycan present in the extracellular matrix, has been reported to influence adhesion and differentiation of stem cells. We hypothesize that chondroitin sulfate restricts the potential of neural stem cells. Experiments assessing chondroitin sulfate proteoglycan expression and chondroitin sulfate's effect on cell adhesion and chick development demonstrate that chondroitin sulfate may mediate maintenance of neural stem cells.

Victoria Darling, Kayla Stringfield, & Savannah Bell – Biological Science

Mentors: Claire Fuller & Donald Adongo

The Relationship Between Ambient Temperature, Growth and Survival of the Tropical Termite *Nasutitermes acajutlae*

Termites act as ecosystem engineers, capable of maintaining the flow of resources by recycling dead organic materials. This characteristic may be especially important on St. John, USVI, where the arboreal nesting termite, *Nasutitermes acajutlae* is the major invertebrate degrader. *Nasutitermes acajutlae* has narrow physiological ranges to abiotic conditions potentially making them susceptible to environmental change. Thus environmental factors such as temperature are of great interest because of their effect on termites. Our first goal was to investigate nest growth rate of *N. acajutlae* in five tropical habitats that differ in temperature (dry forest, mangroves, moist forest, sparse vegetation, and saltflat) on St. John via mathematical modeling. Our second goal was to empirically examine whether ambient temperature impacts the ability of termites to survive exposure to a pathogenic fungus, *Metarhizium anisopliae*. To achieve Goal 1, we used nest volume growth data collected on >200 *N. acajutlae* nests from these habitats spanning the years 1998-2013. We expanded a logistic model capable of describing annual nest growth by adding the effect of external temperature in the mangrove and dry forest habitats. We found an inversely proportional relationship between nest growth rate and ambient temperature in each habitat, but nests within different habitats had different patterns of growth rate. This suggests that other biotic or abiotic factors may have significant influence on the nest growth rate. To achieve Goal 2, termites were collected from warm and cool nests, maintained in warm or cool incubators, then exposed to four different levels of *M. anisopliae*. Termites were checked daily to determine the number of survivors. We found termites from nests in warm, dry habitats had higher survival rates. However, the influence of individual colony was more important than the influence of temperature. These findings replicate and expand on an earlier study in our lab. We hypothesize that these colony-level differences are genetically determined and that colonies with similar levels of survival will be genetically similar. Our studies of *N. acajutlae* have demonstrated its susceptibility to changes in the environment and could help to predict the effect of climate change on this species.

Dylan Darnell - International Affairs

Mentor: Ann Beck

The Roma in Germany: a Benefit or Burden to the German Welfare System?

This project analyses the affect of Roma immigrants on the German welfare system. While there has been little research done on this particular group, I evaluate the claims of authors who have researched other minority groups. From this evaluation I provide my reasoning for the research that provides the best model for this study. Then I provide my analysis and conclusion on the Roma.

Lee Darnell - German & Japanese

Mentors: Reika Ebert & Masayo Kaneko

The Understanding between Two Cultures: Yoko Tawada's Poetic Experiences Abroad

Yoko Tawada with her very surreal writing style engages both German and Japanese readers with strong sensory elements that either impress, or disgust, with the intention of stimulating thoughts about culture or language. This presentation will analyze Tawada's dual-language work "Bilderrätsel ohne Bilder/E toki" (Picture Puzzles without Pictures) in her collection *Nur da wo du bist, da ist nichts/Anata no iru tokoro dake nanimo nai* (A Void Only Where You Are). By exploring the nuances of vocabulary, the senses, and the characters in the short story with some poems, one will be able to recognize the cultural understandings and misunderstandings that occur when a Japanese person visits and experiences Germany. German readers can gain a new perspective of how Japanese people might perceive Germany, and Japanese readers can come to understand the challenges of adapting to a new environment.

Jessica Fry – Political Science

Mentor: Ann Beck

Improving Quality of Children's Lives

To what extent do child ad items and casa volunteers improve the quality of life for children? The method is to look at scholarly research and determine if child ad items and casa volunteers actually improve the quality of children's lives. In conclusion it will be discussed what further research needs to be done and what else we need to know to help improve the quality of life for children.

Aida De La Fuente – Spanish & Economics

Mentor: Mica Garrett

Miedo, oscuridad y misterio: la literatura gótica en Cristina Gracias Las hermanas Agüero

The objective of my investigation is to analyze the different effects of Gothic Literature in the novel *Las hermanas Agüero* by Cristina Garcia. This novel serves as an interpretation of family lives during Fidel Castro's dictatorship; specifically, the lives of two sisters, Constanca and Reina, and their inner-family ties. Through the use of language, magic and imagery Garcia effectively illustrates the genre of Gothic Literature. It is used to highlight the nostalgia the Agüero family feels during this period; emphasizing the characters personas, and setting a dark ambiance throughout the novel. Moreover, the darkness evoked assists in illuminating Castro's oppressive regime. Critics like Tonya Gonzalez believe that Garcia successfully identifies the emotions, conditions, and imagery in her literary work; all representing the effects of this genre. The use of scholarly articles, and different data bases also helped to develop various points of view. In conclusion, Gothic Literature allows for the same emotions the characters feel to be concurrently inflicted onto the readers, keeping them intrigued throughout the whole novel.

Autumn Denton – International Studies

Mentor: Ann Beck

The American Experience: Perspectives of Middle Eastern Students after Studying Abroad in the US

This piece is an examination of what extent Middle Eastern students' perspectives on the US change after studying abroad in America. I will also address the different methods that have been used for gathering such data and suggest the method I would use for the research.

Morgan Dillard – Agriculture

Mentor: Haluk Cetin

Soil Types in Hickman County, Kentucky

This research is based on soil data that is provided by United States Department of Agriculture. In this study, soil classifications were overlayed onto a map of Hickman County, Kentucky in order to show the distribution of each soil type. The study analyzed the most common soil type in order to draw conclusions about the agriculture fertility of the county. A more detailed study is needed to continue this research.

Danielle Geier - Secondary English Education

Mentor: Barbara Cobb

Of Monsters and Men

This research focuses on the conceit of monstrosity and the depiction of humanity in literature between the 17th and 19th centuries. Through the analysis of three primary texts—Mary Shelley’s *Frankenstein*, Victor Hugo’s *The Hunchback of Notre Dame*, and Shakespeare’s *Othello*—I plan to outline a shift in humankind's fear of the monstrous, ending with a criticism of the duality of the term "monster" in today's contemporary culture. Scholars such as Abigail Six and Hannah Thompson have defined the distinction between physical and moral monstrosity. In the case of the first two texts, the seemingly “monstrous” characters (those who are physically monstrous) are indeed the more humane and forgiving characters, while *Othello's* Iago brings light to humankind's fear of unseen, moral monstrosity that is all around us. Further, these texts prove that monstrosity is not an inherent trait of human nature; rather, monstrosity is something made and created from without and is internalized within. There is a visible shift in humankind's fear and fascination of what a culture deems as something truly monstrous. Therefore, these literary monsters serve as a touchstone for the culture around them, bringing to light the cruelty of humankind, and providing contemporary cultures with a unique curiosity for the physical 'other'.

Dylan Gerlach – Spanish & Biology

Mentors: Susan Drake & Janice Morgan

The Search for Identity in Esmeralda Santiago's "El Sueño de América"

Esmeralda Santiago tells the story of América Gonzalez, a hotel housekeeper in Puerto Rico, and the difficulty of her everyday life and the relationships of those who are closest to her. América's identity is not simply defined by her own actions and beliefs, but also on her mother's alcoholism, her abusive lover's erratic behavior, and her troubled teenage daughter, who despises her and everything she has to offer. Living a new lifestyle in the Bronx of New York, América realizes that her new situation still prohibits her from forgetting her agonizing past back home. Santiago is able to use the characters within the novel to effectively portray the emotions, actions and stereotypical contrast. The identity of América is not merely related to her own being, but instead is related to all of the people and things in her life that make her who she is. The search for identity is an ongoing process that is a culmination of who she is, what she has endured and where she hopes to be in her future.

Landon Gibbs - Horticulture

Mentor: Iin Handayani

Infiltration Rate and its Related Soil Properties in Various Land Management Systems of Western Kentucky

Accurate determination of infiltration rates is essential for reliable prediction of surface runoff in order to minimize the risk of transferring pollutants from soil to rivers and lakes. The objectives of this study were to evaluate the impacts of various land management systems on infiltration rates and to relate other soil properties including soil organic carbon (SOC) and macroaggregates with the infiltration rates. The study was conducted in Calloway County of western Kentucky, using six land management systems that included no-till corn, conventional tillage soybeans, conventional tillage tobacco, organically grown vegetables, woodland, and prairie. All the soils have a silt loam textural class on the topsoil. Each soil variable was replicated three times in each of three points in the selected area. Infiltration rates were measured using a single ring infiltrometer. Soil organic matter was determined using loss on ignition (LOI) method. The data was statistically analyzed using ANOVA followed by the least significant difference(LSD) test at α 5%. The results show that Organic farming and woods have the highest infiltration rates (36 to 95 cm/hr) followed by prairie (14 cm/hr), no till corn (12cm/hr) and the conventional tillage systems (4.5cm/hr). The values of infiltration rates were closely related to SOC ($r^2= 0.99$) and macroaggregates ($r^2=0.88$). This study indicates that organic farming and no till systems have better potential to reduce the impact of runoff and soil compaction than the conventional tillage systems.

Mary E. Goeke - Psychology

Mentor: Daniel Wann

The Effect of Team Identification and Dysfunction on Superstition Among Sport Fans

Sport fandom is a universally recognized personality trait and has been found to be so pervasive that two thirds of Americans see themselves as sport fans (Lieberman, 1991). The act of following a sport team often serves as a source of confidence for people (Reysen & Branscombe, 2010). Superstition among sport fans is a common trait, as well. However, most research concerning superstition in sport focused purposely on athlete's superstitious behaviors. Thus, the current research seeks to determine what factors may lead to sport fans engaging in superstitious behaviors. Specifically, we want to know if those labeled as dysfunctional fans exhibit more superstitious behaviors. To test this hypothesis, students from Murray State University were administered a packet of surveys assessing their identification with a sport team, perception as a fan, superstitious behaviors, and level of dysfunction in terms of fandom. We were interested in team identification as a predictor of superstition among fans, because the interaction between fandom and superstition has briefly been studied; having a high interest level in sports has been a significant predictor in one's beliefs in sport superstitions (McClearn, 2004).

Nathan Graves – Japanese

Mentor: Masayo Kaneko

Abe Kōbō: The Mirror Called Identity

Japanese author Abe Kōbō, who was raised in Manchuria for a good portion of his life, brought to Japanese literature a rather interesting point of view in regards to human identity. Specifically, his stories take the idea that people often believe that they are or are not something based on their environment and show, through incidents that involve the stories' protagonists, that this is not necessarily the case. This presentation focuses on how two of his short stories, "Akai Mayu" (The Red Cocoon) and "Mahou no Chōku" (The Magic Chalk) portray this, with support from other works of his. The reactions of these protagonists, when they lose something that they had believed (or had not believed) to make up their identities, will be examined and related to human beings in general.

