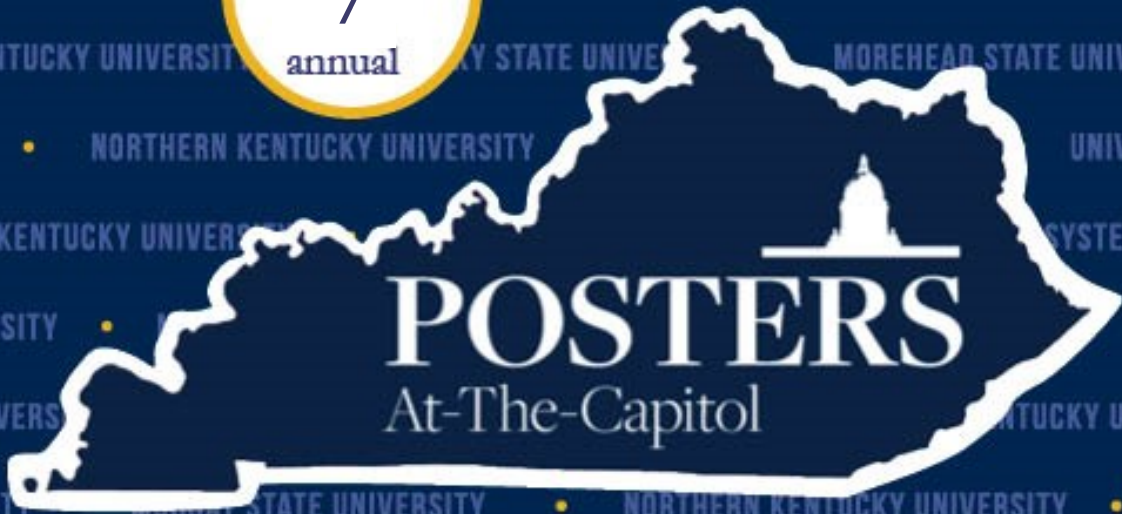


17th
annual



February 8th, 2018
Frankfort Kentucky

Transforming Education for a Brighter Tomorrow

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President Michael Benson, Eastern Kentucky University



For 17 years, the Posters-at-the-Capitol program has proudly showcased the best of our Commonwealth's public institutions of higher education.

As a "School of Opportunity" since our founding more than a century ago, Eastern Kentucky University has long prided itself on giving undergraduates meaningful research opportunities that supplement their classroom experiences and enrich their intellectual curiosity. The projects displayed from ECU and our sister institutions at this event reflect the collaborative process that distinguishes quality higher education and embodies our passion for helping students reach their full potential.

Every April, as part of ECU's annual Scholars Week, our entire campus community comes together to celebrate the scholarly and creative talents of our best and brightest students. Their efforts, in collaboration with our outstanding faculty, inspire us all to always give the very best of ourselves.

Hearty congratulations to all the students and faculty mentors who have joined forces to make the 2018 *Posters-at-the-Capitol* event the best ever, and I wish you continued success as you strive for excellence in every endeavor.

President M. Christopher Brown, Kentucky State University



Kentucky State University is delighted to participate in the annual *Posters-at-the-Capitol*. As the Capital City’s “University on the Hill” serving students across the Commonwealth, we are committed to the scholarly activities to aid an already remarkable student learning experience.

Our student researchers work alongside world-class faculty mentors to think critically, engage in an innovative and inclusive learning community, and offer solutions to problems facing our community both in Frankfort and at-large. As our students work to enhance the wider world and influence society through research, we encourage them to look beyond the present and onward to the future. We are excited to provide these opportunities and create collaborations to support an exceptional learning community and allow our students to showcase their knowledge and talents on a larger scale.

I extend my most sincere thanks to the faculty mentors and extraordinary students for their time, effort and knowledge to the academy. We at Kentucky State University are pleased to continue participation and commend all participants on their contribution to the state of Kentucky and global America.

President Jay Morgan, Morehead State University

Students at Morehead State University look forward each year to communicating their achievements in research to Kentucky legislators and peers from across the Commonwealth at **Posters-at-the-Capitol**.

At MSU we take great pride in our support for undergraduate research, broadly defined to include the original scholarship and creative endeavor of all academic disciplines. I am pleased that our students have many opportunities for success in this area, including participating in our Undergraduate Research Fellowship, Undergraduate Honors or Regional Engagement Fellowship programs; working as volunteer research assistants who receive academic credit for independent studies; and presenting at our annual Celebration of Student Scholarship. These invaluable outside-of-the-classroom activities employ the personal mentorship of faculty who are experts in their fields to enhance student learning and critical thinking. It is evident that undergraduate research promotes the academic and intellectual culture of our campus and, as it has been shown nationally, enhances student engagement, retention, and success. In such a creative environment, the potential is maximized for students to learn lessons which will translate into the skillsets sought by prospective employers resulting in social, industrial, and economic development for our state and nation.



I proudly recognize our students and their mentors for their significant achievements and thank them for their contributions to this year's **Posters-at-the-Capitol**. I am confident in their continued success.

President Robert O. Davies, Murray State University



Welcome to the seventeenth annual **Posters-at-the-Capitol**. Murray State University's leadership in this worthwhile event is both a testament to our students, who are investigating these kinds of scholarly activities in growing numbers, and to our University as we all work to provide a greater number of high quality, research-based teaching and learning opportunities for Murray State students.

Murray State University places a high premium on programs that promote collaborative interactions between our faculty and students. Through our Office of Research and Creative Activity and our system of Residential Colleges, Murray State University continuously supports faculty-student interactions. By providing our students with these kinds of learning opportunities, Murray State is meeting the objectives of the Kentucky General Assembly by ensuring that our graduates are well prepared for the workforce and life after college. We make it our priority at Murray State to ensure that every student is provided with an experiential learning opportunity.

I join the **Posters-at-the-Capitol** Organizing Committee in inviting all citizens of our Commonwealth to visit and review the work of Kentucky's most gifted students. These undergraduate students are contributing ideas that are impacting communities and changing lives. Also, Murray State University is honored to play a key role in organizing this event each year. Congratulations to all students and faculty whose hard work has made **Posters-at-the-Capitol** such a great success.

President Gerard St. Amand, Northern Kentucky University

At Northern Kentucky University, we provide a special educational experience for our students. For many of them, this experience includes a significant research project. NKU's emphasis on undergraduate research empowers students to practice their classroom knowledge and skills on projects that make a difference throughout the region. This hands-on experience deepens their understanding of disciplinary content and allows them to form meaningful relationships with their advisors.



For our students, the research experience is transformative. It teaches students patience, discipline, and analytical skills. As students take ownership of their projects, they develop more confidence as they present their findings. They hone their writing and analytical skills as they conclude their results. Undergraduate research prepares students for the next phase of their life, regardless of their future career.

Undergraduate research also furthers NKU's emphasis on transdisciplinary learning. Across campus, NKU faculty members collaborate in class and on projects that show students how various disciplines intersect. Through undergraduate research, students work with faculty and students outside their major. The cooperative process leads to more innovative thinking and a better result. It also mirrors the world in which they will work, where people who collaborate with others have differing specialties.

NKU is proud to support undergraduate research and to participate in the 17th annual ***Posters-at-the-Capitol***. We commend all of the student presenters for their hard work, because we know that this event is the culmination of months of hard work by students and their faculty mentors. We look forward to hearing more from these talented students in the future and seeing how the subject of many of these posters and presentations change the way we live and think.

President Eli Capilouto, University of Kentucky



The University of Kentucky, as the state's flagship and land grant research institution, is truly the University *for* Kentucky. As such, a fundamental component of our commitment to the state and the people we serve lies in research—the creation of knowledge.

The world-class researchers at UK conduct this important work across an array of disciplines and in collaboration with communities. And, as part of our calling to prepare the next generation of scientists, artists, creators, mentors and givers, among the most precious of these collaborations are those with undergraduate students. Undergraduate research—the interplay between research in the lab and academic preparation in the classroom—provides a rich educational experience for our students.

Now in its 17th year, *Posters-at-the-Capitol* is an opportunity to recognize undergraduate research as an essential part of academia, one that benefits students, faculty and the Commonwealth. Now, more than ever, it is essential to understand and invest in the research and discovery that informs the education we provide, uplifts the communities we serve and fuels a global economy.

Through undergraduate research, students experience the intellectual inquiry that is the foundation of scholarship at the University of Kentucky. They have the precious opportunity to work alongside experts in their fields of study—receiving mentorship and guidance as they enhance what they learn in the classroom with practical applications in the field. For faculty, this represents one of the greatest rewards in academia—watching an eager young mind passionately pursue new knowledge. Igniting curiosity in the next generation of leaders enriches our faculty's experience and is at the core of our noblest profession.

Undergraduate research embodies a vital component of who we are and what we do at the University of Kentucky. By engaging in innovative research activities and inspiring a generation of thinkers, pioneers and inventors, we position ourselves to address our state's most stubborn challenges and create a better future for all those we touch and teach.

Interim President Gregory Postel, University of Louisville:

As a large research institution, the University of Louisville is pleased to do its part to make sure our students have many opportunities to conduct research. UofL has been the conduit for some of the world's most important scientific breakthroughs. Yet, our work is never done. We are constantly seeking new solutions to today's health, social and environmental problems.

It is rewarding to know that Kentucky's elected leaders share our commitment to research and the betterment of our world.

UofL's participation in **Posters-at-the-Capitol** is not only a chance for our undergraduate students to showcase their research work, it also reminds us that great ideas and innovation rarely advance without the hard work of research.

We are pleased to take part in this important initiative and hope you enjoy seeing the work of our students.



President Timothy C. Caboni , Western Kentucky University



The cornerstone of the undergraduate experience at Western Kentucky University is the opportunity for our students to pursue meaningful, useful research that involves teamwork, analytical and problem-solving skills, leadership and an understanding of the broader community. Working alongside faculty mentors, WKU students engage with business and industry, health care professionals, community and social organizations and others in hands-on research that seeks to solve real-world problems.

Now in its 17th year, *Posters at the Capitol* provides an outstanding venue for our students to showcase their impressive work for Kentucky lawmakers. By interacting with these students, asking questions about their research experiences and seeing first-hand the outcomes of their efforts, we are confident that legislators and policy makers will gain a greater appreciation for the value of the undergraduate research experience at all of Kentucky's Postsecondary institutions.

At WKU, we want our students to acquire the appropriate knowledge and gain the relevant experience to prepare them for success in the workplace so that they can make a good living. By engaging them in high level research that results in an improved regional economy and an increased quality of life for citizens throughout the Commonwealth and beyond, we are ensuring that WKU graduates develop the capacity and desire to make a good life - not just for themselves but also for those around them.

Congratulations to all the students whose work is on display today. We thank you for your leadership and the talent you bring to our campus, and we wish you well in your future endeavors.

Welcome from the *Posters-at-the-Capitol* Organizing Committee:



Johnathan Gore
eku.edu



AJ Boston
David Pizzo
murraystate.edu



Michael Henson
moreheadstate.edu



Cheryl Davis
wku.edu



Evie Russell
uky.edu



John Farrar
nku.edu



George Antonious
kysu.edu



Charles Leonard
louisville.edu



C. Steven Cahill
kctcs.edu

Proclamation

by

Matthew G. Bevin
Governor

of the

Commonwealth of Kentucky



To All To Whom These Presents Shall Come:

WHEREAS, Kentucky's universities and the Kentucky Community and Technical College System emphasize the importance of research in higher education for students and the pursuit of in-depth knowledge; and

WHEREAS, The Council on Postsecondary Education strongly encourages Kentucky universities to place emphasis on research initiatives, thereby increasing the opportunity for undergraduates to engage in research and scholarly work; and

WHEREAS, Undergraduates who participate in research and scholarly activity are more likely to pursue advanced degrees; and

WHEREAS, The Commonwealth commends the undergraduate students participating in these life-changing educational opportunities; and

WHEREAS, Kentuckians honor those students who contributed to the 16th annual Posters-at-the-Capitol event;

NOW, THEREFORE, I, MATTHEW G. BEVIN, Governor of the Commonwealth of Kentucky, do hereby proclaim February 8th, 2018, as

UNDERGRADUATE RESEARCH DAY

in Kentucky.



DONE AT THE CAPITOL, in the City of Frankfort the 9th day of January, in the year of Our Lord Two Thousand Eighteen and in the 226th year of the Commonwealth.


MATTHEW G. BEVIN
GOVERNOR


ALISON LUNDERGAN GRIMES
SECRETARY OF STATE

Schedule of Activities

February 8, 2018

9:00 a.m.*Posters-at-the-Capitol* Registration Opens (House-side Mezzanine)

9:00 a.m. to 9:45 a.m.Poster Setup, Participant Browsing, and Legislative Visit Time

10:00 a.m.....Group Photograph (Senate Staircase)

10:15 a.m.Brief Organizational Meetings by Institution
(Locations for these meetings will be announced during the group photograph)

10:30 a.m.Welcome and Invited Guests (Rotunda)

11:00 a.m. to 11:30 a.m.Student Posters Viewing

11:30 a.m. to 12:30 p.m.Legislative Visit Time and Lunch

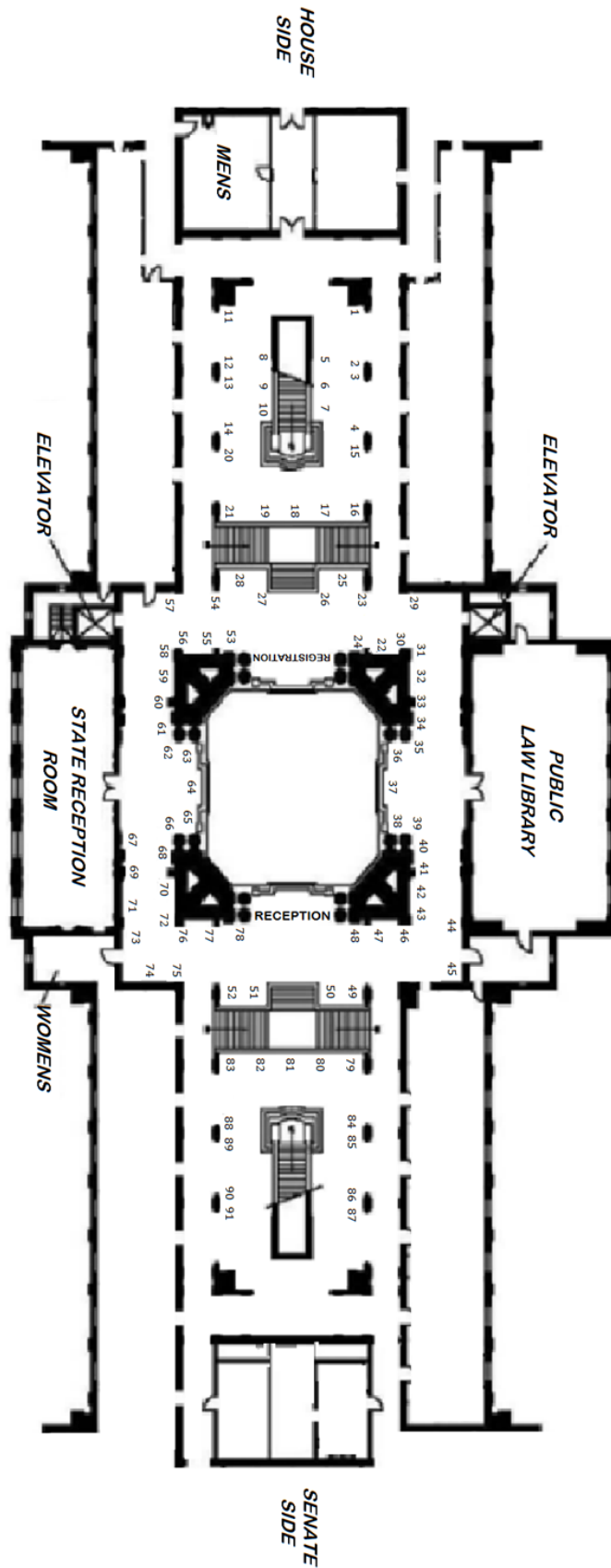
12:30 p.m. to 2:30 p.m.General Poster Display Time

1:30 p.m. to 2:30 p.m.Reception (Senate-side Mezzanine)

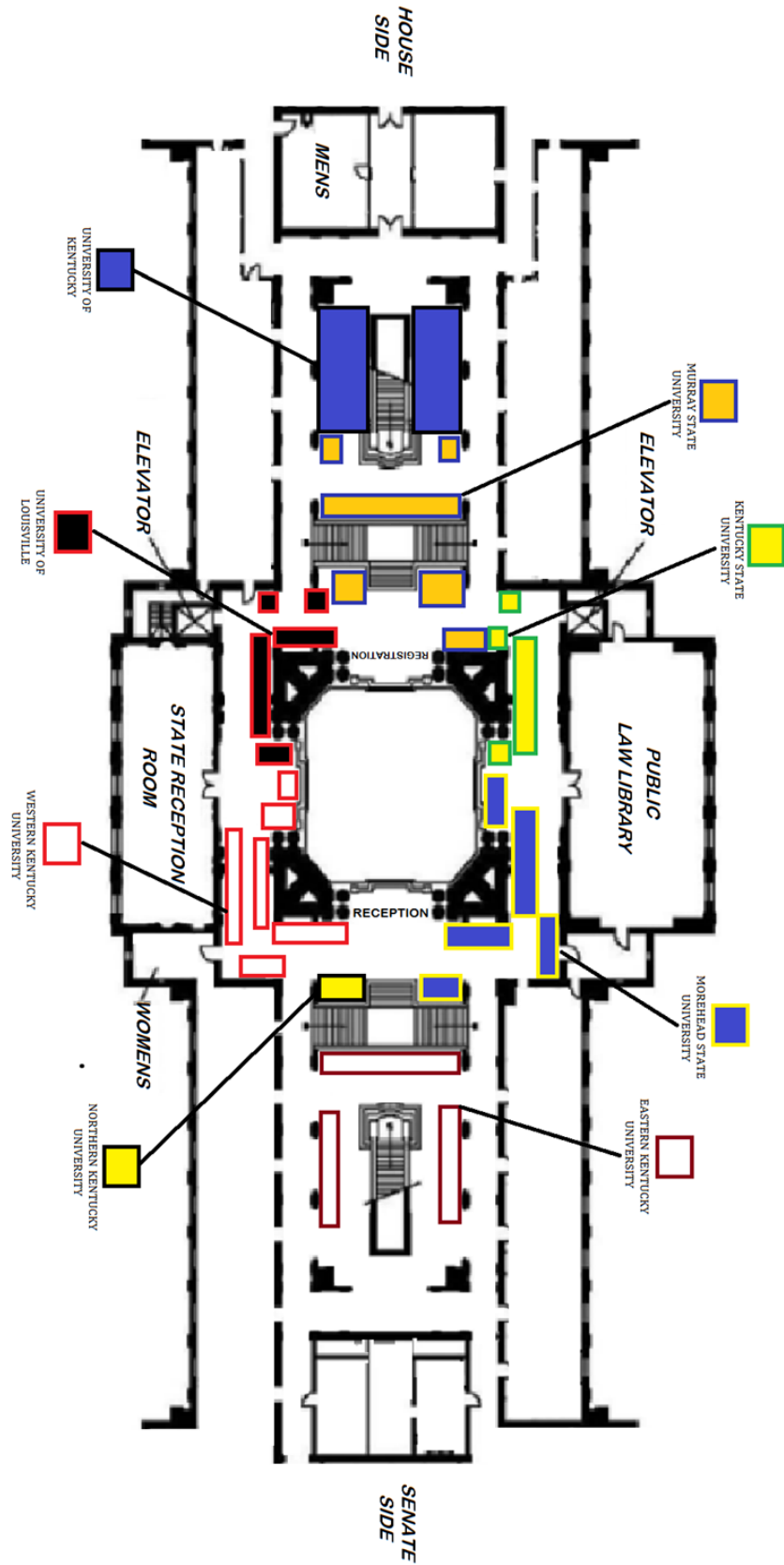
3:00 p.m.Conclusion (Return easels and boards to registration table)

All times listed are in Eastern Standard Time.

