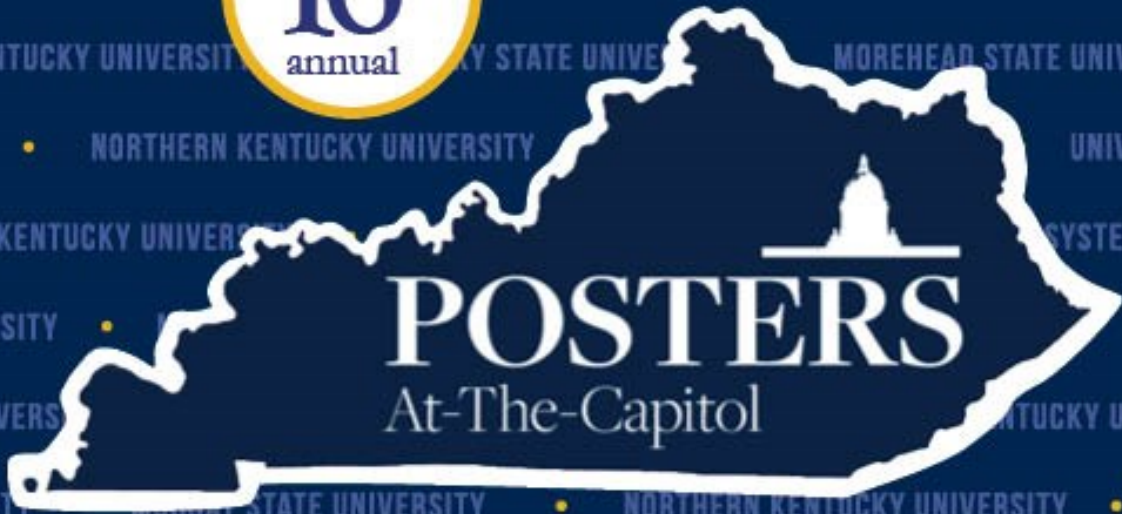


16th
annual



March 2nd 2017
Frankfort Kentucky

Transforming Education for a Brighter Tomorrow

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President Michael Benson, Eastern Kentucky University



For 16 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 EKU 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 EKU'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 2017 *Posters-at-the-Capitol* event the best ever, and I wish you continued success as you strive for excellence in every endeavor.

President Jay Box, Kentucky Community and Technical College System

The Kentucky Community and Technical College System is delighted to take part in this celebration. I applaud the efforts of the ***Posters-at-the-Capitol*** Organizing Committee and our university partners in promoting innovative student research and scholarship.

Engaging students in substantive research projects stimulates critical thinking and builds a strong foundation for advanced research and professional development after graduation. Undergraduate research opportunities also provide student-scholars the added benefits of faculty expertise and mentorship. Moreover, college students with solid research skills typically achieve greater educational outcomes and are also more likely to pursue postgraduate studies than those without these valuable skills.

I am extremely pleased that KCTCS students will have the opportunity to showcase their accomplishments in the research arena. KCTCS, where higher education begins for most Kentuckians, is committed to improving the quality of life for Kentuckians and the pursuit of applied research is one of the myriad ways KCTCS students can enhance economic development within the Commonwealth. Congratulations to the ***Posters-at-the-Capitol*** scholars. I wish each of you continued success on your journey of scholarly achievement.



President Aaron Thompson, Kentucky State University



Kentucky State University (KSU) is a proud participant of the annual *Posters-at-the-Capitol*. Our transformative institution is dedicated to promoting our high-achieving students' data and research. As a comprehensive 1890's land-grant university, KSU has maintained a commitment to service, research and teaching, especially in the food and agricultural sciences.

Our undergraduates are skilled, critical thinkers who will be well-equipped to become global citizens. *Posters-at-the-Capitol* broadens their minds in an ever-changing society. Our students' innovative discoveries will help them to improve our world.

As Frankfort's University, *Posters-at-the-Capitol* is the ideal historic location that allows our students to showcase their creativity for an audience that includes professors, researchers and members of the General Assembly. We appreciate our elected officials' support of our University's students and their research.

Posters-at-the-Capitol unites all of us in undergraduate achievement: students, in-depth research, faculty, our community stakeholders and the City of Frankfort. It is a celebration of mentorship, creativity and accomplishments, and Kentucky State University is thrilled to be a part of it.

I am profoundly grateful to be a part of this scholarly event and I congratulate the students and faculty whose work is highlighted in the Capitol Building.

President Wayne D. Andrews, Morehead State University

We are delighted to continue our participation in the Annual *Posters-at-the-Capitol* program. This event provides an unparalleled opportunity for our students to demonstrate their academic accomplishments and to meet and interact with members of the General Assembly.

We firmly believe that student research significantly enhances the already strong undergraduate experience at Morehead State University. These student projects, completed in collaboration with faculty members outside the traditional classroom setting, represent the personalized student-focused educational opportunities available at MSU. Clearly, the partnership of students with faculty in original scholarship provides the rich academic fabric needed to produce leaders who will possess the intellectual skills and vision required to guide the future social and economic development of our Commonwealth and the Nation. I take great pride in the high priority that we have placed on faculty-mentored, student-engagement activities in basic and applied research, artistic and other creative endeavors, and community and regional stewardship. We are excited about the continued expansion of these scholarly opportunities for students through initiatives such as our unique Undergraduate Research Fellows program and our Celebration of Student Scholarship Week.

I offer my sincere thanks to the faculty mentors who involve students as partners in their scholarship and my heartiest congratulations to these student scholars for their accomplishments.



President Robert O. Davies, Murray State University



Welcome to the sixteenth annual *Posters-at-the-Capitol*. Murray State University's leadership in this worthwhile event is both a testament to our students, who are seeking out 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 Undergraduate Research and Scholarly Activity Office 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.

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 Geoffrey S. Mearns, 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 16th 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 16th 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:

The University of Louisville never shies away from hard work. We gladly accept our legislative mandate to be a “premier metropolitan research university.” Further, we do not see any reason to wait for students to earn a degree before they address tough questions. Many undergraduate students, including sophomores and juniors, strive for answers in fields including physics, engineering, chemistry, pharmacology, toxicology and public health. Some of our students even study the possibility of performing surgical procedures in a zero-gravity environment!



UofL students work alongside some of the top researchers in the country. Our faculty members mentor them as they learn through experience. The ***Posters-at-the-Capitol*** program allows our undergraduate students to share their experiences, ideas and discoveries with Kentucky’s elected leaders. By showcasing our students’ great work, this program also demonstrates UofL’s commitment to education inside and out of the traditional classroom. It serves as a reminder that the state’s financial support of public universities provides dividends for all Kentuckians.

The University of Louisville is proud to participate in the ***Posters-at-the-Capitol*** program. We are proud of our talented, enterprising students. Please take a moment to look at their work and ask them about it. We think you’ll leave just as proud of them as we are.

President Gary A. Ransdell, Western Kentucky University



Western Kentucky University takes great pride in the fact that highly credentialed faculty from a wide array of academic disciplines involve undergraduate students in meaningful research activities. The comprehensive university in America has as its primary responsibility, the applied use of its intellectual capacity to identify and solve problems that exist in its region. At WKU, scholarly collaborations utilize the concepts learned in classrooms and laboratories to prepare students for the workforce and graduate/professional schools. WKU research projects also

address issues important to constituents outside the University, thereby impacting the social and economic development of our community, counties, state, and nation.

As in previous years, it is gratifying to see the number and diversity of student scholars, many of whom are in WKU's independent Honors College or The Gatton Academy, along with their faculty mentors participating in this sixteenth annual *Posters-at-the-Capitol* project. It is vitally important that our legislators meet these students and witness the tangible benefits accruing from ongoing student research at our universities and its potential impact on an improved quality of life for all Kentuckians. WKU is proud to participate in the *Posters-at-the-Capitol* project.

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



Pamela W. Feldhoff
louisville.edu



Mary Janssen
kctcs.edu



Kentucky Council on Postsecondary Education

Matthew G. Bevin
Governor

1024 Capital Center Drive, Suite 320
Frankfort, Kentucky 40601
Phone: 502-573-1555
Fax: 502-573-1535
<http://www.cpe.ky.gov>

Robert L. King
President

March 2, 2017

Dear Participants, Faculty Mentors, and Guests:

I want to welcome you to the 16th annual *Posters-at-the-Capitol* and wish to commend this program for its important mission. *Posters-at-the-Capitol* strives to help increase understanding of the important role that undergraduate research plays in the education of our students. Those responsible for higher education funding in Kentucky will most certainly benefit from participation in this event.

We at the Council on Postsecondary Education continuously strive to discover new strategies to expand research collaborations among Kentucky institutions of higher education and to better communicate the value that research endeavors make to the citizens of this state.

Faculty-mentored experiences such as those exhibited at the *Posters-at-the-Capitol* provide an excellent means for Kentucky to invest in its future. The challenges of our future are both numerous and complex, but our undergraduate students who participate in experiential learning opportunities are more likely to pursue advanced degrees and enter the workforce better equipped for success as a result of these types of experiences.