Samantha Green – Biology & Japanese

Mentor: Howard Whiteman

Every Little Bit Helps: Reducing Impacts on the Environment and an Apartment Household's Wallet

While there is abundant information regarding how to reduce a household's ecological footprint and subsequent impacts on the environment, this information is not always easily available to those outside of scientific fields. The purpose is to make this information available and understandable to urban households, such as apartments or rented property, which have limitations on what they can do to live sustainably, promoting environmental awareness while emphasizing financial benefits of utilizing this information.

Samantha Green – Biology & Japanese

Mentor: Masayo Kaneko

The Glass Box Which Separates Individuals: An Analysis of Haruki Murakami's Themes in Contemporary Short Stories

Murakami Haruki's writing has captured many of the overall mentalities of contemporary Japanese people, such as the nihilism of the 1970s or the anxiety of the 1990s, with recurring themes of isolationism. A metaphorical glass box surrounds the main characters in Murakami's short stories leaving each protagonist with a feeling of isolation, an inability to connect with other individuals emotionally or verbally even though the other characters may be within arm's reach. These stories showcase a variety of characters that have this isolation imposed upon them by other characters or society itself. For example, through societal expectations via gender roles of the housewife and salary man, this leads one to question what consequences exist for attempting to break this glass box and leaves one wondering what the cost of individuality is.

James Cory Groover – Biological Science

Mentor: Howard Whiteman

Patterning Litter Accumulation on Kentucky Lake

Besides being aesthetically displeasing, shoreline litter also puts wildlife at risk through water contamination and physical harm. A better understanding of how, when, and where litter accumulates along the shoreline of Kentucky Lake would improve our ability to clean it up. To address these questions I classified shoreline as one of three types: 1) channel shoreline, 2) embayment shoreline, and 3) embayment slough. I chose ten, 50 meter transects of each shoreline type on both the east and west sides of Kentucky Lake, for a total of 60 transects. After counting and removing the litter from each transect, I plan to monitor them periodically, but due to the time constraints of my class and inclement weather, study sites will only be allowed to recollect litter for about a month before being resurveyed. With the transition of Kentucky Lake from winter to summer pool and the possibility of a spring flood, I am hopeful that conclusions regarding how litter accumulation is affected by lake level and seasonal weather patterns can be obtained from my data. To better understand litter accumulation over time, I plan to resurvey transects after six months and one year. If litter "hotspots" can be identified, lake managers, organizations, and volunteers etc. can maximize their shoreline cleanup efforts on Kentucky Lake. Many local, state, and federal agencies that are facing budget cuts need knowledge regarding increasing the use and efficiency of the limited amount of funds they have available.

Jennifer Haas – Geoscience/Environmental Geology

Mentor: Haluk Cetin

Mining Space: The Role of Spectral Analysis and Remote Sensing in the Mineral Exploration of Near-Earth Asteroids

As an already unsustainable world population continues to increase exponentially, scientists and entrepreneurs alike look outward to the Solar System for a new, untapped source of raw materials. To date there are an estimated 9,000 near-Earth asteroids larger than 165 feet on record. Despite this, given the rate of current technological innovation and the convoluted politics of the world's major space organizations, an economically viable mining operation is currently not a top priority among government and private initiatives. Taking this into account, this report analyzes the use of telescopic reflectance spectroscopy as an effective method of determining whether a specific near-Earth asteroid is a prime candidate for being harvested for much needed resources on Earth. Since the majority of asteroids are theorized to be composed of unaccreted material left over from the formation of the current Solar System, the logical assumption is that the mineral composition of most near-Earth asteroids is similar to that of Earth, in that near-Earth asteroids are comprised of many of the same minerals as Earth, but in differing amounts and concentrations than those found in the Earth's crust. Because most of the physical data on asteroids is derived from meteorites, which serve as asteroid analogues, assessment of the accuracy of said analogues when compared to specific asteroid groups is critical to spectroscopy based study. Due to their proximity to Earth, this analysis focuses on the viability of mining the four types of near-Earth asteroids: Atiras, Atens, Apollos, and Amors.

Zachary Harris – Chemistry

Mentors: Bommanna Loganathan & James Hardin

Chemical Characterization of Bioburner Emissions: Preliminary Observations

Direct conversion of underutilized agricultural biomass feedstocks to energy may provide a valuable and environmentally sustainable heat source for buildings. Murray State University's Hutson School of Agriculture has installed a 100 kBTU/hr biomass burner (BB100 Bio-Burner, LEI Industries, Madisonville, KY) at the Garrett Center to evaluate various crops and biomass materials as energy sources. Previous studies have shown that agricultural waste burning releases a variety of chemical species into the atmosphere. However, very limited information is available on the chemistry of emissions from different feedstocks in biomass burners similar to the LEI ZBio-Burner. In this study, we have characterized emissions from wood chips, sorghum, miscanthus, switchgrass, and corn stalks burned in the Bio-Burner. Emissions were collected using a low flow air sampler drawing flue gas through a charcoal cartridge. Chemical composition was analyzed using gas chromatography and mass spectrometry (GC-MS). Analysis of the sample extracts revealed presence of CO₂, CO, H₂O, and various hydrocarbons in the emissions.

Bradley Hartman - Aquatic Biology**Mentor: Everett Weber*****A Cost Efficient Method, in Conjunction with EPA Method 7474, of Detecting Mercury Contamination in Fish Tissues***

Mercury is a highly toxic metallic substance that is a persistent, bio-accumulative, biomagnified environmental contaminant, and is known to cause multiple adverse medical side effects in humans such as damage to the brain, kidney, lungs, and even increases in chances of cardiovascular disease. The biggest source of human mercury poisoning is through the consumption of fish that inhabit contaminated aquatic ecosystems. Current mercury testing methods are time-consuming, insensitive enough to detect the maximum allowable mercury levels in biological tissues established by governmental agencies, and expensive due to required specialized equipment such as an atomic fluorescence spectrometer. By developing a cost efficient and accurate method of mercury testing, universities, research labs, hospitals, and many other organizations that do not possess an atomic fluorescence spectrometer would have an opportunity for increased research and monitoring of mercury contamination levels. Boris' Mercury Check™ (BCM) test strips can detect mercury levels in water, are inexpensive, and are sensitive to a concentration of 2 parts per billion, the Maximum Concentration Level established by the United States Environmental Protection Agency (EPA). During a preliminary study, where fish tissues were emulsified in an aqueous solution and spiked with predetermined mercury concentrations, we found that the biological tissue either interfered with the test strips ability to detect mercury or absorbed any mercury that was present, and that further method development and research was required. We expanded our previous study by thermally digesting fish tissues with an acid solution in conjunction with EPA Method 7473 (4), and tested fish tissues from several species that have low, medium, and high ranges of expected mercury bioaccumulation, a laboratory control sample, and spiked samples with predetermined mercury concentrations with the BCM test strips. The replicate of each sample will be verified by an atomic fluorescence spectrometer at a later date.

Lori Henry & Nicole Schmittou – Nutrition & Dietetics**Mentor: Beth Rice*****The Acceptability of Cashew Cream as a Fat Replacer to Increase Quality of Fat in Ice Cream***

The purpose of this experiment is to determine the effects of the replacement of whole milk and heavy cream with cashews on the melting and freezing points, texture, appearance, and taste of ice cream. Can an ice cream product having similar properties of a conventional home-made ice cream be produced using a cashew-based fat replacer in the place of heavy cream?

Brenton Hereford – International Studies**Mentor: Ann Beck*****U.S Sugar Subsidies: For Better or Worse?***

To what extent, do current U.S sugar subsidies affect the sugar production in Brazil? I began by dividing the schools of thought: Government Subsidies increase Brazilian sugar production, Government Subsidies decrease Brazilian sugar production, Government subsidies have no effect, and Brazilian sugar subsidies affect U.S. sugar production. Then, I began to research for evidence and papers to support each school. The most reliable school of thought is that U.S. Government Subsidies decrease the sugar production in Brazil. This supports the idea that developed countries' government subsidies drastically influx the price of goods, such as sugar, thereby decreasing the world prices of goods and decreasing the production of goods in the developing world.

Ashlyn Herke – Spanish**Mentors: Susan Drake & Janice Morgan*****Chico y Rita: A Historical Revolutionary Musical***

The Cuban Revolution in the 1950s that culminated in Fidel Castro's triumphant arrival in Havana and the ousting of dictator Fulgencio Batista in 1959, was a time of strife and reform for the country and its people. The many effects and changes in society can be seen in many aspects of the Cuban animated musical *Chico y Rita*, which follows the lives of two Cuban musicians. *Chico y Rita* begins in Cuba in 1948 and illustrates the Cuban revolution's effects on society through its animation style representing historical events and use of music, especially jazz and the genre of musical theater and film, such as *Moulin Rouge* and Disney animated musicals.

Kristina Herrera - Chemistry**Mentor: Daniel Johnson*****Monitoring Chemical Methylation of Peptides with LC-MS/MS and Microchip Electrophoresis***

This research explored the use of reductive methylation to selectively label peptides with a variable number of methyl groups. The primary goal was to produce peptides of varying methylation states that could be used to create an enzymatic methylation assay using microfluidic techniques. A 13-amino acid peptide (synthetically derived from the H3 histone protein) containing two lysines was subjected to reductive methylation with formaldehyde and dimethylaminoborane. Reaction conditions were altered—adjusting reaction time and reductant-peptide ratios—in order to obtain multiple methylation states of the peptide. The resulting products were analyzed via liquid chromatography-tandem (triple quadrupole) mass spectrometry, in order to determine the location and extent of methylation at each of three possible methylation sites. Chromatographic conditions were optimized by adjusting method parameters such as column temperature, flow rate, and organic content of mobile phase. Mass spectrometer parameters were adjusted to yield information regarding methylation state of the peptide. Furthermore, methylated peptide mixtures were subjected to fluorescent labelling and separation via microchip electrophoresis. The results from chromatographic and electrophoretic separations, as well as mass spectrometric data regarding methylation reaction progress and product ion scan-based monitoring of methylation sites will be presented.