Map for Browsing by Participant



Map for Browsing by Institution



Eastern Kentucky University

Poster No.	Student		Faculty Mentor	House No.	Senate No.
90	Bell	Emory	Michelle Grempe	32	26
81	Collins	Kendall	Lindsay Calderon	61	17
86	Gray	Mary Sue	Michael Bradley	51	16
85	Helm	Catelynn	Christopher Hughes	54	14
89	Hopkins	Mark	Geela Spira	86	25
79	Martha	Savannah	Jonathan Gore	45	13
84	Newkirk	Elizabeth	Tanea Reed	74	28
82	Parrett	Sarah	Kelli Carmean	73	28
91	Rice	Whitney	Jon McChesney	85	21
85	Robinson	Devan	Christopher Hughes	54	14
87	Shelton	Angel	Christopher Hughes	71, 73, 81, 89, 91	34
80	Sweet	Ethan G.	Jonathan Malzone	81	34
83	Vaught	Jessica Lynn	Lisa Day, Socorro Zaragoza	71	34
81	Williams	Aggie	Lindsay Calderon	41	31
88	Worley	Skyler K.	Michelle Gerken	93	93

Kentucky State University

Poster No.	Student		Faculty Mentor	House No.	Senate No.
34	Cecil	Rhiannon	Tamara Sluss	57	7
32	Croft	Catherine	George F. Antonious	57	7
35	Graves	Vanetta L.	Kazi Javed, Gail Brion, Megan Combs	57, 56	7
36	Kessler	Samuel	Waldemar Rossi	51	16
30	Lyons	William	Buddhi Gyawali	4	4
29	McCoun	Megan	Karen Friley, John Sedlacek	47	20
34	Mullins	Caitlin	Tamara Sluss	57	7
33	Shorter	Alexius Aunnicia	George Antonius	29	36
31	Stone	Gabriel	Buddhi Gyawali	57	7

Morehead State University

Poster No.	Student		Faculty Mentor	House No.	Senate No.
46	Arnold	Callie	Michael Fultz	99	27
49	Arthur	Cameron	Connie Grimes, Jen Carter	97	30
48	Ball	Cade	Sara Lindsey	74	21
38	Case	Sami	Wesley White, Ilsun M White	3	2
39	Castle	Joe	Katy Carlson	97	30
47	Cooper	Andrew	Shahrokh Sani	73	28
41	Coots	Zachary	Gary ODell	86	25
39	Crouch	Torianne	Katy Carlson	97	30
50	Curnutte	Austin	Christina Conroy	95	29
43	Danzer	Cole	Andreas Loepke, Steve Danzer	11	4
37	Elswick	Justin	Lesia Lennex, April Haight	100	18
45	Gibson	Cassie	Lori Baruth	98, 100	18
46	Gibson	Danielle	Michael Fultz	99	27
49	Hall	Brooke	Jen Carter, Connie Grimes	97	30
47	Mitchell	Cody	Shahrokh Sani	73	28
40	Purdum	Kelsey	Kimberlee Sharp	99	27
37	Von Mann	Elizabeth	Kristina DuRocher	73	6
46	Whitenack	Kaylee	Michael Fultz	99	27
44	Wood	Austin	Michele Paynter Paise	99	37

Murray State University

Poster No.	Student		Faculty Mentor	House No.	Senate No.
16	Akindele	Ifeoluwa	David Eaton	38	38
18	Allen	Matthew	Miranda Terry	21	9
23	Almalki	Saeed	Abdulrahman Yarali	5	1
18	Barefield	Christian	Miranda Terry	38	38
15	Clark	Brandon	Iin Handanyani	5	1
20	Cayton	Emily	Jessica Naber	5	1
15	Chadwick	Bernedette	Iin Handanyani	5	1
19	Chaplin	Chloe	Kathy Callahan	32	36
17	Cook	Emily	Iin Handayani	88	28
23	Frantsvog	Jordan	Abdulrahman Yarali	5	1
20	Foster	Courtney	Jessica Naber	5	1
25	Goheen	Kevin	Iin Handayani, Steve Still	6	6
16	Gordon Jr.	Shawn Vincent	David Eaton	5	1
26	Guebert	Laura	David Pizzo	5	1
24	James	Patrick	Jessica Paine	3	2
28	Johnson	Caprisse	Jessica Paine	5	1
20	Johnson	Victoria	Jessica Naber	5	1
27	Knowles	Sean	Joe Abulhassan	5	1
20	Leon	Izel	Jessica Naber	5	1
27	Leonard	Shane	Joe Abulhassan	5	1
15	Mercer	Mike	Iin Handanyani	5	1
20	Miles	Kelsi	Jessica Naber	5	1
21	Rosa	Rochele	Melony Shemberger	5	1
20	Skaggs	Kathryn	Jessica Naber	5	1
22	Wallace	Erin	Kathy Callahan	30	35
15	Webster	Bailey	Iin Handayani	5	1
23	Williams	Tyler	Abdulrahman Yarali	5	1

Northern Kentucky University

Poster No.	Student		Faculty Mentor	House No.	Senate No.
51	Farmer	Alyssa	Joseph Nolan	67	24
52	Kain	Parker	Qi Li	4	4

University of Louisville

Poster No.	Student		Faculty Mentor	House No.	Senate No.
59	Bartley	Lloyd A.	Michael H. Perlin	40	35
55	Christian	Caroline	Cheri Levinson	4	4
55	Cox	Dustin	Jian Du-Caines	6	2
60	Duong	Nicholas	Gerard Williger	36	36
58	Igwe	Oby	Nino Muradashvili	48	26
63	Kline	David	Sachin Handa, Justin Smith	59	26
57	Kusmic	Samir	Benne Holwerda	38	37
56	Mills	Bri	Gerard Williger	44	33
61	Oropilla	Gabrielle	Dr. Leah Siskind	25	10
54	Riney	Logan	Artem Rudenko, Daniel Rolles	42	35
62	Udoh	Karen	Sham Kakar	36	36

University of Kentucky

Poster No.	Student		Faculty Mentor	House No.	Senate No.
12	Axtell	Alexis	Luke Bradley, Robert Houtz, Roberta Magnani	6	6
11	Beasley	Kalli	Junfeng Zhu	6	6
4	Brown	Kendall	Jazmin Brown-Iannuzzi, Stephanie McKee	6	6
7	Chen	David	Xianglin Shi	88	28
2	Fletcher	Lydia	Luke Bradley	71	22
2	Kloska	Katie	Luke Bradley	71	22
3	Kositzke	Christopher	Ricardo Bessin	75	13
6	Mac	Sarah	Carissa Truman, Brittany Core, Joao Costa	6	6
2	Major	Emily	Luke Bradley	71	22
9	McDaniel	Honour	Corrine Williams	77	13
5	Metz	Amelia	Karen Butler	75	75
13	Miles	Maddie	Sarah Kericsmar	26	53
14	Mullins	Israel	Jeffrey Bewley, Carissa Truman	80	25
11	Nolte	Adam	Junfeng Zhu	6	6
2	Reedy	David	Luke Bradley	71	22
2	Scalf	Max	Luke Bradley	71	22
1	Sullivan	Cristin	Rachel Farr	75	13
2	Tauer	Kara	Luke Bradley	71	22
10	VanMeter	Connor	Rebecca Dutch	45	12
1	Walden	Joseph	Rachel Farr	75	13
8	Wayne	Jeremiah	Matthew Gentry, Katy Brewer	11	4

Western Kentucky University

Poster No.	Student		Faculty Mentor	House No.	Senate No.
70	Banaszak	Alexander	Sanju Gupta	59	26
77	Brown	Vanessa	Joseph Evans	20	32
66	Cecil	Wendy	Cathleen Webb	50	14
71	Cook	Margaret	Yan Cao	60	11
76	Cooper	Lauren	Ali Er	33	33
65	Gabhart	Austin	Mikhail Khenner	53	7
64	Gilliam	Ashley	Ashley Stinnett	2	2
77	Hapney	Kristina	Joseph Evans	20	32
74	Henson	Alex	Sanju Gupta	4	4
78	Hornback	Skyler T.	Edwin D. Stevens	24	5
67	Jackson	Carter	Shahnaz Aly	20	32
73	Jenkins	Wren	Michael Galloway	98, 100	18
67	MacFarland	Kattie	Shahnaz Aly	4	4
75	Nickell	John	Jean Snavelly	99	27
68	Patel	Deeya	Dylan Burnette	3	3
69	Rajendran	Niki	Derick Strode	17	17
77	Sexton	Tiffany	Joseph Evans	20	32
72	Thomas	Zachary	Ali Er	19	32
73	Zieba	Daniela	Michael Galloway	98, 100	18

PROGRAMS OF DISTINCTION

The Kentucky Postsecondary Education Improvement Act of 1997 (HB1) designated funding in support of instructional and applied research programs of distinction at each of the comprehensive institutions in Kentucky. These programs are distinctive because they meet the needs of the Commonwealth by supporting economic development with programs that are in high demand nationally by employers. Programs of distinction include: Kentucky State University-Aquaculture; Eastern Kentucky University-Justice and Safety; Morehead State University-Space Science Center; Murray State University-Telecommunication Systems Management; Western Kentucky University-Applied Research and Technology Program; Northern Kentucky University-Center for Integrative Natural Science and Mathematics.

Katherine Wyant

Dr. Ryan Baggett (Advisor)

Eastern Kentucky University

An Analysis of Human Trafficking in the Southeastern United States: Improving Enforcement and Training

Alyssa Farmer

Dr. Madhura Kulkarni, Dr. Patricia Bills, Dr. Joseph Nolan (Advisors)

Northern Kentucky University

Analyzing the Effects of NGSS-Aligned Professional Development Sessions on Elementary Teaching Methods
(Poster 51)

Danielle Gibson, Callie Arnold, Kaylee Whitenack

Dr. Michael Fultz (Advisor)

Morehead State University

Redesign of a Cell Culture System to Investigate the Effects of Microgravity on Cytoskeletal Remodeling in Smooth Muscle (Poster 46)

Tyler Williams, Jordan Frantsvog, Saeed Almalki

Dr. Abdulrahman Yarali (Advisor)

Murray State University

Security of the Internet of Things (IoT) (Poster 23)

Skyler Hornback

Dr. Edwin Stevens (Advisor)

Western Kentucky University

Theoretical Calculation of the Electron Density Distribution of 1-Methyl-2-Mercaptoimidazole (MMI)
(Poster 78)

Samuel Kessler

Dr. Waldemar Rossi, Dr. Vikas Kumar (Advisor)

Kentucky State University

*Utilization of Black Soldier Fly Larvae (*Hermetia illucens*) in Aquaculture Feed for Nile Tilapia (*Oreochromis niloticus*) and Bio-waste Recycling* (Poster 36)

1. Cristin Sullivan, Joseph Walden, Dr. Rachel Farr (Mentor)

University of Kentucky

Adopting Identities: How Socialization Varies Between Adoptive Families

Socialization – communication with others about one’s life history – is one way in which individuals impart their perceptions, values, and morals about the world. Although this occurs in many contexts, the transmission of life histories often occurs within families, from parent to child. The term *family* has evolved to reference more than biological connections, as adoption has become a common option for many lesbian (L), gay (G), and heterosexual (H) parents. Socialization is especially of interest for family dynamics, as parents may want to encourage the expression of children’s identities, even when they don’t share an identity with their child, such as racial-ethnic, sexual, or adoptive identities. In this study, we explored racial-ethnic and sexual minority parent socialization with a focus on how these strategies work alongside open communication in adoption in order to socialize a child. We were specifically interested in how these socialization practices translated into families with sexual minority parents. Data was collected through questionnaires and in-person interviews with a sample composed of 96 LGH couples. We hypothesized that LG parents, and parents that did not share an ethnic identity with their child, would exhibit greater openness in adoption communication. This is because when parent and child identities do not overlap, it is expected that more communication is required to explore these differences and to be proactive in preparing children for real-world conversations about their family structure. By learning more about adoptive families, our study provides insight into diverse family systems. Additionally, our investigation has implications for public policy and personal life, specifically by providing information to inform adoption laws. This study also complements past adoption research by analyzing socialization strategies of an understudied population in LG parents. Finally, this work begins to address misconceptions about LG parents who historically have been barred from adoption in America.

2. Lydia Fletcher, Emily Major, Kara Tauer, Max Scalf, Katie Kloska, David Andrew Reedy, Dr.

Luke Bradley (Mentor), Dr. Robert Houtz (Mentor), Dr. Roberta Magnani (Mentor)

University of Kentucky

Development and Characterization of a Model Post-Translationally Modified Protein Library

Protein engineering is a platform biotechnology that alters a protein sequence for a variety of applications in research, medicine, and agriculture. For example, the biopharmaceutical industry relies on protein engineering to produce over a quarter of all emerging drugs (a \$60 billion a year industry). However, as the applications for engineered proteins becomes more widespread, new innovations are needed to increase their stringency. While numerous approaches, including the use of combinatorial libraries, have been utilized for engineering protein binding specificity through altering protein sequence, the incorporation of post-translational modifications, which nature uses to alter protein activity, have been overlooked. To incorporate these regulatory elements into protein combinatorial libraries, we developed a powerful bacterial post-translational co-expression system utilizing calmodulin methyltransferase (CaM KMT) to completely trimethylate a diverse protein library of the calmodulin (CaM) central linker region. Characterization of 17 randomly selected library members show that all library sequences were over-expressed and post-translationally modified [1]. In addition, we show that trimethylation differentially altered the conformational changes of CaM associated with the binding of calcium, CaM’s thermal stability, and binding specificity towards CaM-peptide target sequences. To guide future library designs and applications, the specificity of the CaM KMT needs to be defined. Forty mutations were designed to alter the residues around the Lysine-115, the trimethylation site on CaM. The characterization

of individual mutants show that certain positions and residues govern the recognition of CaM KMT, with those positions closest to Lysine-115 having the largest effect. These data further enhance the ability of our post-translationally modified library to unbiasedly target novel sequences, providing a more advanced technology for designing and generating protein with stringent protein-target specificities for biomedicine.

3. Christopher Kositzke, Dr. Ricardo Bessin (Mentor)

University of Kentucky

Development of an Innovative Cucumber Beetle Monitoring Trap

"The striped cucumber beetle *Acalymma vittatum* and spotted cucumber beetle *Diabrotica undecimpunctata howardi* inflict over \$100 million of damage on commercial cucurbit crops annually in the U.S.A. Numerous control methods have been implemented in an attempt to control these pests, but an effective, low-cost method has not been developed. Currently, many large-scale organic farms use costly organic insecticides as their primary control method. Yellow sticky traps provide farmers with a way to monitor beetle populations and efficiently apply these insecticides when beetle populations rise to the economic threshold. However, sticky traps are non-renewable and prove difficult to place without damaging the highly vascular cucurbit plants. Our primary objective was to create a reusable monitoring trap with a more accurate capture rate. Throughout the 2017 growing season we developed a modified funnel trap and deployed it at regular intervals in organic winter squash and mixed cucurbit plantings. By recording the number of beetles captured over a 24-hour period with different variations of the funnel traps, the commercial sticky traps and the live traps currently used to lure beetles for research purposes, we were able to generate a side-by-side comparison of the effectiveness of the respective trap types. The modified funnel traps outperformed all competitors by a factor of 3 or more, significantly increasing the number of beetles collected. In doing so, the modified funnel traps provided a cost-effective, reusable, durable and highly practical alternative to current trapping and monitoring methods. We conclude that this trap could allow farmers to more accurately predict beetle populations in their crops. Additionally, it could serve as an easy, effortless way to collect cucumber beetles for research purposes.

4. Kendall Brown, Dr. Jazmin Brown-Iannuzzi (Mentor), Stephanie McKee (Mentor)

University of Kentucky

Does perceived wealth inequality influence people's attitudes toward being greedy?

Wealth inequality is growing both nationally and internationally. Broadly speaking, wealth inequality is the gap in wealth between the rich and the poor. In the U.S., this gap in wealth is currently the highest since the Great Depression. The current research investigates the psychological impact wealth inequality may have on individuals' attitudes and behaviors. Previous research has demonstrated that being or perceiving oneself to be rich can result in anti-social behaviors, such as being greedy (Piff et al., 2010; Piff et al., 2012; Stellar et al., 2012; Trautmann et al., 2013). The current research seeks to investigate whether the distribution of wealth – whether it be equal or unequal – may also lead to such anti-social behaviors. In particular, we hypothesize that high inequality may lead to extreme upward social comparisons, which in turn may make people greedier than when they are in situations of low inequality. To begin testing our hypothesis, we administered a between-subjects experimental design on Amazon's Mechanical Turk. We developed two pie charts ostensibly demonstrating the level of inequality (equality) in the respondent's state of residence. The participants were asked the extent to which they endorsed items related to being greedy (eg., To be successful, it's important to look out for yourself.).

Finally, we collected demographic measures (e.g., age, political affiliation, socioeconomic status, gender, etc.). With these findings, we hope to provide a much-needed understanding of the psychological processes behind people's willingness to prioritize present benefits over future consequences in situations of high (vs. low) inequality.

5. Amelia Metz, Dr. Janie Heath (Mentor), Dr. Joel Anderson (Mentor), Karen Butler (Mentor)
University of Kentucky

E-cigarette and Marijuana Safety: Nurses' Perceptions

E-cigarette (e-cig) and marijuana use has increased in recent years. Nurse's perceptions are vital as they are on the forefront of patient care. There is limited data on healthcare providers' views of the safety of e-cigs and marijuana, and none specific to nurses. To determine differences in nurses' perceptions of safety of e-cigs and marijuana compared with conventional cigarettes by their demographic characteristics. A secondary analysis was conducted on data from a 24-item survey about perceived safety of e-cigs and marijuana compared to cigarettes, completed by nurses attending the AACN NTI Conference from 2014-2017 [$N > 59^{01}$]. Chi-squared test assessed differences in attitudes about safety by age, degree, location, and years of experience. P -values < 0.05 were statistically significant. Perceived safety of e-cigs was significantly different by generation ($p=0.03$), highest nursing degree ($p=0.025$), hospital location ($p > 4.445$) and years of experience ($p > 4.467$). Of those $^0 9$ years of age, $^2 5.9 \pm$ reported e-cigs as less safe than conventional cigarettes, as did those with doctoral degrees (75.9%), living in the Midwest (72.8%) and with > 15 years of experience (69.3%). Nurses' perceptions of marijuana safety were significantly different by generation ($p < 0.001$), hospital location ($p < 0.001$), and years of experience ($p = 0.002$). Of those ages 45-65, 66.6% perceived marijuana as less safe than cigarettes, as did those in the Midwest (69.3%), and with > 15 years of experience (66.9%). Major gaps exist in the evidence related to nurses' perceptions of the safety of e-cigs and marijuana compared with conventional cigarettes. Our findings support the literature: younger generations view e-cigs and marijuana as safer than older adults. Surprisingly, nurses living in the South perceived marijuana and e-cigs as safer than those in areas of the country where marijuana has been legalized. Our findings support the need for continuing education for nurses and further research in this area.

