



MURRAY

STATE UNIVERSITY

SCHOLARS WEEK

Program Booklet

April 13-16, 2015

Updated: 4/9/15 – 9:00 p.m.

14th Annual
Scholars Week
Program and Abstracts

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Undergraduate Research and Scholarly Activity Advisory Board & Staff	
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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 fourteenth 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 & Design

Dr. Meagan Musselman
Education

Dr. Joyce Shatzer
Education

Dr. David Pizzo
History/URSA

Dr. Terry Holmes
Business Administration

Dr. David Ferguson
Agriculture

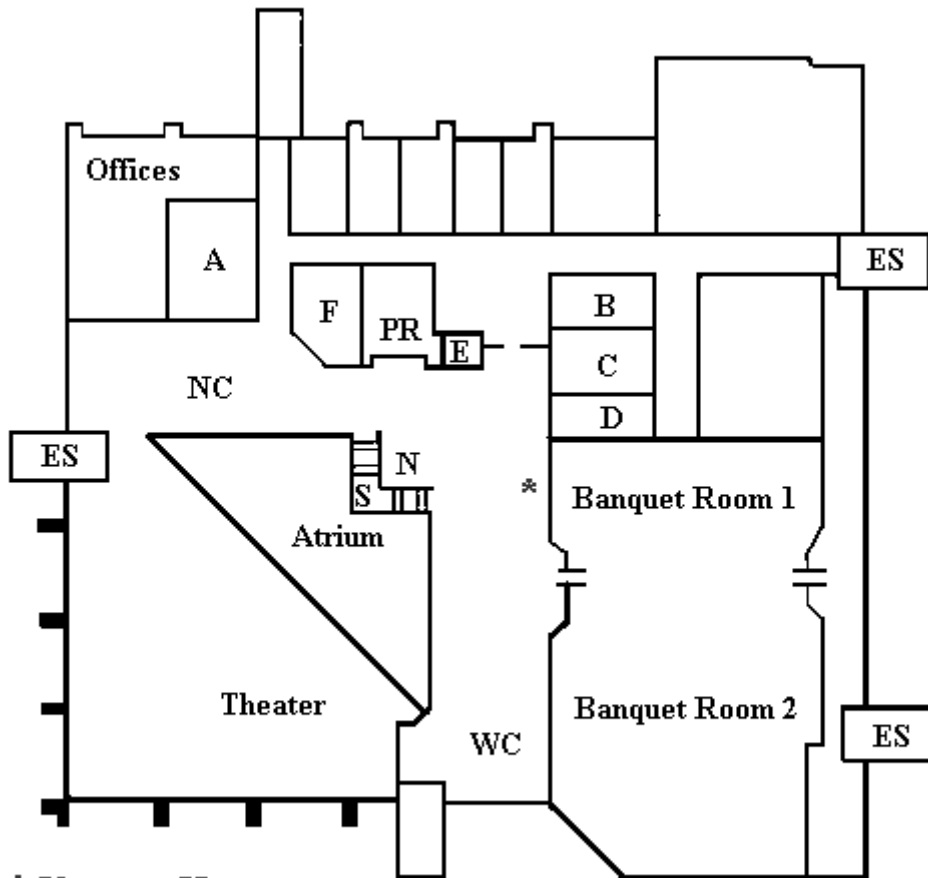
Dr. Summer Cross
Nursing

Dr. Michelle Santiago
Agriculture

Dr. Chris Mecklin
Mathematics & Statistics

Don Kim
Library

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 13, 2015

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*

Amal Aljaddani** – Geoscience

Finding Suitable Location for a New Park, in Murray, Ky Using Fuzzy Membership and Fuzzy Overlay Tools

Michael Banta* – Bio-Chemistry, Renn Lovett* – Nursing & Abigail Steck* – Biological Sciences

The Role of Testosterone Propionate and Estradiol on the Morphological Changes of Benign Prostatic Hyperplasia in Rats

Kate Breitenstein* – Geoarchaeology

Binders in Mississippian Ceramics

David Crittendon* – Psychology

Accentuate the Positive: Positivity Influences the Nation Greater than Negativity

Landon Gibbs* – Horticulture

Dynamics of Soil Infiltration Rates in Various Agro-ecosystems

Bradley Hartman* - Biology/Aquatic Biology/Fisheries

Effects of Predator Size Variation on Future Generations of Predators

Chelsea Holleman* – Agronomy

The Effect of Soil Sampling Depth on Nutrient Recommendations in Kentucky

Emily Knoth** – Geosciences

Stream Aggradation and Flooding at Mount Rainier National Park: A Comparative Study of the White, Nisqually and Carbon Rivers

Mari-Alice Jasper* - Journalism and Sociology

The Influence of Pop Songs on the Promotion of Rape Culture and Sexism

Jordan Love* – Applied Mathematics, Nicholas Morgan* – Engineering Physics & Aaron Whitney* – Engineering Physics
Engineering Design of an Autonomous Trap Monitor for American Burying Beetles

Jordan Love*, Jacob Munson* & Kathleen Kirby* - Applied Mathematics
Development of Mathematical Models for Industrial Lighting System Costs with Applications in Constrained System Optimization

Santiago Martin** – Biology
Modelling Suitable Mist-net Site Areas for Bats in Kentucky After the Arrival of White-nose Syndrome

Katelynn Mollett* – Agronomy
The Impact of Tillage Systems on Soil Physical Properties in Bond County, Illinois

Morgan Owens*, Kendrick Settler* & Marie Carroll* – Psychology
Specific Bilingual Background and Risk of Cognitive Impairment

Michael Pate** – Geoscience
LiDAR Classification of Hopkinsville Kentucky using ArcMap

Stephanie Patterson* – Psychology
Becoming the Little Engine that Could Anxiety, Self-Esteem, and Exam Performance

Victoria Ramlose* – Animal Health Technology
Murray Calloway County Animal Shelter: Community Perceptions, Adoption Success Rates, and Suggestions for Improvement

Kate Schaefer** – Biology
Bat Occurrence and Survey Site Selection at Land Between the Lakes National Recreation Area

Kevin Smothers** – Geoscience
Geostatistical Data Analysis of Division I Public Universities

Christy Soldo* - Conservation Biology
Application of GIS, Bathymetry and Long-term Hydrological Data to Identify Critical Biological Requirements of Bald Cypress for Habitat Improvement in Kentucky Lake

Nicole States* & Clayton Keiser* – Chemistry
BB-500 Emissions Characteristics: Preliminary Observations

Nathan A. Tillotson* – Fisheries/Aquatic Biology, Ben Tumolo** – Watershed Science & Andrew K. Porterfield** – Fisheries/Aquatic Biology
They Phenology of Larval Fish in Kentucky Lake During Early Summer

Melanie Torres** - Watershed Sciences
Determining Wind Direction Patterns in a Diseased Landscape

Sara Wallace* - Psychology
I Just Can't Help Myself: Hoarding Tendencies and Personality Traits

Jimiao Zheng**, Nhan Huynh*, Patrick McCluskey*, Jarred Koerner*, Zachary Ryne* & Ming Gao** - Biological Sciences
Role of Specialized Ribonucleoprotein Granules in Germline Development in Drosophila

Posters-at-the-Capitol Display and Reception

South Lobby, Waterfield Library
5:00 p.m. – 6:30 p.m.

Caleb Brannon – Agriculture Business
The Effect of Row Spacing, Plant Population, and Maturity Levels on Tetrahydrocannabinol (THC) and Cannabidiol (CBD) Levels in Agricultural Hemp

David Crittendon - Psychology
Accentuate the Positive: Positivity Influences the Nation Greater than Negativity

Morgan Ernst – Animal/Equine Science & Lauren Hamm – Pre-Veterinary Medicine
The Correlation of Rider Weight on Equine Stress

Jonathan Ferris – Economics
The Role of Host Cities and Regions in the Economic Success of Professional Sports Franchises

Matthew Green
Obturator Externa Injury: An Uncommon Occurrence

Layne Grissom - Psychology
The Hegemonic Masculinity Scale

Lauren Hamm – Pre-Veterinary Medicine & Morgan Ernst – Animal/Equine Science
Effects of Ivermectin and Moxidectin on Equine Parasites in Horses in Western Kentucky

Bradley Hartman - Aquatic Biology/Fisheries
Effects of Predator Size Variation on Future Generations of Predators

Anne Jablinski – Animal Science, Marisa Bedron – Equine Science, Vaughn Reed –
Agronomy & William Craig Lenoir – Engineering Physics
Bioenergy Crop Production and Combustion in Agriculture

Matthew Jones – Economics
Examining Low Wage Jobs in Kentucky and Exploring Change

Robert J. Lewis - Wildlife and Conservation Biology
*The Consumption of Metallic Lead and its Effects on Tissue Lead Levels of Urban and
Rural Eastern Gray Squirrels*

Liz Markley - Nursing
*A Guide to Nursing Students' Written Reflections for Students and Educators:
Why and How Do We Use Them?*

Jason A. Matthews - Wildlife Biology
*Distinguishing between Eurasian Wild Boar Hybrids and Feral Swine Using
Molecular Analyses*

Tracey Newport - History and Political Science
The Central African Republic: Peace-less Independence

Sara Wallace - Psychology
I Just Can't Help Myself: Hoarding Tendencies and Personality Traits

Oral Session

Nursing Session

Ohio Room, Curris Center
Session Chair: Dr. Summer Cross
12:00 p.m. – 12:45 p.m.

Lindsee Lyles - Nursing & Katheryn Beck - Mathematics
*Finally Calling the Shots: A Study about Vaccination Attitudes in Newly-Independent
College Students*

Heather Raley - Nursing
The Impact of Quality of Sleep on Academic Performance in University Students

Master's in Economics Session

Ohio Room, Curris Center

Session Chair: Dr. Martin Milkman

4:00 p.m. – 5:30 p.m.

Sarah King – Economics

The Insight and Prediction for Nike, Inc.

Kerstin Zenger & Martina Weber – Economics

Empirical Analysis of Beta Factors of Healthcare Companies Before, During, and After the Financial Crisis - A Comparison Between Germany and the U.S.

Tuesday, April 14, 2015

Oral Sessions

Business and Public Affairs Session

Tennessee Room, Curris Center

Session Chair: Dr. Tim Worley

1:30 p.m. – 2:30 p.m.

Flavian Igbokwe - Public Administration

The Barriers to Civil Service Reforms in Nigeria

Ben Manhanke - Television/Video Production

Electronic Colonization: American Media's Effect on Developed and Developing Nations

Madison Mucci – Organizational Communication

Applying the Relational Turbulence Model to the Parent-Student Relationship: A Student's Perspective During the Transition from High School to College

David Petrie - Marketing

Advertising Through the Ages

Modern Language Senior Colloquium

Barkley Room, Curris Center

Session Chair: Dr. Leon Bodevin

3:30 p.m. – 6:00 p.m.

Susan Adams - Spanish with Teaching Certification

Te Sacarán Los Ojos: El Eslabón Entre La Realidad y Ficción

Jordan Eldridge - Spanish

Outcomes: The Cuban Revolution

Rebekah Elkins - Japanese
Changing Situations of Korean-Japanese

Tyler Kennebec - German
Concerning Maidens: A Grimm Examination

Dominik Mikulcik - Japanese
A Nuclear Future

Heather Rey - Spanish
A Changing World: Life After Franco to Life After Franco: Gender Roles in *Te doy mis ojos*

Gabrielle Robinson – French/Teaching Certification
A Study of Rimbaud

Other Sessions

Awards Recognition Reception

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

Recognizing: the 2015 Recipient of the University Distinguished Mentor Award; 2015 Recipients of the Alumni Association's Emerging Scholar Award, 2015 Recipient of the Alumni Association's Distinguished Researcher Award; 2015 Recipient of the Presidential Research Award; and the 2015 Collegiate Research Awards

Sigma Xi Banquet

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

Speaker: Dr. Terry Derting, Professor, Department of Biological Sciences
The Evolving Science of STEM Education

Wednesday, April 15, 2015

Poster Session

General Poster Session

Small 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*

Amal Aljaddani – Geoscience**

Finding Suitable Location for a New Park, in Murray, Ky Using Fuzzy Membership and Fuzzy Overlay Tools

Michael Banta – Bio-Chemistry, Renn Lovett – Nursing & Abigail Steck – Biological Sciences**

The Role of Testosterone Propionate and Estradiol on the Morphological Changes of Benign Prostatic Hyperplasia in Rats

Kerry Bergmann - Dietetics

Use of Avocado Puree as a Butter Substitute in Brownies to Provide a Better Source of Fat

Paige Beuligmann - Pre-Veterinary Medicine

The Effects of Exercise on the Development of Muscle and Bone in Equines

Latasha Blake - Psychology

Perceptions of Relationships and Self-Esteem

Lindsey Bordner - Nutrition Dietetics and Food Management

Acceptance of Sweet Potatoes versus Cream in Tiramisu Dessert

Caleb Brannon

The Effect of Row Spacing, Plant Population, and Maturity Levels on Tetrahydrocannabinol (THC) and Cannabidiol (CBD) Levels in Agricultural Hemp

Kate Breitenstein – Geoarchaeology**

Binders in Mississippian Ceramics

Nick Cash - Biology

*Occurrence of Mammalian Prey and Scavengers on a Potential Re-introduction Site for *Nicrophorus americanus* (Coleoptera: Silphidae; American burying beetle) at Land-Between-the-Lakes National Recreation Area*

Deidra Marie Chandler - Nutrition, Dietetics and Food Management

Effects of Substituting Tofu for Eggs in Sweet Corn Cake

Rachel Clifford – English/Creative Writing
Gender and Sexuality in Science Fiction and Fantasy Literature

Egypt Crider - Psychology
Use of Mental Health Services

David Crittendon – Psychology**
Accentuate the Positive: Positivity Influences the Nation Greater than Negativity

Lindsay Cunningham - Dietetics
Reduction in Nutrient Density for Increase in Satiety: Replacing Cottage Cheese for Mayonnaise in Egg Salad

Mary E. Decker - Nutrition
Acceptance of Orange Cake with Added Turmeric to Increase Antioxidant Potential

Morgan Ernst – Animal/Equine Science & Lauren Hamm – Pre-Veterinary Medicine
The Correlation of Rider Weight on Equine Stress

Jonathan Ferris – Economics
The Role of Host Cities and Regions in the Economic Success of Professional Sports Franchises

Landon Gibbs – Horticulture**
Dynamics of Soil Infiltration Rates in Various Agro-ecosystems

Matthew Green
Obturator Externa Injury: An Uncommon Occurrence

Layne Grissom – Psychology
The Hegemonic Masculinity Scale

Jennifer Haas - Environmental Geology
A GIS-based Volcanic Hazard and Risk Assessment of Mt. Redoubt, Alaska

Lauren Hamm – Pre-Veterinary Medicine & Morgan Ernst – Animal/Equine Science
Effects of Ivermectin and Moxidectin on Equine Parasites in Horses in Western Kentucky

Bradley Hartman** - Biology/Aquatic Biology/Fisheries
Effects of Predator Size Variation on Future Generations of Predators

Olivia Hitt - Marketing
Eating Healthy or Unhealthy - Who Knows? Who Cares? And When? Exploring College Millennials' Food Choice Utilizing an Extended Planned Behavior Model

Chelsea Holleman- – Agronomy**

The Effect of Soil Sampling Depth on Nutrient Recommendations in Kentucky

Emily Knoth – Geosciences**

Stream Aggradation and Flooding at Mount Rainier National Park: A Comparative Study of the White, Nisqually and Carbon Rivers

Elizabeth Kunkel - Dietetics

Sensory Evaluation of Brownies with Dates as a Sugar Replacement

Anne Jablinski – Animal Science, Marisa Bedron – Equine Science/Agriculture, Vaughn

Reed – Agronomy & William Craig Lenoir – Engineering Physics

Bioenergy Crop Production and Combustion in Agriculture

Mari-Alice Jasper - Journalism and Sociology**

The Influence of Pop Songs on the Promotion of Rape Culture and Sexism

Matthew Jones – Economics

Examining Low Wage Jobs in Kentucky and Exploring Change

Nhu Le – Teaching English as a Second Language

Pre-service Teachers' Technological Pedagogical and Content Knowledge (TPACK): Two Case Studies in Vietnam and in the US

Robert J. Lewis - Wildlife and Conservation Biology

The Consumption of Metallic Lead and its Effects on Tissue Lead Levels of Urban and Rural Eastern Gray Squirrels

Jordan Love – Applied Mathematics, Nicholas Morgan – Engineering Physics & Aaron Whitney – Engineering Physics**

Engineering Design of an Autonomous Trap Monitor for American Burying Beetles

Jordan Love, Jacob Munson & Kathleen Kirby - Applied Mathematics**

Development of Mathematical Models for Industrial Lighting System Costs with Applications in Constrained System Optimization

Liz Markley - Nursing

A Guide to Nursing Students' Written Reflections for Students and Educators: Why and How Do We Use Them?