Amber Higgins, Kathryn McAllister, & Desmond Etheridge – Occupational Safety & Health

Mentor: Tracey Wortham

Hospital Food Service Ergonomic Assessment

This presentation will include an analysis of ergonomic issues at a food service department at a health care facility in Western Kentucky. Three members of OSH 663 Applied Workplace Ergonomics visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in Café line worker, food tray preparer, and food cart loader tasks using techniques such as the Strain Index, ACGIH Hand Activity Level, Rapid Upper Limb Assessment, 2D Biomechanics Model, Liberty Mutual Table for pushing/pulling, NIOSH lifting Equation, and Liberty Mutual Table for lifting and lowering. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Brandon Hoehn, Meghan Cavins, & Blake Jones - Occupational Safety and Health

Mentor: Tracey Wortham

Ergonomic Assessment of Profiles Salon and Spa

This presentation will include an analysis of ergonomic issues at a Salon and Spa in Western Kentucky. Three members of OSH 663 Applied Workplace Ergonomics visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in Hair Cutting, Hair washing, and Hair Coloring Tasks using techniques such as Rapid Upper Limb Assessment, Strain Index, ACGIH's HAL TLV, and ergonomic checklists. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Hunter Hogan – Political Science

Mentor: Ann Beck

Feasibility of Complete Conversion to Natural Gas-Fueled Heavy-Vehicles in the United States

The question of whether complete conversion of all heavy-vehicles in the United States to natural gas has been partly researched by multiple scholars and industry experts, but not completely focused on. However, many different variables, such as- economics, the environment, and infrastructure issues- have been examined to find a conclusion. After thorough examination of the literature, it can be concluded that complete conversion of heavy-vehicles in the United States to natural gas is feasible, if infrastructure improvements are made and government incentives continue to be implemented and extended. The question of whether it is feasible to convert all heavy-vehicles in the United States to natural gas has been examined through many different avenues. Different theories on the subject, involving-economics, the environment, and infrastructure capacity- all try to come to a final conclusion. After thorough analysis of the literature, it can be concluded that conversion of heavy-vehicles in the United States to natural gas is feasible if infrastructure improvements are made and government incentives continue to progress.

Michael Holloway, Jeremy Turner, & Kent Sumner - Occupational Safety and Health

Mentor: Tracey Wortham

Ergonomic Research Study: City of Murray Operations

This presentation will include an analysis of ergonomic issues at a Clothing Distribution Center located in Kentucky. Four members of OSH 663 Applied Workplace Ergonomics course visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in manual handling job tasks. Team members used techniques such as: NIOSH Lifting Equation, Rapid Entire Body Assessment, Strain Index, ACGIH TLV, Rapid Upper Limb Assessment, and employees' discomfort surveys. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Jonathan Huether – Biological Science

Mentor: Terry Derting

An Analysis of Nightly Bat Activity in Relation to Lunar Cycles

Guidelines are established annually by the USFWS that mandate survey methods of endangered species of bats. These guidelines stipulate the ambient conditions that are suitable for conducting summer mist net surveys, including temperature, wind speed, sky cover, and precipitation. Several studies have documented significant effects of lunar illumination and moon phase on the nightly activity of bat species; however, conflicting conclusions have been made regarding how these factors impact summer bat survey data. We investigated relationships between bat captures, ambient conditions (temperature, sky cover, & wind speed), moon phase, and lunar illumination. We tested the null hypothesis that bat activity is not affected by lunar cycles. We calculated nightly capture rates of four bat species utilizing KY summer survey data for 2005-2012, from the USFWS. Regression analysis showed that ambient temperature was positively and/or negatively associated with the capture rate of the species studied. Bat capture rates were not significantly affected by lunar illumination. When the number of bats captured was analyzed in relation to moon phase, a significant lunar effect was associated with the species *Lasiurus borealis* and *Eptesicus fuscus*. *Lasiurus borealis* exhibited some "lunar phobia", showing significantly fewer captures on full moon nights than expected, but the data do not strongly support lunar phobia trends due to the inconsistency of this activity. Based on this, we rejected our null hypothesis that bat activity is not affected by lunar cycles.

Nhan Huynh – Biological Science

Mentor: Alexey Arkov

Characterization of Tudor Protein Complex in Drosophila Germline Stem Cells

Germline stem cells belong to a unique class of stem cells that give rise to next generation individuals and, therefore, are responsible for the continuity of life. Our research focuses on the identification and characterization of molecules which control the development and maintenance of germline cells. One of the proteins, which is crucial for these cells, is Tudor (Tud) protein. This protein contains 11 modules called Tud domains which interact with other polypeptides. Using biochemical approaches, we have identified proteins which associate with Tud in germline cells and are in the process of their characterization. Our data are consistent with the hypothesis that Tud is a scaffold protein which recruits multiple polypeptides to specific structures called germ granules which are required for germline development.

Michael George Hyatt – Chemistry

Mentor: Rachel Allenbaugh

A Series of Metallomesogens with Branched Bipyridine Ligands and Transition Metal Complex Mechanochemical Synthesis

Metal-based liquid crystals tend to have high onset temperatures which prevents them from being used for practical applications. To address this problem the effect of beta-branching on the thermal properties in dialkyl-2,2'-bipyridyl 4,4'-dicarboxylate complexes $PtL\beta 16Cl_2$, $AgL\beta 162(DOS)$ and $[AgL\beta 16NO_3] \cdot 0.5 C_6H_{14}$ was investigated. These complexes were characterized by IR spectroscopy, 1H and ^{13}C NMR spectroscopy, thermogravimetric analysis, differential scanning calorimetry and elemental analysis. The improvement of yield, reaction time and purification process for these reactions along with the synthesis of $[Pt(C_6N_4H_{12})(H_2O)_2Cl]Cl \cdot H_2O$ was explored through the use of mechanochemistry.

Caitlin Isbell – Political Science

Mentor: Ann Beck

To What Extent of Women Profession Occupational Attainment Affect Their Likelihood of Gaining the State Political Office?

The research question being asked in this paper is, to what extent of women profession occupational attainment effect their likelihood of gaining the State political office? The documents uses different source to see if there is a correlation between the increase in success for women in the job market and the odds of women holding political office at the state level.

Anne Jablinski – Animal Science

Mentor: Tony Brannon

Biomass- Green Energy for the Future of Agriculture

There is a growing trend towards the promotion of sustainability in the world of agriculture, particularly through alternative sources of energy than fossil fuels. Biomass, vegetative waste from energy crops such as switch grass and sorghum, is a key input for transforming the face of energy for the future of Kentucky, the nation, and the world. The purpose of this particular agricultural experiment at Murray State University using the Bio-Burner 100 unit from L.E.I products in Madisonville, KY, was to determine the most efficient biomass as input for output of energy in the form of heat, and as a preliminary trial for burns utilizing larger burning units. Loose and pelleted forms of switch grass, energy sorghum, Miscanthus, equine waste and wood shavings were burned over eight-hour periods in outdoor temperatures below 55°F. Factors including burn and ash weight, ash clinkers, fan and fuel speed, and chemical and BTU measurements taken by Twin Ports Testing were recorded to assist in determining the success of each burn trial and overall energy balance. Upon analysis of the data, the biomass with the most efficient burn proved to be the wood shavings. The least efficient burn proved to be the forage-based biomass, which included Miscanthus, switch grass and sorghum. Forages burn less efficiently due to their high sugar content, heavy ash production, and need for a high volume of dry matter. The application of this experiment with biomass as energy is vital for improving sustainability in equine and farm-level operations.

Derrick Jent – Biological Science

Mentor: Claire Fuller

A Fungal Pathogen of the Cellar Spider, Pholcus phalangioides

Pholcus phalangioides (cellar spider) is an introduced species in North America. Since they require a warm environment, they are common in homes and other buildings occupied by humans. It has been proposed that *P. phalangioides*, whose bite is harmless to humans, may be important in limiting numbers of *Loxosceles reclusa*, the brown recluse spider. Occasionally *P. phalangioides* is found dead and covered in a dense white fungus. We first determined what fungi were associated with cellar spiders by plating fungal covered spiders on potato dextrose agar. Six species of fungus, including four putative pathogens, were isolated and sent to the USDA for identification. We then tested to determine whether the identified fungi were pathogenic to *P. phalangioides*. Live spiders were collected and exposed to each possible fungal pathogen (6 individuals per fungal species). Only one fungus, *Engyodontium aranearum*, resulted in significantly higher mortality. In further tests exposure to *E. aranearum* resulted in a 100 percent mortality between days 13-20 post-exposure in infected spiders (N = 13) compared to no mortality in uninfected spiders (N = 12). The outcome strongly suggests that *P. Phalangioides* is susceptible to this fungal pathogen; the fungus may be common in many homes considering the spiders almost world-wide distribution. Given that the presence of *P. phalangioides* may be effective in regulating populations of potentially dangerous spiders it is important to understand the factors affecting it's environment.

Rachel Jones & Meagan Miller – Food Service Management

Mentor: Beth Rice

The Effects on Viscosity and Acceptability When Substituting Different Variable Fats in Cookies to Improve Nutritional Value

The goal is to find out which variable would be the best substitute to create a healthier snack for on the go. The purpose of this experiment is to see the difference between cookies made with butter, then flaxseed, and bananas as variable substitutes. The variable cookies will still be tasty but with health benefits.

Kaitlynn Kessinger - Dietetics

Mentor: Beth Rice

Improving Nutrition in Banana Bread by Replacing Oil with Fat-Free Substitutions

Obesity has become a major issue in the United States. Americans are consuming larger quantities of fat than what is necessary in their daily diet. Quick breads, such as banana bread, tend to have a high fat content. Reducing the fat content by replacing vegetable oil with a low-fat or no-fat alternative, such as unsweetened applesauce or non-fat greek yogurt would make the product have an overall lower fat content and be considered healthier to consume. Will banana bread containing unsweetened applesauce or greek yogurt instead of vegetable oil still have similar sensory qualities and be considered acceptable to consumers? The purpose of this experiment is to determine the effect on taste, texture, and volume of banana bread when its fat is replaced with an alternative component.

Sarah King - Economics

Mentor: Not Submitted - Requested

The Education Levels for Women Joining the Labor Force

Women's roles have evolved over several decades. In the early 1900's, women's main role was housewife but then this changed and they joined the labor force during the Great Depression to make more income. During the World War II period there was a greater need for women to join the labor force, because of the shortage of male workers in the labor market. Certain studies showed women stayed in the labor force even after the war when the men returned home. Today, women are getting a higher level of education to have a higher paying job. By getting a higher level of education, this leads women to enter the labor force. The main focus on this paper is how much an impact education is for women joining the labor force. Women with a higher education tend to have a higher paying job.

Terry Allen Kirk - Spanish

Mentor: Janice Morgan

Los de Abajo: The History of the Novel; The Novel of History

The period of the Mexican Revolution was a time of great change, and great controversy for the citizens of Mexico. With his novel “Los de Abajo” Mario Azuela depicts in detail the lives of the common people during this time frame, and how they were transformed from every day land laborers to hard-nosed rebels fighting against those who held political power. Not only are the fictional characters placed into the setting of the Revolution, but the actual events of the war converge with the lives of the fictional characters. However there has been debate through the years of whether or not novel is no more than unconnected scenes of the war without any deeper meaning other than entertainment, or if there is a real sense of unity and reason behind the actions that take place inside the text. Azuela uses his novel to not only describe and represent the war itself, but also the underlying themes that drove it.