I encourage event participants to use your time at the Capital to share the results of your projects, outline next steps for your research, and to underscore the important role that research has played in your academic journey. This is an opportune time to reach out and network with peers, legislators, and faculty from other institutions.

Thank you for the opportunity to share this day with you and to observe the diverse array of undergraduate research endeavors taking place across the Commonwealth of Kentucky.

Sincerely,

A handwritten signature in blue ink, appearing to read "Robert L. King".

Robert L. King
President

Schedule of Activities

March 2, 2017

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

9:00 a.m. to 10:45 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)

10:45 a.m.Welcome and Invited Guests (Rotunda)

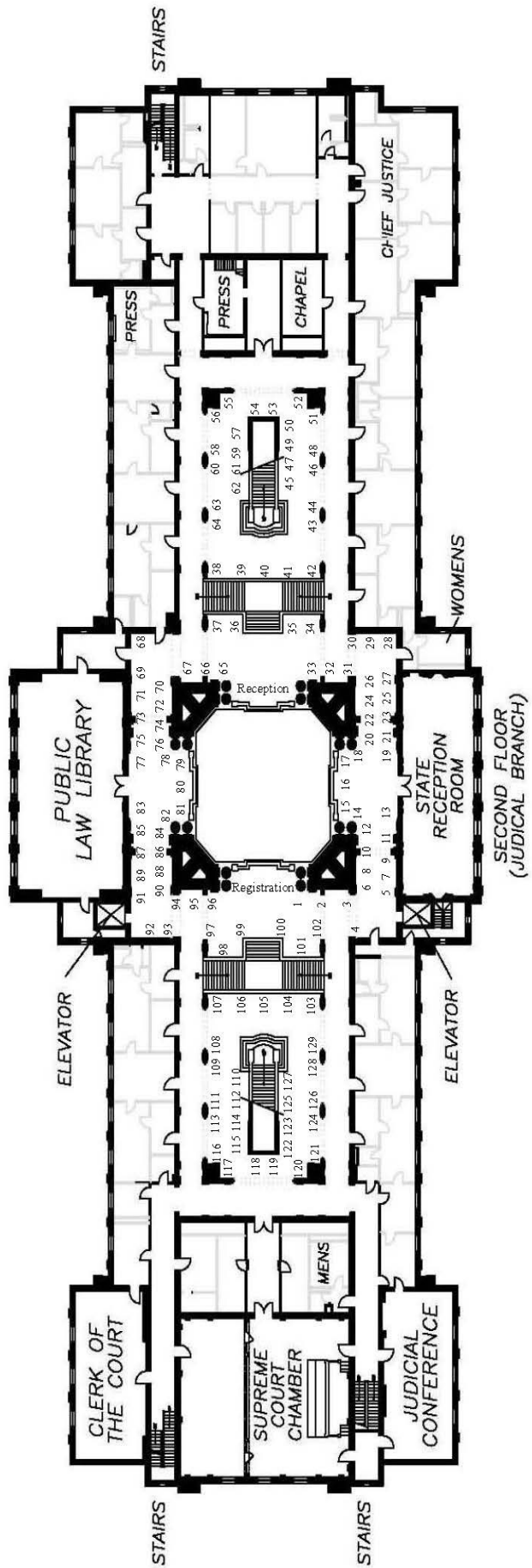
11:30 a.m. to 12:30 p.m.Legislative Visit Time and Lunch

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.



Eastern Kentucky University

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. |
|------------|-----------|--|----------|---------------------------|------------|
| 48 | Baldwin | Justin Ryan Baggett | 46 | 9, 12, 15 | 6 |
| 110 | Blanton | Shelby William Staddon | 78 | 74 | 28 |
| 17 | Cavasos | Robert Jacob Domenghini | 32 | 6 | 6 |
| 93 | Collins | Kendall Lindsay Calderon | 70 | 61 | 17 |
| 95 | Davis | Shelby Michael Lane | 71 | 67, 68 | 24 |
| 24 | Dove | Jessica Barbara Wheeler | 35 | 6 | 6 |
| 60 | Herbig | Michaela Jonathan Gore | 53 | 40 | 44 |
| 84 | Heupel | Kylie Judith Jenkins | 65 | 61, 82, 90, 89, 86, 85 | 17, 21 |
| 116 | Leach | Erica Jonathan Gore | 81 | 82 | 25 |
| 29 | McKinney | Mary Jacob Domenghini | 38 | 6 | 6 |
| 107 | Neville | Khrista Adam Lawson | 77 | 76 | 28 |
| 110 | Parks | Claye William Staddon | 78 | 90 | 25 |
| 112 | Peoples | Jacob Mike Collier | 79 | 81 | 6 |
| 104 | Reeves | Anna James Wells | 75 | 74 | 21 |
| 36 | Sigler | Naomi Paul Grant | 41 | 6 | 6 |
| 84 | Sizemore | Haley Judith Jenkins | 65 | 61, 82, 90, 89, 86, 85 | 17, 21 |
| 37 | Swiney | Madison Matthew Howell | 41 | 6 | 6 |
| 36 | Tunajek | Kayla Paul Grant | 41 | 6 | 6 |
| 56 | Tyring | Shelby Alice Jones | 51 | 33 | 26 |
| 119 | Uelitschi | Patrick Robert Mitchell, Radhika Makecha | 82 | 81 | 34 |
| 78 | Waters | Matthew Ryan Baggett | 63 | 68 | 24 |
| 121 | Whitehead | Charles Atilla Sit | 83 | 81 | 34 |
| 124 | Williams | Kenadii Julie Lasslo | 85 | 91 | 91 |

Kentucky State University

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|-------------|--------------------|--|-----------|------------|----|
| 94 | Antonious | Alexander | Buddhi Gyawali | 70 | 57 | 57 |
| 118 | Bashyal | Mamata | John Sedlacek | 82 | 57 | 57 |
| 88 | Cecil | Rhiannon | Tamara Sluss | 67 | 57 | 7 |
| 118 | Crabtree | Sheri | John Sedlacek | 82 | 57 | 57 |
| 35 | Davis | Kenyatta | Avinash Tope | 40 | 6 | 6 |
| 88 | Davis | Demetrius | Tamara Sluss | 67 | 57 | 7 |
| 118 | Friley | Karen | John Sedlacek | 82 | 57 | 57 |
| 92 | Gearhart | Megan | Kirk Pomper, Jeremy Lowe, Sherri Crabtree | 69 | 56 | 7 |
| 118 | Govindasamy | Sathya | John Sedlacek | 82 | 57 | 57 |
| 88 | Heiby | Garrett | Tamara Sluss | 67 | 57 | 7 |
| 96 | Jackson | Maya | Vikas Kumar | 71 | 57 | 6 |
| 22 | Jakes | Aneasa | Alexander Lai | 34 | 8 | 8 |
| 34 | Kisanga | Anitha | Avinash Tope | 40 | 6 | 6 |
| 97 | Kring | Nathan | Andrew Ray | 72 | 57 | 7 |
| 22 | Kyle | Anjelique | Alexander Lai | 34 | 8 | 8 |
| 118 | Lowe | Jeremiah | John Sedlacek | 82 | 57 | 57 |
| 10 | Lyvers | William | Robert Durborow | 28 | 4 | 4 |
| 100 | Nkuwi | Lusekelo | George Antonious | 73 | 57 | 57 |
| 83 | Pate | George | Janelle Hager, James Tidwell | 65 | 56 | 7 |
| 34, 35 | Patel | Shreya | Avinash Tope | 40 | 6 | 6 |
| 118 | Pomper | Kirk | John Sedlacek | 74 | 57 | 57 |
| 96 | Rossi | Waldemar | Vikas Kumar | 71 | 57 | 6 |
| 118 | Slusher | E. Kyle | John Sedlacek | 82 | 57 | 57 |
| 28 | Wilson | Jordan | Changzheng Wang, Lingyu Huang, Cecil Butler | 37 | 6 | 6 |
| 96 | Yadav | Amit | Vikas Kumar | 71 | 57 | 6 |

Kentucky Community & Technical College System

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|--------------|--------------------|------------------------------|-----------|------------|----|
| 16 | Bell | Sarah | Sherry McCormack, Scott Bain | 31 | 4 | 3 |
| 6 | Berry | William | Shen Liu | 26 | 2 | 1 |
| 16 | Burden | Jennifer | Sherry McCormack | 31 | 4 | 4 |
| 41 | Dukes | Kendra | Mary Janssen | 43 | 15 | 6 |
| 6 | Dyer | Kaleb | Shen Liu | 26 | 2 | 1 |
| 11 | Greene | Ashley | Sherry McCormack, Scott Bain | 29 | 15 | 6 |
| 47 | Kincaid-Bohn | Abby | John Ward | 46 | 29 | 35 |
| 11 | Palandro | Theresa | Sherry McCormack, Scott Bain | 29 | 4 | 3 |
| 6 | Schultz | Dustin | Shen Liu | 26 | 4 | 4 |
| 23 | Young | Christopher | Sherry McCormack, Scott Bain | 35 | 8 | 3 |