6. Sarah Mac, Carissa Truman (Mentor)
University of Kentucky

Evaluating the ability to detect calving time in dairy cattle using a precision technology that monitors tail movement

Predicting calving time allows the farmer to be present during the time of calving to assist in cases of dystocia, or difficulty calving. Dystocia has the potential to increase calf mortality, decrease milk yield, lower conception rate, and increase uterine disorders. The objective of this study was to evaluate the ability of a precision technology (Moocall, Dublin, Ireland) that measures tail movement to detect and alert the onset of calving. Accuracy of the calving device was evaluated by comparing the alert times to the actual time of calving. The calving detection device was attached to the tail 4 ± 3 days (mean \pm SD) before expected calving date, and video was recorded for tail behavior analysis. Monitoring tail behavior was analyzed into three categories: an hour before the hour of the first alert (control period), the hour before the first alert (alert one data) and the hour before the second alert (alert two data). Using PROC TTEST (SAS Institute Inc., Cary, NC) a lower one-sided ($H_0 = 150$) analysis for significance was performed. The average time interval between the first alert and calving was 119 ± 69 minutes (mean \pm SD, $P = 4.45$) and the average time interval of the second alert and calving was $^{21} \pm 52$ minutes (mean \pm SD, $P = 4.45$). Video was evaluated for the frequency and duration of tail lifts during the control

period, hour of the first alert, and the hour of the second alert. Mean frequencies were 3.37, 7.95, and 8.47, respectively. Mean durations of tail lifts were 55, 124, and 134 seconds, respectively. The calving detection device has the potential to alert farmers around two hours before calving. The farmer being present during birth creates the potential to save a dam or calf's life, decrease disease, prevent milk loss, and overall save the farmer money.

7. David Chen, Dr. Xianglin Shi (Mentor)

University of Kentucky

Exposure to Chromium (VI) Enhances the Motility of Colorectal Cancer Cells through Activation of FAK

Colorectal cancer (CRC) is the second leading cause of cancer-related death in the United States. The incidence and mortality of CRC are high in the Appalachian region, including Kentucky. CRC patients in this region are mostly in advanced stages at diagnosis. In addition, high concentrations of heavy metals, such as hexavalent chromium [Cr (VI)], are found in the drinking water and soil in rural Appalachian Kentucky. Since Cr (VI) is a carcinogen, we hypothesize that chromium (VI) enhances the motility of CRC cells. Moreover, focal adhesion kinase (FAK) has been well known in regulating cell motility. Therefore, the role of FAK in Cr (VI)-enhanced motility of CRC cells was examined. Two CRC cell lines, DLD-1 and HT29, were exposed to Cr (VI). The cell motility was determined by wound healing assay. Cellular viability was examined using MTT assay and western blot was performed to investigate the cell signaling. Exposure to Cr (VI) at 0.5 or 1 μ M for 24 or 48 hours significantly increased the motility of CRC cells in a dose-dependent manner compared with the control groups. MTT results indicated that Cr (VI) treatments did not affect cellular proliferation. In addition, Cr (VI) activated FAK and its downstream signals, Src, p130cas and paxillin. Co-treatment with a specific FAK inhibitor blocked the activation of FAK-Src signaling and attenuated Cr-enhanced cell motility. Similar results were observed in both DLD-1 and HT29 cells. Exposure to chromium (VI) activated FAK and enhanced the motility of CRC cells. Inhibition of FAK attenuated Cr (VI)-enhanced cell motility. Therefore, activation of FAK signaling may be a mechanism underlying colon cancer aggressiveness observed in the CRC patients of Appalachian Kentucky, a region with a high content of heavy metals.

8. Jeremiah Wayne, Katy Brewer (Mentor), Dr. Matthew Gentry (Mentor)

University of Kentucky

Personalized Diagnosis for Lafora Disease, a Fatal Epilepsy

Lafora disease (LD) is a fatal, genetic disorder characterized by progressive neurodegeneration, myoclonus (i.e. uncontrolled muscle spasms), and epilepsy. LD patients present with seizures in adolescence that become increasingly severe and frequent, suffer rapid cognitive decline, and typically die within ten years of onset. Abnormal carbohydrate deposits known as Lafora bodies are found in the brains of LD patients and have been shown to drive disease progression. Approximately 50% of LD cases are caused by mutations in the *Epilepsy progressive myoclonus 2A (EPM2A)* gene that encodes a protein called laforin. Laforin is the only protein in humans that can release phosphate from carbohydrates. In LD patients, mutations in the laforin lead to excess phosphate and abnormal branching in cellular carbohydrate stores, causing carbohydrate accumulation and toxicity. There are >50 different laforin mutations that have been described in LD patients, and some patients have milder forms of the disease. We hypothesized that not all laforin mutations are the same and that many mutations may have milder effects on protein function. Our biochemical analysis of disease mutations would allow us to predict disease outcome based on a patient's individual genetics. Recently an unusual case of late-onset LD was described in a patient who lived to the age of 59. This patient contained a novel laforin mutation, where a specific amino acid at position 321 was changed from a phenylalanine to a cysteine (F321C). Using the 3-dimensional structure of laforin and a series of biochemical tools, we found that this mutation and a pre-

viously described LD patient mutation, F321S, uniquely alter the function of laforin, providing a biochemical explanation for the very mild clinical phenotype. Our studies also establish a biochemical avenue for rapid, personalized diagnoses of LD patients, enabling doctors to predict patient progression and design treatment schemes that are specific to patients.

9. Honour McDaniel, Dr. Corrine Williams (Mentor)

University of Kentucky

Preliminary Analysis of Male Perceptions of Reproductive Coercion

Reproductive coercion (RC) can be defined as actions relating to reproductive health taken by a partner in order to maintain power and control in a relationship. While multiple studies have looked at reproductive coercion's role in unintended pregnancies and the correlation with interpersonal violence, this research has only examined the experiences of women. Further, the definition of RC has not addressed the experiences of reproductive coercion among men, though the anecdotal phenomenon of women getting pregnant to trap men is often discussed. This presentation will address the gap between collected RC data for men and women. In a cross-sectional survey of college students from two large, public universities in 2015 (n=4,063), both men and women responded to questions such as: 1) What happened when your partner wouldn't let you use birth control, condoms or other protection when you wanted to or made other statements about wanting to have a baby with you? 2) As a result of the things your partner did/said about birth control and/or condoms, did you have sex that made you afraid of getting pregnant when you didn't want to? 3) Did you stop using birth control or condoms because of what your partner wanted? 4) Were you afraid of what your partner might do if you didn't do what he or she wanted?

During past surveys, men were either excluded or not looked at individually. We expect to show men's experiences with reproductive coercion to be mostly in relation to condom use and birth control sabotage. Evaluating male perception in regards to RC is critical for improving pregnancy prevention programs as well as programs aiming at factors associated with unintended pregnancy. As well, decreasing reporting inequalities between male and female RC experiences will open doors to a broader discussion about healthy relationships and family planning.

10. Connor VanMeter, Dr. Rebecca Dutch (Mentor)

University of Kentucky

Role of Human metapneumovirus Phosphoprotein domains in the viral lifecycle

Human metapneumovirus (HMPV) causes severe respiratory disease, especially in infants, the elderly, and the immunocompromised. HMPV Phosphoprotein (P), which normally interacts with the viral polymerase for replication, has been shown to play roles in other parts of the viral life cycle. Here we have generated deletion mutants of P to investigate the roles of three different regions in protein-protein interactions (e.g., actin), localization, and membrane disruption. To visualize these interactions, we observed infected and transfected cells using confocal microscopy. Co-expression of N and tagged P variants suggest that the C-terminus plays a role in the formation of inclusion bodies, or regions for genome replication and transcription. These results will aid understanding of how HMPV spreads from cell-to-cell and discovery of novel therapeutic targets.

11. Adam Nolte, Kalli Beasley, Junfeng Zhu (Mentor)

University of Kentucky

Sinkhole Mapping of Woodford County Kentucky Utilizing LiDAR

This project utilizes LiDAR (light detection and ranging) in conjunction with GIS (Geographical Information System), aerial photography, and field-checking to delineate, verify, and map sinkholes in Wood-

ford County, Kentucky. LiDAR is a remote-sensing technology that provides detailed topographic maps of the land surface, which are ideal for identifying sinkholes in karst areas. Sinkholes are common geologic hazards that can severely damage buildings, drain farm ponds, damage roads, and wreck farming equipment. In Kentucky, sinkholes cause an estimated \$23 million in damages annually. Woodford County is located in the Bluegrass Region, a karst-dominated terrain, with bedrock consisting of Ordovician limestones and shales. Its land-surface is characterized by sinkholes, springs, underground streams, and caves. Previous mapping of sinkholes using topographic maps identified 1,386 sinkholes in Woodford County. LiDAR detected 2,307 sinkholes, an increase of 937 (41 percent) from the previous effort. This project demonstrates that LiDAR is a highly accurate method for identifying and mapping sinkholes.

12. Alexis Axtell, Tim Uhl (Mentor), Natalie Myers (Mentor)

University of Kentucky

Stroke Volume During Practice and Match Play in Junior Tennis Players

It is not uncommon for junior tennis players to compete in year-round competition exposing players to rigorous workloads. Previous tennis work has used hitting volume as a measure of workload, with methods requiring video analysis that incorporated manual counting of strokes. While the manual counting of strokes may be accurate the demands of such a task are time intensive. Therefore, other avenues of measuring workload must be explored. The Sony Smart Tennis Sensor (SSTS) is a new device that may be capable of measuring hitting volume and stroke type. To determine if the sensor is capable of tracking daily training loads over time and to investigate the criterion validity of the SSTS and in a group of tennis players. Ten high school players (16 ± 1 age, 9 males, 1 female) were recruited to participate. Each player's hitting volume and stroke type were tracked prospectively for 6 weeks using the SSTS. The sensor attaches to the end of the racket handle. Criterion validity was established comparing video data of two practices to SSTS data on 4 tennis players in order to determine the measurement accuracy of the Sony sensor. Strokes were categorized into forehand swings, backhand swings, overhead swings, and total volume. The SSTS is able to measure hitting volume across time. On average, the daily practice and match total volume was 533 and 234 strokes, respectively. Regardless of practice or match play approximately 54% of the total volume of strokes were forehand swings. The measurement accuracy of the SSTS was above 90% for all measured strokes. The SSTS is an accurate way of measuring hitting volume in tennis and can be used to track practice and match volume overtime. Monitoring workloads overtime can help prepare players for rigorous competition schedules.

13. Madelyn Miles, Dr. Sarah Kerckmar (Mentor)

University of Kentucky

Understanding government influence on healthcare legislation

Healthcare is constantly evolving and changing. One of the strongest influencers in this constant change is the government. In order to completely understand healthcare, one must also be able to understand the legislation involved. For providers, this is important to understand since they need to be aware of the resources available to their patients. Being informed about health laws allows providers to make more educated decisions, understand trends in healthcare, and stay compliant with updated standards. The vocabulary, terminology, and overall process used in legislation can be difficult to understand—especially to a lay audience. This study examines recent healthcare laws in Kentucky to better understand whether current legislation aligns with the greatest health needs of the state and to determine better ways of presenting the information in a way individuals from any educational background can understand. Laws passed in 2017 were selected for review from Kentucky's Legislative Research Commission website and compared to the priorities identified in the Foundation for a Healthy Kentucky's "Kentucky Health Issues Poll". Information from the comparison was then translated into a podcast series. Podcasts were uploaded to researcher's Facebook, Instagram, Twitter, and YouTube. Podcasts in-

clude news clips and interviews with professionals who have experience working in areas affected by these new laws. The series consists of six-episodes and was titled “What the Health is Going on?” The findings suggest that Kentucky has a strong healthcare presence in legislation and that many of the laws overlapped with the priority issues identified by the Foundation. Although some laws were irrelevant to the greatest issues, they may still play an important role in improving healthcare in the state. Overall, the study findings indicate that Kentucky is taking steps to improve major healthcare issues, but there is still room for priority alignment with legislation.

14. Israel Mullins, Dr. Jeffery Bewley (Mentor), Carissa Truman (Mentor)

University of Kentucky

Validation of an Automated Body Condition Scoring Camera for Dairy Cattle

Body condition scoring (BCS) is a visual estimate of subcutaneous fat reserves. The scoring system ranges from 1 to 5, in 0.25 increments, with 1 being extremely thin and 5 being morbidly obese. The desirable range for lactating dairy cows varies, dependent on the time in lactation and should be monitored at multiple time points for the greatest managerial impact. Undesirable body condition scores have been shown to negatively impact milk production, disease, and reproduction. Manually scoring BCS has proven beneficial yet requires time for data collection, entry, and analysis. Recently, a camera that automatically scores and records body condition scores of cattle has been released to the market (DeLaval International AB, Tumba, Sweden). The objective of this study was to validate the correlation of the cameras' automated scores with conventional manual scores. Three experienced individuals scored the cows manually, which were recorded and averaged by cow, to compare with the automated scores. All data analysis was performed using SAS 9.3 (SAS Institute Inc., Cary, NC). Using PROC UNIVARIATE, descriptive statistics were found for the averaged manual and automated scores. The average score for all the manual scores was 3.38 ± 0.48 (mean \pm SD) The average automated score was 3.27 ± 0.27 (mean \pm SD). The scores were compared using PROC CORR and the correlation coefficient was 0.78 ($P/6.667$). The correlation demonstrated a strong positive relationship between the manually obtained scores and the automated scores. The agreement between the scores indicates that the automated system can provide BCS that corresponds with a conventional manual scoring system. The automated system may encourage more producers to adopt BCS into their management practices. Using BCS, producers will be able to make management decisions to improve milk yield, reproduction success, and lower disease occurrence.

15A. Brandon Clark, Bernedette Chadwick, Michael Mercer, Bailey Webster, Dr. Iin Handayani (Mentor), Dr. Brian Parr (Mentor)

Murray State University

Comparing Soil Characteristics under Various Land Cover in Kentucky and Illinois [Hybrid Poster 1-A]

Over time, managing different crops has caused soils to change their characteristics. The study includes a comparison between soils found in five different locations. Using the bulk density, water holding capacity, soil organic matter, soil pH, soil water content at field capacity, and soil porosity, this study aims to distinguish how continuously using the same cropping systems will affect soils over an extended period of time. Soil samples were collected from Christian County, Kentucky, Caldwell County, Kentucky, Calloway County, Kentucky, and Madison County, Illinois on August 29th 2017. The soil samples collected include silt loams and sandy silt loams that are in use for horse pasture, raising dark tobacco, conservation reserve program, gardening, and a park. From each location, three undisturbed soil samples and three disturbed samples were taken from the depth interval of 0 to 6.5 cm. The results show that the growth of different plants species can alter soil physical and chemical conditions under different crop-

ping systems. The detail results and further discussion of this study will be described in the poster. In general, the change of soil characteristics due to continuous cultivation was positive and negative depending on the type of land cover.

15B. Bailey Webster, Dr. Iin Handayani (Mentor), Dr. Brian Parr (Mentor)

Murray State University

Soil Responses to Cropping Systems in Fredonia and Princeton Kentucky [Hybrid Poster 1-B]

Cropping systems in Kentucky are strongly dominated by corn, tobacco, soybeans and wheat. Various crop management practices affect soil properties resulting in different functional quality of the soil to support crop growth. Crop rotation and tillage practices influence soil properties, therefore understanding the effect of these practices is essential to maintaining optimal soil environment. The objective of this research was to determine the effects of various common cropping practices in western Kentucky on soil chemical and physical properties. In addition, soil samples from pasture and wooded areas collected to use as a reference for comparison among crop fields. There were five cropping systems identified, such as no till, till, non irrigated, irrigated fields and garden. Soils were sampled on October 1st, 2017. Undisturbed and disturbed samples were collected from the depths of 0-6 cm and 6-12 cm. Undisturbed samples were collected using soil core (ring sample), while disturbed samples were taken using hand trowel. The samples were kept in the refrigerator until analysis. The undisturbed soil samples were used to analyze bulk density, porosity, soil water holding capacity and soil water content at field capacity. The disturbed samples were used to analyze soil organic matter (SOM) and soil pH. The data show that the highest SOM content was found in no till with the lowest in till systems. Wooded areas provided the highest soil water holding capacity and soil water content at field capacity. Total pore spaces were found relatively high in the garden and wooded areas. In all fields, soil pH was considered desirable at the range of 6 to 7.5. In general, no till systems show stratification between depths in each measured soil property.

16A. Shawn Gordon, Dr. David Eaton (Mentor)

Murray State University

Sports: A Highway to Brain Drain? [Hybrid Poster 2-A]

Brain drain is formally defined as the, “emigration of educated or talented individuals” (Investopedia, 2017), usually from rural to urban areas or developing countries to developed countries. Admittedly, the brain drain effect has drawn substantial amounts of attention over the past few years; in spite of this, no work has predominantly focus on how sports affects brain drain. As a result, this prompted me to focus my paper on the facilitation of the brain drain effect by athletes from developing countries. The facilitation of the brain drain effect by athletes can potentially lead to two major highways— first, sports can be used as an outlet to bypass government policies on preventing the brain drain effect; second, sports can be used as a doorway to brain drain.

Coming from a developing country, Belize, we have witnessed countless athletes, going abroad to study but never actually return to Belize; so, this a good opportunity to dissect and interconnect these factors and present the findings. In regards to expected findings, we expect to find that brain drain is indeed facilitated by sports via athletes from developing countries to developed countries, more specifically in Europe, since these players might not actually possess the required skillset or even be exposed enough to make it to the NBA or major leagues in soccer such as La Liga in Spain and the English Premier League. The first step to constructing a data set is to find data from the NCAA, NAIA and mid-level soccer leagues to access data on players from developing countries. Moving on, brain drain is an ongoing challenge faced in developing countries and should be accordingly researched as such!

16B. Ifeoluwa Akindele, Dr. David Eaton (Mentor)

Murray State University

Why do immigrants change behavior based on interaction? [Hybrid Poster 2-B]

For my thesis, I plan on discussing the reason behind why international students change behavior based on who they are interacting with. I have noticed that as an immigrant, I have adjusted my behavior depending on who I am interacting with and I intend to see if this is the same with other immigrants. In one *Psychology Today* study, the authors found that the environment one is in and the culture that is around them that causes people that are bilingual to change behavior when speaking with people from different backgrounds. However, I have discovered that it does not seem to matter whether an international student is bilingual.