Emily Knoth - Geosciences

Mentor: Haluk Cetin

Change Detection of the Carbon River: A Case Study at Mount Rainier National Park, WA

The Carbon River, located in Mount Rainier National Park, is a free flowing glacially fed river. The area averages 70-90 inches of rainfall each year, resulting in a temperate rainforest environment. The Carbon glacier, which feeds the river, resides at 3500 feet, making it the lowest elevation glacier in the contiguous United States. The river is contained by old growth forests but is unstable and has presented hazards in the past. Massive flooding and aggradation of streams contributed to the closure of the Carbon River Road in 2006, restricting access to the park from the northwest. The purpose of this study is to analyze the geomorphological features of the Carbon River, and determine what changes have taken place over a 10 year period. This data should provide a clue as to whether the river is stable in particular areas, which could further be used to help determine which areas are safe for public access.

Benjamin Linzy – History & Criminal Justice

Mentor: David Pizzo

Conflicts in Sudan: How Did We Get Here?

In 2011 South Sudan won its independence from Sudan, since that time tensions between the two nations have remained high. Often boiling over into armed clashes between the two nations. This violence when taken into consideration alongside the continuing crisis in Darfur, paints a disturbing picture. In this paper, the author will examine the British-Egyptian Colonial construction of Sudan and its implication in the current conflicts. In addition, the impact of the international oil economy on the two nations will be considered.

David K. Livingston - Wildlife Conservation**Mentor: Howard Whiteman*****Gin Creek WMA Restoration***

Aquatic ecosystems, streams, rivers, wetlands, and estuaries are under considerable pressure from human activities, including the incorrect disposal of trash. Sources of aquatic debris come from several categories; litter from recreational activities and fast food consumption, fishing related items from recreational and commercial fishermen including nets, fishing line, and bait boxes; litter from smoking; illegal dumping activities including appliances, building and construction waste, tires, and cars; and items that come from sewer overflow. Whether these items enter the aquatic environment from dumping, litter, or accidental routes, debris not only is aesthetically unpleasant, it is economically costly, and it degrades the animals and plants habitat. The Gin Creek Unit of the Big Sandy Wildlife Management Area located in southeastern Henry County, Tennessee has not been spared from the influence of anthropogenic activities. Illegal dumping, littering by vehicles traveling on US 641, shot gun shells, beverage and snack food containers, tobacco dip canisters, bait boxes, all left by outdoor enthusiasts, and the debris that comes from the Big Sandy River when it overflows, as well as the trash that comes from upstream Gin Creek have taken its toll on the WMA. To relieve the stress on the area, all of the debris from Gin Creek's point of origin to the area where it flows through the Gin Creek WMA into the Big Sandy River was removed. The Tennessee Wildlife Resource Agency was notified about the illegal dumping.

Jennifer Martin - Geosciences**Mentor: Lara Homsey*****Reconstructing the Geologic Environment at Tigre Dorado, a Pliocene Fossil Location in Southwestern Kansas***

The Meade Basin in southwestern Kansas contains well preserved Pliocene-aged deposits that include numerous fossil-rich sites. While continuing work on the Meade Basin Rodent Project, a long-term evolutionary biology project, researchers discovered the fossilized remains of a saber-tooth cat at a site they named Tigre Dorado. This site is located near other well studied, fossil rich sites. The purpose of this project was two-fold. The fossil locations are separated by erosional valleys are the sites are not clearly correlated. The first goal of this project was to correlate these sites using traditional sedimentology techniques and reflectance spectroscopy. The second goal of this project was to determine the geologic environment present at the time the fossils were living and determine how that environment changed through time. The results of this project indicate that a fluvial (i.e. riverine) environment dominated the landscape during the Pliocene and that the fossil sites were formed by this single system. As time progressed, this fluvial system significantly lost energy and the landscape became increasingly arid.

Jennifer Martin - Geosciences

Mentor: Haluk Cetin

Mineral Exploration using AVIRIS Remotely Sensed Data

The Airborne Visible InfraRed Imaging Spectrometer (AVIRIS) provides spectral radiance of a target study area in 224 contiguous spectral bands ranging from 400 to 2500 nanometers (nm). AVIRIS data can be used to find mineral “signatures,” or properties of a spectrum that are specific to a given mineral. Once the minerals are identified, the signatures can be used to map the mineral distributions and relative abundances in a given study area. This study uses AVIRIS data from the Cuprite Mining District in Nevada provided by the Jet Propulsion Laboratory of NASA to explore these methods.

Santiago Martin – Biological Science

Mentor: Terry Derting

Summer Bat Demographics In Kentucky Remain Stable Through The Early Years Of White-Nose Syndrome

White-nose syndrome (WNS) has spread throughout most of the eastern United States causing high mortality in cave-dwelling bats in northeastern states; however, impacts in more southern states are unclear. White-nose syndrome was first observed in Kentucky in April 2011 and no signs of high mortality were observed through 2013. The purpose of our research was to determine if capture rates differed pre- and post-WNS in Kentucky. We used statewide bat capture records from Indiana bat surveys, conducted from 2004-2013 in Kentucky. We pooled data into three disease periods: pre-WNS (2008–2009), WNS detection (2010–2011), and post-WNS (2012-2013). We tested the effect of disease period on capture rates using separate negative binomial models for each of three categories of bats: congregating cave-dwelling, non-congregating cave-dwelling, and non-cave dwelling species. There were no significant differences in capture rates between the disease periods within any category of bat species. Furthermore, capture rates did not differ pre- and post-WNS for the most commonly captured species. The results suggest that WNS has not had a noticeable impact on summer bat populations during the first two years of its documented appearance in the state. Analysis of winter population data is needed to verify the impact, or lack thereof, of WNS on Kentucky bat populations.

Tim Martin – Geo-Archeology

Mentor: Haluk Cetin

Detecting Erosional Patterns in an Archaeological Site Located in a Lacustrine Environment Using Remote Sensing

The assessment of an archaeological site includes the integrity of the landscape in which it resides in. The importance of defining the rate at which a site degrades can determine if the site is worth maintaining as a significant contribution to the past. This is especially needed in sites located in fluvial and coastal environments because of the high rate of depositional loss. The study site, 15Tr477, has been photographed by air since the 1930's which allows for the site to be observed before the lake was flooded. The newer National Agriculture Imagery Program (NAIP) imagery allows for new procedures to be applied, such as image to image registration, to the historic photos. With the combination of historic photos and modern NAIP imagery the ability to track the rate of the erosional pattern can help determine if a site is in jeopardy of being degraded beyond repair. By studying sites which are impacted by erosional loss, through remote sensing, valuable information can provide an assessment of how much historical information being lost along with the integrity of the site.

Virginia McClure – Geology/GIS

Mentor: Haluk Cetin

Mapping Hydrothermal Features of the Norris Geyser Basin in Yellowstone National Park Using Satellite Imagery

The Norris Geyser Basin is located within Yellowstone National Park. It is the location of varied hydrothermal and geothermal features, which distinguish this park. These features have captivated visitors and scientists since the late nineteenth century. Among the many other hallmarks represented is the largest active geyser in the world, the Steamboat Geyser. There are current efforts to monitor these features through remote sensing by the US Geological Survey and the Yellowstone Volcano Observatory. Monitoring these dynamic features is important for understanding the nature of these changing systems and their locations. By utilizing Landsat 8, Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), and utilizing collected thermal data including the Global Positioning System (GPS) coordinates of locations, maps were generated to demonstrate the temperature variance of these features along with their locations.

Ronald Merrick - Environmental Geology

Mentor: Haluk Cetin

Change Detection of the Lower Little River Watershed, Kentucky, From 1988 to 2013 Using Landsat Imagery

The lower Little River Watershed (LRW) covers an area of 41,835 acres in Western Kentucky. It is drained by Little River, which flows into Little River Bay in Lake Barkley. This bay is the home to Lake Barkley State Resort Park and is primarily used for fishing and recreation. The river provides drainage of surface runoff for the city of Cadiz, Kentucky, and an extensive agricultural area surrounding the small city. According to Kentucky Watershed and The Environmental Protection Agency (EPA), Little River was found to be polluted for over 80 river miles or most of its length, with sediments, silts, mercury, phosphorous, and nitrates. These agencies assert that the cause of this pollution is a conversion of forested land to agriculture. In contrast, Little River Bay on Lake Barkley remains in good condition and is suited to primary and secondary contact and aquatic life (My Waterway, 2013). In this study, multispectral imagery, specifically Landsat Thematic Mapper (TM), Enhanced Thematic Mapper plus (ETM+), and Landsat 8, were used to quantify the extent to which the lower LRW has been converted from forest to cropland over the last 25 years. An ISODATA post-classification comparison technique was run using ENVI on Landsat Images from 1988, 2000, and 2013, where it was determined that there were seven main classes. Then a change detection was run between those classification maps to identify the areas of significant change and determine if either the earlier or later portion of the time frame experienced greater change. For the entire 25-year period from 1988 to 2013, the forest to crop change indicated in the change detection is 30.2 km². It was found that between 1988 and 2000, 2.5 km² was converted from forest to agriculture and from 2000 to 2013 the change in this category was measured at 26.7 km². While the sum from the two periods very closely correlate to the total time frame, the overall change from forest to agriculture was surprisingly low. Other significant results included a slight contribution of exchange in hay and pasture land to and from forest and a very high percentage, 86.21%, of the land area that did not experience any change in class. The change in land use and land cover over this particular 25-year time period was not significant. Although somewhat surprising that there was so little change, the pollution in Little River is still significant. It could be that the most critical land changes from forest to agriculture that led to the pollution and associated environmental impacts had largely occurred prior to 1988, outside the scope of this study. Also plausible is that there is point source pollution contributing to the condition of the river or it is due to localized changes within the watershed, but forest to agriculture change in one area was offset by agriculture to forest change in another area. The change detections support this to some degree. Lastly, the significant changes could have occurred before 1988, or the hydrogeological features of the areas changed to agriculture could have a much more significant impact due to drainage rates, soil composition, residence time or simple distance to the river. These topics should be explored in future studies of the LRW in order to gain a greater environmental understanding.

Amber Miller, Scott Duckworth, Dan Wang, & Ziling Zhou - Occupational Safety & Health

Mentor: Tracey Wortham

Ergonomic Case Study: Clothing Distribution Center

This presentation will include an analysis of ergonomic issues at a Clothing Distribution Center located in Kentucky. Four members of OSH 663 Applied Workplace Ergonomics course visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in manual handling job tasks. Team members used techniques such as: NIOSH Lifting Equation, Rapid Entire Body Assessment, Strain Index, ACGIH TLV, Rapid Upper Limb Assessment, and employees' discomfort surveys. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Taylor Miller – Political Science

Mentor: Ann Beck

Latinos for Latinos

I explore Latino voting habits and answer the question: are Latinos more likely to vote for other Latinos in state and local elections in the United States? Previously done research seems to be split on answering this question, and offer different explanations. I use a variety of pre-election surveys, election results, and exit polls to draw my conclusions.