Morehead State University

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|------------|--------------------|-------------------------------|-----------|------------|----|
| 122 | Bach | Jordan | Janet Ratliff, Steve Chen | 84 | 99 | 27 |
| 120 | Beard | Cullen | Michelle Lustenberg | 83 | 99 | 27 |
| 108 | Belcher | Matt | Elizabeth Perkins | 77 | 99 | 27 |
| 99 | Casto | Mark | Michael Fultz | 73 | 70 | 27 |
| 68 | Coleman | Adda | Christina Conroy | 57 | 51 | 16 |
| 103 | Crowe | Shelbie | Kim Nettleton | 75 | 74 | 28 |
| 125 | Dennis | Kaitlyn | Denise Vulhop Watkins | 86 | 99 | 27 |
| 46 | Eldin | Michael | Jorge Ortega-Moody | 46 | 27 | 27 |
| 126 | Elswick | Justin | Lesia Lennex | 86 | 100 | 18 |
| 82 | Gebka | Sydney | Johnathan Nelson | 64 | 60 | 11 |
| 99 | Gibson | Danielle | Michael Fultz | 73 | 70 | 27 |
| 106 | Guerrant | Joanna | Gina Gonzalez | 76 | 73 | 28 |
| 14 | Hull | Allison | Gina Gonzalez | 30 | 6 | 6 |
| 64 | Jewell | Merideth | Kenneth Henderson, Steve Chen | 55 | 49 | 38 |
| 71 | Laskovtsov | Albina | Bernadette Barton | 59 | 39 | 22 |
| 71 | Lawson | Amber | Bernadette Barton | 59 | 39 | 22 |
| 120 | Lustenberg | Mikinley | Michelle Lustenberg | 83 | 99 | 27 |
| 108 | MacFarland | Emily | Elizabeth Perkins | 77 | 99 | 27 |
| 101 | Riggs | Terra | Wesley White, Illsun White | 74 | 49 | 38 |
| 127 | Rush | Daniel | Thomas Pannuti | 86 | 88 | 77 |
| 76 | Hezelstine | Matthew | Sanghyun Lee | 61 | 57 | 7 |
| 108 | Shankle | Kevin | Elizabeth Perkins | 77 | 99 | 27 |
| 76 | Stanley | Adam | Sanghyun Lee | 61 | 99 | 27 |
| 115 | Toller | Kaleb | Jorge Ortega-Moody | 81 | 98 | 18 |
| 127 | West | Haley | Thomas Pannuti | 86 | 72 | 27 |

Murray State University

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|----------|--------------------|----------------|-----------|------------|----|
| 9 | Almalki | Saeed | Abdul Yarali | 27 | 1 | 1 |
| 45 | Applin | Richard | David Eaton | 45 | 22 | 9 |
| 55 | Chaplin | Chloe | Kathy Callahan | 50 | 32 | 36 |
| 5 | Drouin | Joshua | David Eaton | 26 | 1 | 1 |
| 33 | Guebert | Laura | David Pizzo | 40 | 5 | 1 |
| 40 | Hardison | Maegann | David Pizzo | 43 | 16 | 3 |
| 9 | Harris | Mitchell | Abdul Yarali | 27 | 1 | 1 |
| 15 | Hearrell | Staci | Jessica Naber | 31 | 1 | 1 |
| 32 | Locke | Sarah | Jessica Naber | 39 | 6 | 2 |
| 32 | Patel | Jalpaben | Jessica Naber | 39 | 6 | 2 |
| 27 | Sparkman | Hannah | David Eaton | 37 | 5 | 1 |
| 13 | Staengel | Jamie | David Eaton | 30 | 5 | 1 |
| 21 | Wood | Rachel | Andrew Black | 34 | 5 | 1 |

Northern Kentucky University

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|-----------|--------------------|-------------------|-----------|-------------------|------------|
| 91 | Black | Cory | Patrick Hare | 69 | 68 | 11 |
| 4 | Boyers | Sage | Sharyn Jones | 25 | 4 | 4 |
| 87 | Israelson | Emily | Shauna Reilly | 67 | 64 | 17 |
| 72 | Krull | Sarah | Douglas Krull | 59 | N/A | N/A |
| 81 | LeDuc | Rachel | Judy Voleker | 64 | 66 | 11 |
| 75 | Mearns | Clare | Cecile Marczynski | 61 | 61, 63, 65, 67-69 | 17, 23, 24 |
| 75 | Thompson | Emily | Cecile Marczynski | 61 | 61, 63, 65, 67-69 | 17, 23, 24 |
| 75 | Turner | Caitlin | Cecile Marczynski | 61 | 61, 63, 65, 67-69 | 17, 23, 24 |
| 4 | Vance | Liza | Sharyn Jones | 25 | 4 | 4 |

University of Louisville

| Poster No. | Student | | Faculty Advisor(s) | Page No. | House No. | Senate No. |
|------------|-------------|-----------|---|----------|-----------|------------|
| 62 | Baumgartner | Richard | Kathy Baumgartner | 54 | 40 | 35 |
| 62 | Boone | Stephanie | Kathy Baumgartner | 54 | 40 | 35 |
| 66 | Bryan | Emily | Elizabeth Gordon, Cynthia Corbitt | 56 | 40 | 40 |
| 73 | Fields | Erica | Jasmine Farrier, Laura Moyer | 60 | 40 | 35 |
| 80 | Furnish | Madison | David Hein | 63 | 60 | 11 |
| 43 | Gora | Evan | Stephen Yanoviak | 44 | 23 | 23 |
| 43 | Gripshover | Noah | Stephen Yanoviak | 44 | 23 | 23 |
| 39 | Hall | Jared | Claudio Maldonado | 42 | 16 | 3 |
| 66 | Hamilton | Kristen | Elizabeth Gordon, Cynthia Corbitt | 56 | 40 | 40 |
| 86 | Hart | Elizabeth | Joseph Steffen | 67 | 67 | 24 |
| 62 | Heitz | Adaline | Kathy Baumgartner | 54 | 40 | 35 |
| 57 | Heller | Kimberly | Lynn Hall, Tim Crawford | 51 | 36 | 14 |
| 2 | Little | Taylor | Daniela Terson de Paleville, Jason Immekus | 24 | 3, 4 | 3, 4 |
| 52 | Masterson | Katlin | Cynthia Logsdon | 49 | 24 | 14 |
| 62 | Mattingly | Delvon | Kathy Baumgartner | 54 | 40 | 35 |
| 54 | Neal | Adria | Laura Moyer | 49 | 30 | 19 |
| 86 | Quesenberry | Tess | Joseph Steffen | 67 | 67 | 24 |
| 90 | Robertson | Nicole | Kara Miller, Julia Hanebrink | 68 | 68 | 24 |
| 86 | Seibert | Christina | Joseph Steffen | 67 | 67 | 24 |

University of Kentucky

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|-------------------|---------------------------|---|-----------|------------|-----|
| 63 | Assef | Sara | Kristin Ashford | 54 | 48 | 26 |
| 105 | Bates | Brian | Andrea Friedrich, Steven Arthur | 75 | 75 | 13 |
| 19 | Bedingar | Esias | Yang Jiang | 33 | 6 | 13 |
| 3 | Buckley | Tori | Kenneth Campbell | 25 | 5 | 5 |
| 74 | Colvin | Kylie | Bruce Webb | 60 | 63 | 23 |
| 105 | Donovan | James | Andrea Friedrich, Steven Arthur | 75 | 75 | 13 |
| 98 | Fletcher | Lydia | Luke Bradley, Roberta Magnani, Robert Houtz | 72 | 72 | 27 |
| 26 | Ghazala | Lina | Amy Confides, Esther Dupont-Versteegden | 36 | 6 | 6 |
| 117 | Gosnell | Heather | Eric Rush | 81 | 75 | 13 |
| 31 | Gouge | Vincent | Ann Morris | 39 | 7 | 7 |
| 50 | Hiner | Whitney | Karen Butler | 48 | 27 | 27 |
| 3 | Isaac | Joslyn | Kenneth Campbell | 25 | 5 | 5 |
| 98 | Kloska | Katherine | Luke Bradley, Roberta Magnani, Robert Houtz | 72 | 72 | 27 |
| 98 | Major | Emily | Luke Bradley, Roberta Magnani, Robert Houtz | 72 | 72 | 27 |
| 102 | McLean | Hillary | Travis Thomas | 74 | 75 | 75 |
| 105 | Neely | Robert | Andrea Friedrich, Steven Arthur | 75 | 75 | 13 |
| 109 | Oo | The Nu Sandar (Kendra) | Tammy Stephenson, Dawn Brewer, Amanda Hege, Jessica Houlihan, Luisyana Gamboa, Lauren Serra, Leslie Hildesheim | 78 | N/A | N/A |
| 111 | Paudel | Sandhya | Craig S, Fernanda C, Horohov D | 79 | 77 | 28 |
| 58 | Preston | Joshua | Kevin Pearson, Leryn Preynolds | 52 | 39 | 22 |
| 44 | Randolph | Megan | Kristen Mark | 45 | 25 | 10 |
| 8 | Reichenbach | Haley | Jeffrey Bewley, | 27 | 5 | 5 |
| 105 | Robinson | Alon | Andrea Friedrich, Steven Arthur | 75 | 75 | 13 |
| 114 | Rondon | Alberto | Matthew Gentry | 80 | 77 | 28 |
| 98 | Scalf | Stephen | Luke Bradley, Roberta Magnani, | 72 | 72 | 27 |
| 44 | Sigler | Brock | Kristen Mark | 45 | 25 | 10 |
| 12 | Talavera-Santiago | Gabriela | Melody Danley | 29 | 6 | 6 |
| 77 | Tillson | Martha | Justin Strickland, Michele Stanton- | 62 | 76 | 13 |
| 44 | Wilson | Nathaniel | Kristen Mark | 45 | 25 | 10 |