In addition, there is no denying that it is possible that the Trump administration can have an effect on the behaviors of international students. I would like to assess how the current climate regarding immigration has affected international students at Murray State's campus in terms of their interactions with other students and how it impacts their decision to finish their education here or go back to their home countries. So far, most of the articles I have found pertain to people from Spanish-speaking countries and their experiences in the United States. There is not a lot of work on people from other countries, specifically African countries, and their schooling experiences before this current administration and during. As far as data collection, there is a large international community on Murray State's campus as well as sub groups within the community. They can be asked to rate their experience at Murray State, whether they feel a sense of belonging on campus, if they feel the environment has changed since Trump's election, and if the amount of people from the same place impacts their decision to leave or stay.

17. Emily Cook, Jessica Pafford (Mentor), Dr. Iin Handayani (Mentor), Dr. Steven Still (Mentor), Dr. John Grove (Mentor), Dr. Mark Coyne (Mentor), Ms. Ann Freytag (Mentor)

Murray State University

Evaluating the Impact of two Contrasting Tillage Practices on Soil Properties in Central Kentucky

Farming practices such as no tillage and plowing can institute change on soil physical and chemical characteristics. In this research, the effects of long-term conventional and no-tillage systems on the selected soil properties were determined in a continuous corn system on a farm with Maury silt loam soil. These samples were taken from University of Kentucky's Research Farm (Spindletop Farm). The field used was tilled in 1969 from bluegrass sod and the first time research was conducted was in 1970. Each plot is 20 ft. by 40 ft. and for many years each plot was split with winter cover crop planted to rye or hairy vetch. The vetch is not used the whole time but the rye is continued to be used. The rye is killed with herbicides in the No-Till plots and plowed every spring in the conventional plots creating different soil conditions. This research has been conducted for over 48 years of continuous no till agriculture under continuous corn. Every time the experiment was conducted, the soil contained four rates of nitrogen applied every spring at 0, 84, 168, and 336 kg/ha. In this research, the soil samples were collected from the conventional tillage no till on June 26, 2017 at 0 and 168 kg/ha of N at the depth of 0 to 7.5 cm and 7.5 to 15 cm. The samples were analyzed for soil organic carbon (SOC), soil aggregates, C in macroaggregates, soil pH, particulate organic matter (POM), and soil porosity. These results will indicate that tillage practice and soil depth are two important factors affecting the soil properties, and conservation tillage practices improve both physical and chemical properties of soil.

18. Matthew Allen, Christian Barefield, Dr. Miranda Terry (Mentor)

Murray State University

Experiential Learning through the Health & Wellness Peer Education Program

The Health and Wellness Peer Education program was established on the Murray State University cam-

pus during the Fall 2016 semester. The purpose of this program is to empower and engage the campus community through outreach and advocacy to help make Murray State a healthier and safer environment for all students. The National Peer Educator Study (2011) found numerous benefits to having peer educator programs on college campuses. One of those benefits is that undergraduate peers are the single most potent source of influence on undergraduate student's affective and cognitive growth and development. Students often feel more comfortable when learning and talking with peers in comparison to faculty. By training peer educators to discuss health behaviors of concerns like alcohol use, sexual assaults, and domestic violence, this creates a safer environment with more open dialogue on these health behaviors for the students on campus. The Murray State University Peer Educators, since the formation in 2016, have presented one campus-wide program, Safe Spring Break Event, and are on the path to host a second, Great American Smokeout Event, in November 2017. The initial campus wide program, Safe Spring Break, had an impact size of about 900, about 100 active participants and 800 passive participants.

19. Chloe Chaplin, Dr. Kathy Callahan (Mentor)

Murray State University

Family Structure in Early Modern Scotland

This research project will explore interpersonal relationships in early modern Scotland. The early modern period is commonly defined at 1500-1750. Under Dr. Callahan's guidance, we looked at archival evidence from the early modern period in the National Records of Scotland which primarily consisted of personal correspondence. Since this project will focus on the upper classes and the depictions of family structures in personal correspondence, these letters between family members provide critical evidence to draw conclusions about family life in early modern Europe. By studying personal correspondence conclusions can be drawn regarding family structure along the lines of economic activity, domestic life, marriage and death, and other major aspects of life. These are important topics to consider when studying how upper class individuals interacted with their society during this time.

20. Courtney Foster, Kelsi Miles, Katie Skaggs, Tory Johnson, Emily Cayton, Izel Leon, Elizabeth Landes, Dr. Jessica Naber (Mentor)

Murray State University

It's Good to Be Blue: A Nursing Study Abroad Exploration of the Sardinian Blue Zone

Blue Zones are areas of the world where, according to studies performed by National Geographic and other experts, people live measurably longer, happier lives with lower rates of chronic disease and a higher quality of life than they do in the United States. There are five identified Blue Zones, with nine common characteristics among these five locations, known as the Power 9 which are related to diet, exercise, relationships, and spirituality. Sardinia, Italy, the first identified Blue Zone, has the greatest concentration of male centenarians in the world.

A nursing professor, along with 17 nursing students, traveled to Sardinia, Italy in May, 2017 to explore the culture, lifestyles, and ultimately the Power 9 at work. In Sardinia, students visited a Blue Zone and interviewed centenarians in their homes, visited local markets, met with longevity experts, visited a winery and olive oil mill, participated in a cooking class, and experienced typical Sardinian celebrations, meals, and social activities. Students and the faculty member analyzed the collected data using a narrative thematic analysis to determine connections to the Power 9 and overall lifestyle characteristics aiding in longevity.

The overall aim of this visit was to research the Blue Zone and draw conclusions about the Power 9 characteristics by interviewing, observing, and analyzing. Students immersed themselves in Sardinian culture and brought back information to the local university community and community as a whole. The

plan is to implement Blue Zone ideals locally and potentially to implement the Blue Zone Project with the help of the Blue Zone experts.

Visiting the Blue Zone in Sardinia was extremely valuable for nursing students in bringing health promotion ideals back to the community and to patients in a variety of settings. Also, this was an important introduction to qualitative research techniques such as interviewing and qualitative analysis.

21. Rochele Rosa, Dr. Melony Shemberger (Mentor)

Murray State University

Oral History in a Journalism Course: Sharing Stories and Reporting News About Public Education in Kentucky

Oral history as a method of gathering information is nothing new. However, in journalism, the method is gaining acceptance as a new, enriching way to report news, showing how issues and topics impact people.

The Murray State University JMC 397 Reporting for Print Media class recorded community oral history as part of an intensive focus on education reporting in fall 2017. Although many facets of the education “beat” were explored, students devoted much of the semester investigating and reporting the issues and challenges facing public education in Kentucky, from the K-12 to higher education levels. For the project to become a meaningful gift for the community, students conducted oral history projects with local residents, asking them to recall their experiences and memories of how public education impacted them. The students created a website filled with content from the oral history interviews including an audio scrapbook profiling how the education system impacted the interviewees. Using this information and local education news features, an ebook was created with a QR code that leads readers back to the website.

Through the multifaceted project outcomes, JMC 397 students received an enriching experience in preserving a piece of local public education history. Additionally, the community was educated on an issue that impacts everyone, from students to taxpayers.

22. Erin Wallace, Dr. Kathy Callahan (Mentor)

Murray State University

Scotland: From the Acts of Union to the Independence Referendum

This presentation will include research and analysis of the formation of the United Kingdom and the role of Scottish economics, politics, and nationalism in the push for independence. Points of interest in this research include: the Darien Scheme, the Acts of Union of 1707, Jacobite Risings of 1715 and 1745, the rise of the Scottish National Party, and the Independence Referendum. These events will be presented to display that there are similarities between events of the past and modern events.

23. Saeed Almalki, Jordan Frantsvog, Tyler Williams, Dr. Abdulrahman Yarali (Mentor)

Murray State University

Security of the Internet of Things (IoT)

The rapidly adopted idea of everyday devices being interconnected and being controllable from across the globe has come to be known as the Internet of Things (IoT). In every home or business there are now connected devices such as lights, locks, thermostats, and even medical devices which have created a much larger attack surface for every network and could increase the possibility of serious damage if they are compromised. Connected devices are even found in hospitals, power plants, and other secure facilities. Safety and security of networks are imperative not only for secure military installations or infrastructure sites, but also at home, work, and schools to ensure the confidentiality of sensitive information and proper authorization to control systems. The list of IoT devices is growing rapidly, and many people are building their own devices while others are buying inexpensive, but highly rated “smart” products. We examined the risks associated with connected devices and the idea of a “Smart Home”. We

demonstrated common vulnerabilities with the do-it-yourself (DIY) and purchased IoT devices. For this demonstration, we built an IoT device using widespread online tutorials and also tested high rated, but inexpensive commercial IoT devices. We exploited vulnerabilities in these types of devices from inside and outside of the network. We also explored the importance of security best practices and how this can prevent the exploitation of these vulnerable devices. We have shown how failure to implement proper security measures can, has, and will continue to result in a range of possible attacks or breaches. If security is not more seriously considered when developing these devices any network with these devices will be vulnerable.

24. Patrick James, Mrs. Jessica Paine (Mentor)

Murray State University

Sensory Evaluation on Flavor, Volume, and Texture of Substituting Amaranth Flour for Wheat Flour in Red Velvet Cupcakes

Celiac disease is becoming more prevalent in today's society and celiac patients are looking for more gluten-free options to replace wheat-made counterparts. Amaranth is a gluten-free grain that has been introduced in many products for its nutritional benefits, such as improvements in calcium, iron and zinc intake. The purpose of this study was to determine if red velvet cupcakes made with amaranth flour could provide comparable taste, volume and texture to a red velvet cupcake made with wheat flour. Both cupcakes underwent a seed-displacement test, which determined that the amaranth cupcake was comparable in volume. When each sample was presented to a group of five panelists, several of the panelists claimed the sample made with amaranth flour produced a "nutty, bitter cupcake" that one panelist described as tasting like "potting soil." In a favorable choice question, two of the five panelists found the amaranth cupcake more favorable than the one made with wheat flour. The hypothesis was not supported in this study, and further research could be done substituting the amaranth flour in a way that could mask the nutty flavor, such as replacing wheat flour in banana nut bread.

25. Kevin Goheen, Dr. Steve Still (Mentor), Dr. Iin Handayani (Mentor)

Murray State University

Soil Characteristics of a Permaculture Orchard in the Jackson Purchase

Permaculture is the development of agriculture systems that are sustainable and self-sufficient. Addressing conservation issues such as diminishing natural resources and changing environmental conditions, permaculture allows for adaptive and resilient agriculture ecosystems that are able to cope with environmental stresses while reducing inputs. The objective of this research is to evaluate eight different zones in a permaculture ecosystem for selected soil attributes, in Briensburg, Kentucky (USDA Hardiness Zone 7b, approximately 51.1" (129.5cm) rainfall/year). As this is the beginning of a long term longitudinal study, only preliminary baseline measures were collected originally, including soil water retention and soil organic carbon. Sampling, processing, and analysis started in December, 2016 and was repeated in September, 2017. A general increase (although not significant except in the case of site 5) in measures of soil organic carbon (SOC) was observed. Measures of soil water holding capacity (SWHC) of the sampled sites increased significantly in 6 of the 8 sites sampled.

26. Laura Guebert, Dr. David Pizzo (Mentor)

Murray State University

Teutonic Tales: An Examination of Cultural Appropriation and Collective Identity during the Nazi Era

Drawing on the scholarly contributions of historians like Johann Chapoutot, Gabriel Vejas Liulevicius, Claudia Koonz, and Ben Kiernan, this research attempts to investigate the appropriation of cultural identity and collective memory to legitimize and advance the ethnic narrative of the National Socialist Party of Germany in the 1930s and 40s. By forcing new interpretations and reinventions of socially accepted

myths, legends, and folklore, the Nazis were able to tap into a potent sense of nostalgia to invoke the blessing of Germanic heroes and historical figures in order to create a sense of credibility and national heritage.

27. Sean Knowles, Shane Leonard, Dr. Yousef Abluhasan (Mentor)

Murray State University

The Changing Workforce: Optimizing the Work-Rest Cycle

The U.S. Department of Health and Human Services estimates that more than two-thirds of adults in the United States are obese or overweight. Over the last decade there has been a surge in the number of obese employees and female employees in manufacturing industries. Many jobs performed by obese workers in the manufacturing industry consist of highly repetitive upper limb tasks that often require excessive force exertions. The development of fatigue-related musculoskeletal disorders is magnified with the prevalence of high obesity levels. In this study, fatigue recovery rate after performing tasks of varying force and repetition levels among obese and normal body mass index (BMI) participants was evaluated. A total of 60 participants were recruited (30 males, and 30 females) and grouped in three body mass index categories (BMI less than 25 kg/m², BMI between 25-30 kg/m², and BMI greater than 30 kg/m²). Each participant performed four tasks (high force / high repetition, low force / high repetition, high force / low repetition, and low force / low repetition), simulated by exerting a grip force of a predetermined level on a hand grip dynamometer. Fatigue recovery rate was measured by comparing the maximal voluntary grip strength of a participant before performing a task and at one-minute, two-minute, five-minute, and ten-minute rest intervals after performing a task. Preliminary results have indicated that as obesity levels increase, a longer rest interval is needed for muscles to recover after performing a task. Initial analysis also indicated that fatigue effects are magnified when the tasks a performed require high forces and in females. Results of this study can be used to incorporate factors such as obesity levels and gender in the design of work-rest cycles to reduce the risk of fatigue related musculoskeletal disorders.

28. Caprisse Johnson, Mrs. Jessica Paine (Mentor)

Murray State University

The Sensory and Textural Evaluation of a St. Louis Style Butter Cake made with Greek Yogurt as a Fat Replacer

In modern America, many nutrition-related health issues are on the rise, including diabetes, obesity, and heart disease. Many nutrition professionals link the rise in these three diseases to the Western Diet, which includes a high fat and sugar content within its foods. Due to the increased consumption of this diet high in sugar and fat, obesity, heart disease, and diabetes rates seem to be rising. However, many people who eat this diet and are at risk for these complications, hesitate to change their diet because they feel that healthier alternatives are bland in flavor or have a repugnant taste when compared to the foods they normally consume.

The purpose of this experiment was to evaluate the sensory and textural differences of a St. Louis-Style butter cake made with Greek yogurt as a fat replacer for cream cheese in a traditional butter cake recipe. Viscosity of the respective batters was measured and the moisture content and tenderness of the finished products were assessed. In addition, the consumer acceptability and sweetness of the cakes were evaluated by a consumer tasting panel. The hypothesis was that the batter of the modified recipe would have a thinner consistency than the control recipe causing the modified cake/recipe to be moister and more tender than the control. It was hypothesized that as a result of the improvements in tenderness, the modified cake would have higher acceptability among consumers than the control recipe.

29. Megan McCoun, E. Kyle Slusher, Mamata Bashyal, Sathya Govindasamy, Dr. John Sedlacek (Mentor), Mrs. Karen Friley (Mentor)

Kentucky State University

Beneficial Insects in Blackberries Treated with Biologically Based Insecticides and Bordered by Native Perennial Plants and Pasture

Conservation biological control is a potential way to reduce insect pest populations by providing habitat for insect predators and parasitoids, also known as beneficial insects. Planting non-crop plants such as native perennial flowering plants and grasses near crops can enhance the populations of beneficial insects, as they provide microhabitat, nectar, and pollen. The spotted wing Drosophila (SWD), *Drosophila suzukii*, is a new pest of soft-skinned fruit and tree fruit, including raspberries, blueberries, and blackberries in Kentucky. Female SWDs insert eggs into the ripening and ripe fruit. Once the larvae hatch, they eat the fruit from the inside. The larvae damage the fruit and consumers are intolerant of larvae in their berries. The objective of this research was to identify and quantify beneficial insects from blackberry plots and the borders of native perennial plants or pasture. Biologically based insecticide treatments used were Grandevo® and Entrust® which are listed by the Organic Materials Review Institute as treatments for organically grown blackberries. This research was conducted at Kentucky State University's Harold R. Benson Research and Demonstration Farm in Franklin County, Kentucky. Treatments consisted of Grandevo® foliar spray, soil spray, foliar and soil spray, Entrust® foliar spray and a water foliar spray, which served as the control. Grandevo® and Entrust® were sprayed every other week, for a total of three times. Five sticky traps were placed in each border row, pasture row and blackberry treatment to monitor the number of beneficial insects in each plot. The traps were collected and reset weekly. The sticky traps were then brought back to the laboratory for identification and enumeration. Beneficial insects captured included lady beetles, minute pirate bugs, big-eyed bugs, syrphid flies and lacewings. There were a greater number of minute pirate bugs in the blackberries bordered by native perennial plants than blackberries bordered by pasture.

30. William Lyons, Jeremy Sandifer (Mentor), Dr. Buddhi Gyawali (Mentor)

Kentucky State University

Developing A Low-Cost Arduino Weather Monitoring System

The purpose of this research was to develop a low-cost weather monitoring system that connects via Wi-Fi for data logging and visualizations for use by farmers and evaluate the reliability and validity of data collected. The developed system is a kit created by SwitchDoc Labs and includes a microprocessor based on the Arduino platform. The system uses Wi-Fi for data transmission at the cost of being a less portable unit. The system was tested during the spring and fall to determining season differences, recording temperature, precipitation, wind speed, wind direction and barometric pressure and displaying data every fifteen minutes on Weather Underground. The microprocessor was powered by a micro-usb power cord, also resulting in decreased mobility. The data collected was compared with the KY Mesonet and National Weather Service data, but no significance difference was found among these data.

31. Gabe Stone, Jeremy Sandifer (Mentor), Dr. Buddhi Gyawali (Mentor)

Kentucky State University

Honeybee Colony Collapse Disorder in the U.S.A

In the world we live in today, and for hundreds of years beforehand, mankind has relied on honeybees to perform plant pollination. Honeybee pollination plays a vital role in producing food for humans, animals, and various types of insects. Based on this understanding in terms of the honeybee's ability to perform pollination, it is very clear to fathom what our reality would be like there were suddenly no more bees. Essentially it would cause global starvation, economic disasters, and overall strife. It is frightening to realize that colony collapse disorder (the systematic breakdown /disappearance of bees), has been increased recently in many parts of the United States. This phenomenon involves the continuation of

bees dying off, and hives becoming barren. Multiple factors such as pesticides, disease, parasites, and extreme weather patterns are reported to be the major culprits for CCD. This study examines the spatial trend and pattern of CCD and its relationship with factors such as temperature, precipitation, pesticide use, and land cover change. Data related to honey bee population, pesticides, temperature, precipitation, and land use change were compiled from 1990 to 2016 and spatial analysis were conducted at the state and regional level. This study reveals that temperature, and precipitation are key contributors to CCD which has a spatial pattern of disorder. Climate and extreme weather change patterns have been found to have a direct effect on the survival, and sustainability of the honey bees especially in the southern United States.