Kristen Mills – Math

Mentor: Robert Donnelly

Rational Trigonometry

A brief overview of rational trigonometry with comparison to classical trigonometry. Pros and cons of each style in relation to education will be discussed with emphasis on Common Core Requirements for trigonometry.

Michael P. Moore – Watershed Science

Mentor: Howard Whiteman

Sex Machines: Evaluating the Reproductive Strategies of Alternate Morphotypes in a Salamander

Polyphenisms, the environmental induction of discrete phenotypes, provide excellent systems for understanding how phenotypes interact with environmental conditions to influence fitness. Facultatively paedomorphic salamanders express two adult morphotypes, terrestrial metamorphs and aquatic paedomorphs, which differ in morphology, physiology, life history, and behavior. Using data from long-term population monitoring of Arizona Tiger Salamanders, we investigated how reproductive strategies differed between the two morphotypes. We predicted that paedomorphs would exhibit increased reproductive effort as a means to mitigate the fitness costs associated with the inability to disperse from spatiotemporally heterogeneous habitats. Overall, we found that paedomorphs reproduced for the first time at a younger age and smaller size than metamorphs. However, we found evidence of sex-specific trade-offs between the age and size at first reproduction, whereby increases in body size delayed first reproduction more in male metamorphs than male paedomorphs. Additionally, paedomorphs had a shorter interval between breeding events, and produced larger eggs, but no differences in clutch size. Together, these findings indicate that paedomorphs tend to invest more in reproduction than metamorphs, but that reproductive strategies strongly depend on body size differences.

Samantha Moore – Clinical Psychology

Mentor: Maria Vazquez

Introversión, Social Support, and Depression Risk

Previous studies have shown that both high neuroticism and low extroversion (or introversion) lead to increased risk for depression. Social support has also been shown to have a strong relationship with depression. This study looks at why introversion is related to depression risk and if this relationship looks different across age groups. 51 college aged students and 49 people over 60 filled out a survey online. A mediation analysis was conducted and found that social support acted as a mediator for introversion and depression, and this pattern was the same for the older and younger groups. Neuroticism, however, was not mediated by social support. Furthermore, there were some differences between the age groups with younger participants having significantly higher neuroticism scores and higher depression scores.

Hunter Morgan - Dietetics

Mentor: Beth Rice

Improving the Nutritional Quality of Pudding with Chia Seeds

The purpose of this experiment will be to increase the protein, fiber, alpha-linolenic acid (Omega-3), and mineral content of pudding while maintaining an acceptable product by replacing the thickening starch of tapioca with chia seeds. How much product acceptability will be sacrificed to increase nutritional content of this product, if any?

Md Niaz Morshed – Geosciences**Mentor: Haluk Cetin*****Land-use and Land-cover Change in Dhaka City, Bangladesh: A GIS and Remote Sensing Approach***

Dhaka, the capital city of Bangladesh, is considered as the eighth largest city in the world because of its land area and high population density. The rapid change in Land-use and Land-cover (LULC) and unplanned urban expansion is receiving considerable attention from the local policy makers and international community. This study used Geographic Information System (GIS) and remote sensing techniques to examine the pattern and direction of LULC change in Dhaka metropolitan city. This study utilized three different remotely sensed datasets in order to analyze LULC classes and their potential individually. Remotely sensed data including Landsat Thematic Mapper (TM), Enhanced Thematic Mapper plus (ETM+) and Operational Land Imager (OLI) were used to estimate the pattern and direction of the LULC change. This study used a supervised classification procedure because of its better control over the classification and error detection, and making corrections. A Post classification comparison change detection techniques was used to estimate the major change between different land classes. The study revealed that built-up area increased significantly from 1989 to 2014 with an annual expansion of 81.54%. This analysis also quantified that this significant growth of built-up areas in the study area resulted from the substantial decrease of vegetation cover and potential agricultural land. It was apparent that 87.77% of the significant change occurred in agricultural land over the study period. Results drawn from this research should contribute to the update of LULC information, forecasting possible future LULC change and ensuring the sustainable development of the city.

Matthew Oliver - Engineering Graphics and Design**Mentor: Emre Bahadır*****Gravity Power***

Gravity has been used for thousands of years by means of water. Hydropower systems use gravity and the weight of water to generate power. So the goal for this project is to create a system that can be set and will create a set amount of power over a given time span. The basic design of the prototype will be using a chain pulley system that will increase in revolutions per minute every chain set it goes through. A weight will be put on to the system which will drop due to gravity and set the sprockets in motion. The weight will be interchangeable to test different output power using a high efficiency inversion motor rewire to produce DC power. The suggested system is based on the principle of conservation of energy. A heavy weight will slowly descend with a fly-wheel and sprocket system. The sprocket and fly-wheel combination will provide a steady and slow motion of the weight with high rpm output. Steady, high rpm rotation will be used to rotate a generator. The generator will be used to create electrical energy and store that energy on a battery. The initial system will be created with about 450lbs weight to rotate a 200lb fly-wheel to reach close to 8000 output rpm. With the help of the sprockets, 0.0305 input rpm or 1.83 revolutions per second will be enough to generate 8000 output rpm. The system is similar to longcase clock (grandfather clock) that runs by the falling weights.

Sgoff Oliver - Economics

Mentor: Jack Cheng

The Effect of Government Spending on the US-Economy in a VAR-model

In this research paper we will determine the effect of government spending in the US on GDP and its components, as there are consumption, investment and net exports, using a VAR-Model. Afterwards we shock government spending to examine the impulse responses of the other components and get to the conclusion that the data fits better to the New Keynesian than to the New Classical approach. The result shows a significant increase in consumption and GDP and some crowding out of investment.

Kiersten Owen - Nutrition

Mentor: Beth Rice

The Effects of Avocado and Greek Yogurt as Fat Substitutions in Chocolate Cake

I will be making a chocolate cake recipe using a control of vegetable oil and two variables; avocado and Greek yogurt. This will give the cake more nutritional value while cutting the fat content. People will be taste testing these three products to see which one tastes the best and has the best texture.

Michael Pate - Geoscience

Mentor: Haluk Cetin

The Retrieval of Glaciers in Mt. McKinley

Through the past century, with the invention of the automobile and the industrial revolution, glaciers have been retreating due to changes of our climate. A large portion of fresh water is trapped within these glaciers and poles, which can be problematic in many ways. Not only will sea levels continue to rise, but fresh water that is trapped within the poles and glaciers will continue and quite possibly diminish completely if appropriate actions are not taken. The reason for choosing Mt. McKinley, is because it is one of the more northern mountain ranges located in the United States. Diverse data are available for the area, since the US government has implemented different types of conservation and monitoring programs. The location of these glaciers is likely to provide vital signs to whether or not there is significance in the way that humans are affecting our environment through the burning of fossil fuels. Through remote sensing techniques, classification of Landsat imagery and performing change detection through the subtraction of two multi-temporal images, rates at which glaciers are retreating can be achieved. The main focus of this study is to examine how quickly these glaciers are retreating and if there is a significant change in the rate at which they are retreating. The time period for this project is for the past 30 years, due to the Landsat data available.

Alyssa Peek – Political Science

Mentor: Ann Beck

Producing Highly Qualified State Judges: Three Perspectives

Research Question: To what extent do current selection procedures produce highly qualified state judges in the United States? This paper explores the long debated controversy of what selection method procedure produces the most qualified judges in state courts in the United States. It examines three schools of thought that each present different ideals on selection methods. Based on the research, evidence, and logic, the conclusion looks to be that merit selection with an emphasis on judicial independence will be the most supported and valid argument.

Scot Peterson - Watershed Science

Mentor: Howard Whiteman

Drought Effects on Benthic Macroinvertebrate Recolonization in a Degraded Stream: Implications for Restoration and Management

Streams are imperiled in anthropogenically dominated landscapes, yet our understanding of the ability of invertebrates to recolonize after perturbations is lacking. To predict its ability to recover from disturbances related to climate change and future restoration efforts, we assessed benthic macroinvertebrate community recolonization in an agriculturally impacted 3rd order stream in western Colorado, USA. During two years of consecutive drought (2012 and 2013), we compared communities at two sites of varying degradation using recolonization traps (upstream, downstream, aerial, hyporheic, and control) and benthic samplers (surbers and cores). Overall, community composition was different between sites. Although benthic sampling showed no annual variation in biomass within sites, recolonization traps generally captured lower biomass during 2013. In particular, the greatest reduction in recolonization biomass was found at the disturbed lower site, suggesting that drought has a more pronounced effect on disturbed stream reaches. Our findings suggest that the recovery of restored stream ecosystems may depend on the degree to which restoration projects coincide with disturbances, such as drought.

Allison Petterson, Patrick Brazelton, Luke Miller, & Derek Hinsey – Marketing

Mentor: Terence L. Holmes

Murray State University Students Perceptions of University Tobacco Policies

Our group, "The Dream Team", was assigned to task of creating a survey to conduct for a Murray State University Marketing Research course. We decided to survey on tobacco policies (We are, after all, located in Kentucky). We created a survey through surveymonkey.com to poll students on what their opinions of this sometimes controversial issue are.

Grace Porter - Watershed Science**Mentor: Kate He*****The Effects of Levee Building on Tree Growth in a Bottomland Hardwood Forest***

The bottomland hardwood forests of the Mississippi Alluvial Valley in the southeastern US are one of the most degraded and threatened wetland ecosystems on Earth. Currently, only about 2.8 million hectares remain of approximately 50 million hectares of original bottomland hardwood forest. Levee building is one of the most prevalent and damaging disturbances to the system. This research explores the effects of levee building on wetland primary productivity measured in tree growth of a dominant forest tree, *Quercus lyrata* (overcup oak). Dendrochronology was used to reconstruct the ecological history of a levee-divided riverine forest in northeastern Louisiana at the site of the largest current bottomland hardwood restoration effort in the USA. Dendrochronological analysis showed several periods of growth suppression, possibly due to levee construction. Relatively strong inter-series correlations were found for both sides of the river, suggesting that tree cores from each area, leveed and un-leveed, followed the same general pattern of growth throughout the studied time period. There is also evidence that after levee construction the growth patterns between trees within the levee deviated from the growth pattern observed in trees that remained connecting to the river flooding.

Victoria Ramlose – Equine Science**Mentor: Shea Porr*****Management of University Equitation Horses and its Effect on Soundness***

Interest in equine programs has been increasing during the last decade. This has resulted in a greater use of horses in university programs across the country. Lameness limits the use of the horses, hampers both the health of the animals and teaching and learning opportunities for students, and is an added financial burden to the university. In university equitation programs, horses are often ridden much less frequently in the summer, as courses are typically only offered in the fall and spring semesters. Previous research has noted that changes in exercise programs sometimes result in increased lameness in some horses. The focus of this project was to monitor the exercise level of university horses throughout the summer and fall semester to determine whether there was a correlation between the sudden rise in horse workload in the fall and any lameness that might develop during that semester. Data was collected weekly from May through December, and included exercise frequency and level as well as any lameness that developed. Workload was categorized into four groups: light, moderate, heavy, and extensive based on the scale developed by the 2007 NRC Nutrient Requirements for Horses. Lameness was documented by experienced horsemen and addressed by a veterinarian as needed. Lack of a correlation between lameness and summer horse use would indicate that the university could continue its current equestrian management strategies. However, if a correlation is discovered, subsequent research would evaluate the implementation of a regular exercise program throughout the summer and its impact on subsequent equine lameness.