Western Kentucky University

| Poster No. | Student | Faculty Advisor(s) | Page No. | House No. | Senate No. | |
|------------|---------------|--------------------|----------------------------|-----------|------------|-------|
| 42 | Alam | Shaumik | Minsub Chung, Moon-Soo Kim | 43 | 20 | 32 |
| 69, 70 | Banazak | Alexander | Sanju Gupta | 58 | 59 | 26 |
| 7 | Bertram | John | Matthew Nee | 26 | 62 | 17 |
| 1 | Boisture | Maleah | William Mkanta | 24 | 1 | 12, 8 |
| 18 | Boone | Ryan | Leyla Zhuhadar | 32 | 7 | 8 |
| 38 | Boyareddygari | Vishnu | Richard Schugart | 42 | 17 | 17 |
| 65 | Cundiff | Meredith | Sharon Mutter | 55 | 48 | 19 |
| 79 | Davis | Andrew | Bruce Kessler | 63 | 61 | 17 |
| 49 | Dong | Xinju | Yan Cao | 47 | 20 | 32 |
| 38 | French | Rachel | Richard Schugart | 42 | 17 | 17 |
| 53 | Gearner | Olivia | T. Keith Phillips | 49 | 20 | 32 |
| 59 | Graff | Parker | Ali Er | 52 | 20 | 32 |
| 20 | Harkins | Chris | Chris Groves | 33 | 20 | 32 |
| 123 | Johnson | Jessica | Jarrett Johnson | 84 | N/A | N/A |
| 51 | Jones | Konnor | Matthew Nee | 48 | 20 | 32 |
| 113 | Kanthawar | Arjun | Richard Schugart | 80 | 86 | 25 |
| 25 | Khan | Sherafghan | Edwin Stevens | 36 | 8 | 3 |
| 113 | Krishna | Nikhil | Richard Schugart | 80 | 86 | 25 |
| 7 | Lamb | Ryan | Matthew Nee | 26 | 62 | 17 |
| 65 | Lawrence | Keely | Sharon Mutter | 55 | 48 | 19 |
| 20 | Losekamp | Katie | Chris Groves, Cate Webb | 33 | 91 | 21 |
| 38 | Menix | Jacob | Richard Schugart | 42 | 17 | 17 |
| 61 | Moore | Brittany | Patrica Kambesis | 53 | 20 | 32 |
| 51 | Obermyer | Olivia | Matthew Nee | 48 | 20 | 32 |
| 85 | Parker | Logan | Yan Cao | 66 | 59 | 26 |
| 67 | Penn | Aubrey | Hemali Rathnayake | 56 | 56 | 7 |
| 38 | Prasad | Ayush | Richard Schugart | 42 | 17 | 17 |
| 38 | Price | Carson | Richard Schugart | 42 | 17 | 17 |
| 89 | Rueter | Keiti | Ivan Novikov | 68 | 20 | 32 |
| 69, 70 | Smith | Tyler | Sanju Gupta | 58 | 75 | 13 |
| 7 | Steward | Kayla | Matthew Nee | 26 | 4 | 4 |
| 20 | Stickney | Caleb | Chris Groves, Cate Webb | 33 | 91 | 21 |
| 113 | Stryker | Stefan | Richard Schugart | 80 | 86 | 25 |
| 38 | Turner | Rachel | Richard Schugart | 42 | 17 | 17 |
| 20 | Vaughn | Cayla | Chris Groves | 33 | 20 | 32 |
| 7 | Wallace | Franklyn | Matthew Nee | 26 | 62 | 17 |
| 65 | Woosley | Catherine | Sharon Mutter | 55 | 48 | 19 |
| 30 | Zieba | Daniela | Michael Galloway | 38 | 7 | 7 |

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.

Daniel Rush, Haley West

Dr. Thomas Pannuti (Advisor)

Morehead State University-Space Science Center

An Analysis of Archival Observations Made of Galactic Supernova Remnants by the Chandra X-ray Observatory (Poster 56)

Mitchell Harris, Saeed Almalki

Dr. Abdul Yarali (Advisor)

Murray State University-Telecommunication Systems Management

CricketSat: Space Temperature Measurement Module (Poster 9)

Naomi Sigler, Kayla Tunajek

Paul Grant (Advisor)

Eastern Kentucky University-Justice and Safety

Eastern Kentucky University's Program of Distinction: Highlighting Research within the College of Justice and Safety (Poster 36)

Cory Black

Dr. Patrick Hare (Advisor)

Northern Kentucky University-Center for Integrative Natural Science and Mathematics

Estrogen Photodegradation Depends on Solvent and Photolysis Wavelength (Poster 91)

Nathan Kring

Dr. Andrew Ray (Advisor)

Kentucky State University-Aquaculture

*Polyculture of Pacific white shrimp, *Litopenaeus vannamei*, and juvenile tilapia, *Oreochromis niloticus*, in indoor biofloc aquaculture systems* (Poster 97)

Sherafghan Khan

Dr. Edwin Stevens (Advisor)

Western Kentucky University-Applied Research and Technology Program

The X-Ray Crystallography Analyses of an Anti-Thyroid Compound: 1-methyl,2-mercaptoimidazol (MMI) (Poster 25)

1. Maleah J. Boisture, Dr. William Mkanta (Advisor)

Western Kentucky University

Aging and Caregiver Issues Related to New Trends of HIV

Tanzania is one of the sub-Saharan countries that has been greatly impacted by HIV/AIDS since it emerged in early 1980s. Due to this impact, and over time, there is an important meaning attached to the terms “aging adults” and “caregivers” in the community. The aim of this study was to assess behavior, knowledge, and attitudes on HIV among providers and caregivers aged 50 and older and to determine measures caregivers and providers in this age group need to take to protect themselves against acquiring HIV infection while in the process of care. The study was conducted for five weeks during the summer of 2016 in Dar es Salaam, Tanzania. The data was collected from formal providers (non-governmental organization, WAMATA and community hospital) and informal providers or caregivers based on voluntary surveys. The data showed that providers, both formal and informal, had provided care to about four HIV/AIDS patients in the past six months. Over 40% of the participants indicated they were not sure if a provider or caregiver can get infected with the disease while caring for a patient. More than 80% of the providers pointed out blood was the type of fluid they came in contact most frequently while caring for patients. Overall, two of the 22 providers (9%) reported to have acquired HIV in the process of care. Finally, only 55% of the providers/caregivers felt adequately prepared to interact with HIV patients in the process of care. Older adults providing care for HIV/AIDS patients constitute an important group of caregivers supplementing HIV care. Our results suggested the importance of continued education and training that should be specifically designed to meet the needs of older providers in both formal and informal settings to improve care and prevent provider infections while caring for patients.

2. Taylor Little, Dr. Jason Immekus (Advisor), Dr. Daniela Terson de Paleville (Advisor)

University of Louisville

Incorporation of a physical activity program "Minds in Motion" in a Spanish-immersion elementary school. Effects on classroom behavior and academic performance.

"Minds in motion" is an intense physical activity program with the goal of targeting vestibular, proprioceptive and sensory systems with the purpose of facilitate the integration of internal and external cues resulting in a more accurate motor response that may result in better balance, coordination and reading skills. The school-based approach of Minds in Motion is called the “MAZE,” which blends developmental gymnastics, balance exercises, and complex movements through a rotating set of protocols. These activities, range from full-body exercises to isolated eye movements with the purpose of improve eye tracking and reading. The purpose of this study was to determine if the incorporation of Minds in Motion approach before school hours results in better academic performance (i.e. reading and math), classroom behavior and agility, balance and coordination in children enrolled in 4th and 5th in a local Spanish immersion elementary school.