Santiago Martin – Biology**

Modelling Suitable Mist-net Site Areas for Bats in Kentucky After the Arrival of White-nose Syndrome

Santiago Martin - Biology

Creation of Roost Trees for Indiana Bats: Effects of Tree Species, Size, and Season of Herbicide Treatment

Jason A. Matthews - Wildlife Biology

Distinguishing between Eurasian Wild Boar Hybrids and Feral Swine Using Molecular Analyses

Andrew Mogan - Physics

Optimum Swarm Size in Swarm Robotics

Katelynn Mollett – Agronomy**

The Impact of Tillage Systems on Soil Physical Properties in Bond County, Illinois

Tracey Newport - History and Political Science

The Central African Republic: Peace-less Independence

Morgan Owens, Kendrick Settler & Marie Carroll – Psychology**

Specific Bilingual Background and Risk of Cognitive Impairment

Michael Pate – Geoscience**

LiDAR Classification of Hopkinsville Kentucky using ArcMap

Stephanie Patterson – Psychology**

Becoming the Little Engine that Could Anxiety, Self-Esteem, and Exam Performance

Alyssa Pingel - Dietetics

Using Benefiber Powdered Fiber Supplement as an Additive in Bran Muffins to Make Muffins a “Good Source of Fiber” or an “Excellent Source of Fiber”

Eryn Pritchett - History

Finding the Truth: An Investigation into the Use of Rhetoric in Thucydides

Victoria Ramlose – Animal Health Technology**

Murray Calloway County Animal Shelter: Community Perceptions, Adoption Success Rates, and Suggestions for Improvement

Deanne Rodgers - Foods and Nutrition

Effects of Substituting Whey Protein Isolate for Eggs in Yellow Cake

Kate Schaefer – Biology**

Bat Occurrence and Survey Site Selection at Land Between the Lakes National Recreation Area

Kevin Smothers – Geoscience**

Geostatistical Data Analysis of Division I Public Universities

Christy Soldo - Conservation Biology**

Application of GIS, Bathymetry and Long-term Hydrological Data to Identify Critical Biological Requirements of Bald Cypress for Habitat Improvement in Kentucky Lake

Jaime Staengel & Taylor Chaddock - Marketing

Linnhoff, Stefan, Taylor Chaddock, Jaime Stangel and Katherine Taken Smith (2015), Prestige, Transcendence and Innovation – New Facets of Organic Food Consumption

Nicole States & Clayton Keiser – Chemistry**

BB-500 Emissions Characteristics: Preliminary Observations

Nathan A. Tillotson* – Fisheries/Aquatic Biology, Ben Tumolo** – Watershed Science & Andrew K. Porterfield** – Fisheries/Aquatic Biology

The Phenology of Larval Fish in Kentucky Lake During Early Summer

Melanie Torres** - Watershed Sciences

Determining Wind Direction Patterns in a Diseased Landscape

Emily Vile - Dietetics

Acceptance of Blueberry Muffins made with Chia Seeds as an Egg Substitute

Christina Walker – Wildlife and Conservation Biology & Derrick Jent - Biology

Effects of the Fungus Beauveria bassiana on the Southeastern Cave Cricket Hadenoeus subterraneus from Mammoth Cave

Sara Wallace - Psychology

I Just Can't Help Myself: Hoarding Tendencies and Personality Traits

Allison West - Dietetics

The Effects of Pureed Black Beans on Appearance, Flavor, Texture, Aroma, and Overall Acceptability of Brownies made with Black Beans in Place of Flour

Jimiao Zheng**, Nhan Huynh*, Patrick McCluskey*, Jarred Koerner*, Zachary Ryne* & Ming Gao** - Biological Sciences

Role of Specialized Ribonucleoprotein Granules in Germline Development in Drosophila

Oral Sessions



Research Symposium

Barkley Room, Curris Center

Session Chair: Dr. Howard Whiteman

9:00 a.m. – 4:00 p.m.

Listed in presentation order

Kaylin Boeckman - Watershed Science

Effects of Predator Size Structure on a Possible Aquatic Trophic Cascade

Ben Tumolo - Watershed Science

Long-term Primary Production Analysis: Attempts to Understand System Specific Limnology While Faced With an Invasive Species

Emily Knoth - Geosciences

Stream Aggradation in the Carbon River: A Case Study at Mount Rainier National Park, Washington

Scot Peterson - Watershed Science

Drought Disturbance Potentially Inhibits Invertebrate Community Recovery in Degraded Streams: Implications for Restoration and Management

Michael Pate - Geoscience

A Spectral Reflectance Analysis of Soil Moisture

Carla Rothenbuecher - Watershed Science

Investigating Primary Production and Litter Decomposition in a Degraded High Desert Stream

Tom Anderson - Biology

Automated Analysis of Temperature Variance to Determine Inundation State and Hydroperiod of Wetlands

Micah W. Perkins - Biology

Dietary Resource Utilization among Watersnakes in Northwestern Kentucky

Larry D. Pharris Memorial Wildlife Fund Research Symposium

Continued as part of the Watershed Studies Institute Research Symposium

Bradley Richardson - Biology

Investigating the Diet Ecology of Four Sympatric Gar Species (Family Lepisosteidae) in Western Kentucky

Melanie Torres - Watershed Sciences

Utilization of Remote Sensing and GIS to Evaluate Vectors of Disease Transmission

Nick Cash - Biology

*Occurrence of Mammalian Prey and Scavengers on a Potential Re-introduction Site for *Nicrophorus americanus* (Coleoptera: Silphidae; American Burying Beetle) at Land-Between-the-Lakes National Recreation Area*

Whitney Walleth - Biological Sciences

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

John Stone – Geosciences

Analysis of Spatial Features in Baltimore, MD using Landsat-8 imagery for Socioeconomic Characterization

Bradley Hartman - Biology/Aquatic Biology/Fisheries

Effects of Predator Size Variation on Future Generations of Predators

Tyler Hoard - Biology/Pre-Professional Medicine

Determining the Parent Species of Garden Dahlias (Dahlia variabilis) Using Molecular Markers

College of Education: Student Teacher Eligibility Portfolios

Crow's Nest, Curris Center

Session Chair: Ms. Jeanie Robertson

10:00 a.m. – 11:30 a.m.

Participant names forthcoming

Middle School Education Session

Tennessee Room, Curris Center

Session Chair: Dr. Meagan Musselman

10:30 a.m. – 11:30 a.m.

Lyndy Hill – Middle School Education

#conceptmapping: Research Papers in 140 Characters or Less

Garris Stroud & Zachary Lisanby – Middle School Education

Write It and Fight It: Discussion-Based Learning in Science

Megan Wagner – Learning and Behavior Disorders/Middle School

Barbie Ain't Real: Argumentative Writing and Positive Self-image in the Math Classroom

Philosophy Session

Ohio Room, Curris Center

Session Chair: Dr. John Muenzberg

1:30 p.m. – 3:00 p.m.

Kyle Reaka - Philosophy

In Defense of Descartes' Cogito

Zachary Tkach - Organizational Communication/Philosophy

A Reconsideration of Human Rights

Other

Exploring the British Empire

Ohio Room, Curris Center

Session Chair: Dr. Danielle Nielsen

9:30 a.m. – 10:30 a.m.

This panel explores the literature of the British Empire written between 1830 and the present. Students prepared papers on the British Empire that examine the different ways in which authors represented the Empire and its people. Student participants are: Danielle Ray; Andrew Burden; Allison Caudill; & Takina Scott.

Scholars Week Luncheon

Large Ballroom, Curris Center

11:30 a.m. – 1:00 p.m.

(For Students and Faculty Participating in Scholars Week and Other Invited Guests Only)

Welcome by President Robert O. Davies

Remarks by Provost Jay Morgan

Performance by the MSU Medieval Drama Troupe of a scene from the York play, *The Resurrection*, in Middle English featuring: Alexis Ash, Erin Froehlich, Connor Jaschen, Keri Mogan, Amber Parker, Andrew Shepherd, and Raquell Verri. Mentored by Professor Bernard Lewis.

Thursday, April 16 2015

Oral Sessions

Occupational Safety & Health Session

Room 146, I & T Building

Session Chair: Dr. Tracey Wortham

9:30 a.m. – 10:20 a.m.

Ali Aljaloud, Cody Mitchell & Gavin Wallace - Occupational Safety and Health
Residential Constructions Ergonomics

Lauren Carter, Danielle Corbitt & Alexia Riley - Occupational Safety and Health
An Ergonomic Analysis of Milking Sub-tasks at a Dairy Farm

Callie Copeland, Rasha Khalil & Rachel Ragovin - Occupational Safety and Health
An Ergonomic Evaluation of August Moon

Undergraduate Economics Session

Ohio Room, Curris Center

Session Chair: Dr. David Eaton

2:00 p.m. – 4:00 p.m.

Participant names forthcoming

Other

Contemporary Perspectives on Hawthorne's *The Scarlet Letter*

Ohio Room, Curris Center

Session Chair: Dr. Gina Claywell

12:30 p.m. – 1:30 p.m.

This panel will examine current research regarding Nathaniel Hawthorne's classic novel, *The Scarlet Letter*. The papers were generated in ENG 321 Research in Literary Studies. Panelists are Russ Lowery, Jessie Hedrick, and Kate Post.

Faculty Recognition Banquet

Large Ballroom, Curris Center

Contact: Ms. Donna Miller

6:00 p.m. – 7:30 p.m.

(Faculty and Professional Staff Only)

Abstracts

Susan Adams - Spanish with Teaching Certification

Mentor: Dr. Tanya Romero-Gonzalez

Te Sacarán Los Ojos: El Eslabón Entre La Realidad y Ficción

Cría cuervos (1976), a film directed by Carlos Saura, is well-known for being a criticism of Francisco Franco's dictatorship. While being critical of the dictatorship was one of Saura's main purposes, I think that his film is also a good representation of the events that occurred prior to his death, after his death, and the psychological effect his death had on Spain as a whole. I will compare the reality of the events related to the death of Franco, such as Franco's relationship with Juan Carlos and the political and cultural changes, with the fictitious story of *Cría cuervos*. I argue that even though the main purpose of the film, which was not released until after the death of Franco, was to criticize the dictatorship, it is also a good illustration of the events surrounding the death of Franco. In conclusion, by closely examining the film *Cría cuervos* and the events leading up to and following the death of Franco, I hope to create a link between the reality of Franco's death and the fictitious events occurring in the film.

Ali Aljaloud, Cody Mitchell & Gavin Wallace - Occupational Safety and Health

Mentor: Dr. Tracy Wortham

Residential Constructions Ergonomics

This presentation will include an analysis of ergonomic issues at a residential construction in Western Kentucky. Three members of OSH 663 Applied Workplace Ergonomics visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in construction using techniques such as 2D Biomechanics, Rapid Upper Limb Assessment, and RULA. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Amal Aljaddani – Geoscience

Mentor: Dr. Robin Zhang

Finding Suitable Location for a New Park, in Murray, Ky Using Fuzzy Membership and Fuzzy Overlay Tools

Several criteria were taken into account to find a suitable location for a new park in Murray, Ky. The goal of this research is to evaluate the land suitability for a new park and recreation area to serve the growing population. A safe area away from any natural hazard was the most important consideration. Then, vegetated or cultivated area at present time, accessible and linkage to residents and visitors, and to avoid steepness area were the second set of main criteria. In this research, I relied primarily on various GIS tools such as fuzzy large membership and fuzzy overlay along with other tools. Several vector and raster layers were collected including land use/land cover map of 2011, 10 meter-pixel DEM, streets, streams and flood zones. The result shows that suitable location for a new park with varying degree of suitability from 0 (unsuitable) increasing gradually to 1 (the most suitable). Most of the suitable locations are located in the outskirts of the City in the North West, North, East, South and South West.

Tom Anderson - Biology

Mentor: Dr. Ray Semlitsch

Automated Analysis of Temperature Variance to Determine Inundation State and Hydroperiod of Wetlands

Monitoring the inundation state and hydroperiod of wetlands is critical to understanding aquatic community structure but can be costly and labor-intensive. We tested the ability of temperature data from cost-effective iButton dataloggers to reflect the inundation state (wet or dry) of constructed wetlands in central Missouri, based on our hypothesis that dry ponds would show greater daily temperature variance than ponds that remained inundated with water. We evaluated this method with two experiments in cattle tank mesocosms and performed a large number of site visits to existing natural wetlands in which we had deployed iButtons. True inundation state from pond visits was compared to predicted inundation state over different temperature variance thresholds expected to delineate wet or dry ponds. We confirmed that the daily temperature variances of dry iButtons were higher than the variances of inundated iButtons, as expected, and determined a variance threshold that could be used to delineate whether a pond was wet or dry with greater than 80% accuracy. From field observation of inundation state, we optimized an automated procedure to efficiently process and analyze large amounts of iButton data. Using this approach, hydroperiod length (number of days wet and dry) and the number of drying and filling events can be calculated. Several caveats are also provided that should be considered prior to using this method to maximize the accuracy in detecting inundation state and hydroperiod.

Michael Banta – Bio-Chemistry, Renn Lovett – Nursing & Abigail Steck – Biological Sciences

Mentor: Dr. Suguru Nakamura

The Role of Testosterone Propionate and Estradiol on the Morphological Changes of Benign Prostatic Hyperplasia in Rats

Prostate cancer is most frequently occurring (29% of all cancer cases) just in 2011. Prostate hypertrophy is linked to prostate cancer and is regulated by hormones. In the prostate, H-K-ATPase is expressed in the anterior lob, lateral lob and dorsal lobes of the prostate. H-K-ATPase is the proton pump responsible for the regulation of pH in prostatic fluid. The male hormone testosterone is produced and regulated in the prostate. Recent studies have shown that estrogen can enhance transcription of androgen – responsive genes, potentially playing a crucial role in inhibiting prostate hypertrophy. The purpose of this study is to examine the relationship between hormone regulation and morphological and histological change in the prostate. The experiments are designed to test the possibility that female hormones as well as male hormones regulated this enzymatic activity and prostate hypertrophy. Histopathological studies have been used to identify morphological changes in prostate in the rats treated with different doses of testosterone and estradiol. The morphological changes of the prostatic cells are analyzed after administering different doses with combinations of male and female hormones to the animal groups. Results suggest that cellular morphological changes in prostatic hypertrophy are under the influence of hormonal concentration.

Kerry Bergmann - Dietetics

Mentor: Dr. Kathy Stanczyk

Use of Avocado Puree as a Butter Substitute in Brownies to Provide a Better Source of Fat

An experiment will be conducted to test the acceptability of avocado as a fat substitute for butter in brownies. The substitution is being done with a one-to-one ratio of avocado to butter. Ten panelist will taste two samples, a control and the avocado variation and use a score card to rate both samples in terms of acceptability, color, flavor, texture, appearance and tenderness.

Paige Beuligmann - Pre-Veterinary Medicine

Mentors: Dr. Terry Canerdy, Dr. William Dewees, & Dr. Shea Porr

The Effects of Exercise on the Development of Muscle and Bone in Equines

The goal of this project is to determine the effects of exercise on the muscle and bone of equines. This goal was achieved through extensive research from scholarly articles and previous studies. A survey was handed out to Murray State students who owned horses in order to collect data. This data was analyzed and compared to the findings of previous research projects.