Jennifer Ratajczyk – Political Science

Mentor: Ann Beck

The Effects of Active Military Combat Experience on Decision Making during Armed Conflict

To what extent does a Commander in Chief's active combat military experience affect his willingness to engage in US initiated armed conflict? This research examines the influences a Commander in Chief faces during decision making processes in armed conflict situations. Along with previous active military experience, the research will also examine two other areas that may affect decision making.

Melanie Reason - Environmental Geology

Mentor: Haluk Cetin

Land Cover and Water Quality in Land Between the Lakes, Kentucky

This research compares trends in water quality to changes in land cover over a period of ten years (1995-2006). Water quality data collected from 1995-2006, gathered from long-term water quality monitoring services, was plotted to identify trends. The parameters studied included dissolved oxygen, pH level, nitrogen and phosphorus measurements, turbidity, and conductivity. Land cover data was recorded from the 1992 and 2006 National Land Cover Database reports, and the amount of change in percent in each land cover class was calculated and then plotted in order to compare the amount of change in each land cover class to overall trends in the water quality parameters listed here. Further study must be conducted to quantify the direct and specific effects of changes in land cover on water quality in small watersheds.

Shannon Reed - Dietetics

Mentor: Beth Rice

The Acceptability of a Healthier Pizza Crust in Which Flour Is Replaced with Cauliflower

The purpose of this project is to make pizza crust healthier and gluten free by substituting cauliflower for regular flour. The control will be a pizza crust made with regular flour. The variable will be made with cauliflower shredded in a food processor. Through this project I am hoping to come up with a product that can help both people who are trying to eat more nutritious food and also those who must eat gluten-free.

Zachary K. Reeder - Chemistry

Mentor: Kevin Miller

Imidazolium-Containing Polyurethanes: Deciphering the Relationship between Structure and Thermal Properties

The interest in charge-containing polymers, commonly referred to as ionenes, has increased significantly over the past decade due to their potential application in areas such as electroactive devices and membrane separation sciences. Here, we report the synthesis and thermal properties (T_g and T_d) of several imidazolium-containing, linear, thermoplastic polyurethanes. During the course of this study, three key structural deviations were explored: (1) Hard Segment Content (NCO:OH ratio), (2) Soft Segment Content (PPG MW) and (3) Counteranion Selection .

Bradley Richardson – Biological Science

Mentor: Michael Flinn

A Dietary Comparison of Four Sympatric Relatives: Alligator Gar, Longnose Gar, Shortnose Gar, and Spotted Gar

During the past decade, increased efforts to reintroduce alligator gar *Atractosteus spatula* to the Lower Mississippi River basin have resulted in the early success of populations at low densities. To ensure sustainable populations of alligator gar, continued monitoring is crucial. The reintroduction of alligator gar to western Kentucky, places the species into a system from which it was absent for more than 50 years. Currently, the system is occupied by three other native gar species: Longnose Gar *Lepisosteus osseus*, Shortnose Gar *L. platostomus*, and Spotted Gar *L. oculatus*. This project aims to compare diets of these four species within Clarks River, Kentucky. Extirpation of the alligator gar may have allowed these close relatives to generalize their diets to fill the open niche. Scales and bones were collected from stomachs and used to identify prey items. Shad (Family: *Clupeidae*) was the most common prey fish found in the Clarks River and in the diet for three of the four gar species, occurring in 29.4% (alligator gar, n=12) to 58.8% (longnose gar, n=19) of stomachs containing prey. However, 40% of freshwater drum (Family: *Sciaenidae*) prey were found in alligator gar stomachs versus 21% across all gar species. This difference in drum composition, a bottom-dwelling species, suggests that alligator gar may prefer a more benthic location in the water column.

Matthew Richardson - Journalism

Mentor: David Eaton

Going Pro in Something Other Than Sports: Comparing Graduation Rates of the Student Body and Student-Athletes

The primary means of measuring success in college is through monitoring graduation rates of students. Only one measurement, named the Federal Graduation Rate (FGR), measures the rate of both student-athletes and the general student body on an even level. However, this measurement is fairly inaccurate for various reasons. The main criticism of the FGR is it counts transfer students as non-graduates, even if they finish school at another institution. In response, the NCAA instituted the Graduation Success Rate (GSR) in order to more accurately display the graduation rate of student-athletes, primarily to account for students who transfer schools or go pro before graduation. However, this new measurement only applies to student-athletes. So, the FGR remains the only direct comparison of graduation rates between them and the student body. This study takes a closer look at how both the FGR and GSR data is compiled, and analyzes the effectiveness and accuracy with which both measurements are reported. The overall national data will provide the foundation for the study, but graduation rates of students from the Southeastern Conference will be used to compare the success of a power conference with the overall national success.

Stephanie Rexing – Agronomy

Mentor: David Ferguson

Evaluation of Seed Treatment for Soybean Production in Western Kentucky in 2013

Growers continue to look for new innovative ways of boosting soybean yields. Seed treatments can be an effective way of protecting early seedlings from disease and insect pressure especially during cool damp environments, allowing the seed access to defense mechanisms, and sometimes triggering genes to aid in stress or initiating root growth at an early stage. For this particular study, the objective was evaluating various soybean seed treatments for growth and yield for growers in the western Kentucky production area. The seed treatments in observation consisted of 1) fludioxonil, mefenoxam fungicides, 2) thiamethoxam insecticide, 3) lipo-chitooligosaccharide, Bradyrhizobium inoculants, 4) harpin protein, 5) pyraclostrobin, metalaxyl, fluxapyroxad fungicide, 6) pyraclostrobin, metalaxyl, fluxapyroxad, imidacloprid, harpin protein, 7) mefenoxam, fludioxonil, thiamethoxam, 8) ipconazole, metalaxyl, lipo-chitooligosaccharide with inoculants, 9) control, no seed treatment, and 10) N,N'-diformyl urea. The plots were planted early on 9 May 2013 at a location on Murray State University research farm using a 4.9 maturity soybean planted with radial bean meters that better singulate the seeds. The 2013 growing season marked the third year of conducting this research with an addition of a new seed treatment and modifications to treatments 5 and 6. There were eight replications of the ten treatments studied. Plant population measurements taken over three dates were pooled and analyzed. The average plant population was 144,785 plants per hectare, with some highly significant differences found. Treatments 8 and 4 had significantly higher plant populations compared to treatments 7, 10, 3, 9, and 1. Growing conditions of the 2013 growing season offered ample rainfall with relatively cool temperatures. Observations of plant population, early vigor, insect counts, canopy closure, and lodging notes were monitored throughout the season. Harvest dates took place on 9 October 2013 and finished on 10 October 2013. Yields averaged to 3997.67 kg/ha with a 375.40 kg/ha difference between the highest yielding treatment and lowest. As a result, yields showed to have no significant difference between seed treatments at LSD of .10.

Hannah Robbins - Agronomy

Mentor: Iin Handayani

Soil Carbon, Nitrogen, and Aggregate Stability Associated with Common Agroecosystems in Western Kentucky

Soil carbon, nitrogen, and aggregate stability are the main indicators of soil quality. These properties are controlling factors in the success of sustainable agricultural production. The objective of this study was to evaluate the changes of soil C, N, C/N ratio, and aggregate stability under typical agroecosystems in western Kentucky. Composite soil samples were collected from selected counties at depths of 0-10 cm and 10-20 cm. The agroecosystems utilized for this study were conventional tillage, no tillage, organic farming, livestock pasture, and forests. Soil organic matter was determined using the method of loss of ignition (LOI). Soil total N was analyzed using the Kjeldahl method. Soil aggregates were measured using a wet sieving procedure. The results showed that the soil organic C was high in wooded areas and forage fields for the topsoil layers. Crop fields had a comparably lower amount of soil organic C in both top soil and sub soil layers. The percent aggregation is easily identifiable in every agroecosystems. The wooded areas tested had the greatest aggregate stability followed by the forage fields and finally the crop fields. Further details and discussion about this study will be presented in the poster.

Joan Rodriguez - Spanish

Mentor: Mica Garrett

Social Commentary in the Poetry of Nicolás Guillén and Luis Palés Matos

Nicolás Guillén and Luis Palés Matos lived in the same time period but in two different countries. Yet they are the two poets associated most strongly with Afro-Caribbean poetry. This project concentrates on the ways in which both of these men have influenced the Afro-Caribbean culture's perspective of the African race and its lasting influence in the region.

Carla Rothenbuecher - Watershed Science

Mentor: Howard Whiteman

Does Degradation Affect Ecosystem Function in Streams?

In stream ecosystems, riparian areas are the physical and biological interface between aquatic and terrestrial ecosystems. Riparian vegetative communities provide important ecosystem services to streams including shading and organic matter, which greatly influence energy sources such as primary productivity and litter fall. These processes play a vital role in stream function and yet have been subject to anthropogenic degradation. Of particular concern is degradation caused by livestock, where riparian habitat is impacted by direct consumption of vegetation and concentrated animal movement. Changes in riparian vegetation and habitat due to grazing may be adversely impacting stream function, yet no studies have investigated the effects of stream degradation on algal or detrital bottom-up pathways. In Kimball Creek (De Beque, CO), various amounts of stream channel and riparian habitat alteration have occurred, including cattle grazing. I predict that decreased detrital inputs and increased light penetration due to loss of riparian vegetation has shifted some Kimball Creek reaches from an allochthonous-based system to an autochthonous one, with potential cascading effects on higher trophic levels. Because these ecosystem function shifts likely involve time lags in community assembly, I predict that such shifts will lead to reduced biodiversity and ecosystem functionality in impacted stream reaches. In order to test this hypothesis, I will investigate several fundamental processes including primary productivity and decomposition and how these processes differ along a degradation gradient. Because few studies focus on degraded ecosystems, this research will be important for future management and restoration of this and other degraded streams.

Lindsey Scaggs - Zoological Conservation & Ryan Johnson - Wildlife Conservation

Mentor: Howard Whiteman

Destroying the Ozone: One Mower at a Time

Over the course of human existence on the planet ecosystems, species population and overall well-being have been altered. Destruction of the planet can be contributed to human interaction based on what benefits them. Global warming has been a big topic of debate in both the scientific and political realm. Can it be stopped, what can be done to control the problem and what effects will it have in years to come; are all questions that have been asked and debated. Over the past few years greenhouse gasses have been discovered to be a leading cause of depleting the ozone. The best thing that can be done is reducing the amount of emissions that are released into the environment. On Murray State's campus, lawn mowers are run constantly and that is something that cannot really be stopped. However there is a way that the amount of emissions that are released can be dramatically reduced by burning propane fuel in place of gasoline. It has been estimated that 800 million gallons of gas are used each year by people mowing their yards. The pollution that is created from these gasoline powered mowers accounts for 10% of the world's pollution each year. Switching over to a propane mower can cut the amount of fuel used by 30%. By taking simple measures the destruction of our planet can be greatly reduced and in turn enhance the quality of life for generations to come.