3. Joslyn Isaac, Tori Buckley, Dr. Kenneth Campbell (Advisor)

University of Kentucky

Developing new therapies for heart failure

Cardiovascular disease is the leading cause of death in Kentucky. Hospitalizations for cardiovascular disease cost our state ~\$4 billion each year; treating patients who have heart failure accounts for 10% of this cost. (All data from the Kentucky Cabinet for Health and Family Services). Patients who have heart failure struggle to pump enough blood to meet their body's basal demands. Drugs can help with symptoms but do not completely restore function. The only cure for heart failure is a cardiac transplant but just 0.25% of Americans who would benefit from the procedure will receive a new heart. New therapies are desperately needed. As undergraduates, we have spent 18 months helping in research lab at the University of Kentucky. Our group collaborates with the Center for Transplant and Organ Failure and the Gill Heart Institute to obtain cardiac samples from organ donors and from patients undergoing surgeries. The samples we collect are used in research studies and sent to other researchers around the world. We have also performed biophysical experiments measuring how two drugs, omecamtiv mercabil and isoproterenol alter the way cardiac cells contract. Our data show that omecamtiv mercabil increases the magnitude of contraction while isoproterenol makes cells contract faster. Both drugs affect cells from the left and right sides of the heart in similar ways. These data provide new information about cardiac contraction and may help scientists to accelerate the development of better therapies for heart failure.

4. Sage Boyers, Liza Vance, Dr. Sharyn Jones (Advisor)

Northern Kentucky University

Harmony & Harvest at the 1839 Parker Academy

Near the village of New Richmond, The Parker Academy was established in 1839 under the direction of Daniel and Priscilla Parker. This is believed to be the first school in the United States to offer fully integrated classrooms that were open to all races, religions, and genders. The Academy was a preparatory school that became a safe haven for its numerous students, many of whom were runaway slaves. Faculty and students from NKU partnered with the National Underground Railroad Freedom Center to conduct archaeological excavations in 2015-2016. Fieldwork focused on the schoolhouse foundation and the men's dormitory. This presentation illustrates the intriguing history of the Academy through its material culture. Ceramics, glass, building materials, coins, game pieces, fragments of musical instruments, and buttons are among the artifacts that were recovered. In particular several potential decorative or ornamental personal items may inform interpretations about ethnicity; while this topic is controversial and our work is inconclusive these artifacts add richness to descriptions of what may have occurred in the past. In addition, we recovered a high frequency of diagnostic artifacts that inform our understanding of ways the community may have come together by engaging in events including food and leisure activities (music, games, celebratory feasts). Analysis is ongoing but already we have uncovered patterns emerging from the data that tell a story about daily life. Our work provides a window into this unique community and a chance to better understand the development of identity at this important site.

5. Joshua Drouin, Dr. David Eaton (Advisor)

Murray State University

The Effects of Charities on Rural Economic Development

This research examines the impact of charities and NGOs on economic development in areas served by the charitable groups. We will look at both long term NGO and charitable involvement, as well as disaster related efforts. By drawing on the comparisons we can empirically test the Samaritan's Dilemma put forth by James Buchanan. This hypothesis suggests that while charity actions can help in the short term, they can lead to long term dependencies. By providing necessary services for free, charities undermine local entrepreneurs and hinder industry and business creation. Without businesses to sustain a community, people are unemployed and hence cannot purchase goods. Subsequently, charities see this hardship that people are facing and seek to help them, and so the cycle continues. This issue can arise even assuming that charities are acting with benevolent intent and without corruption. There is an optimum point of aid in which communities can survive hardship just enough to recover and begin sustaining themselves, but any aid beyond this point removes profits from the markets and dissuades entry. Thus, the optimum point of aid is the point in which local individuals can realize the profits and obtain them, without removing the profits. This paper will primarily focus on charitable and NGO involvement in rural areas in Africa and East Asia.

6. William Spicer Berry, Kaleb Rankin Dyer, Dustin Lee Schultz, Shen Liu (Advisor)

West Kentucky Community and Technical College

Model Truss Bridge Design

Bridges are one of the most important and costly engineering projects, involving extensive design considerations that try to minimize expenses while insuring the bridge will not fail. Different models of bridges were constructed in order to perform experiments that determined which beams were in compression and how much force was experienced in the beam's when a static load was applied. Computer simulations were also performed to determine the loads on the different beams. The simulation and calculated results were compared to ensure accuracy of the final results. It was determined that a Howe bridge offers the lowest maximum compression on any beam when compared to the Pratt bridge. The cost did not increase because the diagonal members only switched positions and no extra material was needed.

7. Franklyn Keith Ramsey Wallace, Ryan Lamb, John Bertram, Kayla Steward, Dr. Matthew Nee (Advisor)

Western Kentucky University

Materials and methods to improve the quality of water resources

Although wastewater treatment facilities are effective in the removal of solid wastes and bacterial contaminants, a variety of harmful chemical pollutants are able to pass into drinking water. In Kentucky, pesticides from farm runoff and pharmaceutical waste from hospitals frequently enter wastewater. Catastrophic events like the 2014 Elk River spill meant toxic 4-methylcyclohexanemethanol was detected in the Ohio river, even where the city of Louisville derives a majority of its drinking water. Our

lab develops materials and analytical techniques (Raman Spectroscopy) for improving a technology called photocatalytic degradation, which uses special materials (photocatalysts) that harvest sunlight to break down chemical pollutants. For example, we can embed the photocatalyst into a buoyant supporting material such as polydimethylsiloxane (PDMS), an environmentally inert polymer that we can produce as buoyant beads embedded with TiO₂ as a photocatalyst. We demonstrate this material on a model pollutant to suggest ways to improve the process further. We have also developed Raman spectroscopy techniques for monitoring reactions in real time, 100 times quicker than conventional methods of analysis, with some disadvantages: Raman is not a very sensitive technique, and it is unreliable for accurately tracking the change in the concentration of pollutants over time. Here, gold nanoparticles were used to enhance sensitivity and accuracy and thus study a broader range of pollutants. The use of nanoparticles presents an additional issue because nanoparticles tend to aggregate together when subjected to conditions necessary to monitor reactions, and thus signal diminishes as a function of time. This was addressed by introducing a secondary capping agent which stabilized growing nanoparticle clusters and prevented them from aggregating to the point of signal loss. Overall, this work serves to broaden the selection of pollutants that can be studied using Raman spectroscopy, and adds to our tools for ensuring the water security for Kentucky.

**8. Haley Reichenbach, Dr. Jeffery Bewley (Advisor), Mrs. Barbara Wadsworth-Jones (Advisor)
University of Kentucky**

Comparison of DX613 copper sulfate acidifier footbath to a 5% copper sulfate footbath for prevention of digital dermatitis lesions in dairy cattle

The objective of this study was to compare a 2.2% copper sulfate footbath with 325.31 mL of DX613 Acidifier (**treatment**; GEA Farm Technologies, Naperville, IL) to a 5% copper sulfate footbath (**positive control**) on the frequency and severity of DD in Holstein (n = 59) cows. The study was conducted at the University of Kentucky Coldstream Dairy from November 11, 2015 to January 20, 2016. Footbaths were delivered via a split footbath (Intra Care Foot Bath, Diamond Hoof Care LTD Alberta, Canada). The left side of the bath served as the positive control and the right side served as the treatment, cows were exposed to the solutions, five times per week. The DD lesions were scored biweekly using a M0 to M4 scoring system. A M0 score indicated no lesion (non-active lesions); M1 indicated small lesions (active lesions); M2 indicated large and potentially severe lesions (active lesions); M3 represented healing lesions (non-active lesions); and M4 represented chronic lesions (non-active lesions). The DD lesions were further separated into active lesions or non-active lesions for statistical analysis. A Chi-Square test calculated using the FREQUENCY procedure of SAS (SAS Institute, Inc., Cary, NC) indicated no-significant difference between the two concentrates (chi-square = 1.18, $P = 0.56$). A McNemar's test indicated significant differences in the prevalence of lesions from the beginning to end of the study (treatment: $P < 0.01$, positive control: $P < 0.01$). The DX613 Acidifier may be a viable alternative for dairy producers.

9. Mitchell Harris, Saeed Almalki, Dr. Abdul Yarali (Advisor)

Murray State University

CricketSat: Space Temperature Measurement Module

The CricketSat Project at Murray State University was developed to establish better understandings for the design and assembly procedures of satellite technology. The satellite consists of one remote sensor that provides specific frequencies corresponding to various temperatures. By purchasing this inexpensive CricketSat, it provides students with the opportunity to advance their understanding of satellite technology and partake in hands on learning.

The CricketSat is composed of a single wireless module and a receiving antenna. The sensor transmits an audio tone that changes frequency in response to temperatures within the atmosphere. During launch, the CricketSat is attached to a helium balloon and operates at a signal of 433 Megahertz (MHz). Radio scanning software, such as Spectrum Lab and HDSDR are used during this project to record specific frequencies relayed from the transmitter to the receiving antenna. To accurately decipher transmission signals, calibration is necessary. For proper calibration, students must first record the frequency and temperature results at room temperature, then in ice water, and finally with the thermistor in between a given student's thumb and index finger. Calibration establishes a direct correlation between temperature and frequency which can be plotted on a graph for students to better understand.

This project is significant to Murray State University because it will expand student's educational horizons and can guide students toward new employment interests. The intention of this project is to allow students to be involved in hands-on learning within the lucrative industry of space technology. With a cost of less than \$30, the CricketSat is completely affordable for any university. Proper advertising of this project will directly result in an increase of recruitment and retention rates of students. By placing more emphasis of satellite technology, university's will be handed the opportunity to expand research and development for more sophisticated and valuable projects.