Latasha Blake - Psychology

Mentor: Dr. Paula Waddill

Perceptions of Relationships and Self-Esteem

This study was designed to investigate the how people view different types of couples and how they think those couples view themselves. The study was conducted with 52 participants from Murray State University. These participants were given picture booklets that consisted of twelve pictures. Six pictures were of heterosexual couples, three with a female on the left and three with a male on the left side. The other six pictures were of homosexual couples, three were gay couples, and the other three were lesbian couples. The participants were asked to fill out a survey that asked questions about how they thought the person on the left in the pictures felt about themselves. These questions were rating the perceived self-esteem of the person in the left of these pictures. This was conducted to see if there was a difference in how people viewed the males and females self-esteem of heterosexual couples and homosexual couples. They were also asked to fill out a self-esteem survey that evaluated themselves after they were done filling out the questions for the couples in the pictures. This was conducted to see if there was any correlation between the participants own self-esteem and how they viewed other people's self-esteem. The results showed that there is a difference in how the participants viewed the males and females self-esteem of heterosexual and homosexual couples. There was also a correlation with the participants own self-esteem and how they viewed the couples self-esteem.

Kaylin Boeckman - Watershed Science

Mentor: Dr. Howard Whiteman

Effects of Predator Size Structure on a Possible Aquatic Trophic Cascade

Recent trophic cascade research has shown the important role predator size structure can play in altering cascade strength. Greater predator size structure has the potential to dampen top-down control. Larval Arizona tiger salamanders (*Ambystoma tigrinum nebulosum*) have been shown to induce trophic cascades in low-productivity, lentic ecosystems. The cascade has not been investigated in more productive systems or in lotic environments. In Kimball Creek, a western Colorado stream, *A. t. nebulosum* larvae are found across a range of sizes during the summer months. Using this existing size variation, we experimentally tested how the strength of top-down control changed with predator size structure in recirculating mesocosms over a four-week period. Changes in benthic invertebrate communities, *macrophyte biomass*, and chlorophyll a concentrations were measured across eight size-structure treatments. Although benthic invertebrate abundance and biomass did differ across treatments, they did not correspond closely with increasing size structure treatments as predicted. The use of non-metric multidimensional scaling is necessary and will be used to increase our understanding of changes in benthic invertebrate communities over the course of the experiment. The results of our study indicate that under moderate larval densities, none of the treatments produced changes in primary production. However, it is possible that using higher larval densities, which varies widely in natural beaver ponds, could produce a stronger cascade, detectable at the lowest trophic level.

Lindsey Bordner - Nutrition Dietetics and Food Management

Mentors: Dr. Kathy Stanczyk & Dr. Beth Rice

Acceptance of Sweet Potatoes versus Cream in Tiramisu Dessert

Many Soft Textured desserts contain a high fat substance to give them their desired texture and taste. In this study the researcher wanted to replace the fat substance with a low fat substance to see if it would be an acceptable substitute for the whipping cream. The researcher decided to replace the fat substitute with pureed sweet potatoes which is not only a low fat substance, but it is also a great source of provitamin A. Once the tiramisus were made, the researcher performed two sensory tests and one objective test to see if the pureed sweet potatoes would give a desirable texture and flavor compared to the original tiramisu dessert. The first sensory test included subjects to be blindfolded prior to receiving the samples and then for them to rate each sample on a hedonic scale from 1-7 on overall liking of the flavor, aroma, and texture. Then the subjects' blindfolds were removed and the test was repeated, but this time they also rated the samples on appearance. The second test the panelist used an ordinal scale using the one sample of each dessert and rated each sample on texture, temperature, color, aroma, and consistency for the outside appearance of the dessert, the inside appearance of the dessert, and after tasting the dessert. The last test performed was a line spread objective test to test the consistency textural differences between the low fat tiramisu and the original tiramisu.\

Caleb Brannon

Mentors: Dr. Tony Brannon & Dr. Jason Robertson

The Effect of Row Spacing, Plant Population, and Maturity Levels on

Tetrahydrocannabinol (THC) and Cannabidiol (CBD) Levels in Agricultural Hemp

In 2014, a very historic event took place that could have a dramatic effect on our state and national agricultural industry. The 2014 Farm Bill contained language that allowed institutions of higher education to perform research on agricultural hemp. This opened up the opportunity for states that had already legalized hemp research to immediately start trials. Kentucky was one of few states that had legalized agricultural hemp before passage of the bill. Therefore, we were able to begin the nation's first legal hemp research project at Murray State University when the first shipment of seeds was received and planted on May 12th. A second planting occurred on June 12th. Banned since the 1930's, no information is available on the effect of different planting scenarios. Therefore, our research was focused on the effects of row spacing, population, and planting dates on the important compounds Tetrahydrocannabinol (THC) and Cannabidiol (CBD) levels at different maturity stages. THC is the primary psychotropic cannabinoid and CBD is the non-psychotropic cannabinoid. A French variety, Futura 75, obtained from Cannavest was used across the entire test. We planted our trials in 7.5, 15, 20, and 30 inch rows. In each of the different row spacing trials, two plant population levels were used - 25 pounds of seed per acre and 40 pounds per acre. The research objective was to test the effect of row spacing, plant population, and maturity levels on the THC and CBD levels in the plants. Three different tissue samples were taken on regular intervals to compare maturity dates. The results indicated all THC levels of Futura 75 were lower than .3% and CBD levels of the first planting were significantly above the second planting. Upon completion and reporting of the research, all results on all variables will be presented and compared.

Kate Breitenstein – Geoarchaeology

Mentor: Dr. Kit Wesler

Binders in Mississippian Ceramics

Mississippian ceramics are a fairly well-studied aspect of Southeastern archaeology. However, the reconstruction of these ceramics to systematically learn more about these cultures is not well-studied. The replication of these works, specifically in their surface treatment, is very important in examining what people during this time (850-1450 AD) and region (Southeastern United States, in addition to Indiana, Illinois, Wisconsin, Minnesota and Oklahoma) found aesthetically valuable. The designs on ceramic works such as plates and bowls have been studied, but the pigment and paint binder have not been nearly so examined. Pigment is the powder form of an organic or mineral substance that gives paint its color. Paint binder is a liquid with varying viscosity that can hold the pigment in suspension and adhere the pigment to surface. Pigment and its binder are how color was applied to surfaces. Understanding what these pigments and binders are can help archaeologists determine how the resources available were used in the surface treatment of art. This study aims to examine the potential binders that hold the pigment to a ceramic surface, in a limited scope. The goal of this study is to determine which, if any of the chosen binders (water, corn oil, egg or sap) hold the pigment to a ceramic vessel, and how the vessel may have been treated before the paint was applied. This will be accomplished by mixing pigments with locally occurring potential binders, and visually comparing those results to archaeological examples available nearby and those that are digitally accessible.

Lauren Carter, Danielle Corbitt & Alexia Riley - Occupational Safety and Health

Mentor: Dr. Tracey Wortham

An Ergonomic Analysis of Milking Sub-tasks at a Dairy Farm

This presentation will include an analysis of ergonomic issues at a dairy and poultry farm in Western Kentucky. Three members of the OSH 663 Applied Workplace Ergonomics course visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in multiple subtasks of milking cows using such techniques such as Strain Index, the Rapid Entire Body Assessment, and the Rapid Upper Limb Assessment. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Nick Cash - Biology

Mentor: Dr. Terry Derting

*Occurrence of Mammalian Prey and Scavengers on a Potential Re-introduction Site for *Nicrophorus americanus* (Coleoptera: Silphidae; American Burying Beetle) at Land-Between-the-Lakes National Recreation Area*

The American burying beetle (*Nicrophorus americanus*, Olivier; ABB) is an endangered carrion beetle important in recycling nutrients back into ecosystems. Land Between the Lakes National Recreation Area (LBL) lies central to the ABB's historic range and is currently under consideration for ABB re-introduction. A critical component of ABB ecology is the availability of rodent-host carcasses (70-120g) for reproduction and rearing young. Carcass availability is a function of rodent and competing scavenger populations. We assessed LBL as a potential re-introduction site for ABB by conducting a two-part study. First, we examined the current small mammal population within four habitat types (grassland, two stages of fire-managed woodland, and unmanaged forest) using live trap grids. Density and species of competing scavengers at a given site were assessed using camera traps. Four grids of each habitat type were surveyed for a total of 2352 trap nights. Our results indicated significantly more small mammals >70g in grassland sites and significantly more small mammals <70g in recent burn sites, compared to old burn and unmanaged forest sites. There was no significant difference in competitor abundance among the habitats. Next we investigated direct competition between *Nicrophorus* beetles and vertebrate scavengers by monitoring rat carcasses for 72 hours. Our results indicated significant differences in competitive pressure among the habitat types, with highest competition in recent burn sites and lowest competition in forest sites. We concluded that grassland sites within LBL would provide the most suitable habitat for ABB in terms of small mammal availability and lower competitive pressure.

Deidra Marie Chandler - Nutrition, Dietetics and Food Management

Mentor: Dr. Kathy Stanczyk

Effects of Substituting Tofu for Eggs in Sweet Corn Cake

The research project will provide another way to lower fat content in a sweet corn cake. The research will explore the effects of substituting tofu for eggs. By lowering the fat content in the recipe makes the product more healthful for individuals with type 2 diabetes and cardiovascular disease. I will prepare the experiment with accuracy and use score cards to do sensory test and complete objective tests. My data is represented in detailed graphs.

Rachel Clifford – English/Creative Writing

Mentor: Dr. Danielle Nielsen

Gender and Sexuality in Science Fiction and Fantasy Literature

The representations of gender and sexuality have always been topics of great debate in Science Fiction and fantasy. For my senior honors thesis, I looked into a history of representation, representation trends today across multiple publishing houses, and the effect on fans of Science Fiction and fantasy. I found that representation did not start until the 1960s, and that while strides were made prior to 2000, it wasn't until then that representation in mainstream publishing really took off. Yet, there is still much to be desired. While female protagonists are featured just as often as men, the way in which they're represented is seen by many to be sexist. LGBT protagonists are few and far between in mainstream publishing. As a result, groups of fans (collectively known as fandom) have taken to producing their own inclusive versions of mainstream works, through fanfiction or fan art. Some fans have even gone further, to write their own original works. However, rather than going through mainstream publishing, these authors are providing them via alternative publishing methods.

Callie Copeland, Rasha Khalil & Rachel Ragovin - Occupational Safety and Health

Mentor: Dr. Tracy Wortham

An Ergonomic Evaluation of August Moon

This presentation will include an analysis of ergonomic issues at a local restaurant in Western Kentucky. Three members of OSH 663 Applied Workplace Ergonomics visited the site to evaluate potential ergonomic risk factors for musculoskeletal disorders in lifting trays (either balancing drinks, or relocating several trays at a time), lifting food trays to place in buffet area, cleaning (dishes and janitorial tasks) using techniques such as the NIOSH lifting equation, Hazard Zone Checklist, Rapid Entire Body Assessment, Strain Index, Total Body Discomfort Survey and interviews that will require the use of a goniometer, protractor, and measuring tape. Photos and videos were used to visually record these tasks. An overview of the findings along with recommendations for reducing ergonomic hazards will be presented.

Egypt Crider - Psychology

Mentor: Dr. Laura Liljequist

Use of Mental Health Services

Concerns such as stress, anxiety, eating disorders, and depression are often presented to college counseling centers. The bigger problem is students who need mental health treatment, but are not actively seeking it. A better understanding of the factors associated with negative stigma towards college mental health services could inform efforts to increase service utilization. One of the goals of the proposed research project is to determine whether or not students in need of health care treatment are utilizing health services, especially the psychological and counseling services, on campus.

Underutilization will be operationally defined as needing treatment, but not seeking it on campus. If students are underutilizing counseling services, the other goal is to examine some reasons students do so. Factors such as attitudes toward counseling as well as key demographic variables identified in previous research will be examined.

David Crittendon – Psychology

Mentor: Dr. Jana Hackathorn

Accentuate the Positive: Positivity Influences the Nation Greater than Negativity

Feelings of patriotism and nationalism raise up as priming from news and traumatic events are commonly broadcasted and our elected political officials in times of war use phrases like, “you’re either with us or you’re with the terrorist”, or referring to countries opposing us as “the dark side” (Althaus & Coe, 2011; Citrin, et al., 2001). The differential effects of positive and negative priming is important as feelings of patriotism and nationalism may be affected by political news and/or military related traumatic events are commonly broadcasted. Thus, the current study examined to what extent using positive (pro-America) or negative (anti-other) quotes would influence patriotism and nationalism scores. It was hypothesized that positive quotes towards America would raise patriotism levels and military approval, whereas negative quotes would raise nationalism, xenophobia, and need for punishment scores. The current study found that there was a significant difference in positively primed groups in terms of patriotism, nationalism, punishment and, military acceptance. Findings contradict Social Identity Theory, by suggesting that an in-group mentality has a larger impact on attitudes that derogating an out-group.

Lindsay Cunningham - Dietetics

Mentor: Dr. Kathy Stanczyk

Reduction in Nutrient Density for Increase in Satiety: Replacing Cottage Cheese for Mayonnaise in Egg Salad

The purpose of this experiment is to uncover the emulsifying capability of pureed cottage cheese in serving to replace mayonnaise in a traditional egg salad recipe. The objective of this experiment was to lower the calories, total fat, and saturated fat, while increasing the amount of protein and subsequent satiety. Consumer appeal has been gauged to uncover the degree to which this ingredient stands up against the more nutrient-dense mayonnaise product as a successful replacement.

Mary E. Decker - Nutrition

Mentor: Dr. Kathy Stanczyk

Acceptance of Orange Cake with Added Turmeric to Increase Antioxidant Potential

The purpose of this research project is to obtain and present information pertaining to the acceptance of turmeric in orange cake. On the poster presentation it will present the characteristics of turmeric. One example is explaining the role of turmeric in the body as it acts as an antioxidant which reduces inflammation in the body. When turmeric is added to orange cake it also affects some characteristics of the cake. Some characteristics of the orange cake will be judged using objective testing in which human subjects participate in. Two different cakes will be tasted; one being the control cake without turmeric and one being the experimental cake. The panelist for this project will judge the cake based on color, crumb color, moisture and texture of the cake. The poster presentation will present the nutrient facts of the two cakes involved in the research project. After the panelists have participated in the objective testing the results will show whether or not the turmeric indeed affected the cake.

Jordan Eldridge - Spanish

Mentor: Dr. Martin Kane

Outcomes: The Cuban Revolution

One cannot deny the Cuba has changed significantly since the Revolution of 1959. Nonetheless, it is always being debated if those changes have made the country better, or just the opposite. There are three major positive results of the Cuban Revolution: education, health, and equality, in no particular order. In regards to education, perhaps the best and most important improvement is the alphabetization of Cuba. The significance of the improvements in health are shown by low infant mortality rates, and a higher average life span than the United States. Lastly, the equality of the genders has been greatly bettered since the Revolution. However, even with these great improvements, there have been many setbacks, namely, the issue of human rights, as well as the problems with international relationships, especially with the United States.

Rebekah Elkins - Japanese

Mentor: Prof. Yoko Hatakeyama

Changing Situations of Korean-Japanese

As the legend of an ethnically homogeneous nation permeates Japanese thought, many fail to recognize seemingly hidden minority populations—particularly the over five-hundred thousand Zainichi Koreans, Korean nationals who call Japan their home. Three major waves of Korean migrations and the following complex historical consequences have left Zainichi Koreans in a separated situation in which the individual suffers from discrimination and injustice based predominately on his ethnicity and nationality. Nevertheless, since Zainichi author Kaneshiro Kazuki's publication of GO in 2000, the 21st century has seen significant changes in the Zainichi Korean situation through continuing globalization, the increasing importance of soft power, and pressure to change from the international community. This paper intends to map the development of the Zainichi situation since 2000 and compare current and future minority situations to those of the past. Finally, this paper will suggest a future for the Zainichi Korean community as a leader for minority movements in Japan.