32. Catherine Croft, Dr. George Antonious (Mentor)

Kentucky State University

Investigating the Impact of Sewage Sludge on Herbicide Residues in Runoff

Contaminated surface water has become a critical environmental problem. Soil erosion, nutrient runoff, loss of soil organic matter, and the impairment of environmental quality from sedimentation and pollution of natural waters by agrochemicals have stimulated interest in proper management of natural resources. Herbicides mobility from agricultural activities impact surface water quality. Studies at Kentucky State University (KSU) were conducted to investigate the effect of municipal sewage sludge on the persistence of the herbicide bensulide, also known as Prefare 4E in soil and runoff water following field application. The study was conducted in a randomized complete block design (RCBD) with three soil treatments replicated six times. The three soil treatments used were: sewage sludge (SS) only, sewage sludge mixed with yard waste (SS+YW) compost, and no-mulch (NM) bare soil. Prefare 4E was applied at 2 L of the formulated product (the recommended rate of application) which is equivalent to 2.7 kg active ingredient per acre. Results revealed that the half-life ($T_{1/2}$) values of bensulide residues in soil varied among the three soil treatments and averaged 44.3, 37.6, and 27.1 d in SS-YW mix, SS alone, and NM bare soil treatments, respectively. We concluded that The incorporation of SS+YW and SS to native agricultural soil could increase water seepage into the soil column, reducing runoff water volume down the soil slope and bensulide residues in runoff following natural rainfall events.

33. Alexius Shorter, Dr. George Antonious (Mentor)

Kentucky State University

Persistence of Permethrin and Cypermethrin Residues on Treated Vegetables: An Overview

A pyrethroid is an organic compound similar to the natural pyrethrins produced by the flowers of pyrethrums (*Chrysanthemum cinerariaefolium* and *C. coccineum*). Pyrethroids constitute the majority of commercial insecticides. The major agricultural pyrethroids at present are esters of 3-phenoxybenzyl alcohol or α -cyano-3-phenoxybenzyl alcohol used as a single isomer (deltamethrin) or as a mixture of four isomers (permethrin) or eight isomers (cypermethrin). Permethrin and cypermethrin are two insecticides commonly used in agricultural production in Kentucky and worldwide. They are very similar in chemical structure, but cypermethrin contains a cyanide (CN) group. It was found that the CN group affects the physical and chemical properties of the two compounds. We investigated differences in the persistence, vapor pressure and solubility in water that might affect their behavior under field conditions. A CN group at α - carbon of the 3-phenoxybenzyl-alcohol moiety enhanced the insecticidal activity roughly 3-6 fold compared to non-cyano pyrethroids. The solubility of permethrin in water is 5.5×10^{-3} mg/L at 20°C versus cypermethrin that is 4.0 \times 10 mg/L at 20°C. Permethrin was extracted from plants using hexane and cleaned-up using a 1.2 m \times 2 mm i. d. open glass chromatographic column packed with Florisil. The GC chromatograms revealed the presence of the two stereoisomers (cis- and trans-permethrin) at retention times of 26.0 and 26.6 minutes, that corresponds to half-lives ($T_{1/2}$) of 4.45 and 3.41 d, respectively. The electron impact mass spectrum of permethrin extracted from plant leaves and fruits indicated the molecular weight of 390 and molecular ions of m/z 183, 163, 127, 91, and 51, along

with other characteristic fragment ions. The results revealed that the trans-isomer was less persistent than the more stable cis-isomer.

34. Rhiannon Cecil, Caitlin Mullins, Dr. Tamara Sluss (Mentor)

Kentucky State University

Population Growth of *Pyrus calleryana* Cultivars and Impact on Native Tree Species on the Campus of Kentucky State University

Pyrus calleryana "Callery Pear" is an invasive ornamental plant species that hybridizes with other pear cultivars such as the "Aristocrat" and "Bradford". These trees are characterized by rapid growth and weak limbs. Hybrids of these cultivars have recently established on the campus of Kentucky State University. The study estimated the population size and growth rate of *P. calleryana* on the Kentucky State University Campus over two years and to compare community diversity and species richness of native trees in plots with *P. calleryana* and plots without the invasive species. Based on an initial survey from 2015, there were two *P. calleryana* and in 2017, 97 trees within a 1235 m² area were identified resulting in a growth rate of 48 per year. Native species richness was higher in plots without *P. calleryana* and were dominated by black walnut, hackberry, box elder, black cherry, and white locust. Soil moisture ranged from 10-51% and soil pH from 5.9-6.2 in the study plots. Four methods of removal will be implemented in each plot respectively with the fifth plot serving as the control. The four experimental removal methods are; pruning, pruning and fabric cover, shovel removal, and chemical treatment. The plants will be removed in late November. The plots will be reexamined in the spring to determine which removal method resulted in the greatest proliferation and diversity of native plant species, also the abundance of *P. calleryana* in the plots will be recorded to determine which removal method was the most efficient at preventing *P. calleryana* regrowth. Our study demonstrates the exponential growth and dispersal of these pear hybrids and their impact on native species.

35. Vanetta Graves, Dr. Kazi Javed (Mentor), Dr. Gail Brion (Mentor), Megan Combs (Mentor)

Kentucky State University

The Mobility of Nickel in Soil and the Efficacy of Sphagnum Peat Moss to Immobilize Nickel with Contaminated Soils

Soils contaminated with nickel are a major human health hazard as many food crops, including legumes, and leafy and root vegetables readily uptake nickel. Consequently, consumption of food and water high in nickel can lead to major health issues, including cancer. Current soil remediation methods include physical (relocation/replacement), chemical (leaching, fixation, electro-kinetic removal, vitrification), and biological (phytoremediation, microbial and animal) of contaminated soil, which can be expensive, hazardous, and time consuming, sometimes taking decades to be effective. In order to address these issues, Sphagnum Peat Moss (SPM) was selected as a test sorbent for metal absorption due to its extremely low cost (\$27-\$69 per metric ton), sustainability, and high Cation Exchange Capacity (CEC). In this study, soil samples, collected from three Texas Superfund sites, were tested for heavy metal content and leachability to determine metal mobility in soil. SPM was added to contaminated soil (10% and 20%) to determine how much metal could be absorbed. The results showed a mixture of 20% SPM to soil immobilized 11% more nickel than the soil alone, showing the addition for SPM to nickel contaminated soils is an effective nickel absorbent over a short period of time (12 hours). This study showed that application of SPM to contaminated soils limits nickel mobility and has potential field application in the environment.

36. Samuel Kessler, Dr. Waldemar Rossi (Mentor), Dr. Vikas Kumar (Mentor)

Kentucky State University

Utilization of Black Soldier Fly Larvae (*Hermetia illucens*) in Aquaculture Feed for Nile Tilapia (*Oreochromis niloticus*) and Bio-waste Recycling

This study sought to define the abilities of the Black Soldier Fly Larvae (*Hermetia illucens*) (BSFL) as nutritional aquafeed replacement for Nile Tilapia (*Oreochromis niloticus*) and utilize bioconversion of waste material. An eight-week feeding trial with Nile Tilapia was conducted in a recirculating aquaculture system (stock density $3.08 \pm 0.2 \text{ kg/m}^3$) utilizing BSFL reared on dried distiller's grains with solubles (DDGS), in isonitrogenous and isocaloric diets, consisting of replacement for fishmeal (FM), soybean meal (SBM), and oils. Three diets were formulated to contain 32% crude protein (CP) and 8% lipid, where the Control derived most of its CP and lipid from FM, SBM, fish oil (FO) and soybean oil (SBO). Test diet one (BSFLM) replaced all FM and most of the SBM in the Control with BSFL meal. Test diet two (BSFLM+O) was identical to BSFLM except for replacement of FO with BSFL oil (BSFLO). Analysis of results revealed in spite of apparently lower nutritional value than the Control, waste-reared BSFL-derived feedstuffs satisfy the diet of Nile Tilapia, as health-related blood parameters, specific growth rate, condition factor, and intestosomatic index of fish were unaffected. Furthering sustainable application, this study conducted a BSFL rearing trial which utilized varied-stage liquid biodigestate, collected after methane sequestration for energy production. Volumetric composition of the substrate consisted of 0.28-parts peat moss, 1-part hand-pressed DDGS, and 1-part varied liquid digestate. BSFL proximate nutrition was consistent with DDGS-reared BSFL used in Tilapia diets; qualifying bioconversion of biodigestate as a potential method in developing BSFL aquafeed for Nile Tilapia.

37. Justin Elswick, Dr. Lesia Lennex (Mentor), Dr. April Haight (Mentor)

Morehead State University

6th -12th Grades Engineering Project: Turbine Design

Developing enthusiasm and creativity to resolve world energy problems is a dilemma facing educators. How can educators bring the excitement of real-world issues into their classrooms? What kind of affordable equipment can they use? This project seeks to develop materials and means through which Middle and High School students can creatively engineer solutions to existent problems. What kind of turbine, in a gravity-fed system, would generate the most energy? Results from an engineering thought survey and turbine energy production are presented in this session.

38. Sami Case, Alexandria Cantrell, Aubrey Bennett, Katie Everman, Gregory Carter, Dr. Wesley White (Mentor), Dr. Ilsun White (Mentor)

Morehead State University

A potential animal model of drug vulnerability

Various methods predict whether an animal might be vulnerable to drug abuse. For example, rats that show high levels of exploration, that have a high initial response to a moderate dose of drug, or that show a highly sensitized response after repeated receipt of a drug, also tend to readily acquire and escalate drug use. Prior research using a small sample of rats showed large individual differences in the magnitude of acute withdrawal following amphetamine and morphine. Most animals had a substantial reduction in activity 13-24 hours following drug, whereas a smaller percentage of animals showed no evidence of acute withdrawal at all. Such "low withdrawal" animals could be vulnerable to rapidly acquiring and escalating drug intake, because they do not experience some of the major costs of drug receipt. The present research continued to assess whether the intensity of acute withdrawal from drug might be a predictor of drug-abuse vulnerability. Adult male Wistar rats were given a moderately-high dose of amphetamine at six-day intervals, for a total of six tests. Following amphetamine administration, animals were placed in individual open fields, and activity was monitored for the next 24 hours. Three days

after receiving an amphetamine administration, animals received a saline administration and again were monitored for 24 hours. Animals showed a range of deficits in activity 13-24 hours following amphetamine. Before or after these tests, animals were assessed for exploration of a novel context, for their initial response to a moderate dose of drug, and for sensitization following repeated amphetamine. Scores on these predictors of drug vulnerability were not correlated with acute withdrawal scores. If future research showed that the magnitude of acute withdrawal was correlated with readiness to self-administer drug, the acute withdrawal measure would be disclosed to have unique predictive value.

39. Joe Castle, Torianne Crouch, Dr. Katy Carlson (Mentor)

Morehead State University

Accents and Focus Particles Draw Attachment

There is growing evidence that pitch accents can affect syntactic attachment in ambiguous sentences (Schafer et al. 1996; Lee & Watson 2011; Carlson & Tyler 2015). One explanation is that the focus status of the accented word makes it important to the main sentence assertion and thus draws attachment (Schafer et al. 1996). Our experiment therefore tested whether other means of focusing words, such as the focus particle *only*, could also affect attachment.

In the experiment, 20 sentences (e.g., *Susie (only) learned that Bill (only) arrived # on Friday*) had the focus particle *only* before V1 (*learned*) or V2 (*arrived*); two further conditions also accented the verb with the particle. Participants (N=52) chose between paraphrases showing V1 or V2 attachment of the final adverbial phrase, *on Friday* (either Susie learned something on Friday or Bill arrived on Friday). *Only* on V1 led to over 60% V1 attachments; *only* on V2 led to 35% V1 attachments, a significant difference. Accents on either verb raised V1 attachments slightly. The non-significant effect of accent suggests that focus from one indicator makes another one redundant.

This research shows that in sentences not thought to be focus-sensitive, emphasis indicated by accent or particle position can have important consequences for syntactic structure, and therefore for meaning. This contributes to a broader project of understanding how prosodic factors like emphasis function in sentence processing.

40. Kelsey Purdum, Dr. Kimberlee Sharp (Mentor)

Morehead State University

Elementary Teachers' Experiences Using Informational Texts to Teach Social Studies in Eastern Kentucky

One component of the United States' public school curriculum core is social studies. Since the No Child Left Behind Act (2001), elementary social studies has been marginalized, and in some cases, eliminated from the school day in favor of increased time for literacy and mathematics instruction. Kentucky's adoption of the ELA Common Core standards in 2010 set in motion an opportunity to re-position social studies status in the elementary school day. This opportunity, referred to as *informational texts* in the Common Core standards, emphasizes reading and comprehension skills of nonfiction. Has the use of informational texts provided elementary teachers more opportunity to teach social studies content? Are elementary teachers consulting state and national standards for teaching social studies when utilizing informational texts; and, are elementary teachers assessing social studies content knowledge when teaching with informational texts? This study seeks to understand these questions and whether the ELA Common Core is the impetus teachers need in order to revitalize social studies instruction in the elementary grades. This presentation will report on the research design, population, methodology, and literature review as it pertains to Eastern Kentucky elementary teachers' experiences using informational texts to teach social studies.

41. Zachary Coots, Dr. Gary O'Dell (Mentor)

Morehead State University

Gunpowder Mill Explosions in the United States 1800-1865

The manufacture of gunpowder has been a significant industry in the United States from the post-Revolutionary period to the end of the nineteenth century, when traditional “black powder” was replaced by “smokeless” powder. The product being highly combustible and explosive, the occupation was an extremely dangerous one. Consultation of historic newspaper archives located more than 160 powder mill explosions that took place in the United States during the period 1800-1865. The information contained in these accounts has been analyzed to determine the causes, magnitudes, and socioeconomic impacts of these explosions and relate this to the technological evolution of the industry.

42. Elizabeth Von Mann, Dr. Kristina DuRocher (Mentor)

Morehead State University

Images of Feminism in the Twentieth Century

The protests and activism of women's liberation of the 1960s and 1970s became defining images for the modern feminist movement. An important factor in analyzing these events is examining the differences between what the protests were trying to demonstrate and how the media at the time chose to represent the movement. The media's representation of the 60s and 70s feminist movement was a key factor in how the country came to view feminism, and the effects of this propaganda can be seen in the post-feminism of the women's liberation movement. This research seeks to analyze the negative effects that media representation has on skewing the ideals and facts of modern feminism.

43. Cole Danzer, Dr. Andreas Loepke (Mentor), Dr. Steve Danzer (Mentor)

Morehead State University

Long-term fate-mapping to assess the impact of postnatal isoflurane exposure on granule cell pre- and post-synaptic terminal structure

Use of general anesthetics in children is necessary for the treatment of conditions that require surgical intervention. Studies in developing animals, however, demonstrate that clinically relevant anesthesia-treatments increase neuronal death and alter brain structure. Notably, neuron production during development follows a complex temporal sequence, such that at any given time the developing brain can contain fully mature neurons, immature neurons, and active neural progenitors. Recent work demonstrates that anesthetics selectively disrupt neurons of distinct ages. In the hippocampal dentate gyrus, two-week-old immature granule cells were found to be selectively vulnerable to anesthesia-induced cell death. Only about 10% of these cells succumbed to acute exposure to anesthesia, raising the possibility that the surviving cells might be “injured”, and integrate abnormally into the brain. To address this possibility, we used a transgenic mouse model fate-mapping approach to identify and label immature granule cells. Cells were exposed to isoflurane for 6 hours when they were two weeks old, and then their morphology examined two months later. Exposed granule cells exhibited normal positioning, spine density, and presynaptic structure, suggesting that anesthesia does not impair the integration of this specific age-cohort of cells. Nonetheless, while two-week-old cells were found to recover from anesthesia exposure, the results should not be extrapolated to other age-cohorts, which may respond differently.

44. Austin Wood, Dr. Michele Paise (Mentor)

Morehead State University

Movement in the Elementary General Music Classroom: Developmentally Appropriate Practice

Elementary music teachers use a variety of movement activities in the classroom. The common thought is that movement engages a student's brain more than the contemporary lecture. In this study I explored the assistance of kinesthetics by teaching a lesson with and without movement. The group not moving

will be the control group. I assessed each class with a microphone at the end of the lesson having them sing the tune by themselves. Lastly I took my recordings to an unbiased graduate student in my department and had them judge the accuracy of the recordings with a copy of the music.

45. Cassie Gibson, Dr. Lori Baruth (Mentor)

Morehead State University

Music as a Means of Healing: The Effects of Music Therapy Concepts With Regard to Elementary School Age Children and on Infants in the Neonatal Intensive Care Unit

Music therapy has been proven to help people in many capacities, from education to the medical field. This study will focus on the effects of music therapy concerning children in elementary school as well as infants in the Neonatal Intensive Care Unit. This project will research and describe what music therapy is and what it encompasses. It will then describe several forms of healing for children in elementary schools, such as coping skills for depression, anxiety, autism, as well as therapy for the specially abled child. Additionally, this project will report on research findings of the benefits that music therapy has in the medical field, more specifically, the NICU. This project is designed to raise awareness of how music provides healing to infants and children. With this study, we hope to provide evidence of music therapy as healing based on recent research, therefore presenting a strong argument as to why children need music in their lives.

46. Callie Arnold, Danielle Gibson, Kaylee Whitenack, Dr. Michael Fultz (Mentor)

Morehead State University

Redesign of a Cell Culture System to Investigate the Effects of Microgravity on Cytoskeletal Remodeling in Smooth Muscle

There are few studies that have examined the effect of microgravity on the cytoskeleton in smooth muscle. Although they conclude that the phenotype of smooth muscle may be gravity dependent, those that have been performed have utilized simulated microgravity. Therefore, the effect of microgravity on the cytoskeletal elements essential for force generation and maintenance in smooth muscle remains poorly understood. The effect of microgravity on the alpha-actin, beta-actin, and myosin components of the cytoskeleton in resting and contracting A7r5 smooth muscle cells is the primary research focus. Collaboration between the Department of Biology and Chemistry, SpaceTango (Lexington, KY), and the Craft Academy for Excellence in Science and Mathematics, has resulted in a redesign of a cell culture system that will allow for the culture, visualization, stimulation, and subsequent fixation of A7r5 cells aboard the International Space Station (ISS). Previous designs were limited by power availability prior to installation within TangoLab on the ISS. Upon return to Earth, components of the cytoskeleton will be examined by fluorescent microscopy to investigate if microgravity alters the characteristic remodeling observed on Earth.

47. Andrew Cooper, Cody Mitchell, Dr. Shahrokh Sani (Mentor)

Morehead State University

Sleep Apnea Screening

Recent studies reveal there is a strong correlation between sleep apnea and hypertension and cardiovascular disease. It is well known that Obstructive Sleep Apnea (OSA) increases the risk of atrial fibrillation and relates to congestive heart failure, and other vascular diseases. Traditionally, sleep apnea has been diagnosed via overnight polysomnography (PSG). PSG is inconvenient, expensive and limited access test, therefore, in many cases sleep apnea passes undiagnosed. The yearly financial cost of serious OSA in the United States is 65 to 165 billion dollars. Because overnight PSG is inconvenient, expensive, and limited clinical based service. There is a large interest in developing alternative methods of identifying OSA. In this regard, we have developed a simple system that provides an easy, reliable, inexpensive, and transportable approach to automate the diagnosis of sleep apnea. This allows the public to have

OSA tests at home using their smart phone without the need for attended overnight tests. The approach uses smartphone wearable technology (as a data acquisition platform for collecting electrocardiogram (ECG) signal) and machine learning classification as an analysis technique. We investigated new features of ECG signals which is alternated with Obstructive Sleep Apnea. The new cardiovascular variable was used as a new attribute in our comprehensive Obstructive Sleep Apnea prediction model to increase its accuracy to predict the class label of unknown patient records (sleep apnea vs non-sleep apnea).