10. William Lyvers, Dr. Robert Durborow (Advisor)

Kentucky State University

Glenn Hoffman: World Fish Parasitologist

Dr. Glenn Hoffman was a world-renowned fish parasitologist with a highly-accomplished career beginning in the 1940s and extending past his retirement in 1985. He authored "the bible of American fish parasitology" *Parasites of North American Freshwater Fishes* (1999) and three other major books. His career was mainly at the U.S. Fish & Wildlife Service Eastern Fish Disease Laboratory, Leetown, West Virginia and at the U.S. Fish Culture Station in Stuttgart, Arkansas. This presentation of Dr. Hoffman's life is based on his book *The Fish Doctor: Autobiography of a World Fish Parasitologist* written with the help of Glenn's son Lyle in 2010, the year that Glenn died (Dr. Lyle Hoffman is a physics professor at Lafayette College, Easton, Pennsylvania where he also served as Department Head for ten years).

This presentation is also based on digital scans of Glenn's slide photo collection that he willed to me (and were mailed to me by his son Lyle). My student William Christopher Lyvers has worked hard digitizing these "Kodachrome" slides. I was in communication with Glenn during his final years while he was residing at a retirement complex in Bethlehem, Pennsylvania, just 8 miles from his son Lyle's home. We exchanged information including my DVD *Diseases of Warmwater Fish and Trout Diseases* that I mailed to him. He was extremely appreciative of having these interactions with me, and as a result, he designated

that I should receive one of his two sets of slides (the other set went to U.S. Fish & Wildlife Service in Leetown, WV.

11. Ashley Greene, Theresa Palandro, Sherry McCormack (Advisor), Scott Bain (Advisor)
Hopkinsville Community College
The Effects of the Stratosphere on Materials

Three different types of pipes were tested to see at what point in time they would break. The pipes, PVC pipe, PEX pipe, and CPVC pipe, were filled with water and attached to a helium filled weather balloon. The ends of the pipes were sealed to trap the water inside. The pipes were secured onto a payload in a Styrofoam box surrounded by cheese cloth. This frame secured the pipes and ensured that they stayed in one place and could not move around the container. The balloon and payload were then released and climbed approximately 92,000 feet above the original point of launch. The purpose of the experiment was to test the reliability of the pipes by way of stress through expansion pressure caused by the frozen water. It was predicted that the pipes would burst due to the pressure provided by higher altitude and colder temperatures of around -50 degrees Celsius. The pipes are not made to withstand temperatures and altitudes such as these. Only the CPVC pipe broke under the stress that near space provided.

The balloon satellite, filled with helium, carried diverse payloads weighing under 12 pounds all together and it ascended about 92,000 feet above ground. In one of the experiments on the payload, a set of 9V batteries was insulated, attached to a solar panel, and sent into near space. The purpose of the experiment was to test if that sending solar powered batteries into near space would generate a greater voltage than the control set of batteries. The difference in voltage of 9V lithium batteries between the ones on the ground and the ones sent into the stratosphere charged by solar power was studied. After the payload was retrieved, the voltage of the batteries were measured with a voltmeter and compared to the voltage of the control set of batteries that were attached to a solar panel on the ground. Results failed to authenticate the hypothesis. The control set generated a voltage of 7.35 V and the variable set attained a voltage of 7.16 V. The results were affected by outside variables when the payload landed.

12. Gabriela Talavera-Santiago, Dr. Melody Danley (Advisor)
University of Kentucky
Sensory Ablation and Red Swamp Crayfish Burrowing Behavior

Procambarus clarkii, the red swamp crayfish, is considered a tertiary physical ecosystem engineer that creates burrows consisting of a chimney-like opening with several underground tunnels. The ability to build these burrows, or to navigate back to the burrows following a foraging event are poorly understood. Because crayfish are nocturnal animals that typically live in turbid waters with low visibility, crayfish utilize their primary antenna like a blind man's cane (tactile), to locate prey and or familiar landmarks. They utilize their secondary antennules for chemical cues (chemosensory) such as pheromones released by other crayfish. To better understand the role these sensory appendages on the burrowing behavior of crayfish, crayfish burrowing behaviors were quantified after removal of their (primary) antenna, (secondary) antennules, or both. It was hypothesized that removal of these sensory appendages would result in decreased burrowing attempts, or less complex burrows constructed due to loss of these important sensory appendages. Preliminary results show no significant differences among the treatment groups in terms of burrowing behavior (degree of construction, number of burrows

constructed, or location of burrow construction). However, preliminary results showed significant differences in amounts of time individuals spent in or out of the burrow, and the amounts of time individuals spent being active without burrowing or not being active at all throughout examination (p-value < 0.05, 2-way ANOVA). Preliminary results indicate loss of sensory appendages may influence the burrowing activity of crayfish.

13. Jamie Staengel, Dr. David Eaton (Advisor)

Murray State University

Stackelberg Price Competition in the Organic Food Market

Recently in the organic food industry, more lines of organic food are being introduced in stores as demand for organic products continues to grow. The organic food industry has witnessed high price premiums in the past which, according to economic theory, would in a perfectly competitive market attract entry until those price premiums decreased to the point where economic profits were zero. However, the USDA's National Organic Certification Cost Share Program, or NOCCP, was introduced in its current form in 2009 and offers reimbursement for farmers who are already certified with certification or recertification costs for their organic farming operation. Since the program only reimburses farmers who have endured the required three year transition period, during which a farmer cannot sell their products as organic and receives no price premium and lower yields, a question arises: Is the NOCCP functioning as an effective barrier to entry and keeping potential farmers out of the market who cannot be first certified to qualify to receive a reimbursement from the NOCCP? Utilizing state-level data from the United States Department of Agriculture's (USDA) *Census of Agriculture*, this paper strives to discover if growth in the organic food industry is inorganic and taking place among farms already certified and utilizing the NOCCP. If price premiums remain high while the NOCCP is in place, that may be indicative of the program serving as an effective barrier to entry and helping existing organic farmers maintain economic rents.

14. Allison Hull, Dr. Gina Gonzalez (Advisor)

Morehead State University

Dietary supplement attitudes and behaviors in the personal training profession

Dietary supplements are a growing multi-billion dollar industry. Supplement usage is widespread and many individuals take supplements for health, performance, and disease prevention reasons. However, due to a lack of FDA regulation, there are concerns with the safety and efficacy of many dietary supplements. Exercise professionals and personal trainers are in a position to educate the public on dietary supplements; however, it is unknown how exercise professionals and personal trainers approach this topic personally and professionally. The purpose of this study was to better understand behaviors and attitudes of personal trainers with respect to dietary supplements. The research included an extensive literature review on supplements in the personal training profession and a review of existing instruments. Based on this information, an instrument was created to reflect personal trainers' behaviors and attitudes. Once the instrument was created, it was pilot tested on a small group of personal trainers, revised, and then disseminated to a larger sample. Statistics included descriptive data and differences in supplement attitudes and practices with respect to demographic data. This research is supported by an Undergraduate Research Fellowship provided by the Academic Honors Program.

15. Stacie Hearell, Dr. Jessica Naber (Advisor)

Murray State University

Emergency Education to Students in a Rural Healthcare Area

The purpose of this research process was to bring emergency healthcare education to advanced students in their Junior and Senior years of high school. The subjects were students enrolled in an advanced physical education program at local rural high schools. A pre-test was given to each student involved to assess their skills involving basic healthcare and how to respond in an emergency situation. The topics covered in the presentation were emergency room etiquette and processes, treatment for basic injuries and symptoms, as well as education for situations that should and should not result in a visit to the emergency room. The presentation ended with the teaching of basic life support including high quality cardiopulmonary resuscitation (CPR) and airway management, as well as rescue breathing and automated external defibrillator (AED) use. Students were provided an opportunity to practice resuscitation skills and airway management. The students also demonstrated the correct use of an AED. Upon completion of the teaching the students were not certified in CPR or AED use, however a basic understanding and correct presentation of skills were documented. A posttest was used to assess the knowledge gained throughout the teaching. This test was reviewed with the students and each scenario was discussed to determine proper reactions.

16. Jennifer Jo Burden, Sarah Bell, Sherry McCormack (Advisor), Scott Bain (Advisor)

Hopkinsville Community College

Near-Space Conditions and their Effects on Physiology

The NASA Balloon Satellite, which is a balloon that is sent 100,000 feet into the upper atmosphere to collect data, and stream that data live to NASA webpage, will carry experiments that are part of a payload. My experiment will be a Neulog Sensor Logger that will collect data on the UVA and UVB exposure rate of light from the upper stratosphere and on the ground. Data measuring the exposure rate of the light will also be collected from robot welding cells or sections in which one robot will be measured in comparison to the six robots in another cell. The theory is that the UVA exposure does not change from the upper stratosphere to earth nor does the UVA exposure change no matter the number of robots. The UVB rays should decrease in exposure rate of the light as they enter into Earth's atmosphere unlike the UVA. The significance with UVA and UVB radiation is that in dangerously high levels of radiation can cause damage to the cornea of the eyes.