Morgan Ernst – Animal/Equine Science & Lauren Hamm – Pre-Veterinary Medicine

Mentors: Dr. Shea Porr & Dr. Michelle Santiago

The Correlation of Rider Weight on Equine Stress

Stress has many causes and is known to have negative health consequences in animals and humans. One area of concern is the impact of rider weight on equine health. The average weight of Americans is rising, and concern for equine welfare is growing. The objective of this study was to evaluate the effect of rider weight on equine stress by measuring vital signs, salivary cortisol, and behavioral cues. Eight horses were weighed, and values for 15, 20, 25, and 30% of their body weight were calculated. Experienced riders and tack were also weighed, and additional weight added in saddlebags to reach treatment weight. On four different days, horses performed a riding test under each of the four treatments. Heart rate was collected during the ride using a wireless monitor. Behavior was also evaluated throughout the ride. Saliva samples for salivary cortisol testing, respiration rate and rectal temperature were collected before and after exercise. It was hypothesized that horses will show more signs of stress at higher treatment weights, including increased heart rate and salivary cortisol concentrations as well as behavioral changes. It was also expected that heart rate and respiration rate will take longer to recover after horses have carried higher treatment weights. Results from this project may assist riding programs in evaluating equine stress and may result in changes to programs, including putting weight limits on riders or limiting the frequency and length of time horses may have to carry heavier loads.

Jonathan Ferris – Economics

Mentor: Dr. David Eaton

The Role of Host Cities and Regions in the Economic Success of Professional Sports Franchises

In each of the four major professional American sports leagues (NFL, MLB, NBA, NHL), franchise success/failure has been a daily dialogue. Franchises with large, loyal fan bases have often shown strong financial metrics regardless of the team's on-field performance (the Dallas Cowboys and New York Yankees of the world). Yet other teams historically struggle year-in and year-out to fill seats and have often faced ownership changes and threats of relocation. While a large base of literature looking at the impact of professional sports franchises on their host regions has been published, very little research looks at the ability of regions to support their franchises. On-field performance undoubtedly impacts a franchise's success, but what role has the host city/region played? What characteristics of a host region have traditionally led to an environment conducive to economic success for a pro-sports franchise? In examining these questions, I compared factors including overall population, mean income, population age distribution, the proximity of other professional and collegiate athletic teams and the overall demographic makeup of the region. I specifically focused on the idea of sports teams as complements and/or substitutes. The primary example I used is Louisville, KY. With no professional sports team in the state, and an NBA-ready venue recently opened in downtown Louisville, many have labeled the city an attractive destination for an expansion or relocating NBA franchise. Why the holdup? The University of Kentucky and University of Louisville have consistently boasted two of the most loyal and fervent basketball fan bases in the country. I looked into the question of how these affect potential professional sports teams. I hypothesized that the presence of these major college basketball programs inhibit the economic ability of Louisville to support a professional basketball franchise, as they act as substitutes to a potential franchise. In examining these characteristics on a large scale, I worked to determine the overall ability (or lack thereof) of regions to economically support current and/or potential franchises.

Flavian Igbokwe - Public Administration

Mentor: Dr. James Clinger

The Barriers to Civil Service Reforms in Nigeria

The Nigerian Civil service has undergone several reforms following its creation around 1861 by the British colonial powers. It has also been faced with myriads of challenges on its road to the provision of service delivery and effective performance to the entire citizenry. From independence up until now, the Nigerian civil service has witnessed high level of unqualified personnel join the civil service due to political patronage and this has resulted to oversize workforce causing the nation about 87% of government revenue (Anazodo et al, P. 17). In order to solve the problems of inefficiency and ineffectiveness in service delivery, the Nigerian Civil service has undergone series of reforms prior to and following independence. Unfortunately, these various service reforms have not been able to fully resolve the lingering problems of the Nigerian civil service in terms of service delivery and efficiency. Several variables across demographics and time periods of these public service reforms have militated against their success bringing about numerous questions. The framework of this research is to review the various civil service reforms in Nigeria from independence following, dividing it across two time periods of the military regime and the civilian regime and to discover the basic factors responsible for the failure/success of the reforms. Again, being of colonial creation, the framework of this work would make a comparative study that reviews other African colonies like Ghana and Uganda in the civil service to ascertain their model of civil service reforms as compared to Nigeria.

Landon Gibbs – Horticulture

Mentor: Dr. Lin P. Handayani

Dynamics of Soil Infiltration Rates in Various Agro-ecosystems

The evaluation of infiltration rates is vital to estimate surface runoff in order to reduce the risk of pollutant contamination and to efficiently apply water and fertilizers for a crop's benefit. The objectives of this study were (1) to assess the impacts of six agroecosystems on infiltration rates; (2) to observe the temporal variability of soil infiltration rates under various seasons (fall-spring-summer-fall); and (3) to quantify the relationships between soil infiltration rates with other properties including soil organic carbon (SOC), macroaggregates, and bulk density. The study was conducted in Calloway County of western Kentucky using six agroecosystems. They were no-till corn, conventional tillage soybeans, conventional tillage tobacco, organically grown vegetables, woodland, and prairie. All of the soils used in this study have a silt loam texture. The infiltration rates were measured using a single ring infiltrometer. Soil organic carbon (SOC) was measured using the loss on ignition (LOI) method. Macroaggregates and bulk density were determined using wet sieving and ring methods, respectively. 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 the wooded system have the highest infiltration rates (35.2 cm/hr and 37.7 cm/hr) and the lowest bulk densities (1.0 g/cm³ and 1.1 g/cm³), respectively. The relationship between infiltration rate and organic carbon, bulk density, macroporosity, and total porosity was $r^2=.99$, $r^2=.60$, $r^2=.69$, and $r^2=.66$. The no-till corn field had a higher bulk density than the conventionally tilled systems (1.7 g/cm³) and lower total porosity of 37%, but had a higher infiltration rate than the conventionally tilled systems at approximately 12.9 cm/hr. The organic system had a 60% lower bulk density than the no-till corn, which were the highest and lowest bulk densities, respectively. The most dramatic differences amongst infiltration rate occurred in the wooded system which increased from 36.3 cm/hr in the fall of 2013 to 39.3 cm/hr in the summer of 2014. Amongst the averages, however, which range from 4.3 cm/hr to 37.7 cm/hr, the seasonal changes were not significant.

Matthew Green

Mentor: Eric Frederick

Obturator Externa Injury: An Uncommon Occurrence

There are thousands of athletic injuries every year in sports ranging from sprained ankles, concussions, muscle strains, and joint dislocations. One of the least common injuries seen is an obturator externa tear. The obturator externa is one of the six external rotators of the hip. The muscle originates at the rim of the pubis and ischium and attaches at the trochanteric fossa on the greater trochanter of the femur. The muscle is responsible for assisting the femur with external rotation and adduction. The purpose of this study was to realize the uncommon phenomenon of this kind of injury and understand how this uncommon injury could happen to young, healthy athletes. Most research shows this kind of injury happens in elderly women who have had hip replacement surgery or with total hip dislocations in athletes and in the elderly population, but none of which in a young, healthy athlete that only tears this one muscle. Results showed that the mechanism of injury was inconclusive and that further research needs to be done for an accurate understanding to why this injury occurred. Rehabilitation for this injury is also a trial and error due to the fact that there is very little to no research showing any rehabilitation techniques of a torn obturator externus. Hopefully with further testing and research, this injury will be better understood so uncommon injuries such as this one can be prevented and treated appropriately as necessary.

Layne Grissom - Psychology

Mentor: Dr. Jana Hackathorn

The Hegemonic Masculinity Scale

A hegemonic male is in popular culture referred to as a "metrosexual" male. The research created a scale to measure hegemonic masculinity which has not yet been published before. The scale created seeks to identify metrosexual/hegemonic behaviors in males to be used as a tool to further other research regarding Gender Theory, male role norms, and other society based research. Analyses showed an adequate reliability (Cronbachs alpha = .78) as well as validity through correlations with associated scales such as the MRNI-R (Male Role Norm Inventory-Revised) subscales of Avoidance of Femininity and Fear and Hatred of Homosexuals, and fashion scales. This research also hopes to increase scholarly understanding of societal changes as the social norms that used to differentiate males and females adapts to a more equality based culture.

Jennifer Haas - Environmental Geology

Mentor: Haluk Cetin

A GIS-based Volcanic Hazard and Risk Assessment of Mt. Redoubt, Alaska

The goal of this project is to analyze common Geographic Information Systems-based (GIS-based) methods of volcanic hazard and risk assessment, simplify these methods into a consolidated, generally applicable format, and apply the resulting format to Redoubt Volcano, Alaska and the surrounding study area. Mt. Redoubt is one of a group of four stratovolcanoes found along the western shores of the Cook Inlet in southern Alaska, and is located less than 200 kilometers from the state's largest metropolitan area, the city of Anchorage. Despite the fact that the vast majority of the total state population lives in the shadow of Mt. Redoubt, there are only a few comprehensive studies of the volcano – many of which were written over a decade ago. In order to better communicate the inherent risks of residing near a volcano or related natural hazard (e.g. property damage, property loss, health issues, physical injury, and loss of life), representative maps indicating the likelihood and range of eruptive events are a necessary tool in educating the general public and promoting awareness. Simplistic mapping techniques, such as buffers and weights, were therefore coupled with 2010 United States Census population data as well as vector data of travel centers and key infrastructure in the study area. In order to create a viable GIS-based volcanic hazard and risk assessment of Mt. Redoubt, Alaska, data were gathered specifically pertaining to the population, infrastructure, lithology, topography, and land use/land ownership within the study area with the secondary aim of examining potential volcanic hazards on the major metropolitan area located in Anchorage, Alaska. These data were then mapped and analyzed visually to determine the physical extent of probable volcanic hazards as well as the areas at greatest risk should a volcanic eruption of Mt. Redoubt occur. These data were chosen specifically to create a visual analysis of regions at greatest determined risk in the region based on the impact to both the local human population and economy. Degree of risk was based on relative population density of the area in combination with land use or land ownership data for the state. When integrated with data pertaining to geologic evidence of past eruptions and volcanic activity, this approach offered a succinct solution to the complexity of both volcanic activity forecasting while simultaneously instructing a specific, at-risk population. Given the nature of past eruptions within the local historic geologic record and the nature of land ownership in the study area, ashfall was deemed the most extensive volcanic hazard by far, with land owned by private citizens and the US military categorized as at the greatest risk. Thus, the end result of this GIS-based hazard and risk assessment was an updated series of map-based educational tools illustrating sources of volcanically associated hazards and risks aiming to be as informative as they are cautionary.

**Lauren Hamm – Pre-Veterinary Medicine & Morgan Ernst –
Animal/Equine Science**

Mentors: Dr. Shea Porr & Dr. Michelle Santiago

Effects of Ivermectin and Moxidectin on Equine Parasites in Horses in Western Kentucky

Internal parasites are a common health concern in the equine species. Parasitism can have a negative effect horses' health, including weight loss, intestinal ulcers, a higher incidence of colic (abdominal pain), and even death. Unfortunately, overuse of dewormers has resulted in parasite resistance to some commonly used drugs in various areas of the United States. Because of this, some dewormers may not have the desired effect on parasites. The objective of this project was to evaluate the efficacy of ivermectin (IVE) and moxidectin (MOX), two common dewormers, on horses owned by Murray State University in order to test the resistance of parasites found in western Kentucky. Fecal samples from 41 horses were collected and evaluated for the presence of parasite eggs. Horses were classified as low, medium, or high shedders based on the number of eggs present. Horses were then blocked by classification and assigned to one of two treatment groups (IVE or MOX), or to a control group (untreated). Two weeks after treatment, fecal samples were again collected and evaluated for the presence of parasite eggs. The efficacy of the two dewormers was evaluated based on egg reappearance rates. Based on a review of the literature, it was hypothesized that MOX, which was released in 1997, would be more effective at controlling parasites than IVE, which was released in the early 1980's. Testing these dewormers is important because many horses are on a deworming schedule that utilizes both MOX and IVE. If either of them is ineffective at controlling parasites, it would be inappropriate to pay for or utilize dewormers that do not have the desired effect on improving equine health.

Bradley Hartman - Biology/Aquatic Biology/Fisheries

Mentor: Dr. Howard Whiteman

Effects of Predator Size Variation on Future Generations of Predators

Size variation is a ubiquitous, fundamental aspect of most populations that has broad implications for the ecology and evolution of numerous species. Recent research on size variation of top predators has promoted an integrated understanding of population, community, and ecosystem-level processes. Although many studies of size-structured interactions focus on shifts in diet as predators grow via theoretical modeling approaches, there is a need for empirical work, particularly in understanding how size structure, predator density, and cannibalism interact, the community dynamics that result from interactions between predator size classes, and the mechanisms that create variation in size structure. Size-structured salamander populations provide a model system for such empirical studies. From 32 ponds within Land Between the Lakes Recreational Area in Western Kentucky, physical data on each pond and its surrounding environment were recorded, and photographs of multiple size classes of Mole Salamanders (*Ambystoma talpoideum*) were taken that were used to measure body size and determine developmental stage. We found substantial size variation of Mole salamander populations, in some cases up to a factor of five, but were unable to correlate this variation with estimated population density. Size variation and facultative paedomorphosis are often a result of previous community interactions and both biotic and abiotic factors, therefore a multivariate and multi-year analysis of these factors will be conducted, and further experiments will be conducted during Spring 2015 to ascertain the effects of cannibalistic paedomorphic predators on developing larval cohorts.

Lyndy Hill – Middle School Education

Mentor: Dr. Kimberly J. Stormer

#conceptmapping: Research Papers in 140 Characters or Less

21st Century learners live in an instant gratification nation because they are accustomed to getting and sending information in the simplest and most efficient of means. The idea of research papers, in-text and parenthetical citations, and massive word counts can be daunting. Teachers are left with the task of finding a way to relate to students and still teach these concepts without overwhelming middle school students. The overwhelming part of writing papers for many middle-schoolers is organizing all of the information. According to Valdes-Vasquez and Klotz, “Concept mapping helps solicit and organize ideas” (2013). This organization provides an easy way for students to map out their thoughts and relate topics to a common idea or theme. Conlon (2009) states, “The rationale for TCM [text concept mapping] seems straight-forward—a learner faced with the task of transforming a text into a concept map is necessarily engaged in the selection of main concepts, organization of these concepts into related categories and their reintegration into a structure of meaningful propositions.” The rationale for writing a research paper is much the same, organization of concepts and reintegration of these concepts into a coherent and meaningful structure. Therefore, students may use the same information they would in a formal research paper, and cite their information/sources through the concept map, just with a different structure. This presentation will demonstrate the comparison of concept maps to tweeting in an effort to minimize the daunting task of teaching research papers at the middle level.

Olivia Hitt - Marketing

Mentor: Steffan Linhoff

Eating Healthy or Unhealthy - Who Knows? Who Cares? And When? Exploring College Millennials' Food Choice Utilizing an Extended Planned Behavior Model

Anecdotal evidence suggests there exists a discrepancy between what students say they wish to eat - healthy food - and what they often actually tend to eat - unhealthy foods. Building upon the Theory of Planned Behavior, an extended model was developed integrating the following factors: level of involvement (low/ high), temporal horizon (long- vs. short term behavioral intent) and objective knowledge (are students aware of the (un)healthiness of the food they wish to consume?). Data collection for this study is pending.

Tyler Hoard - Biology/Pre-Professional Medicine

Mentor: Dr. Dayle Saar

*Determining the Parent Species of Garden Dahlias (*Dahlia variabilis*) Using Molecular Markers*

Garden dahlias (*Dahlia variabilis*) are colorful plants that have been in cultivation for over 300 years. There are over 40,000 varieties that are grown all over the world. Over 35 “wild” species inhabit the mountains of Mexico. Cultivated dahlias are hybrids of at least two of these wild species. Molecular studies in the early 2000s identified several potential parental species. However, none of the studies definitively identified the parental stock of the cultivated plants. This study is using new molecular markers to identify the parent species of the cultivated plants.