48. Cade Ball, Dr. Sara Lindsey (Mentor)

Morehead State University

The Benefits of International Studies for American Education Students

In an era of ever-growing international communication, college students are presented with more choices regarding international education. While the sense of adventure may be reason enough to study abroad, there are certainly many more benefits of international experiences. Further, much can be learned from the educational systems of other countries.

The purpose of the research project was to tease out the differences in educational processes in successful systems across Europe to determine what factors might be playing into their success. These factors were then used to create a syllabus for an international course to be offered to American students interested in furthering their knowledge of education. The primary method for isolating differences was to analyze the results of TIMMS 2015, PISA 2015, and PIRLS 2011 in order to identify the top five countries. From there, the researchers pulled relevant, peer-reviewed literature from on-campus library sources to gather information about the systems, focusing on curriculum, teacher preparation, and school setup (length of school day, school year, recesses, age of enrollment, etc.). This information was entered into a spreadsheet and commonalities noted. Articles and websites from the departments of education of each country (Ireland, Finland, Norway, Belgium, Poland, and the Netherlands) were also examined. The results entered into the spreadsheet were then compared to the American educational system in order to ascertain which areas might be best for American students to examine in situ.

Notable commonalities that emerged, including the availability of choice in the European systems, were included in a syllabus designed by the researchers for a comparative education class to be offered to American students who wish to study abroad.

49. Cameron Arthur, Brooke Hall, Kaylee Whitenack, Dr. Connie Grimes (Mentor)

Morehead State University

The SpaceTrek App

The SpaceTrek Application is a mobile app for an all-girls space camp called SpaceTrek. This app will connect the girls to technology from their application to their testimonials years later. In the application phase the girls will be able to answer fun questions about themselves that their fellow campers will be able to see to get to know them better. This page will later be replaced with the testimonial page where the alumni will be able to keep up with each other after the camp. In addition to this, the app will allow for communication between the campers and the camp advisors through the linked social media. The social media connection will also enable the campers to post pictures of their favorite moments at SpaceTrek, which will act as advertisement for the camp. In the camp mentors speak almost every day. This inspired another feature of The SpaceTrek application which is the ability to store mentors' contact information. Our goal is to offer this app on both Google Play Store and The Apple App Store at the beginning of Summer 2018.

50. Austin Curnutte, Dr. Christina Conroy(Mentor)

Morehead State University

Violent Civil Disobedience

We argued that violence committed as an act of self-defense against structural violence can be justified, and further; that we should properly define this type of violence as a form of civil disobedience. Debate over the justification of violent political activism regained prominence in the popular discourse in recent years. The question became pertinent in the wake of political violence committed by factions of both far left and far right in a series of public demonstrations. Commentators from across the political spectrum held that nonviolent political activism is both morally and tactically superior. However, not all violence is morally equal. We found that there was an important distinction to be made between the violence committed via the normal functioning of social, political, and economic institutions, or structural violence, and the violence committed as an act of self-defense against it. We concluded that in the process of defending against structural violence, the use of violence against both people and property is sometimes both necessary, and justified.

51. Alyssa Farmer, Dr. Madhura Kulkarni (Mentor), Dr. Patricia Bills (Mentor), Dr. Joseph Nolan (Mentor)

Northern Kentucky University

Analyzing the Effects of NGSS-Aligned Professional Development Sessions on Elementary Teaching Methods

Elementary teachers in Northern Kentucky school districts have been presented with and taken advantage of a unique professional development (PD) program in which they participate in live teaching demonstrations and reflection sessions that incorporate the Next Generation Science Standards (NGSS) and the practices associated with them. The effectiveness of the sessions has been evaluated based on the percent of time these learned practices were used in the classroom before and after participation in at least one session. Since 2014, teachers have had the opportunity to participate in the sessions several times and surveys were collected after sessions. The impact of the PD program on their teaching methods—as reported in the surveys—has been analyzed and summarized by and across each year of participation. Analysis techniques included repeated measures analysis of variance (RM-ANOVA) with Tukey-adjusted multiple comparisons to evaluate change in percent across sessions, with the results from a participant’s first session serving as a baseline. For both early elementary and later elementary grades, teachers reported statistically significant increases in their implementation of the practices, especially after participation in the first session. These results contribute to the elementary science teaching community, identifying areas worth exploring as elementary teachers take up new ideas in science teaching.

52. Parker Kain, Dr. Qi Li (Mentor)

Northern Kentucky University

Using Cloud Computing to Assess Healthcare Professionals

Traditionally, the assessment of healthcare professionals relies on surveillance data, which is both intensive in terms of human labor, and difficult to collect. In this research, we pushed to develop a method to rank and compare physicians based on social media analytics. Rather than forcing patients to rate healthcare professionals after hospital visits, this research pushes to develop a method to rank and compare physicians based on social media analytics. Twitter continues to grow as a Social Media platform, and with it the field of data analytics pushes to analyze and connect this data into meaningful patterns. Traditionally one of the barriers to this type of analyze is the lack of computing resources to process the continuously coming data and handle the large scale analysis. Therefore, in this research, we used cloud computing such as Amazon Web Services to address this issue. Python was leveraged using the Tweepy library to pull tweets and twitter account information from Cincinnati area twitter users, and natural language processing was used on these account details to determine if the users were healthcare profes-

sionals using natural language processing libraries like NLTK. Network analysis was performed on a single confirmed professional to find additional potential physician accounts until a suitable base was gathered. This information was then pushed to Amazon Web Services for cloud storage, where it then could be analyzed further using a python server. From here, more Natural Language Processing was done to determine the defining features of a successful physician, and whether or not social media data has a correlation with other healthcare ranking sites. Based on this research, we have found that social media paired with cloud computing can be used to analyze physician performance. Cloud computing environment like Amazon AWS can support social media analysis.

53. Dustin Cox, Dr. Jian Du-Caines (Mentor)

University of Louisville

Atmospheric tides in determining the mean state of the Ionosphere-Thermosphere system

The Thermospheric Ionospheric Electrodynamics General Circulation Model from the National Center for Atmospheric Research was used to evaluate tidal effects on the Ionosphere-Thermosphere system by turning the tides on and off. This contributed to our understanding of the role that atmospheric tides play in the dynamic system of the Earth's atmosphere, especially in the upper atmospheric frontier. The results obtained for the mean state parameters showed varied correlation with atmospheric tides. This demonstrated that while atmospheric tides play a major role in atmospheric dynamics, they are not the sole participant.

54. Logan Riney, Dr. Artem Rudenko (Mentor), Dr. Daniel Rolles (Mentor)

University of Louisville

Coulomb Explosion Imaging of Molecular Fragmentation in Femtosecond Pump-Probe Experiment

The Coulomb Explosion Imaging technique is used to study cis- and trans-dichloroethene molecules in the gas phase. The molecules are photo-ionized by 790nm, 25fs near-infrared laser pulses, and the resulting fragments are measured by coincident ion momentum imaging. The experimental data is then compared to numerical simulations of the Coulomb Explosion process carried out by utilizing the 8th order Runge-Kutta Method. This method is used to calculate the kinetic energy released after the molecule has been photo-ionized.

55. Caroline Christian, Dr. Cheri Levinson (Mentor)

University of Louisville

Effectiveness of Online Imaginal Exposure Therapy for the Treatment of Eating Disorders

Eating disorders (ED) are serious mental illnesses with high mortality, impairment, and societal costs. Despite the high societal burden, there are very few empirically supported treatments for ED. Cognitive-behavioral therapy has the best success rate for ED treatment, but even in this therapy, relapse rates are reported to be as high as 60%. Novel treatments are urgently needed. This study adapted imaginal exposure (IE) therapy, which is commonly used as treatment for posttraumatic stress disorder (PTSD), to treat EDs. Participants ($N=35$) were recruited from ED treatment facilities across the United States. All participants met diagnostic criteria for current or past ED. Participants completed four online IE therapy sessions, during which they were asked to write about and imagine an ED-maintaining fear, as well as document their level of anxiety across therapy sessions. Participants filled out questionnaires before the first IE session, as well as one month after the final session. Participants exhibited a significant decrease in anxiety over the course of the four exposures, with additional decrease in anxiety at the one-month follow-up ($f(4)=10.64, p=0.004, \eta^2=0.35$). Participants also had significant decrease in food avoidance behaviors ($t(33)=2.14, p>4.48$) and shape concerns ($t(33)=2.20, p>4.479$). Weight concerns ($t(76)>5.2^2, p=.069$) and eating concerns ($t(33)=2.009, p=.053$) approached significance. These results suggest that online IE therapy has the potential to reduce anxiety, cognitive distortions, and avoidance behaviors in

individuals with ED. This type of therapy may be used in conjunction with existing treatments to address high anxiety and irrational ED cognitions and has the potential to reduce the high societal burden associated with EDs.

56. Brianna Mills, Sebastian Heinz (Mentor), Lia Corrales (Mentor), Gerard Williger (Mentor)
University of Louisville

Looking for Dust-Scattering Light Echoes

Galactic X-ray transient sources such as neutron stars or black holes sometimes undergo an outburst in X-rays. Ring structures have been observed around three such sources, produced by the X-ray light being scattered by dust grains between us and the neutron star. These dust-scattering light echoes have proven to be a useful tool for measuring and constraining distances in our Milky Way galaxy, mapping its dust structure, and determining the dust make-up in the clouds producing the scattering echo. Detectable light echoes require a sufficient quantity of dust along our line of sight, as well as bright, short-lived X-ray flares. Using data from the Monitor of All-Sky X-ray Image (MAXI) aboard the International Space Station, we ran a peak finding algorithm in Python to look for characteristic flare events. Each flare was characterized by its fluence, the integrated flux of the flare over time. We measured the distribution of flare fluences to show how many observably bright flares were recorded by MAXI. This work provides a parent set for dust echo searches in archival X-ray data and will inform observing strategies with current and future X-ray telescope missions such as Athena and Lynx. The more echoes we can detect, the better we can understand the Galaxy we live in.

57. Samir Kusmic, Dr. Benne Holwerda (Mentor)
University of Louisville

Measuring the Sizes & Shapes of Galaxies

We use software to get galaxy morphometrics, so we can go into further study. However, in the coming decade, new surveys are expected to increase galaxy count one thousand fold, and we will be lagging behind in computation. Therefore, we looked into software alternatives than what we use now to see how quick, precise, and accurate the parameters we get. We looked into a software called Source Extractor and compared its computations to GALFIT and then correlate with spectroscopic redshift. Source Extractor ran for 8-10 hours, substantially quicker than GALFIT, but it not precise as GALFIT. It does, however, show trends that agree with current understanding, and the models used in Source Extractor can be used to discern morphology of galaxies. Overall, Source Extractor would be good for a quick first look.

58. Obiamarajie Igwe, Dr. Nino Muradashvili (Mentor)
University of Louisville

Neuronal Degeneration and Short-term Memory Impairment after TBI

Traumatic brain injury (TBI) was associated with impaired short-term memory with causes of vehicle accidents and falls. Protein plaques containing fibrinogen (Fg), are associated with memory loss. After TBI, Fg in blood was higher than normal ($> \sim 2$ mg/ml), which resulted in increased Fg in extravascular space. Therefore, Fg bonded to its endothelial receptor intercellular adhesion molecule-1 (ICAM-1). Fg then interacted with cellular prion protein (PrPC), which had a strong effect on the loss of memory and cognition. Mechanisms of Fg and PrPC complex formation and its functional implication are not known. This present study tested the level of Fg-PrPC complex formation, neuronal degeneration and the short-term memory after mild TBI and severe TBI. We hypothesized that after a mild to moderate injury, there was an enhanced deposition of Fg & Fg-PrPC complex formation that led to reduction in short-term memory, while severe trauma caused exacerbation of these effects and greater neuronal degeneration. We used C57BL/6J wild type (WT) mice models. TBI was made by using a TBI 0310 (Precision Systems and Instrumentation device with a 2mm diameter flat tip). Impactor settings were 3.5 m/sec velocity, 500msec stimulation duration with 0.5mm depth for mild-to-moderate TBI and 2mm depth severe TBI.

Expressions of Fg, ICAM-1, PrP^c and neuronal degeneration were seen using immunohistochemistry and confocal microscopy. Observed effects of Short-term memory post TBI were tested by Novel Object Recognition Test Two Trial Recognition Test & Spontaneous Alternation Test. Results showed with TBI-induced inflammation and Fg to endothelial ICAM-1 interaction, deposition of Fg in extravascular space increased; resulting in enhanced Fg-PrPC complex formation. There also was an increase in neuronal degeneration & reduction in short-term memory, involved with the upregulation of TrkB. To conclude, it might not be unexpected that these effects were exacerbated after a severe brain injury.

59. Lloyd Bartley, Dr. Michael Perlin (Mentor)

University of Louisville

Role of mating loci and ammonium transporter expression in stressor sensitivity of haploid cells of *Ustilago maydis* and levels of pathogenicity

Ustilago maydis is a biotrophic pathogen of maize. In order to cause disease in the host, the fungus must undergo a dimorphic switch from yeast-like, budding state to a filamentous state that allows for plant penetration and propagation of the infection. Different environmental cues can induce filamentous growth and some, specifically low nitrogen availability, are essential for mating to occur in nature. In haploid wild type strains of *U. maydis*, low nitrogen availability also results in a non-infectious filamentous growth response. Mating is governed by the coordinated expression of genes from the mating loci in *U. maydis*, the a locus and the b locus. The b locus in particular must play an additional role in haploid cells, as deletion of the locus prevents filamentation due to low nitrogen limitation. Previous work found that the *U. maydis* genome encodes two ammonium transporters (AMTs), Ump1 and Ump2. While deletion of Ump1 does not produce an observable phenotype, deletion of Ump2 in haploids results in the loss of filamentous growth as a response to low nitrogen, similar to what is observed with deletion of the b locus. Overexpression of the high affinity ammonium transporter, Ump2, results in filamentation under non-inducing conditions and can rescue the filamentation defect of the b locus deletion mutant. Preliminary experiments in the lab suggest that the different mutants just mentioned have different susceptibilities to different abiotic stressors. In light of the discovery, we hypothesized that mutations in the b locus specifically might govern this differential stress tolerance; we tested this hypothesis with several stressors. Finally, we examined the role if any, of different b mutants in pathogenicity.

60. Nicholas Duong, Dr. Michael Busch (Mentor), Dr. Gerard Williger (Mentor)

University of Louisville

Shape Modeling and Boulder Mapping of Asteroid 1992 UY4

The structure and history of near-Earth asteroids are important to study because they collide with Earth, sometimes with significant consequences for climate and the survival of many species, including our own. If NASA is ever to deflect an asteroid on a collision course, it is crucial to know as much as possible about its size, composition, structure and boulder distribution. The boulder distribution in turn helps to map the asteroid's gravitational field. 1992 UY4 is a near-Earth asteroid discovered in 1992. In August 2005, UY4 made a "close" (for space) pass of Earth, about 15x farther than the Moon. It is the only chance to study the asteroid until its next pass near Earth in several hundred years. It was observed using the Arecibo Radio Observatory and a NASA tracking telescope in Goldstone, California. We used specialized software for radar analysis of asteroids, SHAPE, to study the asteroid's detailed form, boulder distribution and pole orientation. We would like to determine whether boulders are uniformly distributed across UY4's surface or not. To do this, SHAPE takes a series of parameters and generates synthetic delay-Doppler radar images and compares them with the data from the observations. After producing models of 1992 UY4's overall shape for each candidate pole direction, we mapped boulders/blocks in the radar images. In a preliminary analysis, most of the boulder candidates have ambiguous locations on UY4's surface -- they may be either north or south of the asteroid's equator. However, their locations in longitude are unambiguous. So far, there is no indication of an inhomogeneous distribution

of boulders in longitude. We continue to refine the models to explore the asteroid's characteristics in further detail.

61. Gabby Oropilla, Dr Leah Siskind (Mentor), Cierra Sharp (Mentor), Mark Doll (Mentor)
University of Louisville

Strain Differences in Susceptibility to Cisplatin-Induced Renal Fibrosis

Cisplatin is a potent chemotherapeutic; the dose-limiting side effect of this drug is nephrotoxicity, causing acute kidney injury in 30% of patients. This can lead to end stage renal diseases, particularly chronic kidney disease (CKD), which is marked by the development of fibrosis. Currently, there are no therapeutic interventions, which may be due to limitations in the mouse model used to study cisplatin-induced kidney injury. We have previously developed a repeated dosing regimen of cisplatin (mice treated with 7 mg/kg once a week for 4 weeks, mice euthanized at Day 24) in which FVB/n background mice survive and develop renal fibrosis indicative of CKD. Commonly, C57BL/6J background mice are utilized to study the nephrotoxic effects of cisplatin on the kidney; however, C57BL/6J mice have been shown to be resistant to renal fibrosis in some models of experimental fibrosis. We wanted to determine if this resistance would also be evident with our repeated dosing regimen of cisplatin. Preliminary data have indicated that while FVB/n mice develop fibrosis when treated with 7 mg/kg of cisplatin, C57BL/6J mice do not. We hypothesized that C57BL/6J mice would require a higher dose of cisplatin in order to develop interstitial fibrosis that occurs with our repeated dosing of cisplatin. Several techniques were utilized including QRT-PCR, IHC, and Western blot analysis to determine the presence of fibrosis in these mice and to compare fibrotic and inflammatory markers to FVB/n mice treated with cisplatin. C57BL/6J mice only developed fibrosis when treated with 9 mg/kg cisplatin, which coincided with a robust inflammatory response. In contrast, FVB/n mice developed fibrosis and had a robust inflammatory response with only 7 mg/kg cisplatin. These data suggest that C57BL/6J mice are susceptible to the development of renal fibrosis with our repeated dosing model of cisplatin but only when treated with a higher dose.

62. Karen Udoh, Dr. Sham Kakar (Mentor)
University of Louisville

Targeting Cancer Stem Cells in Recurrent Lung Cancer

Lung cancer is the leading cause of cancer mortality in the world. Five-year survivability still remains dismal due to drug resistance. The development of drug resistance with cisplatin or platinum/taxane combination chemotherapies has led patients to suffer from recurrent lung cancer. These chemotherapy treatments target cancer cells but leave behind cancer stem cells. Cancer stem cells (CSCs) are stem-like tumor cells that have the potential to differentiate, self-renew, and proliferate. This allows the cancer to relapse even after initial elimination of the tumor. We hypothesize that Verrucarin J will inhibit cell proliferation in lung cancer cells and CSCs by inducing apoptosis, targeting Wnt1 signaling pathway and reducing the expression levels of key stem cell markers and genes. To determine the effect of Verrucarin J, a MTT Assay was conducted to measure the cell proliferation rate and cell viability in the treated cells. This will then be used to define the IC₅₀ of Verrucarin J. An apoptosis assay was performed to see if the compound induces cell death. To examine the relative levels of key markers found in cancer stem cells, such as ALDH1, Notch1, Hey 1, CD 133, Oct 4, B-catenin, Wnt1, TCF-4, and LGR5, RNA were amplified from the treated cells followed by real-time PCR. To establish a possible mechanism at which Verrucarin J was targeting the lung cancer cells, a GSK3 inhibitor (CHIR99021) was used to treat the A549 cells to affect the Wnt pathway. Results showed that Verrucarin J reduced cell viability in A549 and H1793 cells, decreased gene expression of key CSCs markers in a dose dependent manner and induced apoptosis in treated cells. From the PCR results of GSK3 inhibited cells, there was an increased levels of the Wnt

pathway genes. This lead to a potential application of Verrucarin J as a therapeutic agent.