The purpose of this research experiment is to study the effects that a large change in atmospheric pressure has on blood chemistry and cell structure. In this experiment, canine blood is being sent to near-space on a helium filled balloon for approximately two hours, and then parachuted back to the ground when the balloon bursts at an approximate altitude of 100,000ft. The blood will be kept from freezing to eliminate any effects of hemolysis (the bursting of blood cells) from this cause, as the lowest temperature reached is below -50°C. Two tubes of blood will be sent to near-space and two will be kept on the ground as controls. One of the tubes sent to near-space and one of the controls are for studying the changes in the blood's cell structure and are in vacuumed sealed tubes containing an anticoagulant. The other two tubes are for studying the changes in the blood's chemistry and are in vacuumed sealed tubes containing a different anticoagulant that is more suited for studying the blood's chemistry. The

blood will be analyzed at a professional laboratory for any changes or abnormalities. No changes are anticipated in the blood's chemistry, but there may be shrinkage or rupture of the blood's cell structure due to low atmospheric pressure.

17. Robert Cavazos, Dr. Jacob Cody Domenghini (Advisor)

Eastern Kentucky University

Comparison of two hydroponic tower systems for lettuce production

Hydroponic vegetable production is increasing at a rate of 5.3% each year. Vertical farming has proven to use less land and water than traditional farming while reducing fossil-fuel emissions and fertilizer waste. This study evaluated the production of Black Seeded Simpson lettuce, *Lactuca sativa*, to test the performance of two hydroponic tower systems, a commercially available tower and a student-designed tower in an indoor farming system in Richmond, KY. Each tower contained 24 plant compartments. The commercial tower compartments were evenly spaced on an eight-inch diameter, four-foot-tall pipe; the student-designed tower compartments were dispersed on two four-inch-diameter pipes that were four feet tall. The commercially-available tower, a product by Juice Plus, and the student-designed tower were evaluated during two studies in 2016. An average-size leaf from each compartment was harvested weekly and leaf area index (LAI) and leaf weight were measured. Lettuce was destructively harvested at the conclusion of the studies and total LAI and leaf weight recorded for each tower. The commercial tower produced significantly higher yields ($P=0.05$) with an average LAI of 2092.4 cm² and leaf weight of 66.9 g per compartment compared to the average LAI and leaf weight yields of the student tower which were 1594.2 cm² and 52.2 g respectively. Lower yields from the student tower may have been caused by poor light distribution resulting in light not reaching the lettuce located in the area between the two pipes.

18. Ryan S. Boone, Dr. Leyla Zhuhadar (Advisor)

Western Kentucky University

Improving Ecosystem Quality Through Data Mining Application

The main objective of this research is to develop an automated predictive water quality control system for Kentucky's natural water ways. The health and sustainability of our ecosystem is paramount to the wellbeing our state. Keeping our waterways healthy ensures that the agriculture and aquaculture sectors remain a strong industry for current and future Kentuckians. Using data sets from the Green River Preserve and other Kentucky organization of field station sites, we are implementing data mining algorithms to predict instances of harmful levels of pollution. These algorithms will uncover where and when our attention should lie to effectively improve our state's waterways while simultaneously creating a very detailed image of how Kentucky's ecosystem changes over time. When implemented this system will collect data for vital to biological research and send alerts when certain factors such as oxygen saturation, E. coli levels, and certain herbicide and fertilizer chemicals exceed healthy or acceptable levels necessary for local wildlife populations. Once this system is fully integrated in Kentucky, the platform can be expanded to the other states, not only improving scientific research and understanding through mass data collection and sharing, but also by improving the health of the United States' ecosystems by use of automated monitoring for efficient management.

19. Esias Bedingar, Dr. Yang Jiang (Advisor)

University of Kentucky

Brainwave Signatures For Detecting Malingered Neurocognitive Deficit (MNCD)

Traumatic brain injury is a major public health concern in the United States, affecting up to 1.7 million people each year. Mild traumatic brain injury (mTBI) accounts for 80% of these cases. Various tests have been created in order to document brain injury and evaluate cognitive functions. However, neuropsychologists report that up to 40% of individuals undergoing evaluations following mTBI may be malingering deficits. This points to a need for innovative and non-invasive approaches to validating mTBI while identifying malingerers.

The aim of this study was to utilize neuroimaging and behavioral approaches to detect MNCD by comparing the reaction times and brainwave signatures of honest and malingerer cohorts during a working memory test. Subjects were grouped into three cohorts: healthy controls with no history of head injury (n=16), otherwise healthy subjects malingering cognitive deficits (n=16), and those with documented mTBI (n=15). Subjects were fitted with a 32-channel electrode EEG cap and asked to perform two tasks: a computerized version of the Test of Memory Malingering (TOMM-C) and an old-new memory recognition task. Data were recorded using Neuroscan 4.5 and analyzed using EP Toolkit 2.0.

Event-Related Potentials (ERPs), which are time locked to an event or a stimulus have also been used to detect malingering. In this study, P300 was used as indicator for recognition memory because it is an ERP component elicited in the process of decision making.

Preliminary results indicate latency differences in the onset of the P300 wave (associated with attention, memory, and executive function) in the frontal cortex, which could be related to additional neural processes associated with malingering. Additional differences in mean voltage between the P300 waveforms of the honest and malingering groups were identified in the central and occipital lobes as well. Reaction time will be studied to further correlate differences between the three groups.

20. Caleb Stickney, Katie Losekamp, Cayla Baughn, Chris Harkins, Dr. Chris Groves (Advisor), Dr. Cate Webb (Advisor)

Western Kentucky University

Pathways for Environmental Sulfuric Acid Contamination from Disturbance of Geologic Materials

Air and water quality in the southeastern US have been impacted by sulfuric acid (H_2SO_4) formed by oxidation of sulfur in the mineral pyrite (FeS_2) exposed to the environment through disturbance of Pennsylvanian-aged coals by mining or construction. Two case studies here illustrate pathways by which such H_2SO_4 can move through the environment. Coals of western Kentucky contain relatively high concentrations of pyrite that when burned produces strong “acid rain” that can have impacts on vegetation and water quality. Mammoth Cave National Park (MCNP) has been impacted by such sulfuric acid rain. Rainfall data from just outside MCNP show that from 2002 to 2005 rainfall pH averaged 4.7, some ten times as acidic as unpolluted rainfall. Beginning in 2005, due to regional changes in coal burning technology, rainfall pH began increasing. Rainfall pH from 2014 to 2016 averaged 5.2,

representing a drop in acidity of about 68%. During the same period dissolved SO_4^{2-} in the rainfall dropped by about 55%.

H_2SO_4 from pyrite-bearing coal can also contaminate surface streams with so-called Acid Mine Drainage (AMD). In 2012 residents along Freeman Branch Creek near Eldridge Alabama observed orange and black discoloration along the stream which had not previously been seen. Inspection of geological maps showed that the Pennsylvanian Pottsville Formation underlying the area contains coal and appeared to be a likely source of the contamination. Although we hypothesized that coal mining may have been responsible, subsequent field investigation instead suggested that blasting associated with recent highway construction upstream from where the discoloration had been observed may have enhanced pyrite weathering, along with buffering by limestone bedrock used as fill material. This highlights how construction activities in sulfide-bearing geologic materials can influence water quality. Understanding of geochemical conditions and processes in such settings can be informed by the extensive existing literature on AMD.

21. Rachel Wood, Dr. Andrew Black (Advisor)

Murray State University

Greatness from Small Beginnings: Amy Hennig and the Importance of Women in Video Game Writing

Amy Hennig, creative director and writer for the *Uncharted* video game series, has had a great impact on the world of interactive storytelling, namely with her portrayal of female characters in the action-adventure genre. During her time at Sony-owned developer Naughty Dog, Hennig encouraged gamers and developers alike to redefine the genre through in-depth storytelling and well-rounded characters. This paper explored how these female characters, while unique in their backgrounds and roles within the games' plots, represent well-developed and unique character archetypes within the realm of video games, a rare trait for female characters the action genre before the first game's release in 2007. These characters are also an example of how video games can be approached and critiqued from a more literary standpoint. Hennig's writing style and literary background enable an analysis of her characters as mirrors, foils, and antagonists, all while still forming characters that have personal motivations other than to service the series' rugged protagonist. Likewise, this paper, through use of feminist criticism, analyzed the ways in which Hennig's growth as a female game writer mirrors the plight of the nineteenth century female novelist, especially in relation to writing for a particular audience. No longer filled with oversexualized action heroines or merely damsels in distress, the *Uncharted* universe brings the action-adventure genre strong women, directed by a woman, yet applauded by gamers and critics alike.