Chelsea Holleman – Agronomy

Mentor: Dr. Lin Handayani

The Effect of Soil Sampling Depth on Nutrient Recommendations in Kentucky

The objective of this study was to determine the relationship between soil sampling depth and the nutrient values of soil test analyses. Samples were collected from a 0-5 cm depth, 0-10 cm depth, 0-15 cm depth, and 0-20 cm depth. Each field was grid sampled using a 0.25 acre grid. P and K levels were determined using the Mehlich III method. The results of the soil test analyses were used to determine the amount of P and K fertilizers that should be applied to each field in order to provide the needed nutrients for a soybean crop with a yield of 40 bushels per acre. Nutrient recommendations were made for each sampling depth. Analysis of standard deviation of nutrient levels and fertilizer recommendations for the no-tillage group showed that variability in nutrient levels of both P and K was greater from sampling points within the field than it was for sampling depths at any one point in the field. Fertilizer recommendations for P had an average standard deviation of 12.22 units less for variation within a single sample point than within a consistent sampling depth throughout the field for the tillage samples. K recommendations followed the same trend, by having an average standard deviation of 43.70 units less within a single sample point in the field than within a consistent sampling depth throughout the field for the tillage samples. Based on these trends, it can be concluded that horizontal spatial variation within the field is greater than vertical spatial variation within the field.

Anne Jablinski – Animal Science, Marisa Bedron – Equine Science/Agriculture, Vaughn Reed – Agronomy & William Craig Lenoir – Engineering Physics

Mentor: Dr. Tony Brannon

Bioenergy Crop Production and Combustion in Agriculture

Biomass, vegetative waste from energy crops such as switch grass and sorghum, is a key input for transforming the face of energy and agriculture for the future of Kentucky, the nation, and the world. The purpose of this experiment at Murray State University using the Bio-Burner 100 unit—BB-100— from L.E.I products in Madisonville, KY, was to evaluate the efficiency of a combustion-based energy converter and boiler using various biomass materials, and as a preliminary trial for burns utilizing burner units attached to a drier with higher heating capacity. Loose forms of switch grass, energy sorghum, miscanthus, corn stalks, and wood shavings were burned over five-hour periods in outdoor temperatures below 67°F. Factors including burn and ash weight, ash clinkers, fan and fuel speed, moisture levels and absorbency of material, BTU measurements, water flow, propane usage per burn, and some emissions data were recorded to assist in determining the success of each burn trial and overall energy balance of the system. Upon analysis of the data, the biomass with the most productive burn proved to be the wood shavings. The least productive burn proved to be the cellulosic biomass, which included miscanthus, switch grass, corn stalks, and sorghum. Grasses burn with more difficulty in comparison to woody materials due to their high hydrocarbon content, heavy ash production, and need for a high volume of dry matter. The application of this experiment with biomass used as energy is vital for improving sustainability in livestock and farm-level operations.

Mari-Alice Jasper - Journalism and Sociology

Mentor: Dr. Jared Rosenberger

The Influence of Pop Songs on the Promotion of Rape Culture and Sexism

For many years, sociologists have been studying how music affects human behavior and cognitive thinking. Technological advances in the radio industry have allowed for their broadcast to reach a wider audience. This study strives to bring awareness to the misogynistic messages that are transmitted to the mass media through music. A sample of “The End of the Year Top 100” by Billboard will be used to test this hypothesis. In order to analyze this material critically, a quantitative analysis approach was used in order to code for instances of dehumanizing, objectifying and abusing women. Through this research I propose that audiences are subliminally exposed to sexist messages that promote gender inequality and rape culture in modern society.

Matthew Jones – Economics

Mentors: Dr. David Eaton & Dr. Jim McCoy

Examining Low Wage Jobs in Kentucky and Exploring Change

Kentucky is one of many states that set the minimum wage the same as the federally mandated minimum. This is in contrast to multiple other states that have set the minimum at a higher level. Rather than looking at the country as a whole, I examined the job trends here in Kentucky. Gathering data from other states and other sources, I looked to not only examine minimum wage jobs but also those near it. Going further, I explored the effects that the proposed Federal Minimum Wage increase would have on Kentucky as well as any other increases.

Tyler Kennebec - German

Mentor: Dr. Reika Ebert

Concerning Maidens: A Grimm Examination

When it comes to the Grimm brothers' collection of fairytales, many are familiar with the more famous stories, at least on a basic level, thanks to their being popular children's tales. But these stories are significant culturally beyond the world of children, and how they shape perspectives of magic, morals, and gender remain well into adulthood. This project seeks to provide a deeper examination of what can be taken away from the Grimm fairytales in regards to the presentation of gender roles: specifically, feminist or, in contrast, misogynistic messages.

Sarah King – Economics

Mentor: Dr. Jessica Dunn

The Insight and Prediction for Nike, Inc.

As sport enthusiast, I was drawn to research a company that was well-known in the sporting industry. I have always worn the products produced by many companies in the Textile – Apparel Footwear and Accessories industry, but one name stood out as the most interesting. Nike, Inc. has been around since the early 1970's. It is recognized around the world and the product line continues to grow through acquisitions and exploring new market opportunities. Throughout the paper I will explain the Strengths, Weaknesses, Opportunities, and Threats that will help to identify areas that should continue to be nourished and sheltered while other areas will need attention to prevent problems or issues from destroying the company's image. The financials are based on the most recent reports possible as well as a 3-year history and forecast for upcoming year. Based on the outcome of these reports, I feel the company has good solid performance year over year that is consistent with or above the Textile – Apparel Footwear and Accessory industry. They are also showing a strong presence over their competitors who are continuing to stay in the forefront with Nike and to compete for the young athletes. We recommend the purchase of stock in Nike for someone who is looking for steady growth and low risks on their investment.

Emily Knoth – Geosciences

Mentor: Dr. Robin Zhang

Stream Aggradation and Flooding at Mount Rainier National Park: A Comparative Study of the White, Nisqually and Carbon Rivers

The Carbon River, located in Mount Rainier National Park, is a glacially-fed braided river, and drains the Carbon glacier, the lowest elevation glacier in the contiguous United States. The river is surrounded 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, limiting access to the park from the Northwest. The purpose of this study is to analyze the rate at which the Carbon River is aggrading, or increasing in height over time due to build up in sediment. More specifically, this study analyzes the Carbon River channel geometry and stream bed elevation from 1994 to 2014 and determines if channel dynamics are significantly different throughout the reach and through time. This project uses topographic surveying and LiDAR datasets to help resolve stream stability in particular areas, which could further be used to help determine which areas are safe for public access. This data is potentially applicable to other aggrading stream systems in the Cascade Mountain Range.

Emily Knoth - Geosciences

Mentor: Dr. George Kipphut

Stream Aggradation in the Carbon River: A Case Study at Mount Rainier National Park, Washington

The Carbon River, located in Mount Rainier National Park, is a glacially-fed braided river, and drains the Carbon glacier, the lowest elevation glacier in the contiguous United States. The river is surrounded 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, limiting access to the park from the Northwest. The purpose of this study is to analyze the rate at which the Carbon River is aggrading, or increasing in height over time due to build up in sediment. More specifically, this study analyzes the Carbon River channel geometry and stream bed elevation from 1994 to 2014 and determines if channel dynamics are significantly different throughout the reach and through time. This project uses topographic surveying and LiDAR datasets to help resolve stream stability in particular areas, which could further be used to help determine which areas are safe for public access. This data is potentially applicable to other aggrading stream systems in the Cascade Mountain Range.

Elizabeth Kunkel - Dietetics

Mentor: Dr. Kathy Stanczyk

Sensory Evaluation of Brownies with Dates as a Sugar Replacement

Substituting dates for sugar in a standard brownie recipe benefits many populations: those with diabetes, those who are trying to lose weight, and those who have any sort of gastrointestinal issues. The purpose of this study is determine if this standard brownie recipe still has a desirable appearance, texture, and taste after substituting the sugar for dates. It is hypothesized that there will be no significant difference between the control brownie recipe and the amended brownie recipe in appearance, texture, taste, aftertaste, and overall acceptability.

Nhu Le – Teaching English as a Second Language

Mentor: Dr. Juyoung Song

Pre-service Teachers' Technological Pedagogical and Content Knowledge (TPACK): Two Case Studies in Vietnam and in the US

The study examined the Technological Pedagogical and Content Knowledge (TPACK) of pre-service teachers in the two contexts in order to gain better understanding on how language teachers combine their knowledge of technology, pedagogy and content together in the classroom. The study also analyzed pre-service teachers' perspectives about the Computer-Assisted Language Learning (CALL) course as well as their technological applications in language teaching and learning environment through pre-survey, post-survey and interview. The results indicated that the pre-service teachers felt more confident about their TPACK after taking the CALL course and that they maintained positive attitudes toward technology integration in language education. However, the interview analysis revealed certain factors that could affect their use of technologies in the classroom.

Robert J. Lewis - Wildlife and Conservation Biology

Mentors: Dr. Stephen White & Dr. Joe Caudell

The Consumption of Metallic Lead and its Effects on Tissue Lead Levels of Urban and Rural Eastern Gray Squirrels

Eastern gray squirrels (*Sciurus carolinensis*) are known to routinely consume or be exposed to lead from many anthropogenic sources, including ingesting bullet fragments, gnawing on flashing, and, historically, inhaling (or ingesting) organic lead compounds aerosolized from burning leaded fuels. However, there is little research on consumption of metallic lead in squirrels. While we know that squirrels commonly ingest metallic lead, we do not know if they are ingesting it incidentally when foraging; if they gnaw, but do not ingest the lead, or if they intentionally gnaw and ingest metallic lead. It is also unclear if squirrels metabolize this ingested metallic lead or if it is simply passed through the digestive system without being metabolized. To determine this, we supplied lead in the form of ingots to determine if squirrels are primarily gnawing lead, but not ingesting any, or incidentally ingesting relatively small amounts. If squirrels do ingest lead we examined if they metabolize the lead or pass it through the digestive tract without significant absorption. We collected 30 squirrels from the city of Murray, KY before supplying lead, 30 after supplying lead, and 30 from the Land Between the Lakes National Recreation Area, as a control. The area under the lead ingots was examined for shavings to determine the approximate amount of lead consumed and digestive tracts were examined for the presence of lead fragments. Liver and muscle tissues from these squirrels will be analyzed for lead concentrations.

Jordan Love – Applied Mathematics, Nicholas Morgan – Engineering Physics & Aaron Whitney – Engineering Physics

Mentors: Dr. James Hereford & Dr. James Hardin

Engineering Design of an Autonomous Trap Monitor for American Burying Beetles

Current trapping methods for the critically endangered American burying beetle (ABB) (*Nicrophorus americanus*) are labor intensive and provide limited temporal data. The objective of this study is to develop an autonomous monitoring system that can be added to existing US Fish and Wildlife approved ABB traps that will detect ABB and other insects of interest as they enter a trap, classify them to species, and then transmit SMS/MMS messages over the cell phone network alerting field personnel of significant trap events. Insects that enter the trap are imaged and then classified to species using image processing algorithms that employ shape and color based processing on low cost Android™ cell phones. An Arduino Uno™ microcontroller board communicates with the cell phone and is responsible for monitoring the trap environment, power control and actuating a trap door.

Jordan Love, Jacob Munson & Kathleen Kirby - Applied Mathematics

Mentor: Dr. Donald Adongo & Dr. Renee Fister

Development of Mathematical Models for Industrial Lighting System Costs with Applications in Constrained System Optimization

The goal of this project is to develop effective mathematical models to optimize industrial lighting systems under financial constraints. Specifically, we investigate the justification of the replacement of current lighting bulbs with Lighting Emitting Diode bulb (LED) competitors. Furthermore, we analyze the purchase, installation, and use of motion sensors as a means to reduce overall lighting usage and its feasibility under constraints. In our research, we develop two multivariate equations to model the respective scenarios. We apply data obtained from our industry partner, Briggs & Stratton, at their Murray, Kentucky location. We find that, given our data, LED replacement was not financially feasible but motion sensor installation possibly feasible.

Lindsee Lyles - Nursing & Katheryn Beck - Mathematics

Mentor: Dr. Michael Perlow

Finally Calling the Shots: A Study about Vaccination Attitudes in Newly-Independent College Students

The objective of this study is to examine rates of and attitudes toward the influenza vaccination present on the campus of Murray State University. Data will be collected via surveys completed voluntarily in the student center. Previous studies have focused on high-risk patients and healthcare workers; one study focused on corporate and university employees, but did not take students into consideration. This study will attempt to fill the gap in knowledge by gathering familiar information from a previously unstudied group of individuals. I hypothesize that many students will have gone without the immunization, indicating the need for more education about this topic on this campus and in colleges in general.

Ben Manhanke - Television/Video Production

Mentor: Dr. Kevin Qualls

Electronic Colonization: American Media's Effect on Developed and Developing Nations

The effect of foreign media on other countries' native cultures has been a wide source of academic research and international debate, most points centering on the West's dominance in this area. The importance of this topic given our continued and growing global interconnectivity is undeniable, but discussion has largely focused around the effect on core developed nations who compete for cultural dominance, with less thought being given to still developing nations whose cultures are not so established. This is a comparison of the effect of Western media, specifically American media, on developing and other developed countries.

Liz Markley - Nursing

Mentor: Jessica Naber

A Guide to Nursing Students' Written Reflections for Students and Educators: Why and How Do We Use Them?

Experiences from the clinical setting are ideal for building critical thinking skills if reflection is used as a teaching tool. Reflecting on clinical experiences develops critical thinking ability, fosters self-understanding, facilitates coping, and leads to improvement in clinical practice (Craft, 2005; Kennison, 2006). Reflective writing as a pedagogical strategy allows students to integrate their thoughts and experiences with didactic material to more adequately understand both the experiences and the didactic material (McGuire, Lay, & Peters, 2009). Reflective writing is defined as an assignment that is focused on an activity that students have experienced, such as class readings, clinical rotations, or group activities, that highlights what the student learned from the activity (McGuire et al., 2009). Reflection is the purposeful and recursive contemplation of thoughts, feelings, and happenings that pertain to significant practice experiences (Judd, 2013). Reflective journaling helps students progressively develop their critical thinking, self-reflection skills, and cultural humility (Schuessler, Wilder, & Byrd, 2012). This study will explore reflective writing from the perspective of the nursing student and the nurse educator. The following questions will be answered: What are the benefits of reflective writing for the nursing student and the nurse educator? Why is reflective writing critical in nursing education? How can reflective writing develop critical thinking skills of nursing students? Why would nurse educators want to use reflective writing in their nursing courses, both clinical and didactic? What are the barriers to using reflective writing for students and educators? What is the role of the nurse educator in student reflection? What are the essential components of reflective writing assignments?

Santiago Martin – Biology

Mentor: Dr. Robin Q. Zhang

Modelling Suitable Mist-net Site Areas for Bats in Kentucky After the Arrival of White-nose Syndrome

Several cave-dwelling bat species have declined in the eastern United States as a result of White-nose syndrome (WNS), which has significantly increased the level of effort required to capture bats for regulatory purposes as well as research. The objective of my research was to compare bat species distributions before and after WNS was detected in Kentucky to determine suitable mist-netting sites for the most commonly captured species in the state: the big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), northern long-eared bat (*Myotis septentrionalis*), and tri-colored bat (*Perimyotis subflavus*). I used statewide bat capture records from summer Indiana bat surveys conducted from 2007-2014 and pooled data into pre-WNS (2007-2010) and post-WNS (2011-2014) periods. I used Generalized linear models with a negative binomial distribution to determine if elevation, distance to caves, forest area, total length of streams, and waterbody area around the mist-net site were significant predictors of the total bats captured. The significant environmental were used in MaxEnt to create species distributions maps and suitable survey area maps for each species. White-nose syndrome appears to have changed species distributions in Kentucky, especially for the northern long-eared bat, making suitability maps useful to determine the best areas to surveys in the state.