63. David Kline, Dr. Sachin Handa (Mentor), Justin Smith (Mentor)

University of Louisville

Tunable Copper Complexes for Sustainable Photocatalysis

Photoredox catalysis has direct applications in sustainable chemistry and thus an immense impact on our environment. With the ability to harness energy directly from the sun to catalyze useful chemical reactions, photocatalysts can help to eliminate the need for harsh reaction conditions and reduce generation of hazardous chemical waste. Photocatalysts based on Earth-abundant metals such as copper have recently emerged as sustainable alternatives to rare-earth metals including iridium and ruthenium, which are no longer required for many photocatalyzed chemical transformations.

64. Ashley Gilliam, Dr. Ashley Stinnett (Mentor)

Western Kentucky University

A Comparative Study of How White-Identifying Populations View Muslims in the US and UK

In recent years, Western society has been concerned with a number of complex, interwoven concepts and events, such as immigration, assimilation, and terrorism. As a result, populist movements have pervaded and catalyzed Western countries' reactions. The United Kingdom (UK) and the United States (US) are central to this larger discussion. For example, the UK recently finalized 'Brexit,' the decision to leave the European Union, and the US has implemented new travel restriction policies, targeting some countries with Islam as a majority religion. Given these events and the current debates surrounding multiculturalism, my larger research question addressed how majority populations view minority groups. While several studies have illustrated how Muslims in the West form their own identities, there is little research on how Muslims are perceived as a group by majority non-Muslim populations. Therefore, this comparative research project contributes to an understanding of white-identifying populations' perceptions of Muslims in the UK and US, using qualitative and quantitative ethnographic methodologies. Methods utilized included free lists, card sorts, and semi-structured interviews. Free listing consisted of asking participants to write down all lexical items they could recall within a delineated category. Card sorting consisted of participants organizing a set of twenty-two photographic cards of individuals of various ethnicities, religious and non-religious attire into delineated categories. Semi-structured interviewing consisted of open-ended questions within the topic area. The data for this research was collected in the UK and US during 2016-2017, and was supported by an international Faculty-Undergraduate Student Engagement (FUSE) grant, Diversity Abroad Grant (DAG), World Topper scholarship, and Honors Travel Abroad Grant through Western Kentucky University. The initial results suggest there are unconscious biases regarding Muslim populations in both countries, but there are similarities and differences in how they manifest and in what cultural attitudes or practices contribute to them.

65. Austin Gabhart, Dr. Mikhail Khenner (Mentor)

Western Kentucky University

A Perturbation Method for Determination of an Approximate Analytical Solution of a Nonlinear System of ODEs

We considered the steady-state (time-independent) solutions of a system of two nonlinear diffusion-type PDEs that model concentrations of carbon atoms and dimers in the course of a growth of two graphene islands on copper by the chemical vapor deposition. Wolfram Mathematica was used to find the

approximate solutions for various parameters sets by implementing a perturbation method; next, the full system was solved numerically and the solutions were compared. We found that the maximum values of the concentrations were not always midway between the two islands. We also found that for certain parameters the solutions would concentrate around one value, and on Cu[100] surface the first and second order perturbative solutions for the atom concentration are equivalent.

66. Wendy Cecil, Dr. Cathleen Webb (Mentor)

Western Kentucky University

A Study of Mercury in Bald Eagle Feathers and Quills

Methylmercury is a naturally occurring and toxic form of mercury which may biomagnify through the food chain and bioaccumulate in individuals. This study examined a full body loading and mercury analysis completed for 33 feathers including tail feathers, primary feathers and breast feathers within a single, individual bald eagle (*Haliaeetus leucocephalus*). Mercury analysis was completed using an AMA 254 Mercury Thermal Analyzer for feather tissue and quill samples. Of all samples analyzed in this project, approximately 46% were quality assurance and quality control samples. Feathers are commonly analyzed for contaminants in avians. Quill analysis has not been reported in any of the related literature. This study is the first study to report analysis of feather quills for mercury in bald eagles or in any other avian species. An implicit assumption of the literature seems to be that the quills are of no significant interest because the mercury levels are low. This study reports elevated levels of mercury in both bald eagle feathers and quills. Feathers ranged in mercury concentration from 7.8 ± 1.6 ppm Hg to 30.4 ± 5.2 ppm Hg. Feather quills ranged from 8.0 ± 2.3 ppm Hg to 34.3 ± 10.9 ppm Hg. The average quill mercury concentration, 15.1 ppm Hg, is actually quite high and is, for individual feathers, correlated with the mercury levels in the vein portion of the feather. The discovery that feather quills contain measurable concentrations of mercury may revolutionize feather analysis and has the potential to expand opportunity for future research.

67. Carter Jackson, Kattie McFarland, Shahnaz Aly (Mentor)

Western Kentucky University

Adaptive Reuse: Is it Really Necessary?

The reuse of an old building for a purpose other than which it was intended has become popular among designers in recent years. This type of architecture—known as adaptive reuse—has fostered a belief that all things historic must be of significance and that just because something is old, it must be preserved. Our research contributes to the conversation surrounding adaptive reuse by questioning the perpetuated belief that old buildings must always be saved, specifically asking: if a building is incapable of providing for the needs of contemporary society, is it worth saving? We examine this issue by analyzing the new construction of a concert hall in Rochester, New York and the adaptive reuse of the historic Chattanooga Terminal Station in Chattanooga, Tennessee. The decisions to design an entirely new concert hall and to reuse a historic train station were each the result of careful analysis of historic structures in their communities and the cultural significance of the proposed project. Our research seeks to understand what specific elements of these respective projects necessitated the decision to pursue adaptive reuse or new construction. Among these considerations were overall cost, change in building regulations and codes, availability and instillation of new technology, and sustainability. Though we analyzed the technical aspects of these two approaches to design, the significance of our research lies in our examination of the ways in which architecture engages with a community as the stage society tells its story and how architecture, both new and old, can best operate within contemporary society. Throughout our research, we maintained that the best architecture, whether new or old, continually proves its

worth through its ability to interact with and enrich the lives of all people and their cultures.

68. Deeya Patel, Dr. Dylan Burnette (Mentor)

Western Kentucky University

Cellular Mechanisms Underlying Cardiotoxicities of Cancer Therapies

Dilated cardiomyopathy (DCM) is the most prevalent heart muscle disease, with a 50% survival rate within five years of diagnosis. In the progression of DCM, heart muscle cells, known as cardiomyocytes, elongate and weaken the ventricular walls of the heart. A number of DCM cases have been linked with cancer therapy treatment, with several studies observing the effect of these treatments on animal cardiomyocytes. We examined the impact of cancer therapies on human cardiomyocytes in vitro in order to glean an understanding of how the toxicity is expressed in humans. We treated human induced pluripotent stem cell cardiomyocytes (hiCM) with various inhibitory drugs, and, through phase-contrast and immunofluorescence microscopy, hiCM were quantified over time, revealing a strong correlation between high drug concentration and cell death. Our data suggests that cardiomyocytes may be dying from a necrotic death, due to the observed health and functionality of the cardiomyocytes until the moment of destruction.

69. Nikitha Rajendran, Dr. Rachel Tinius (Mentor)

Western Kentucky University

Correlation between maternal physical exercises during late pregnancy and infant motor development

The relationship between maternal physical activity during late pregnancy and infant motor development has not been studied. Here we hypothesize that women who were physically active during pregnancy will have newborns with higher motor skill development at 4 months of age. Physical activity during late pregnancy (32-39 weeks) was assessed using Actigraph Link devices. Wrist-worn tri-axel accelerometers are a valid measure of physical activity-based energy expenditure in pregnant women. Data were collected for seven consecutive days at 30 Hz. The accelerometer output was sampled by a 12-bit analog-to-digital converter. The percentage of time spent sedentary, as well as the amount of time spent participating in different categories of physical activity ranging from light and moderate were calculated using algorithms corresponding to the following activity counts: sedentary: 0 - 99 counts/min, light: 100 - 759 counts/min, lifestyle: 760 - 1951 counts/min, moderate: 1952-5724 counts/min. In addition, potential confounders (e.g. amount of time infant spends in different positions, number of siblings, daycare environment, etc.) were assessed via surveys. The maternal physical activity levels during pregnancy and the AIMS scores in infants at 4 months has positively correlated. These results provide evidence to encourage pregnant women to be physically active throughout pregnancy in order to improve the motor development and performance of their child. These findings suggest maternal exercise as an effective and resourceful approach to improve maternal and infant health- as motor performance early in life is linked to improvements in cognitive function in childhood. In the coming months, the infant motor development using the Alberta Infant Motor Scale (AIMS), a validated test to assess motor control in infants at 4 months of age, will be performed by trained physical therapists and physical educators.

70. Alexander Banaszak, Dr. Sanju Gupta (Mentor)

Western Kentucky University

Graphene-mediated Surface Enhanced Raman Spectroscopy and Detection of Biomolecules

In this work, we prepare graphene-mediated surface-enhanced Raman scattering (G-SERS) platforms comprising few-layer graphene nanosheets decorated gold nanoparticle for biomedical and biotechnology. Raman scattering is surface-sensitive and nondestructive inelastic light scattering vibrational spectroscopy technique. SERS, a specialized form of Raman spectroscopy, is useful for rapid and precise identification of small biomolecules and industrially relevant chemical dyes at ultralow concentration. This phenomenon is due to enhanced Raman signals by several orders of magnitude on the SERS-active surfaces. While the key point of SERS technology is the metal nanoparticles, which generates localized surface plasmon resonances in response to laser exposure and the resulting electromagnetic enhancement, controlling interparticle gap, the diameter of the metal nanoparticles and their ratio on graphene supports offer an advance toward sensitive G-SERS platforms via localized hybridization at graphene-metal interface. We have used low temperature thermal reduction technique to produce few-layer functionalized graphene supports and wet chemistry for size tunable gold nanoparticles as cost-effective facile synthesis approaches for G-SERS platforms. Simple and high-throughput arrays (so-called 'biochip') are developed by decorating graphene nanosheets with gold nanoparticles as well as sandwiching gold nanoparticle and few-layer graphene for cascaded signal amplification to differentiate nucleotide bases (adenine; A, thymine; T, cytosine; C, guanine; G) and to detect beta-carotene and malachite green chemical dye.

71. Margaret Cook, Dr. Yan Cao (Mentor)

Western Kentucky University

Influence of Arsenic on Lanthanide Bioaccumulation in *Nephrolepis exaltata* and Related Effects

Defined by their magnetic, phosphorescent, and catalytic properties, rare earth elements (REEs) are comprised of the fifteen lanthanide metals as well as Yttrium and Scandium. Many fields, like electronics, manufacturing, medical science, technology, renewable energy, and defense technologies have a strong dependence on REEs. Current methods of obtaining them are inefficient, expensive, and pollute the environment. Plants, however, have natural mechanisms of absorbing *certain* REEs. This study focused on the interactions between Arsenic and five REEs; Europium, Terbium, Neodymium, Gadolinium, and Yttrium, and how it affects uptake, biomass growth, and chlorophyll. The presence of Arsenic in the soil generally aided the uptake of the other metals. A possible explanation for this phenomenon involves the ligand receptor sites which regulate the transport of ions into and out of the plant's cells. *Nephrolepis exaltata*, the plant under study, is a known accumulator of Arsenic. Thus, the ligand receptor sites should be able to bind to Arsenic molecules, and when it opens the ion channel, the lanthanide molecules also have a chance to get through the membrane. A general trend was that the roots had higher amounts of metals than the leaves or shoots of the same concentration. This was likely due to the metals not being able to be translocated through the shoots and up to the leaves. Therefore, it explains there not being a significant effect on the health of the plant.

72. Zachary Thomas, Dr. Ali Er (Mentor)

Western Kentucky University

Laser-induced hydrogen generation from coal

This study presents a simple way of obtaining hydrogen gas from various ranks of coal, coke, and graphite using nanosecond laser pulses under different conditions such as water, air and argon atmosphere. Coal samples were initially characterized by scanning electron microscope (SEM), Fourier transform infrared (FTIR) spectroscopy, and calorimeter. It was observed that 532 nm laser pulses were more effective than 1064 nm pulses in gas generation and both were nonlinearly correlated with respect to the laser energy density. Gas chromatography measurements indicate that mainly hydrogen and carbon monoxide were generated. The hydrogen to carbon monoxide ratio shows that the highest efficiency rank was anthracite coal, with an average ratio of 1.4 due to its high fixed-carbon content and relatively high hydrocarbon amount. Graphite was used as a pure carbon source to study the possible reactions of gas yielded during the irradiation process. In addition, theoretical simulations using a standard finite difference method supported experimental observations. The possible mechanisms of gas generation were explained with chemical reactions. The amount of hydrogen production using laser pulses might be enough to power devices where relatively small amounts of hydrogen are needed.

73. Wren Jenkins, Daniela Zieba, Dr. Michael Galloway (Mentor), Dr. Jean-Luc Houle (Mentor), Dr. Guangming Xing (Mentor)

Western Kentucky University

ShovelWare: Providing an archaeological field research management system through a Function-as-a-Service cloud

ShovelWare is a project designed for an ongoing field research project analyzing the Bronze and Iron Ages of Mongolia. Accessible through a web interface and cross-platform mobile application, it is a replacement for pencil-and-paper data collection and excessive, error-ridden input into digital spreadsheets. In the Mongolia project, pottery, bronze tools, human bones, artifacts tied to burial mounds, monuments, deer stones, rock art, habitation sites, and agricultural animal bones benefit from instant digital recording. Information taking further evaluation includes carbon dating of horse teeth and analysis of carbon, strontium, and oxygen isotopes, however entry into the consolidated project database assists in expediting the process. Features include importation and exportation of existing Microsoft Excel spreadsheets. This enables ShovelWare to blend together data from previous field seasons and provide backups of data. Deploying ShovelWare on smart tablets allows for use of features such as automatic collection of metadata in the form of GPS coordinates and timestamps; additionally, it allows for access to a camera, microphone, and further features such as computational power and barometric sensors. The management structure hierarchically organizes specific Notebooks within broader Projects. Notebooks hold three forms of notes: Text, Audio, and Photo. Tagging photo notes instantly is superior over captioning photos of artifacts hours or days after recording.

Although ShovelWare emphasizes archaeology, the project structures can be used in any discipline. The mobile applications are designed for use in remote places with no internet connectivity, so databases between multiple tablets attempt to locally synchronize before synchronizing with the entire project post-field season. Data storage and project service hosting was accomplished through the use of various AWS services. Along with making internal data sharing amongst a project easier, ShovelWare allows archaeologists to share their findings globally.

74. Alex Henson, Dr. Sanju Gupta (Mentor)

Western Kentucky University

Synthesis and Extensive Characterization of Mesoporous Graphene-based Nanomaterials For Renewable Energy and Environmental Applications

Graphene-based nanomaterials including few-layer graphene oxide, reduced graphene oxide, three-dimensional scaffolds of graphene and graphene-carbon nanotube aerogels and their nitrogenated counterparts are synthesized using environmentally friendly methods. These nanomaterials are extensively characterized in terms of surface morphology and structure using electron microscopy, optical and vibrational techniques which provided microscopic structure and unprecedented physical properties useful for electrochemical energy storage and water desalination. Raman spectroscopy (RS) provided lattice dynamical structural characterization at nanoscale revealing collective atomic/molecular motions and localized vibrations. We analyzed Raman spectra in terms of prominent band position and intensity ratio that help to quantify microscopic stress/strain, structural disorder, number defect density, respectively. Photoluminescence excitation (room temperature luminescence with varying excitation wavelength) spectra revealed the electronic band structure such that distinct localized pi electrons were found in-between the band gap for the functionalized graphene. In addition, we have used advanced electrochemical microscopy technique to investigate dynamic physicochemical processes occurring at the surface of these exotic graphene-family nanomaterials and at the solid/liquid (electrode/electrolyte) interface. We discuss our experimental findings in terms of the multiple roles of oxygen and nitrogen functional groups and establish (micro)structure-property-activity relationship, relevant for alternative energy, catalysis, sensing and water treatment, to name a few.

75. John Nickell, Dr. Jean Snavely (Mentor), Dr. Kam Chan (Mentor)

Western Kentucky University

The Effect of Financial Literacy on Preventive Health Care Usage

With health care expenditures rising across the board, and financial literacy at a concerning rate for nations across the globe, it is only natural that we ask ourselves the question, "Could the two be related?" This study examines the impact of financial literacy on preventive health care participation using data taken from a survey of students at Western Kentucky University. This project argues that preventive health care is an investment in an individual's physical human capital, and financial literacy has a positive, significant impact on preventive health care. An individual with high financial literacy will recognize the economic value of their health and, therefore, will participate more in preventive health care. The results of our study support our conjecture that individuals who are financially literate also utilize preventive health care. These findings will help to carry out significant policy implications in health care and financial literacy education.

76. Lauren Cooper, Dr. Ali Er (Mentor)

Western Kentucky University

The Effects of Photo-Activated Graphene Quantum Dots on Bacterial Deactivation

With the growing levels of anti-bacterial resistant pathogens spreading in society, new forms of treatments and therapies are needed to effectively deactivate bacteria. A biocompatible photodynamic therapy agent that generates a high amount of singlet oxygen with high water dispersibility and high levels of luminescence is desirable to increase effectiveness of the therapies. In this work, a graphene-based bio-material was produced as a less-toxic alternative to other photosensitizing agents. Methylene blue was

used as a photosensitizer for comparison to evaluate the total effectiveness of the graphene in bacterial elimination. Graphene quantum dots (GQDs) were synthesized by irradiating benzene and nickel oxide mixture using nanosecond laser pulses. The productivity of GQDs was investigated by changing laser power density and wavelength with respect to time. Atomic force microscopy (AFM), Raman spectroscopy, transmission electron microscopes, and scanning electron microscopes were used for characterization of GQDs. Results show that GQDs with size less than 10 nm with excellent photoluminescence property were obtained. Initial results of deactivation of *E. coli* with methylene blue show 90% efficiency. The results of these studies can potentially be used to develop therapies for the eradication of pathogens in open wounds, burns, or skin cancers.