Lindsey Schapker, Jessica Felden, & Mark Weaver - Nutrition

Mentor: Beth Rice

NTN 432 Class Project

This experiment will analyze the nutritional effects and overall quality of substituting quinoa flour and whey protein powder for 50% of the all-purpose flour in a Nestle chocolate chip cookie recipe. The objective test we will be performing on the cookies will be measuring the width and height with calipers; as well as, compare and contrasting the nutritional value of each of the three variables. The sensory tests for our judges will be to evaluate the acceptability, flavor, appearance, and texture of the variety of cookies we provide to them. During the experimentation, we will control for oven temperature by using the same oven and cooking the cookies for the same duration. The ingredients will be purchased at the same time to remove any extraneous variables. We will use specific measurements while cooking to eliminate the human error from our experiment.

Marcie Siders & Carly Rekosh - Conservation Biology

Mentor: Howard Whiteman

Kentucky Rain

Flooding and storm water runoff is an issue in the Murray area. A rain garden can help sequester some of this water in addition to filter toxins before they have a chance to infiltrate creeks, streams and ground water. Rain gardens are shallow depressions with well-draining soil that collect water for short periods of time, usually less than 24 hours. These gardens can provide an oasis for bees, birds and toads. Ours will feature native plants that are well suited for this area and have deep root systems that can soak up lots of water. The plants will be tolerant of both wet and dry conditions and chosen based on when they flower to provide ever-changing beauty.

Rachel Slone & Kinsi Norrington - Dietetics

Mentor: Beth Rice

Effect of Oats as a Replacement Extender for Breadcrumbs in Meatloaf

The purpose of the experiment is to test the effects of substituting oats instead of breadcrumbs on the texture, flavor, moisture, and thickness of a traditional meatloaf recipe.

Jaime Staengel – German & Economics

Mentor: Stefan Linnhoff

Conceptual Cornerstones for Examining Millennials' Attitudes Toward Organic Food

The focus of this research is to examine the attitudes of millennials' toward organic foods. The questions focus on perceived knowledge students have toward organic foods, as well as their attitude toward such food. At this time, the focus of the study will be geared toward students here at Murray State. Over the summer though, the study will be translated and I will take it with me to Regensburg, Germany this fall. Once there, I will give the study to those students as well, allowing a cross-cultural study to be performed.

Colten Stafford - Environmental Geology**Mentor: Haluk Cetin*****Mapping Effects of Natural Resource Exploitation Around Theodore Roosevelt National Park Using Remote Sensing***

As we progress into the future, our need for domestic sources of oil and natural gas are increasing. With a majority of the private sector land already in production of these resources, the need to expand these operations are beginning to threaten the National Parks of the United States. Several parks are already allowing drilling within their boundaries and many are being scouted. The Theodore Roosevelt National Park in North Dakota is one of these parks that is beginning to fill the pressure of natural resource exploration. With this park already being divided into two distinct areas, drilling apparatuses can be seen from within the park limits and the once pristine sounds of nature have been replaced with the noise of oil and natural gas production. The purpose of this study is to map effects of these activities around Theodore Roosevelt National Park using remote sensing.

Mike Stonewall - Geoscience**Mentor: Haluk Cetin*****An investigation of the Chickamauga Dam and Surrounding Terrain Using Light Detection and Ranging (LiDAR) Data***

The Chickamauga Dam, named after an 18th-century Cherokee tribe called the Chickamaugas, became operational on January 15, 1940. It was built with a 60-by-360-ft lock that allows barges to pass. When the Tennessee Valley Authority (TVA) and the US Army Corps of Engineers (ACE) collaborated to reform the Tennessee River watershed there were two substantial goals: to help frustrated farmers with floods in southern Illinois and Ohio and to make a fully navigable water channel from Knoxville to Paducah. At 685.40 ft above sea level, the Chickamauga Dam is the third of nine steps of dams on the Tennessee River, the first and last being Fort Loudon (813 ft) and Kentucky Dam (375 ft), respectively. Located at 85.23° W and 35.10° N in Chattanooga, Tennessee this dam rises 129 feet above the river and drains the Chickamauga Lake, which has 784 miles of shoreline and 36,240 acres of surface water. This dam is the only one in the TVA system that is not a producer of hydroelectric power. The purpose of this project is to interpret the Chickamauga Dam and surrounding landscape using airborne Light Detection And Ranging (LiDAR) data, which were collected in the spring of 2011 by Hamilton County, Tennessee with vertical accuracy that is suitable for 2 foot contours.

Shaun Strawser - Sociology

Mentor: Scott Byrd

Fracking and Activism in Appalachia

When studying social movements and activism, it is important to consider the cultural context in which these movements develop. Movements that develop within different cultural contexts will bring unique cultural symbols and identity to the framing process when developing strategies and discussing issues. The goal of these localized strategies is to establish the legitimacy of their positions within the communities affected by specific issues. The relationship between activists and their target organizations has been described by Ferguson and Smith as a "legitimacy dance," wherein both sides vie for public attention and support. Using both direct and indirect strategies, each side attempts to undermine the legitimacy of the other while reinforcing their own. This complex "dance" can determine the success or failure of social movements, and ultimately affect levels of activism in communities within a particular cultural environment. This study is particularly interested in the relationship between hydraulic fracturing, or "fracking," and levels of activism within the cultural context of Appalachian communities. Activism in the Appalachian region will be evaluated in order to understand the relationship between density of fracking sites and levels of activity among members of environmental organizations. Survey data will also be collected to determine attitudes toward hydraulic fracturing, and the perceived impact of fracking on participants' lives.

Danielle Thomas – Pre-PA

Mentor: David Pizzo & Edmund Zimmerer

Eugenics in the States: The Origin and Intention

It has been over a century since the story of the Jukes spread like wildfire across 19th century America. This marked the beginning of an era riddled with racism, selective Darwinism, and pseudoscience. These primary ideas eventually grew into a horse-breeding model for humans, wherein a legislative body could decide which humans would be allowed to reproduce, and which would be forcibly sterilized. This is the philosophy of Eugenics. This project began with studying background information. The first goal was to understand Eugenics as a movement, and the mindset of its followers. This was accomplished by a combination of extensive reading and studying the history of Nazi Germany. Time was spent visiting historical sites in the City of Berlin, investigating racial prejudice and medical interventions of that time period. One thing among many that was discovered was the origin of eugenics. The first Eugenicists, arguably the founders of Eugenics itself, were rooted in the United States. The campaigns, the sterilizations and arguments for ever-improving the human race went on for decades, then gradually disappeared after the war. Genetics was of particular interest to this group. They combined Genetics with preconceived ideas about inferiority, misinterpreting Gregor Mendel and Charles Darwin in their works about inheritance and natural selection, respectively. The studies performed were poorly constructed and biased.

Caitlin Thomas - Economics

Mentor: Martin Milkman

State Merit-Aid – Preferences Rather than Enrollment Evidence from New Mexico’s Legislative Lottery Scholarship Program

Financial aid is awarded at the federal, state, and institutional level in order to reduce the total cost of higher-education. Recent trends have found state legislatures earmarking revenues from state lotteries, or other outside resources, for revolutionized merit-aid programs. Georgia's HOPE scholarship began the states' movement to provide financial incentives to the "best and brightest" students to remain in-state for their post-secondary education. Following the new merit-aid movement, New Mexico enacted a state lottery that would allocate its funds to the Legislative Lottery Program; a scholarship to those in-state students who meet specific state benchmarks. This study analyzes the 'success' of the program and finds evidence suggesting merit-aids affect on school preference rather than school enrollment.

Ben Tumolo - Aquatic Ecology

Mentor: Michael Flinn

Diet Analysis of Silver Carp (*Hypophthalmichthys molitrix*) in Two Large Embayments of Kentucky Lake, A Reflection of Availability or Selectivity?

The Silver Carp (*Hypophthalmichthys molitrix*) and Bighead Carp (*H. nobilis*), collectively referred to as Asian Carp, have established populations throughout the Midwestern United States. Recently, Kentucky Lake was invaded by significant populations of Asian Carp. The objective of this project is to understand potential impacts of Asian Carp on reservoir primary productivity. It is important to understand the Asian Carp diet specific to Kentucky Lake because these fish demonstrate considerable diet plasticity and quantifying the impacts of their invasion may be related to reductions of the lowest trophic levels. Silver Carp (n=10 TL \bar{x} =74.3 cm \pm 2.5 SE=0.80) were caught from two embayments of Kentucky Lake with mono-and-multifilament gill nets (12.7 cm stretch mesh). Fishes foreguts were surgically removed in the field and contents were extruded in the lab. Prey items were identified to the taxonomic level of genus when possible and enumerated based on cell count. Reference phytoplankton samples collected by Hancock Biological Stations long term monitoring program were identified and enumerated with the same methodology. Diet analysis showed no significant difference (P>0.05) between diets at the taxonomic level of Class except for Euglenophyceae (P<0.05). More differences in diet composition existed at the generic level and four out of fourteen genera were significantly different between sampling locations. Though most genera were similar, Ledbetter Bay diets had higher numbers of Coelsphaerium and Blood River diets showed higher counts of Anabaena, Microcystis and Volvox (all p<0.05). Further investigation will determine if differences are reflected in the phytoplankton communities at these locations.

Camie Underwood - Environmental Geology

Mentor: Haluk Cetin

Estimation of Deforestation Rate in McLean County, KY Using Multi-temporal Landsat Imagery

The main purpose of this study was to estimate deforestation rate in McLean County, KY using multi-temporal Landsat imagery taken in 1990, 2000, 2010. The Landsat datasets were classified and a post-classification comparison technique was used to estimate the rate. The human population's net CO₂ contribution to the atmosphere in the area was calculated to compare with the estimated amount of CO₂ that is stored (used up) by the trees in the county. Another purpose of this study was to determine in McLean County needed to consider better methods for forest management, or possibly stop harvesting trees.

Kristen Walker & Haley Tubbs – Nonprofit Leadership

Mentor: Roger Weis

Gobble Til Ya Wobble

We arranged a Thanksgiving bash called “Gobble Til Ya Wobble” for the mentors and mentees of West Ky Mentoring in order to celebrate Thanksgiving and everything we have to be thankful for. A lovely dinner was donated by a local church and WKYM board members for the event. After dinner, the mentees wrote what they were thankful for on a feather and attached it to a turkey poster board. Then everybody participated in an epic dance party complete with disco lights and a dancing turkey.