Santiago Martin - Biology

Mentor: Dr. Terry Derting

Creation of Roost Trees for Indiana Bats: Effects of Tree Species, Size, and Season of Herbicide Treatment

Snags suitable as roost trees are an essential but ephemeral resource for the Indiana bat (*Myotis sodalis*). Production of roosting habitat ensures that maternity colonies have adequate primary and alternate roosts to rear their young. Our objective was to determine an effective approach to producing natural snags with sloughing bark suitable for Indiana bat roosting. We tested for effects of season of herbicide treatment (Triclopyr® 3a), tree size, and tree species on rate of tree decay and production of sloughing bark. The tree species injected were green ash (*Fraxinus pennsylvanica*), shagbark hickory (*Carya ovata*), silver maple (*Acer saccharinum*), and white oak (*Quercus alba*). Small (<16" DBH) and large (≥16" DBH) trees of each species were injected during summer or winter. Rate of tree death differed significantly among species. Two years post-herbicide treatment, most of the green ash and white oak trees were dead; but 90% of the silver maples and 70% of the shagbark hickories were still alive. Tree size was associated significantly with tree death; with larger trees taking longer to die than smaller ones. The rate of production of suitable bark was slow. No tree reached a level of high suitability (> 25% sloughing bark) as a bat roost tree and most trees were in still in the not-suitable category (0% sloughing bark) in the third year of the study. Rate of production of suitable bark was associated significantly with tree species, but not tree size category, DBH, height, crown class, or season of herbicide treatment. Shagbark hickories and silver maples were more likely to have a higher level of suitable bark compared with other species. Based on results to date, the shagbark hickory was the species of choice for production of standing roost trees for Indiana bats.

Jason A. Matthews - Wildlife Biology

Mentors: Dr. Joe N. Caudell & Dr. Chris Trzepacz

Distinguishing between Eurasian Wild Boar Hybrids and Feral Swine Using Molecular Analyses

Wild hogs (*Sus scrofa*) are a serious threat that impact natural areas, farmland, and even urban landscapes. They destroy personal property, predate on wildlife, displace native species, and destroy the diversity of native wetlands. Previous research has shown that examining the differences in the gene MC1R using molecular methods and the examination of the hair coat of wild hogs has the potential to identify wild hogs and hybrids from domestic species; however, this technique has not been evaluated in such a manner that would make it useful for conservation officers and prosecutors in a court of law. Therefore, we evaluated both the morphological and genetic methods as a tool for identifying wild hogs using the model of disease testing where the morphological methods are applied by field personnel as a screening test and the genetic methods are used in a confirmatory manner. The objective was to determine the accuracy and precision of each of these methods for identifying wild hogs in the US. We compared the MC1R gene between samples of DNA from known Eurasian wild boar, domestic hogs, wild hogs exhibiting the white-tipped guard hair phenotype, and feral swine that do not exhibit the white-tipped guard hair. We used gel electrophoresis to differentiate between the various wild and domestic hogs breeds. We also enlisted biologists, students, and other wildlife professionals assess photos and patches of hair from each type of hog to determine the accuracy of morphological assessment for identifying wild hybrids and recently released feral hogs. We believe these methods will be instrumental for law enforcement to identify and prosecute individuals involved in the anthropogenic spread of wild hogs in Kentucky and throughout the US.

Dominik Mikulcik - Japanese

Mentor: Dr. Michael Dixon

A Nuclear Future

Since Japan's fall after the Second World War, it has steadily increased into one of the most economically powerful countries in the world. This growth has coincided with energy and resource consumption resulting in domestic supplies being all but depleted and a national dependence on foreign imports. A concurrent development after World War II was that of nuclear energy being used to produce electricity. Japan followed American plant models and became a leader in nuclear energy production. This paper will look at how Japan has used its nuclear power to meet its economic energy as well as domestic demands, additionally a special emphasis will be given to Japan's ability to continue to meet this demand following the Great East Earthquake and tsunami disaster. It will show that Japan's reliance on nuclear power is a matter of national security which will continue in the near future.

Andrew Mogan - Physics

Mentor: Dr. James Hereford

Optimum Swarm Size in Swarm Robotics

Swarm robotics is a growing area of research that offers promising solutions to many medical and engineering problems. When using swarm robotics, the question of optimal swarm size naturally arises. In this project, we examine the performance of a swarm of robots as the swarm size increases. To do so, we simulate a simple maze and measure the time it takes for half the swarm to exit the maze. Here, the bots use an obstacle avoidance algorithm, rotating clockwise through a random angle between 40 and 80 degrees when they encounter an obstacle. We then compare the results of the simulation to a theoretical model in order to determine the efficacy of the swarms.

Katelynn Mollett – Agronomy

Mentor: Dr. Iin Handayani

The Impact of Tillage Systems on Soil Physical Properties in Bond County, Illinois

Tillage practices profoundly influence soil physical properties. Therefore, it is important to investigate tillage systems that sustain soil physical properties required for the ideal environment for crop growth. The objectives of this study were (1) to evaluate the impact of conventional tillage and a tillage rotation on soil properties including soil organic matter (SOM), bulk density (BD), compaction, and porosity and (2) to determine if these properties are differently affected by tillage practices in the northern, central, and western portions of Bond County, Illinois. Soil samples were collected from the depth of 0 to 7.5 cm and 7.5 to 15 cm from three areas and three different sites. All the data was analyzed using one way analysis of variation (ANOVA) and the least of significant difference test at α 5%. The results show that all the properties were significantly affected by tillage practices, but the magnitude of differences varied among the soil properties. The highest SOM content was observed at the woodland sites for the northern area. The highest bulk density results were observed at the central rotational tillage site and the western rotational tillage site. High soil compaction was mostly observed at the northern and western woodland sites. Soil porosity at the depth of 0 to 15 cm was highest at the woodland sites. The findings of this study will be beneficial for farmers to identify a type of tillage system that would better the soil physical environment for crop growth in the different areas of Bond County, Illinois.

Madison Mucci – Organizational Communication

Mentor: Dr. Timothy Worley

Applying the Relational Turbulence Model to the Parent-Student Relationship: A Student's Perspective During the Transition from High School to College

During the transition from high school to college, students encounter a range of new experiences and emotions. This study looks at that transition and its connection to the parent-student relationship through the lens of the relational turbulence model. After surveying and evaluating first-year students, we found that turbulence in the parent-student relationship is prevalent during the transition to college.

Tracey Newport - History and Political Science

Mentor: Dr. David Pizzo

The Central African Republic: Peace-less Independence

With the Central African Republic (CAR) imploding on itself and becoming a failed state, the French Government has decided to step in and help reestablish order amongst the chaos. The CAR has been ruled by many tyrants and dictators with many coming to power through undemocratic means. The country's stability is rocked often times as organizations and people try to become the leader of the CAR. With each change of power, however democratic the means are, it is typically followed by authoritative regimes and leadership. That often times repress the citizens of the nation.

Morgan Owens, Kendrick Settler & Marie Carroll – Psychology

Mentor: Dr. Maria Vazquez-Brown

Specific Bilingual Background and Risk of Cognitive Impairment

In the present study we predicted that people from multilingual countries would have a greater set of compensatory skills and thus a greater cognitive reserve as measured by the ADAS-Cog word recall task, which tests memory for word lists and is used as a measure of cognitive impairment. Data was originally obtained worldwide during clinical trials for Alzheimer's Disease drug therapies (Clinical Path Institute Online Data Repository). The average number of languages spoken, life expectancy, educational attainment and health expenditures were determined for each country (Central Intelligence Agency World Fact Book). We found a significant effect of the number of languages spoken on the ADAS-Cog word recall score even after controlling for age, life expectancy, health expenditures, and educational attainment, $F(1, 2060) = 8.75, p = 0.003$. These findings suggest that multilingualism at the national level might lead to a greater cognitive reserve.

Michael Pate – Geoscience

Mentor: Dr. Robin Zhang

LiDAR Classification of Hopkinsville Kentucky using ArcMap

LiDAR (Light Detection and Ranging) has proven to be an accurate method for producing digital elevation models of the environment. Since its beginning, LiDAR has given analyst the capabilities not only to determine precise elevation measurements, but also a 3 dimensional view of our surroundings. LiDAR is used today by many professional organizations and businesses to aid in decision making for multiple applications. Some of these applications are locating the high points of building tops, height of utility poles, erosion of soils, height of trees, etc. LiDAR has great potential due to its ability to not just gather the highest point at any given area, but also its capabilities to gather the data underneath tree canopy, so it can obtain the true ground elevation. This is possible by the sensors ability to send out multiple pulses and collect the returns based upon its precise timing of when the light leaves the sensor and when it returns. The purpose of this study is to become more familiar with using LiDAR datasets within ArcMap. Unlike previous experiences, I have not had much experience using LiDAR in ArcMap and am wanting to learn how to classify LiDAR data with the software.

Michael Pate - Geoscience

Mentor: Dr. Haluk Cetin

A Spectral Reflectance Analysis of Soil Moisture

Soil moisture is an important water variable that has various effects on the environment, such as the water cycle, crop production and for forecasting changes in regional water balances. In a world where water consumption is increasing, it is important to conserve this valuable resource. Traditionally, soil moisture content has been obtained predominantly through in-situ methods (soil moisture probes). The main problem with obtaining data through these means, especially over large areas, is that it is costly and time consuming. On the other hand, remote sensing can be considered an important tool to estimate soil moisture content if properly used. The shortwave infrared bands for the majority of multi and hyper spectral sensors have the potential for estimating the soil moisture content of the top few centimeters soil. In this study, a spectroradiometer will be used to measure the spectral reflectance of the soil samples. Most spectroradiometers have the ability to give more robust spectral measurements due to the number of bands most sensors have. The main goal of this study is to evaluate the role of remote sensing methods in quantifying soil moisture content. The chosen study area is located in western Kentucky, more specifically Calloway County. This allows for more heterogeneous soil samples. Quantifying soil moisture content of heterogeneous soil types is important to understanding how soil type affects soil reflectance.

Stephanie Patterson – Psychology

Mentor: Dr. Jana Hackathorn

Becoming the Little Engine that Could Anxiety, Self-Esteem, and Exam Performance

The current study investigated how much anxiety, created by either mortality salience (MS) or dental fear affected exam performance. Thus, this study examined whether anxiety unrelated to an exam could affect the grade achieved on the exam. Additionally, as self-esteem is connected to both MS and exam performance, the influence of bolstering self-esteem was also examined. A 2 (MS vs. Dental) X 2 (Self-esteem bolstering vs. none) ANOVA was conducted on both anxiety scores and on exam totals. Results indicated that those who were allowed to bolster their self-esteem prior to taking an exam reduced their overall level of anxiety and performed better. However, a post hoc analysis involving a median split of anxiety indicated that of all who were allowed to bolster their self-esteem, those that had higher anxiety performed better on the test than individuals with low anxiety. Implications will be discussed.

Micah W. Perkins - Biology

Mentor: Dr. Perri Eason

Dietary Resource Utilization among Watersnakes in Northwestern Kentucky

Understanding how similar species coexist is a fundamental ecological question, with theory predicting the most highly competitive species driving others to extinction. For similar species, coexistence may be facilitated by divergence in dietary resource utilization patterns, which can occur across a variety of factors, including among species and age classes. Our study focused on three sympatric, congeneric watersnake species in northwestern Kentucky. The diamondback (*Nerodia rhombifer*), northern (*N. sipedon*) and plain-bellied (*N. erythrogaster*) watersnakes inhabit similar wetland habitats and appear to have considerable dietary overlap, with all three species feeding on fish and amphibians. In order to determine differences in dietary resource utilization patterns, we used a combination of stomach content analysis and stable isotope techniques. Carbon isotopic analysis showed that northern watersnakes had a greater niche width than the other species, suggesting that this species fed across a wider range of terrestrial to aquatic habitats. Diamondback watersnakes fed over a larger range of trophic levels than did northern and plain-bellied watersnakes. Stomach analysis showed that northern watersnakes and diamondback watersnakes had diverse diets. Plain-bellied watersnakes had narrow diets, feeding primarily on anurans. Snout-vent length of snakes was related to both $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ with longer snakes taking prey from differing habitat types and higher trophic levels than shorter snakes. While there were overlaps in dietary resource utilization, watersnakes species had either generalist or specialist diets, which may allow coexistence.

Scot Peterson - Watershed Science

Mentor: Dr. Howard Whiteman

Drought Disturbance Potentially Inhibits Invertebrate Community Recovery in Degraded Streams: Implications for Restoration and Management

Restoring and managing degraded streams can be problematic in regions prone to drought. Using recolonization traps, we compared the recovery of invertebrate communities at two sites (Degraded and Reference) along an agriculturally impacted 3rd order stream in western Colorado, USA during two consecutive drought years (2012-2013). When compared to 2012, total abundance was reduced in traps open to upstream sources at both sites in 2013, despite an overall increase in natural community abundance at these sites, suggesting that diminished flow during the second drought year reduced potential colonizing individuals. Yet, total drift densities significantly increased at both sites during the second year of drought, rejecting this hypothesis. Taxa composition of drifting invertebrates at the degraded site, however, shifted between years and became dominated by numerous small-bodied invertebrates that were extremely rare in recolonization traps in 2013. These results support previous studies in which experimental reduction in flow induced higher drift densities. Our results indicate that invertebrate communities in severely impacted stream reaches recover much slower than those from less degraded ones and reduced flows may inhibit restoration efforts during times of drought.

David Petrie - Marketing

Mentor: Dr. Murphy Smith

Advertising Through the Ages

The purpose of this project is to provide a timeline of how marketers have advertised from the earliest times up to the recent methods utilized today. Using this timeline of how far advertising has evolved throughout the years, this thesis will comment on today's methods and predict future advances in the marketing arena. Without a doubt, technology and advertising are directly correlated. This thesis shows how, with every technological advance, the entire world of marketing shifts drastically. Whether it be the printing press, a television, or the Internet research shows that marketers quickly utilized this technology. In recent times, as technology changes seemingly every day these effects on marketing can be clearly noticed. After creating basic timelines and charts of how advertising has progressed it appears that it will continue increasingly changing more radically as time goes on. Therefore, it is fascinating and exciting to speculate on what advertising can realistically look like as technology becomes available to marketers. The effects of the marketing techniques on society will be addressed for each time period especially when discussing the pros and cons of future techniques and current campaigns marketers are experimenting with. This thesis will be formed from extensive research and supplemented by my own opinions and conclusions based on such research.

Alyssa Pingel - Dietetics

Mentor: Dr. Kathy Stanczyk

Using Benefiber Powdered Fiber Supplement as an Additive in Bran Muffins to Make Muffins a "Good Source of Fiber" or an "Excellent Source of Fiber"

For this experiment, a bran muffin recipe will be modified to increase the fiber content by the addition of wheat dextrin powder, commonly known as Benefiber. There will be one control and two experimental versions of the muffins. The control will have no Benefiber powder; the first experimental muffin will have a total of 45.6g of Benefiber total and will increase the fiber content per muffin to 4 grams. According to labeling guidelines, this will be considered a "good source" of fiber. For the second control muffin, 91.2g of powdered Benefiber added to the mix, increasing the fiber content per muffin to 8g. This will be considered an "excellent source" of fiber. The goal of the experiment is to test overall acceptability of the muffin variations through objective evaluations such as using a volumeter and a wettability test, among others. Subjective tests will be conducted using a panel of 10 participants. The results will be evaluated and the most acceptable muffin variation will be determined.