77. Vanessa Brown, Kristina Hapney, Tiffany Sexton, Dr. Joseph Evans (Mentor)

Western Kentucky University

The Use of Platelet-Rich Growth Factors in Dentistry

As dental treatment options are expanded, new techniques within the office setting are constantly being developed. Present treatment modalities can assist with the stimulation of tissue formation after dental surgical procedures leading to various results. The placement of Leukocyte Platelet Rich Fibrin (L-PRF) provides enhanced healing following specific dental procedures using the patient's donor tissue and therefore optimizes the final outcome. As a dental hygienist, it is important to be aware of alternative dental procedures implemented into treatment planning and to promote patient education, post treatment evaluation, and maintenance. Leukocyte Platelet Rich Fibrin (L-PRF) is an autologous graft that is obtained from the patient's blood. This provides a condensed network of fibrin that is saturated with cytokines, growth factors, and platelets. L-PRF speeds up the healing process and also reduces the need for bone grafts. It is capable of generating both soft tissue and bone and can be used in conjunction with a bone substitute or alone. One of the primary objectives as a dental hygienist is to educate patients and discuss all treatment options. In order to better benefit patients, it is necessary to be aware of viable treatment alternatives that could encourage a more favorable result. L-PRF is an advantageous technique that provides optimal results when used in conjunction with many dental procedures and is truly an asset to the dental profession. Using this technique may be advantageous for a cost effective procedure and yield enhanced results through the use of an individual's own tissue.

78. Skyler Hornback, Dr. Edwin Stevens (Mentor)

Western Kentucky University

Theoretical Calculation of the Electron Density Distribution of 1-Methyl-2-Mercaptoimidazole (MMI)

The thyroid gland is responsible for producing hormones that regulate both gene expression and metabolism. Hyperthyroidism, caused by above average levels of thyroid hormones, can lead to serious conditions such as cardiovascular disease, osteoporosis, or even infertility if left untreated. The most common treatment for hyperthyroidism, 1-methyl-2-mercaptoimidazole (MMI) works to block the synthesis of the thyroid hormone thyroxine (T₄) by inhibiting thyroid peroxidase (TPO), a key enzyme in the synthesis pathway. This study looked to facilitate further research on the mechanisms of action of MMI and other thiourea-based compounds by examining the molecular structure and electronic properties that are helpful in modeling enzyme-substrate docking experiments that simulate the drug's biological activity. The electronic structure of the MMI molecule has been determined using advanced quantum mechanical techniques and the computing facilities at WKU's High-Performance Computing Center. Quantum mechanical molecular wavefunctions, total energies, and electron density distributions of MMI have been calculated with large basis sets using three different theoretical approaches. Theoretical electron distributions were compared directly with a previous experimental determination of the electron density obtained from high-resolution, low-temperature single-crystal x-ray measurements. The theoretical

and experimental electron distributions show excellent agreement within the estimated uncertainties of the experiment except in the sulfur lone pair region, where less lone pair density is observed compared with the experiment. The topologies of the theoretical densities were analyzed using the Quantum Theory of Atoms in Molecules (QTAIM) formalism which identifies critical point features of the topology which are characteristic of the atomic properties and bonding network present in a molecule. The energies of the N-H...S and C-H...S hydrogen bonds were also determined from theoretical calculations on molecule pairs, and compared with approximate estimates obtained from values of the bond critical point parameters.

79. Savannah Martha, Dr. Jonathan Gore (Mentor)

Eastern Kentucky University

A Link between Time Perception and the Effectiveness of Meditation

Recent research suggests that meditation is a healthy way to cope with stress and anxiety, but it is also important to focus on how individual differences affect the productivity of those meditation practices. This study aims to find a link between time perception and the effectiveness of meditation. This study tests the hypothesis that future-oriented people will benefit from meditation the most. A sample of undergraduate students ($n = 228$), participated in a 10-minute meditation session and took an anxiety scale afterwards. The students then took an online survey to measure the degree of their past, present, and future time perceptions. The results of the study did not support the hypothesis. The post hoc analysis of this study, however, showed that gender moderates the association between time perception and post-meditation anxiety.

80. Ethan Sweet, Dr. Jonathan Malzone (Mentor)

Eastern Kentucky University

Assessing the Periodic Groundwater Flow Conditions of a Perched Aquifer System in the Daniel Boone National Forest

Natural ephemeral wetlands situated among the ridge-tops in the Daniel Boone National Forest serve as reservoirs that recharge a shallow groundwater system. Unique interactions between surface and groundwater in these isolated systems provide substantial support for the native ecosystem, serving as a breeding ground for amphibians and as source water for vegetation—especially in periods of drought. Currently it is not understood how groundwater could provide regional biodiversity, a drought buffer, or a crucial role in biogeochemical cycling. It was the goal of this research project to define the seasonal controls of groundwater levels within the aquifer system.

This was accomplished by: 1.) Monitoring groundwater and surface water in a representative wetland in the Daniel Boone National Forest, Kentucky. 2.) Quantifying the physical properties of the aquifer and groundwater evapotranspiration rate. 3.) Numerically modeling the groundwater recharge rate required to sustain groundwater levels by analytic element method.

Monitoring and aquifer tests were conducted in the summer of 2016 and 2017. All data gathered in the field was introduced into a computer model to simulate the groundwater processes. The results of our research indicate that groundwater stored within hill-slopes acts as a reserve for the surface water during the winter months and contributes further support for the ecosystem. In the dynamic transition from winter to summer months, vegetative water use intensifies during leaf-out (~ 0.002 - 0.005 m/d) and eventually overcomes the groundwater recharge rate (0.0017 - 0.003 m/d), which can completely desiccate the system. Periodic storm events inundate the wetland, recharging both the surface and groundwater. These sub-seasonal storm events maintain groundwater levels for up to 20 days, before vegetation depletes the stored water.

81. Kendall Collins, Aggie Williams, Dr. Lindsay Calderon (Mentor)

Eastern Kentucky University

Attenuating Breast Cancer Tumor growth mediated by dose dependent treatment of Pt-Mal-LHRH

In the United States one in eight women will be afflicted with breast cancer. Triple negative breast cancers account for 15% of these diagnoses and are significantly more aggressive than other subtypes, as well as, being difficult to treat. Current platinum drugs on the market, including cisplatin and carboplatin, have been shown to effectively improve patient prognosis, however, they cause numerous debilitating side effects. Subsequently, we have synthesized a new analog of carboplatin, "Platinum-Mal-LHRH", to selectively target breast cancer cells overexpressing the LHRH receptor. Initial *in-vitro* results showed that Platinum-Mal-LHRH has a higher potency towards 4T1 (stage IV) breast cancer cells compared to carboplatin. Cell viability was analyzed by an MTT assay, resulting in significant, ($p > 0.01$), reduction in viable cancer cells treated with Platinum-Mal-LHRH compared to carboplatin. Drug uptake was also evaluated by ICP-MS in which Platinum-Mal-LHRH displayed a 20-fold increase in cellular uptake compared to carboplatin. We also found that Platinum-Mal-LHRH selectively targets 4T1 breast cancer cells as there was a significant, ($p > 0.0001$), decrease in 4T1 cell viability compared to normal mammary cells. To verify increased apoptosis, flow cytometry was used to compare the cell death of 4T1 treated with Pt-Mal-LHRH versus those treated with carboplatin. In-vivo tumor assessment was conducted and there was a significant decrease in tumor growth with Pt-Mal-LHRH treatment. In turn, we did a dose dependent treatment of Pt-Mal-LHRH 5-40mg/kg/wk and found a significant decrease in tumor volume. Our data indicates that Platinum-LHRH is potentially a more potent and selective chemotherapeutic agent than other platinum based drugs currently on the market, such as carboplatin. Future directions include DNA analysis for adduct formation and quantification.

82. Sarah Parrett, Dr. Kelli Carmean (Mentor)

Eastern Kentucky University

Changes in Shaker Theology through Westward Expansion: An Analysis of Death Traditions

Through their expansion west into the American frontier, the religious group known as the Shakers experienced theological and cultural changes between their original New England communities and the newer established communities in the west. Two specific death traditions are examined as means to measure the changes in expressions of religiosity among two sites: Mount Lebanon, New York and Pleasant Hill, Kentucky. Higher amounts of change among religiosity represents the Shakers' culture becoming more "worldly" opposed to remaining traditional in their cultural theologies and practices.

83. Jessica Vaught, Dr. Lisa Day (Mentor), Dr. Socorro Zaragoza (Mentor)

Eastern Kentucky University

Chica Traducida: Subalternity and Cultural Erasure in the Translations of The House on Mango Street

In 1984, Sandra Cisneros published *The House on Mango Street*, a short story cycle that provides 88 vignettes taking place within the community on Mango Street, a Chicano-Puerto Rican barrio in Chicago. The book is often called a "coming-of-age" text, but each vignette tells a different person's experiences, with several recurrent characters, including Esperanza (the narrator), her family, and her neighbors on Mango Street. In the 1994 Spanish translation of the novel, translator Elena Poniatowska uses poetic license in one vignette of the novel in particular, completely changing the passage's message about sexuality and adolescence. By revising the passage in her translation, Poniatowska erases critical components of Chicana culture when Chicanas already both lack a prominent place in mainstream literary canon and struggle with liminality within their personal identities. While Cisneros claims her own subjectivity as a Chicana writer in writing vignettes through which her characters can also achieve subjectivity, Poniatowska erases Cisneros' effort to create space and exercise agency by co-opting the text through

her own poetic license in the translation process.

84. Elizabeth Newkirk, Dr. Tanea Reed (Mentor)

Eastern Kentucky University

Differential Expression of Oxidized Proteins in Moderate TBI

Traumatic brain injuries (TBI) are the result of injuries to the brain that lead to primary and secondary injuries. Primary injuries include the initial force causing damage to the brain and secondary injuries consist of chemical cascades as a result of primary injury. Secondary injuries produce reactive oxygen species ultimately causing oxidative damage in the brain. Protein carbonyls are an indicator of oxidative damage and are used to measure the level of oxidative damage and efficacy of treatment. Gamma-glutamylcysteine ethyl ester (GCEE), a moiety of gamma-glutamylcysteine, can upregulate glutathione in the brain and reduce protein carbonyl levels. Glutathione has shown to be a strong antioxidant that can reduce oxidative stress in the brain. Oxidative stress is created through the imbalance of reactive oxygen species and antioxidants resulting in damaged brain tissue. The purpose of this study was to determine if GCEE is a suitable treatment in reducing oxidative damage caused by TBI. GCEE was administered sixty minutes post-injury to determine if brain damage was reduced at this time point. A proteomic approach was used to investigate specific proteins that underwent differential expression in tissue samples, while slot blot analyzed the levels of protein carbonyls. Results using these techniques demonstrated significant differences between control and saline treatments with promising results from GCEE treatment. Annually, there are 10 million cases of TBI in the world with no cure or successful treatment to prevent or reverse subsequent secondary damage. Results from this project could lead to more effective treatments for traumatic brain injury.

85. Catelynn Helm, Devan Robinson, Dr. Christopher Hughes (Mentor)

Eastern Kentucky University

Finding Maars on Mars

We are collecting data to provide evidence for groundwater beneath the surface of Mars. Liquid water would mean that conditions on Mars were potentially once conducive to life. Recent developments have showed there may be water on Mars, whether at the planet's poles or below the surface. Further evidence could constrain where and in what amount groundwater existed on Mars, and would be a significant breakthrough for planetary science. Maars are craters formed from volcanic explosions which occur when groundwater comes into contact with hot lava or magma. Maars on Mars would provide evidence for water in the past. This breakthrough could even raise the chances of finding extraterrestrial life. We use a program called JMars to display satellite data on which we trace depressions, and record the locations that we mark. In the region of Xanthe Terra, we mapped depressions ≥ 1 km in assigned 1° squares. We mapped depressions caused by craters, collapsed ice features, smaller "secondary" craters caused by debris from larger craters, or even volcanoes – particularly maars. Our current focus is on the Arena Colles region. Our criteria for this region includes mapping surface features such as depressions ≥ 0.25 km in size, beginning in a 10° square at $85^\circ\text{E } 30^\circ\text{N}$ and working southeast. We trace the depressions that fit our criteria on satellite data with a pixel size of ~ 5 m. Once collected, we input the data into a spreadsheet to analyze our results. The initial results from our research show many craters in the Xanthe Terra region on Mars, some of which may indicate volcanic activity in the past. This will provide us with a reasonable possibility that we may find maars, which would greatly progress our search for groundwater at or below the surface of Mars.

86. Mary Gray, Dr. Michael Bradley (Mentor)

Eastern Kentucky University

Improving Non-consumptive Tourism in Kentucky

Kentucky has the benefit of offering a robust array of natural resources for recreation and tourism. Sustainable, non-consumptive, tourism such as outdoor photography and hiking allows economic impacts to thrive while conserving the valuable natural resources. The researcher facilitated a comparative analysis of states with substantial non-consumptive natural resource tourism, relative to Kentucky. Other states involved in the comparative study include Alaska, Texas, and Washington. The researcher gathered information on states in many different geographic areas of the country to further improve the range of the study. Kentucky has many opportunities to improve tourism while conserving its natural resources. Marketing to new audiences and access to diverse populations are two areas where Kentucky natural resource tourism has much room for improvement. Due to the diverse wildlife of the state, there is a wide variety of natural attractions and opportunities to potentially bring in tourists of all interests. A multitude of plant and animal life, as well as copious cave systems, rivers, and the Appalachian Mountains invite outdoorsman of all nature. The many neighboring states surrounding Kentucky provide easy access to those wishing to visit. All of these factors provide an ideal situation for non-consumptive natural resource tourism in the commonwealth. Ideally, Kentucky would be able to bring in more tourists, improving its economic gain, while allowing its wildlife to be appreciated and protected. Economic growth brought by recreation and tourism can in turn be used to further improve and expand its natural areas available for tourist use. Using the information gathered from other states and their natural resource tourism marketing plans, Kentucky can improve its own and expand the overall tourist experience.

87. Angel Shelton, Dr. Christopher Hughes (Mentor)

Eastern Kentucky University

Looking at Xanthe Terra, Mars: Structural History by Mapping Linear Features using CTX Imagery

The structural geology of Xanthe Terra, Mars is unique due to its proximity to different features. It is located on the Martian Dichotomy, the boundary between the Northern "Lowlands" and Southern "Highlands" with an elevation difference of 1-3km. This allows for study of both hemispheres. Xanthe Terra is also located North of the equator near Valles Marineris, a large canyon that runs along the equator. The presence of this canyon indicates a history of structural change. By studying structural features within Xanthe Terra, and the possible effects of the structural change from the surrounding areas, we have produced a better understanding of geology in this area.

We used the program JMars to map linear features within a small area of Xanthe Terra using Context Camera (CTX) imagery collected by NASA's Mars Reconnaissance Orbiter. CTX imagery has a high spatial resolution, and covers a large area of Mars. CTX imagery allows for mapping of smaller structural features and provides detailed images of features for identification. Data were collected for each linear feature, including various attributes such as length and the base CTX image. The features were then attributed a stress type (compressional or extensional). Based on the stress type and imagery the linear features were then identified by type of deformation. We used Rose Diagrams to get a view of the stress field's orientation within the area. The 400+ Linear features mapped and identified show the presence of features caused by both extensional and compressional stress.

Xanthe Terra has a rich structural history. Its unique location has given insight to the structural history of the surrounding areas, and of Mars itself. This contributes to our overall understand of the geology of Mars.

88. Skyler Worley, Dr. Michelle Gerken (Mentor)

Eastern Kentucky University

Promoting Therapeutic Recreation Services in Child and Adolescent Mental Health Programs

Today, “an estimated 13% of children and adolescents, aged 8–15 experience severe mental health disorders at some point in their life” (Nami.org). In most states, there is an outpatient day program called Child and Adolescent Mental Health Services (CAMHS) where mental health specialist care and treat for different types of mental disorders among the clients of their region. The purpose of this research is to promote therapeutic recreation services into the outpatient program. Certified Therapeutic Recreation Specialist use specific interventions to help cope with specific mental health behaviors and actions while a mental health specialist only focuses on the treatment of the disorder.

“The goals and objectives of recreation therapy center on resiliency (and associated protective factors), self-reliance, competency, independence, problem-solving/decision-making skills, communication, self-esteem, and self-efficacy. Therapeutic recreation activities have long been suggested to address the needs of youth with a variety of mental disorders with particular focuses on emotional and behavioral disorders” (Skalko, Williams, & Cooper, 2008).

89. Mark Hopkins, Dr. Geela Spira (Mentor)

Eastern Kentucky University

The Application of an Occupation-Based Model for understanding local lifestyles: A comparison of Senegal, West Africa & Appalachian communities in Kentucky: An auto-ethnographic experience.

Understanding other cultures will expand our ability to appreciate our own culture, and realize that local themes may not be universal, but are unique to this area. Through use of values, habits & routines, and performance capacities we can compare diverse cultures to our own, and through that become more accepting of other’s differences while celebrating our lifestyle.

As an Occupational Science & Therapy Student at Eastern Kentucky University, use of Occupation-based models provide a framework with which to observe and analyze components of individuals, communities and populations in order to provide client-centered interventions. The Occupation-based model chosen was the Model of Human Occupation which identifies three major areas of life style activities with which to compare two diverse cultures.

Volition was explored through the values and beliefs of hospitality and of honor in both communities. Habits, routines, and rituals were explored by comparing each culture’s manners and their greeting rituals. Performance capacity, or one’s physical abilities, were compared by viewing differing attitudes and approaches to fitness.

By applying the MOHO model to two diverse cultures, it was found that this is a successful tool to analyze and interpret how cultures function and use practical, moral and societal codes. It is hoped that by understanding how Kentucky is both unique and universal, the Commonwealth will be able to maintain its unique identity while integrating into the diversity of the greater national and international communities.

90. Emory Bell, Dr. Michelle Grempp (Advisor)

Eastern Kentucky University

The Educational Experience of Students who are Deaf and Hard of Hearing in Kentucky

Children who are Deaf or Hard of Hearing (DHH) require much specialized instruction in order to successfully learn in school. Through my course of studies in the Education of the Deaf and Hard of Hearing program at Eastern Kentucky University, I was made aware that there is a shortage of teachers of the deaf in Kentucky, and that as a result many children who are DHH are being taught by teachers without specialized DHH certification. This led to me to wonder just what the educational experience of a child who is DHH in the state of Kentucky looked like. Through my honors thesis, I engaged in research to de-

termine what the actual experiences of these students looked like. I then outlined an ideal educational path for a child who is DHH in the state of Kentucky and compared this to the actual experiences based upon data from a number of sources. Possible causes contributing to a less than ideal educational experience for some children in Kentucky who are DHH experience were discovered. Some of these causes included lack of information for parents about the urgency of following up on newborn hearing screening results, lack of detailed facts about all possible communication options, and insufficient emphasis on the importance of early language development. Additional challenges that were discovered related to the availability of resources and services in certain areas and the overall shortage of qualified personnel across the state. Suggestions for possible solutions will be shared.

91. Whitney Rice, Dr. Jon McChesney (Mentor)

Eastern Kentucky University

Trauma and Recreation: How Refugees Overcome Displacement and Assimilation Through Play

This research study examines the impact of participation in recreation and sports as a means for successful assimilation of African refugees into host cultures. The term African is used with caution in this paper and it is understood that it incorporates many nations; however, it is used in this paper as a reference point. This paper provides new and useful insights into the resettlement needs and issues facing young refugees and the ways in which community sport may or may not facilitate the integration process. The evidence for a recreational approach to recovery for traumatized children is based on program foundations. Evaluations measure the lasting impacts of intervention and serve as a basis for expansion. Discussed are the benefits of community sport in negotiating belonging, building trust, and forming community while analyzing recreation as a means for overcoming sexual and gender-based violence (SGBV), developing basic skills, and establishing mutual acceptance.