Sara Wallace – Psychology

Mentor: Paula Waddill

Personality Traits and Greek Organization Interest

This study examined the relationship between Greek membership interest and the personality traits of extraversion, adjustment, conformity, and confidence. Extraversion significantly predicted interest in Greek organizations; more extraverted people expressed greater interest in Greek organization life. On the other hand, adjustment, confidence, and conformity did not account for a significant unique proportion of variance in Greek interest.

Whitney Wallett - Biological Sciences

Mentor: Paul Gagnon

The Influence of Plant-Plant Interactions on *Aristida stricta* Performance Across a Complex Environmental Gradient

Plant-plant interactions have been shown to influence individual plant performance and shape community composition and structure. Consensus as to how these interactions vary in type or intensity with different abiotic factors or along environmental gradients remains elusive. To explore the interactions occurring along a complex moisture and soil resource gradient, I conducted neighbor removal experiments surrounding focal *Aristida stricta* (wiregrass) individuals (n=96) along the sandhill-seepage slope gradient of longleaf pine habitat at Eglin AFB, FL, USA. After neighbor removals (heterospecific, homospecific, or total) that followed fire, I monitored each individual's first growing season change in growth (Δ in basal diameter) and potential reproductive output (no. of flowering culms x average no. of flowers/culm). Preliminary analyses indicate that total neighbor removal significantly reduced individuals' potential reproductive output ($P < 0.0015$). Other removals had no significant effect on individuals' reproductive output, and removals did not significantly affect post-fire growth ($P = 0.9270$). Although preliminary, these results suggest that facilitation, rather than competition, may be a key interaction occurring along this moisture and soil resource gradient. This finding contradicts the results of many studies that have reported intense competition along other gradients, but aligns well with previous theory concerning plant-plant interactions in high-stress environments.

Whitney Wallett - Biological Sciences

Mentor: Paul Gagnon

Factors Influencing *Aristida stricta* Distribution, Dominance, and Performance at Local and Regional Spatial Scales

Climatic and other large-scale abiotic factors determine the distribution of biomes and vegetation worldwide. Concurrently, local environmental conditions, resource levels, and biotic interactions affect species at the individual level. Together, these factors determine a species' distribution, dominance, and performance. To explore large-scale factors determining the regional distribution and dominance of *Aristida stricta*, a perennial bunchgrass dominant throughout much of the endangered longleaf pine ecosystem, I will conduct species distribution modeling (SDM) of *A. stricta* occurrence data throughout the state of Florida. Simultaneously, to explore how biotic interactions affect individual *A. stricta* growth and reproductive performance across a soil moisture and resource gradient, I am conducting a neighbor removal experiment on 96 focal individuals located within sandhill and seepage slope habitats of Eglin AFB, NW Florida. I am currently assembling data sets that will allow for SDM completion in upcoming months, while preliminary analyses from the first growing season following neighbor removals suggest that facilitation may be a key interaction occurring across this environmental gradient. Following a second growing season of data collection and completion of SDM, I will draw conclusions concerning the factors most influential to *A. stricta* performance and dominance. These conclusions will provide insight into *A. stricta*'s niche requirements, as well as better inform longleaf pine ecosystem restoration efforts.

Whitney Wallett - Biological Science**Mentor: Howard Whiteman*****A Prescription for Prairie: Developing a Restoration Plan for Hancock Biological Station's Demonstration Prairie***

Prior to the 1820s, the Jackson Purchase region supported areas of 'barrens' vegetation characterized by deep soils, dominant prairie grasses, stunted trees and shrubs, and occasional timber groves. These barrens were maintained by frequent lightning and anthropogenic fire, as well as grazing by bison and other native herbivores. Following European settlement, these barrens were almost completely eliminated as they were cleared for agriculture or replaced by oak-hickory hardwood forests in the absence of necessary disturbance. As these barrens supported a diverse assemblage of prairie grasses, forbs, and associated wildlife, much interest exists in restoring these habitats throughout the Jackson Purchase and similar regions throughout Kentucky and Tennessee. Murray State's Hancock Biological Station (HBS) possesses a small area of potential demonstration prairie in which several barrens-associated species have been previously identified. This project attempted to create a restoration plan for the prairie that includes a description of the site's history and characteristics, a site comparison with other Western KY restoration prairies, suggestions for improvement of an ongoing prescribed fire regime, and restoration goals. Additionally, the plan includes a strategy for how restoration, prairie maintenance, and monitoring might be incorporated into and perpetuated by MSU's biology curriculum. With additional and adaptive development, this plan may encourage student involvement in successful restoration of HBS' prairie, provide the university with a demonstration site for educational purposes, and contribute to broader efforts to conserve and protect endangered barrens habitats.

Joseph White - Economics**Mentors: Simone Silva, Jim McCoy, & Seid Hassan*****The Skilled Labor Market, Growth, and Income Inequality: A Theoretical and Empirical Analysis***

This paper investigates how the labor market, the capital market, and their relationship determine income inequality as measured by the Gini Coefficient. The analysis is based on an estimation of the Kuznets Curve by Barro (2000) but latter makes adjustments to account for endogeneity and the effects of the supply and demand for skilled labor. I build a theoretical model of this supply and demand framework, and then use the implications of such a framework to make additions to Barro's Kuznets Curve framework. This theoretical model asserts that income inequality actually decreases in the long run for increases in capital formation and product complexity. My results found that the Kuznets Curve still persists after controlling for possible endogeneity. Furthermore, my empirical model confirms that inequality decreases for an increase in product complexity or capital formation.

Kaitlyn Whitewood – Pre-Veterinarian

Mentor: Terry Derting

Effects of Pet Therapy on the Stress Levels of Therapy Dogs

There are numerous studies that show positive effects of animal-assisted therapy (AAT) on humans, although little is known about the effects that AAT has on therapy animals themselves. The objective of my research was to determine the effect of human interactions with therapy dogs on the dogs' stress level. My null hypothesis was that AAT has no effect on the stress level of therapy dogs. In order to accurately measure the stress that a therapy dog may experience while doing a therapy session, I measured the level of salivary cortisol present before and after nine certified dogs were engaged in a 15-minute therapy session with 2-4 persons, as well as their heart rate and respiration rate. None of the physiological measures of the dogs before they engaged in a therapy session differed significantly from the same measures made after the therapy session. From these results, we concluded that therapy dogs did not experience a change in stress. While interactions with humans had no adverse effects on the stress level of the dogs; the dogs also did not exhibit measurable benefits of the interactions. The results suggested that beneficial effects of AAT on human stress are not reciprocated to the therapy dogs involved. Alternatively, because therapy dogs are trained to interact with humans they may have low levels of stress that are maintained during therapy sessions. Further research is needed to determine the effects of AAT on dogs engaged in longer therapy sessions (e.g., 1 hour) that more closely match the actual work periods experienced by most therapy dogs.

Tiffany Whitfill - Public Relations & Psychology

Mentor: Daniel Wann

We've Got Spirit, How About You: An Examination of the Sport Fandom of University Sponsored Spirit Groups

To date, there appear to be no empirical studies investigating the sport fandom of spirit groups. In Wann's 1993 study, results showed that highly identified subjects seemed to be more involved with that team. As a result, I tested one hypothesis and four research questions. The original sample consisted of 70 college students attending a mid-southern university. Eight participants were removed from the sample because they returned incomplete questionnaires. After listening to a brief introduction and providing consent, participants completed six sections of the questionnaire. These six sections included: demographics, the Sport Spectator Identification Scale, the Sport Fandom Questionnaire, the Sport Spectator Motivation Scale, the Fan Dysfunction Scale, and a knowledge section containing questions about current and historical men's basketball knowledge at that school, and general basketball. The hypothesis was tested through an ANOVA. As predicted, spirit group members reported higher identification scores. Group differences in fandom, dysfunction, and total motivation were examined via ANOVAs. Significant group differences were not found for any measure. Group differences in specific motives and knowledge types were examined via a pair of MANOVAs (with subsequent follow-up univariate tests). Significant group differences were not found on either MANOVA. Because of the high number of trends found in the data, adding additional participants to the sample would aid in acquiring the statistical power needed. Future research should include an examination of other levels of cheerleading (e.g., high school, professional, competitive). There may also be differences at schools where there is a highly successful tradition in basketball.

Carli Whittington - Biological Science & Lucas A. Daily - Chemistry

Mentor: Kevin M. Miller

Linear and Covalently Crosslinked Polyesters Containing a Pendant Imidazolium Group: Synthesis and Thermal Properties

The scientific and commercial impact of ionic liquids has evolved from developing potential solvent replacements to functional integration into polymeric materials. The interest in polymerizable ionic liquids, particularly those containing the imidazolium group, has increased significantly over the last decade due to its relative ease of functionalization and potential application in areas such as electronic devices and drug delivery vehicles. In an effort to further explore the area of ionically-charged polymers (ionenes), we wish to report on the synthesis and thermal analysis of a series of polyesters (linear and covalently crosslinked networks) in which a pendant imidazolium group has been anchored into the polymer backbone. As part of this study, we wanted to compare changes in thermal properties such as glass transition temperature and thermal stability as a function of polyester structure (linear vs. network) as well as anion selection (basicity and size). Linear polyesters were prepared using standard nucleophilic acyl substitution conditions while the covalently crosslinked networks were prepared using the Michael addition polymerization. In addition to the thermal analysis data, a correlation between the ¹H NMR chemical shift values of the imidazolium H2 proton and hydrogen bonding capability of the anion will be discussed.

Cash Willis - Manufacturing Technology

Mentor: Robert Pilgrim

Bipedal Robots: What are the Main Issues with Dynamic Bipedal Movement in Robots?

In bipedal humanoid robots there are two types of walking. They are static and dynamic. Static walking assumes that the robot is statically stable. This means that, at any time, if all motion is stopped the robot will stay indefinitely in a stable position. It is necessary that the projection of the center of gravity of the robot on the ground must be contained within the foot support area. This kind of walking requires large feet, strong ankle joints and can achieve only slow walking speeds. Today, most of the active research is indynamic walking, which provides more realistic and agile movements [1]. This type of walking is much more challenging since it requires additional sensors, and control software for maintaining balance while starting and stopping. Bipedal dynamic walking allows the center of gravity to be outside the support region for limited amounts of time. There is no absolute criterion that determines whether the dynamic walking is stable or not. Indeed a walker can be designed to recover from different kinds of instabilities. However, if the robot has active ankle joints and always keeps at least one foot at on the ground then the Zero Momentum Point (ZMP) can be used as a stability criterion. The ZMP is the point where the robot's total moment at the ground is zero [4]. Dynamic walking ensures that the robot can start walking from any point. The goal of this research is to determine the main issues faced with dynamic movement in bipedal robots and whether an Arduino processor can be used to construct a low cost bipedal robot that walks dynamically. For the sake of greater efficiency in walking and a low energy requirement, the construction of a passive dynamic bipedal robot is being employed to research the main issues faced with dynamic movement in bipedal robots. References: [1] EV Cuevas, R Rojas, D Zaldívar, "Bipedal robot description" pp.2, 2005.

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