Eryn Pritchett - History

Mentor: Dr. Aaron Irvin

Finding the Truth: An Investigation into the Use of Rhetoric in Thucydides

For centuries, scholars have looked to Thucydides as truth- a factual and accurate account of the Peloponnesian War- due to his thorough use of critical analysis and logical deduction. Unlike his predecessor, Thucydides dodged the literary autopsy that has plagued Herodotus for eons. However in the past few decades, scholars such as Francis M. Cornford and Donald Kagan have started to see Thucydides' work as a narrative construction rather than an unbiased account of the Peloponnesian War. How was Thucydides able to escape the cynical eye of analysts who tore apart the accuracy of Herodotus? The answer is found in Thucydides' use of rhetoric. By adopting the practices of Athenian orators, he was able to create a compelling narrative of events that would go unquestioned for ages. While most scholars focus on Thucydides for his political theories, it is important to understand his impact on the genre of writing history, in his time and our own. In Thucydides time, "history" as an art form was extremely new; in fact, Herodotus, a contemporary of Thucydides, is credited as the "Father of History." However, Herodotus' lack of focus and penchant for tangents puts the validity of this claim into question when compared to the work of Thucydides. Like the histories of today, Thucydides creates a narrative of events to illuminate the truth he wants his readers to see. In doing so, he employs his knowledge of Athenian rhetoric to create a "possession for all time."

Heather Raley - Nursing

Mentors: Dr. Jessica Naber & Dr. Jeff Osborne

The Impact of Quality of Sleep on Academic Performance in University Students

Current literature suggests that the most effective method for improving quality of sleep include regulating a consistent sleep schedule throughout the week. But the relationship between quality of sleep and the academic performance of university students is insufficiently addressed in literature. The aim of this research study was to assess the relationship between quality of sleep on academic performance of university students. The study was conducted between January 2015 and March 2015 at a mid-size university in the South, and included a systemic random sample of students from all student classification levels (freshman, sophomore, junior, and senior) currently enrolled in courses. A self-administered questionnaire was distributed to assess demographics; a sleep profile including sleep duration, sleep environment variables, daytime sleepiness, and the use of sleep remedies; and an academic profile including number of enrolled courses, and current cumulative GPA. This study will report findings that most university students report that they feel they do not get a sufficient amount of sleep and they frequently experience daytime sleepiness.

Victoria Ramlose – Animal Health Technology

Mentor: Dr. Anna Doom

Murray Calloway County Animal Shelter: Community Perceptions, Adoption Success Rates, and Suggestions for Improvement

The purpose of this study is to improve adoption rates in the Murray Calloway County Animal Shelter by making the community more aware of the goals and protocols of the shelter. Animal shelters have a bad reputation in some cities, and there are people nationally that believe animals that show up in shelters are there because they are diseased, aggressive, or untrusting of humans. A survey of community members showed that the people of Calloway County that took the survey believe that twenty-one percent of the dogs and twenty-six percent of the cats at the shelter are aggressive. The survey also showed that the community members believed an average of thirty-four percent of dogs and forty percent of cats at the shelter to be diseased. Adoption and euthanasia rates of shelters are not nationally recorded, but based on various research projects, the Murray Calloway County Animal Shelter appears to have much higher adoption/rescue rates and significantly lower euthanasia rates than the national average. Furthermore, interviews conducted with the animal control officer, director of the Humane Society, and director of the Murray Calloway County Animal Shelter provide insight as to why this shelter is so successful comparatively. The ultimate goal of this study is to make the Calloway County community more aware of the struggles and the triumphs the shelter experiences, alter false perceptions of the shelter to positive, fact-based positions, and boost adoption rates and funding.

Heather Rey - Spanish

Mentors: Dr. Tanya Romero-González & Dr. Leon Bodevin

The Role of Women After the Franco Regime; The Psychology of Relationships in Te Doy Mis Ojos

After the dictatorship of Francisco Franco ended in Spain(1975), women took on a more independent role than what was previously expected of them, such as their involvement in economic activity as well as obtaining new rights in the 1978 Constitution. This work argues that as time passes, women continue to become more empowered in Spanish society. In my project, I will examine the film *Te doy mis ojos* by Iciar Bollain(2003) as well as the 1978 Constitution. I will discuss the psychological effect that this shift in power continues to have on both men and women by analyzing the relationships through symbolism in the film. I argue that, although there are still remnants of the impact from Franco's dictatorship on contemporary Spain, we can see that in the 21st century women have begun to gradually establish their own independence and regain control of their lives while moving away from a male-centered society.

Kyle Reaka - Philosophy

Mentor: Dr. Rory Goggins

In Defense of Descartes' Cogito

My project will be a presentation/reading of a research paper defending Rene Descartes' cogito: "Cogito, ergo sum", or "I think, therefore I am" as a rational, foundational basis on which to formulate beliefs about the world. In the paper, I provide a defense of the cogito as an idea that is known innately in virtue of the capacity to possess rational thought. I further defend it from critiques that state it has an insufficient basis, or requires knowledge of an outside logical syllogism in order to be known.

Bradley Richardson - Biology

Mentor: Dr. Michael B. Flinn

Investigating the Diet Ecology of Four Sympatric Gar Species (Family Lepisosteidae) in Western Kentucky

During the past decade, efforts to reintroduce alligator gar (*Atractosteus spatula*) to the Lower Mississippi River basin have resulted in the early success of low density populations. To ensure the production of sustainable populations of alligator gar, continued monitoring is critical. The reintroduction of alligator gar to western Kentucky, places the species into a system from which it was absent for more than 50 years and is occupied by three other native gar species: longnose gar (*Lepisosteus osseus*), shortnose gar (*L. platostomus*), and spotted gar (*L. oculatus*). The objective of this study was to compare diets of these four species within Clarks River, Kentucky. Prey items were collected from stomachs and identified to lowest taxonomic resolution possible. Fish prey were comprised primarily of shad (*Clupeidae*), freshwater drum (*Sciaenidae*), and sunfishes (*Centrarchidae*). Longnose gar were found to be the most specialized of the gar species. Alligator and Spotted gars displayed the most generalized diet. A high degree of overlap occurred between all four species, particularly Alligator Gar. The interactions of these sympatric gar species and their prey are important for reintroduction success and efforts for alligator gar in western Kentucky.

Gabrielle Robinson – French/Teaching Certification

Mentor: Dr. Therese SaintPaul

A Study of Rimbaud

My thesis is Arthur Rimbaud cannot be easily classified. He is the father of modern poetry in France. I believe Arthur Rimbaud has brought about a whole new movement for French Literature; one which cannot easily be determined as Symbolism or Realism but somewhere in between. Arthur Rimbaud has taken the best parts of the preceding poetic movements: Romanticism, Realism, and Symbolism, to captivate his audience.

Symbolism would not have occurred without the influence from Romanticism and Realism. Similarly, I argue that Rimbaud would not be the dramatic and lurid writer that he was if it weren't for the inspiration he received from the unique poetry of Paul Verlaine and Verlaine would not have been the great poet he was without the influence of the unique genius of Charles Baudelaire. I have selected these poems to analyze: *Claire de la Lune* by Paul Verlaine, *Chant d'automne* by Charles Baudelaire, and *Roman and Le Bateau ivre* by Arthur Rimbaud. This will provide concrete conclusions regarding Rimbaud's shocking poetry. Then I will explore why he is considered the father of Modern Poetry, and what innovations he had generated all on his own but with the influence of the great poets who came before him. I will examine examples of poetry written by these three poets, to demonstrate their different/similar poetic styles (themes, imagery, etc.) and to show evidence of the evolution from Romanticism and Realism to Symbolism exemplified in the works of Rimbaud. All have played a strong role in creating the style of writing which the world now recognizes as Pre-Modern as exemplified by the short thrilling works of Rimbaud.

Deanne Rodgers - Foods and Nutrition

Mentor: Dr. Kathy Stanczyk

Effects of Substituting Whey Protein Isolate for Eggs in Yellow Cake

The effects of substituting protein in yellow cake was tested by judging the texture, color, moistness, and flavor. Whey protein isolate (WPI) was substituted for eggs either 50% or 100%. Each cake (control, 50% WPI, and 100% WPI) was baked under the same controlled environment, the only variable being the amount of WPI substituted. 10 blinded panelist were asked to taste each cake, rinsing their mouths between bites, and rate the cakes under the certain characteristics. After the results were collected, the individual characteristics were tabulated to measure the amount of noticeable differences in the cake.

Carla Rothenbuecher - Watershed Science

Mentor: Dr. Howard H. Whiteman

Investigating Primary Production and Litter Decomposition in a Degraded High Desert Stream

Riparian vegetation provides numerous ecosystem services to streams, especially as a source of organic matter critical for many aquatic organisms. Kimball Creek (De Beque, CO) is a severely degraded stream in which loss of riparian vegetation and altered hydrologic regimes may have caused a decrease in litter inputs and increased light penetration, inducing a shift from an allochthonous based system to an autochthonous one. In two 100-meter reaches, “reference” and “degraded”, ceramic tiles were submerged in two riffles per reach to measure algal growth. Litter decomposition was estimated using a leaf pack experiment with single-species packs of box-elder (*Acer negundo*) or willow (*Salix exigua*). Average algal ash-free dry mass (AFDM) did not differ between reaches, except in the first sample period where average algal AFDM was higher in the degraded reach. However, average chlorophyll a ($\mu\text{g}/\text{cm}^2$) in the reference reach was higher in all four sample periods. In both reaches, average leaf mass loss of elder was greater than willow, whereas average leaf mass loss of willow was the same. Additionally, the decay rate (k) of elder was significantly greater in the degraded reach than in the reference reach. The faster decomposition rate of elder in the degraded reach may be a result of higher water temperature and/or differing consumptive effects of macroinvertebrate communities as compared to the reference reach. Currently, macroinvertebrate samples from these experiments are being processed, and will aid in further understanding primary productivity and decomposition dynamics in a degraded stream ecosystem.

Kate Schaefer – Biology

Mentor: Dr. Robin Zhang

Bat Occurrence and Survey Site Selection at Land Between the Lakes National Recreation Area

Bat populations are mere remnants of their previous numbers. A now infamous disease, white-nose syndrome (WNS), hit North American bat populations and is thought to have killed more than 5.7 million bats. Making constructive management decisions for populations of individuals able to survive the initial severe decline is the most important response for areas hit with the disease. To make management decisions we must be able to effectively survey for individuals to assess their habitat requirements especially in endangered and WNS-susceptible species. Between 1993 to 2008 there have been mist net surveys for bats to examine local populations and species assemblages at Land Between the Lakes National Recreation Area in western Kentucky/Tennessee. These surveys occur at points chosen for high potential capture rates with respect to habitat features important to bats. I looked at the capture data of imperiled species in relation to the habitat across survey areas to determine differing occurrence and determine sites with habitat characteristics similar to points having high capture success. These results may aid future targeted survey efforts to determine areas of greatest capture potential for species of interest and provide information on local habitat relationships.

Kevin Smothers – Geoscience

Mentor: Dr. Robin Zhang

Geostatistical Data Analysis of Division I Public Universities

The goal of this research is to see whether a geospatial relationship exists amongst data collected for variables relating to Division I public universities (i.e. tuition, enrollment). If a spatial relationship exists, then a spatial data interpolation method should represent the relationship and be able to predict known values from the data set. Some common interpolation methods will be used to determine which method, if any, provides the most accurate predictive map.

Christy Soldo - Conservation Biology

Mentor: Dr. Michael B. Flinn

Application of GIS, Bathymetry and Long-term Hydrological Data to Identify Critical Biological Requirements of Bald Cypress for Habitat Improvement in Kentucky Lake

Large flood-storage reservoirs like Kentucky Lake serve many ecosystem functions, but suffer from a decrease in aquatic habitat due to the loss of large woody debris. In 2013, we started a multi-year study with the objective to increase persistent habitat to meet the needs of several goals. These goals include the reduction of sediment re-suspension from wave action, increase stable substrate for invertebrates (aquatic and terrestrial) and to increase stable fish spawning habitat. We identified locations in the southern end of Blood River (a large embayment of Kentucky Lake) where Bald Cypress (*Taxodium distichum*) trees had a high likelihood of survival by producing a digital elevation model and bathymetric model of the study site. Bathymetric measurements were collected using a Lowrance fish finder during high water periods (April/June). To assess areas subjected to inundation, we modelled water levels at various flood stages under several typical water years. The duration of inundation under varied and natural flooding conditions was determined using long-term hydrological data. We have identified areas under three scenarios: (i) high likelihood for tree survival, (ii) high likelihood for fish spawning use and (iii) moderate likelihood for tree survival and fish spawning use. In the spring of 2014 we will plant approximately 100 trees under these different scenarios to assess success of increasing persistent habitat for invertebrates, birds and fish.

Nicole States & Clayton Keiser – Chemistry

Mentors: Dr. Bommanna Loganathan & Dr. Jason Robertson

BB-500 Emissions Characteristics: Preliminary Observations

Direct conversion of under-utilized 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 500 kBTU/hr biomass burner (BB500 Bio-Burner, LEI Industries, Madisonville, KY) at the Farm 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 characteristics of emissions from different feedstock in biomass burners similar to the LEI ZBio-Burner. In this study, we have collected flue gas from wood chips, sorghum, equine manure and switch grass samples burned in the Bio-Burner. Emissions were collected using a BFS2000 Isokinetic air sampler drawing flue gas through glass fiber filters and impingers containing deionized water and silicagel. Preliminary results suggested that the mass of particulate matter ranged from 1mg/m³ to 80 mg/m³ of flue gas with lowest particulate content in flue gas from wood shavings and the highest in switchgrass. Relatively higher water content (51 mL/m³) was found in equine manure compared to other biomass feedstocks.

John Stone – Geosciences

Mentor: Dr. Robin Zhang

Analysis of Spatial Features in Baltimore, MD using Landsat-8 imagery for Socioeconomic Characterization

In 2010 the United States Census cost just over 13 billion dollars. It is a time consuming process which involves large amount of data and manpower. This study is a preliminary analysis of the application of remote sensing to a socioeconomic census. This study looks at several factors: total vegetation, entropy, and edge shape, and applied them to the concentric zone urban land use model to determine their usefulness in identifying areas of high, medium, and low income. The analysis was conducted using MATLAB and ERDAS IMAGINE. In the analysis, a Landsat 8 image of Baltimore was divided into concentric rings in combination with census data. The concentric model states that as the further out from central business district a residential area is typically the higher income that residence will have. Census data was then used to find areas of high, medium, and low incomes based on household income. Each census tract was assigned a value of high, medium, or low based on which income type occupied the highest percentage of the tract. Areas of all three income types were identified in each of the three rings and two 450 m² samples were extracted for each type. Each area was then measured for total vegetation, entropy, and edge shape. This study found vegetation varied greatly between each of the three rings for the same income type. Vegetation is useful for identifying low income areas close to the central business district. The further out from the CBD though the less useful of a measurement this becomes. Entropy is the measurement of the lack of order or predictability. Entropy was useful for identifying high income areas for all three rings but did little to distinguish middle income from low income. Regularity of shapes is the measurement of the number of corners. A Canny Edge detector was ran and a corner count done to attempt to determine whether spatial shapes could be defined based on this number. This data provided little correlation to income type. In conclusion this study found that the concentric ring model showed enough variability in each income type that it is a valuable way to divide a city for this kind of research. This study also found that areas of middle income were overall the most difficult to determine. They showed wide variability for the measurements in all three districts. Further research will be needed to find a more reliable measurement to determine middle income areas.

Garris Stroud & Zachary Lisanby – Middle School Education

Mentor: Dr. Kimberly J. Stormer

Write It and Fight It: Discussion-Based Learning in Science

It is no secret that middle and high schools are social environments. Instead of dissuading interaction among students, evidence shows success in actively channeling these social interchanges into a core part of instruction. In addition to challenging the monotony of the traditional lecture, classroom discussions and debates can reap long-lasting benefits in the promotion of student literacy as well (Alozie et al., 2009). Such activities provide students with the opportunity to develop their critical thinking and comprehension abilities, even without the presence of a text or an explicit relation to reading (Hollenbeck, 2011, p. 218). In this sense, classroom discussions serve to promote the skills necessary for fostering growth in student literacy. Science educators who wish to enact these objectives in their classrooms may find that discussions and debates are viable methods of instruction. In the interest of improving our grasp of discussion-based learning and its effectiveness in improving students' literacy skills, our group created a lesson featuring a classroom discussion and writing activity about alternative energy in which students "write it out and fight it out." After listening to songs discussing the pros and cons of alternative energy, students engaged in a Think-Pair-Share with their group members to reinforce these concepts. Students then constructed arguments using textual evidence and in-text citations, and proceeded to discuss and debate their written arguments with their peers. This presentation will illustrate the benefits of discussion-based learning as a literacy strategy within the science classroom.

Jaime Staengel & Taylor Chaddock - Marketing

Mentor: Dr. Stefan Linnhoff

Linnhoff, Stefan, Taylor Chaddock, Jaime Stangel and Katherine Taken Smith (2015), Prestige, Transcendence and Innovation – New Facets of Organic Food Consumption

Literature on organic food has concentrated on four attributes that consumers commonly associate with organic food: organic products are generally considered to be safer, healthier, more ethical and more environmentally beneficial. This research inquires about four additional perceptual dimensions that have not been previously discussed in the literature in depth: the relationship between organic food and perceptions of transcendence, innovation, authenticity and prestige.

Nathan A. Tillotson – Fisheries/Aquatic Biology, Ben Tumolo – Watershed Science & Andrew K. Porterfield – Fisheries/Aquatic Biology

Mentor: Dr. Michael Flinn

They Phenology of Larval Fish in Kentucky Lake During Early Summer

A working knowledge of larval fish communities within aquatic ecosystems can be useful in understanding system dynamics as a whole. The timing and ecology of larval fishes in reservoir systems is important for determining components for successful fish reproduction and potential species interactions. The objectives of this study are to better understand larval fish phenology by sampling Kentucky Lake. Kentucky Lake is the largest reservoir of the eastern United States, and understanding larval fish in this system may be useful for determining recruitment patterns of specific fish taxa. We sampled larval fish along the lower portion of Kentucky Lake from April – May of 2014. Using larval push-nets, we collected samples on transects ranging from 335m to 1341m. Water volume sampled was calculated based on average speed traveled over a known time and corrected by multiplying by an estimated net efficiency (70%). Larval fish were enumerated, identified, and densities were calculated as fish/m³. Over 6 sampling events, we collected a total of 30 samples where lake surface temperature ranged from 16.62 – 22.21°C. During our sampling period, larval fish densities ranged from 0 – 71.45 fish/m³. Densities were compared using a one-way ANOVA. We found significant differences ($p = 0.0001$) in larval fish densities between sampling days. Using pairwise comparisons (Tukey Kramer), we determined that larval densities from May 15 were significantly greater than the densities from all other sampling dates. Understanding larval phenology is useful for determining the overall ecology in reservoir systems, including the establishment and dynamics associated with Asian Carp.

Zachary Tkach - Organizational Communication/Philosophy

Mentor: Dr. Rory Goggins

A Reconsideration of Human Rights

Human Rights are generally thought to possess universal and unchanging qualities, altogether independent of human interference. This is demonstrably not so. Human Rights are created by and subsequently either enforced or not enforced by humans. The process of creating and enforcing human rights is inexorably tainted by human interests. Since this is so, there are no such things as inalienable human rights. Instead, human rights can truly only exist where they are enforced. If human rights are not enforced, it makes no sense to claim that they exist. In other words, there is no project to "discover" human rights, but to actively create and maintain them through a navigation of human interest and the practical use of enforcement.

Melanie Torres - Watershed Sciences

Mentor: Dr. Howard Whiteman

Utilization of Remote Sensing and GIS to Evaluate Vectors of Disease Transmission

Emerging infectious diseases, especially zoonotic diseases, are a concern for not only the environment, but to humans as well. To better understand fatal disease transmission and the effects that environmental factors have on these diseases ability to disperse, the use of remote sensing practices, combined with Geographic Information Systems (GIS) analysis, mapping, and modeling functions, are integral. This research will use a combination of remote sensing and GIS tools to determine the methods of dispersal for the amphibian-killing chytrid fungus, *Batrachochytrium dendrobatidis* (chytrid), in the south-central Rocky Mountains of Colorado. Although this fungus has been studied for over a decade, it is unknown how chytrid has been able to rapidly disperse across the globe. This is particularly problematic in remote areas, where anthropogenic dispersal is unlikely. For example, the Boreal Toad (*Bufo boreas boreas*) has drastically declined in remote areas of the Rocky Mountains due to chytrid. Using remotely sensed temporal data and GIS mapping and analysis tools, I propose to determine the geographic distribution of chytrid in boreal toads and other amphibian vectors in south-central Colorado, create chytrid dispersal models that can be tested with current and past distribution time-series data, and explore ways to broaden remote sensing models for disease transmission to other zoonotics. Working at Murray State University's Mid-America Remote-sensing Center (MARC) and collaborators from Murray State, Colorado Parks and Wildlife, and NASA, this project will utilize historic and recent Landsat imagery, ancillary GIS data, GAP products, climatic data, and chytrid distribution data to accomplish my research goals.

Melanie Torres - Watershed Sciences

Mentor: Dr. Robin Zhang

Determining Wind Direction Patterns in a Diseased Landscape

Chytridiomycosis is an amphibian-killing fungal pathogen that is responsible for several species extinctions and global amphibian population declines. While there is a bevy of information regarding much about its habitat preferences and limitations, how it attacks and kills its hosts, and its distribution, little is known about how the aquatic fungus, *Batrachochytrium dendrobatidis* (chytrid), spreads from location to location – many cases state that it has spread quickly and on large geographical scales. One method that researchers have indicated could be a viable dispersal option is via birds, specifically aquatic birds like ducks and geese. To further determine whether this could be a potential option for chytrid spread, I am observing temporal wind patterns throughout central and western Colorado, where chytrid distribution data has been previously collected. I am currently testing whether there are any correlations between wind direction and patterns of chytrid spread for the past five years (2010 – 2014). If there are any correlations within the two data sets, this can potentially indicate that birds – who use directional wind patterns to migrate – are a potential vector for chytrid spread.

Ben Tumolo - Watershed Science

Mentor: Dr. Michael B. Flinn

Long-term Primary Production Analysis: Attempts to Understand System Specific Limnology While Faced With an Invasive Species

Silver Carp (*Hypophthalmichthys molitrix*) have established populations throughout the Midwestern U.S. and populations in Kentucky Lake have increased rapidly within the past decade. This project aims to understand potential impacts of Silver Carp on reservoir primary productivity. Diet analysis was conducted on Silver Carp from Kentucky Lake to determine system specific trophic levels. Limnological data including primary production from the Kentucky Lake Long Term Monitoring Program (KLMP) was analyzed both temporally and spatially with nonmetric multi-dimensional scaling (NMDS). Primary production was compared pre (1990-2004) and post invasion (2005-2013). Spatial analysis of primary production compared contrasting reservoir habitats (e.g. embayment and main channel); to date, overall NMDS results show overlap between primary production pre-and-post invasion along with high intrasite variability, making it difficult to detect changes. However, some patterns show important differences in primary productivity post invasion and are being analyzed further. Whether the recent invasion of Silver Carp is negatively impacting Kentucky Lake is not yet clear. Future analyses will focus on measuring the differences in variability of primary production based on these periods. In addition we will shift our focus to investigate ecologically limiting factors of primary production in Kentucky Lake (e.g. reservoir hydrology and nutrient levels). Investigating long term trends in the Kentucky Lake ecosystem is important to understanding the invasion ecology of Silver Carp.

Emily Vile - Dietetics

Mentor: Dr. Kathy Stanczyk

Acceptance of Blueberry Muffins made with Chia Seeds as an Egg Substitute

The objective of this experiment is to decrease the amount of cholesterol by substituting chia gel for the eggs in blueberry muffins, while keeping the texture, flavor, tenderness, and moistness the same as in a “regular” muffin. There will be no difference in the flavor of a blueberry muffin made with eggs and one made with chia gel in place of the eggs.

Megan Wagner – Learning and Behavior Disorders/Middle School

Mentor: Dr. Kimberly J. Stormer

Barbie Ain't Real: Argumentative Writing and Positive Self-image in the Math Classroom

Interconnectedness is essential in understanding the middle level learner. According to Bucher and Manning (2012), “For example, adult-like behavior brought on by physical development can be strengthened or tempered by psychosocial and cognitive development, just as psychosocial development plays a role in cognitive development” (p. 30). It is changes in these areas that allow for teachers to use developmentally responsive teaching. Developmentally responsive teaching first takes into consideration the needs of the students. Swaim states (2005), “ We have learned that when middle school educators implement practices based on their knowledge of learning and human development, students make measurable gains in academic achievement while moving forward in becoming healthy, ethical, and productive citizens” (p. 29). Developmentally responsive teaching comes from using relevant and integrative curriculum in the classroom. Teaching and curriculum become relevant to students because teachers use real-world examples to disprove the “perfect” image. The best real-world example of the “perfect” image is Barbie. This presentation will demonstrate an interdisciplinary math/language arts lesson that engaged students in using proportions to better understand Barbie’s dimensions.

**Christina Walker – Wildlife and Conservation Biology & Derrick Jent -
Biology**

Mentor: Dr. Claire Fuller

Effects of the Fungus Beauveria bassiana on the Southeastern Cave Cricket Hadenocetus subterraneus from Mammoth Cave

Fungal pathogens are a common problem seen in Mammoth Cave and have been known to kill many animals that live in the cave. The cave cricket, *Hadenocetus subterraneus*, is a key component in the cave ecosystem. Within the cave, many cricket cadavers have been found with a thick, white fungus growing on them; this fungus has been identified to be *Beauveria sp.*. I collected this fungus as well as 40 live crickets to study the relationship between them. Due to unexpected high mortality rates within the first day, only 12 crickets were used. Six were infected with a solution of 1×10^5 conidia solution, and the other six were exposed to a Tween-80 solution for the control group. Mortality rates are currently being observed and will be completed by April. The relationship between the cave crickets and the fungal pathogen currently affecting bats, *Pseudogymnoascus destructans*, is also being studied. All 40 crickets that were collected were placed individually on agar plates and are being observed and isolated to see if the fungus is observed on them. Multiple plates have already grown a similar fungus and will be sent out to the USDA for identification.

Sara Wallace - Psychology

Mentor: Jana Hackathorn

I Just Can't Help Myself: Hoarding Tendencies and Personality Traits

Although many studies have been conducted regarding the subject of hoarding, treatments and obsessive compulsive disorders, there is little known research regarding how various personality traits not commonly associated with obsessive compulsive disorder (OCD) are related to hoarding. Hoarding is associated with substantial functional impairment, as clutter prevents the normal use of space for basic activities such as cooking, cleaning, moving through the house, and even sleeping. The current correlational study examined the relationship between hoarding tendencies and other personality traits including anxiety, sociability, impulse control, orderliness, reclusiveness, neuroticism, cautiousness. A total of 175 participants (males = 81, females = 93, gender-queer = 1), with ages varying from 18-79 ($M = 25$, $SD = 10.98$), were recruited from both undergraduate psychology courses and MTURK. The results indicated that difficulty discarding objects was significantly correlated (all $ps < .001$) with anxiety ($r = .34$), impulse control ($r = -.36$), orderliness ($r = -.40$), neuroticism ($r = .35$), and cautiousness ($r = -.27$). Also, the amount of clutter in the home was significantly correlated (all $ps < .001$) with anxiety ($r = .26$), impulse control ($r = -.43$), orderliness ($r = -.38$), neuroticism ($r = .31$), and cautiousness ($r = -.35$). Finally, over acquisition of objects was also significantly correlated (all $ps < .001$) with anxiety ($r = .35$), impulse control ($r = -.45$), orderliness ($r = -.29$), neuroticism ($r = .37$), and cautiousness ($r = -.45$). Sociability and reclusiveness were not significantly correlated with any of the hoarding tendencies (all $ps > .05$). These results can serve as valuable information for further research and development of hoarding treatments. By understanding which personality traits are significantly correlated with hoarding behaviors, treatment methods can be altered in the presence of these specific traits to be most beneficial to each hoarder's individual treatment.

Whitney Wallett - Biological Sciences

Mentor: Dr. Paul R. Gagnon

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

Plant-plant interactions influence individual plant performance and shape communities. Consensus as to how these interactions behave across environmental gradients remains elusive. To explore the interactions occurring along a complex moisture and edaphic gradient, we 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, conspecific, total, and no removal) following fire, we monitored individuals' performance in terms of growth (change in basal diameter, total aboveground biomass) and potential reproductive output (PRO = no. flowering culms x average no. of flowers/culm) for two subsequent growing seasons. Total neighbor removals significantly reduced individuals' PRO ($P < 0.02$) versus heterospecific removals and controls. Total removals also significantly reduced individuals' growth in the first post-fire growing season ($P < 0.03$), but led to increased growth for individuals in seepage slope habitats during the second post-fire growing season ($P < 0.03$). Total removals in sandhill habitats significantly reduced individuals' cumulative growth over both growing seasons ($P < 0.05$). Total aboveground biomass was not significantly influenced by neighbor removals, but was significantly influenced by position along the sandhills-seepage slope gradient ($P < 0.01$). Both total aboveground biomass and PRO were reduced with increasing distance to nearest pine, perhaps due to associated changes in sub-surface water availability, microbial populations, or other factors. Our results suggest that both competition and facilitation are active along the sandhill-seepage slope gradient, and confirm that plant-plant interactions can shift in nature and degree across environmental gradients, life history characteristics, and time since disturbance.

Allison West - Dietetics

Mentor: Dr. Kathy Stanczyk

The Effects of Pureed Black Beans on Appearance, Flavor, Texture, Aroma, and Overall Acceptability of Brownies made with Black Beans in Place of Flour

The purpose of this experiment is to determine the effects on appearance, flavor, texture, aroma, and overall acceptability of brownies made with black beans in place of flour. The substitution of black beans for flour will create a healthier brownie for consumers. Black beans are a dense, filling product that will keep consumers feeling satisfied for a longer period of time. The black beans naturally provide beneficial nutrients including: vitamins A, K and C, potassium, folate, iron, magnesium, thiamin (vitamin B1), riboflavin, copper, calcium, phosphorus, protein, omega-3 fatty acids and niacin. The black beans also provide high amounts of dietary fiber. Recent studies found that dietary fiber may be protective against cardiovascular diseases, diabetes, obesity, colon cancer and diverticular diseases, and among others. With the obesity epidemic among adults and children, taking unhealthy recipes and formulating them to have increased nutrient value will be beneficial. In our paper we analyzed whether and how the betas of representative healthcare companies of the U.S. and Germany changed over time. We focused on the time before, during and after the financial crisis. Using the CAPM framework showed that betas changed over time for both countries. Overall the values decreased during the entire observation period. Furthermore, we expanded our model and found a significant influence of the market capitalization for most of the companies.

Kerstin Zenger & Martina Weber – Economics

Mentor: Dr. Martin Milkman

Empirical Analysis of Beta Factors of Healthcare Companies Before, During, and After the Financial Crisis – A Comparison between Germany and the U.S.

In our paper we analyzed whether and how the betas of representative healthcare companies of the U.S. and Germany changed over time. We focused on the time before, during and after the financial crisis. Using the CAPM framework showed that betas changed over time for both countries. Overall the values decreased during the entire observation period. Furthermore, we expanded our model and found a significant influence of the market capitalization for most of the companies.

**Jimiao Zheng, Nhan Huynh, Patrick McCluskey, Jarred Koerner,
Zachary Ryne & Ming Gao - Biological Sciences**

Mentor: Dr. Alexey Arkov

Role of Specialized Ribonucleoprotein Granules in Germline Development in Drosophila

Germ cells belong to a special group of stem cells which give rise to either eggs or sperm and eventually to the next generation. Non-traditional organelles referred to as germ granules have been implicated in the formation of germ cells. However, the composition and the assembly of these granules are not well understood. Our research focuses on Tudor, a scaffold protein that works with multiple components and contributes to germ granule formation. Using electron microscopy and biochemical approaches, we determined the structure of Tudor and proposed a model of its interaction with several granule components. Our study suggests that this large Tudor complex plays a major role in the silencing of transposable elements and germ cell development.

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