22. Anjelique Kyle, Aneasa Jakes, Alexander Lai (Advisor)

Kentucky State University

Surveillance of air microbial content in the campus of Kentucky State University

To determine if there is a pattern of microbial contamination in air in a confined space such as a campus setting, we have conducted a long-term longitudinal indoor air microbial quality survey. Surveyed areas

include hallways, library, and restrooms. Sedimentation method was adopted for simplicity and reproducible. Nutrient agar plates were distributed at strategic areas, and environmental conditions such as ambient air temperature and humidity were recorded. Other factors such as the volume of traffic and/or occupancy were noted. After exposure for an hour, the plates were then incubated at 37 C for 24 h. The number of colonies were counted, and representative colonies were further sub-cultured and/or Gram-stained to determine the microbial species. Longitudinal data analysis and multifactorial analysis were used to determine if there were correlations between number of colony-forming unit (CFU) to parameters such as seasonality, traffic, and ambient temperature and humidity. Several statistically significant observations were noted. For example, during the winter of 2015-2016, the month of March had a higher microbial content, and as expected, a higher usage of the restroom resulted in higher CFU in the collecting plates. Further breakdowns and analysis of our results will be presented. A long-term goal is to determine if the pattern of microbial contamination correlates to environmental parameters such as temperature and humidity. An implicit goal is to determine if there is a correlation to student absenteeism due to respiratory tract infection.

23. Christopher Young, Scott Bain (Advisor), Sherry McCormack (Advisor)

Hopkinsville Community College

High Altitude Ballooning and The Effect of Temperature on Balloon Ascent Rate.

High-altitude balloons are unmanned balloons, usually filled with helium or hydrogen, that after release, ascend into the stratosphere, generally attaining an altitude of between 60,000 to 100,000 feet. The balloon payload includes scientific experiments on organisms, equipment to study radiation, temperature, ultra- violet radiation, and pressure. The balloon flights and experiments are logged by means of video devices and are tracked from the ground through multiple tracking devices. The effect of temperature on the ascent rate of the balloon could change how the balloon expands as it ascends, affecting the burst height. The data collected from multiple different sensors will be altitude, time, and temperature. Once all of the data is collected, the ascent rate will be calculated, then a graph of ascent rate vs temperature will be made. With the graph being complete, the ascent rate will be compared to different temperatures to see if there is a correlation.

24. Jessica Dawn Louise Dove, Mrs. Barbara Wheeler (Advisor)

Eastern Kentucky University

Oil Dries Used in Arson Scenes: New Absorbent Material

The presence of an accelerant is hard to determine because fire can destroy this evidence, therefore it is crucial to obtain as much information as possible from the scene if arson is suspected. Usually only trace amounts of the accelerant may be left behind after the fire. It can be collected from a variety of materials, but hard inert materials such as thick timber or concrete make collection difficult. These two substances are very hard, non-porous and areas may be large making it difficult to obtain samples for laboratory analysis. Research was done to see if oil dries, commonly used for hazardous material collection, can be used at an arson scene to collect trace amounts of accelerants. Initially several brands of oil dries were tested to determine whether recovery is possible. With recovery the level of detection

and identification was determined by gas chromatography. This helped investigators collect samples from inert and hard to collect materials such as concrete.

25. Sherafghan Khan, Dr. Edwin Stevens (Advisor)

Western Kentucky University

The X-Ray Crystallography Analyses of an Anti-Thyroid Compound: 1-methyl,2-mercaptoimidazol (MMI)

Hyperthyroidism is the over activity of the thyroid gland, producing an excess of thyroid hormones. This gland is located in the anterior neck, just below the laryngeal prominence and is involved in converting digested iodide into the thyroid hormones thyroxine (T4) and triiodothyronine (T3). One of the key enzymes involved in this process is thyroid peroxidase (TPO), which is synthesized with the help of thyroid stimulating hormone (TSH) found in the anterior pituitary gland. Current methods for treating hyperthyroidism involve administering an anti-thyroid drug such as 1-methyl,2-mercaptoimidazol (MMI). This compound blocks the production of TPO, and this in turn blocks excess production of the thyroid hormones. Our x-ray diffraction study has resulted in the first detailed 3-D molecular structure determination of MMI, and our goal is to use this structural information with additional high resolution x-ray measurements to determine the distribution of electrons in the drug molecule. This data will provide a better understanding of the factors important in binding of MMI to TPO and the mechanism of inhibition, which may lead to design of safer and more effective drugs for the treatment of hyperthyroidism. MMI crystallizes in the triclinic space group P-1 with 4 molecules in the unit cell. Over 100,000 x-ray scattered intensity measurements were collected at a temperature of -153oC using a Bruker automated x-ray diffractometer located in the Advanced Materials Institute at WKU. This data reveals that crystals of MMI contain 2 unique molecules, which are connected with neighbors using an extensive network of N-H to S and weaker C-H to S hydrogen bonds.

26. Lina Sarah Ghazala

Ms. Amy Confides (Advisor), Dr. Esther E. Dupont-Versteegden (Advisor)

University of Kentucky

Elevated Pax3+ cell number potentially compensates for Pax7+ cell-depletion in diaphragm muscle of running mice.

Satellite cell-depletion in hind limb muscles does not affect hypertrophy, sarcopenia or the ability to adapt to aerobic exercise. However, the ability of the constantly active diaphragm muscle to adapt to a stressor such as exercise is decreased with a loss of satellite cells is unknown. We hypothesized that satellite cell-depletion would negatively affect diaphragm muscle, particularly with running and in aged mice. We used the Pax7-DTA mouse model to deplete over 90% of Pax7 positive cells in the diaphragm muscle upon treatment with tamoxifen which induces CreER-mediated expression of DTA. Female mice were treated with vehicle or tamoxifen at 4 months of age and were either given running wheels at 6 (young) or 22(aged) months of age or remained sedentary for 8 weeks after which they were euthanized. Satellite cell-depletion was associated with 25-28% decreased running activity in young and aged mice. Satellite cell-depletion had no effect on fiber type distribution or cross sectional area of fibers in both young and aged mice regardless of running activity. Minimal effect was observed on diaphragm

function measured using on ultrasound analysis. There was no significant difference in myonuclear abundance among treatment and activity groups suggesting that there may be another stem cell type present in the diaphragm muscle of satellite cell-depleted mice which could compensate for the loss of Pax7+ cells. We used fluorescent in situ hybridization to detect Pax3+ cells and found an increased abundance of these cells in young and aged diaphragm muscle in satellite cell-depleted mice. We were unable to detect Pitx2+ cells in both young and aged diaphragm muscle. These results indicate that satellite cell-depletion does not negatively affect diaphragm muscle independent of running activity and conclude that the increased presence of Pax3+ cells in satellite cell-depleted diaphragm muscle potentially compensates for the loss of Pax7+ cells. Supported by NIA AG043721.

27. Hannah Sparkman, Dr. David Eaton (Advisor)

Murray State University

Does Gentrification help or harm a community?

Gentrification is the process of renovating and improving housing and business districts so that it conforms to the middle-class taste. Gentrification is most frequently affecting predominantly black neighborhoods across the United States. This phenomenon is claimed to be the cause of the displacement of residents in poorer communities and of a cultural shift in neighborhoods with deep rooted histories. It could also be the case that gentrification is mainly hurting the long-time residents of these neighborhoods rather than hurting the actual neighborhoods themselves. Research on this topic includes, but is not limited to, various demographic data including before and after analysis of the neighborhood. It's said that residents of these neighborhoods are being pushed out and around to surrounding neighborhoods so another point of research that is conducted is to observe the areas around the gentrified section using several different radii. Gentrification has also been praised because supporters of it claim it has been the result of the reestablishment of historical neighborhoods and has restored these neighborhoods to their former glory. To examine the impacts of gentrification I will examine property values, crime, and income per capita among other variables that will measure demographic changes in neighborhoods. This could also be further proof that gentrification is mainly hurting the long-time residents of these neighborhoods rather than hurting the actual neighborhoods themselves. The purpose of this research topic is observe the effects of gentrification before and after it occurs to determine if it has really helped or hurt the affected neighborhoods.

28. Jordan Wilson, Changzheng Wang (Advisor), Lingyu Huang (Advisor), Cecil Butler (Advisor)

Kentucky State University

Potential use of transglutaminase in restructuring deboned Asian carp meat

Bighead and silver carp, commonly called Asian carp, are non-native fish that have negatively impacted North American waters including Kentucky rivers and lakes. Harvesting Asian carp for human consumption has been proposed as one of the tools to reduce or eliminate Asian carp from Kentucky waters. Intramuscular bones in Asian carp has to be removed in order to attract American consumers. However, the process of mechanical deboning Asian carp destroys the structure of the fish muscle, limiting the options of products forms that can be made from Asian carp meat. Transglutaminase has been used in the meat industry to restructure beef or pork from small pieces of meat. The objective of

this project was to determine if transglutaminase could be used to form fillets from deboned carp meat. Asian carp captured from Mississippi River were deboned and ground through 5mm screen by a commercial fish processor. Samples of Asian carp mince were mixed with 0, 0.3, 0.6 or 1.2 g of transglutaminase enzyme in Ziploc bags. The force required to cut through the slice was used as the indicator of the strength of the reconstructed meat. The color of the meat was measured with a Minolta chroma meter (model CR-400). The slices were weighed before and after boiling at 100 C for 1 min, and the cooking loss was calculated as the weight difference divided by the initial weight expressed as a percent of the initial weight. The force required to cut through the meat increased, whereas the cooking loss tended to increase as the amount of transglutaminase increased. The results suggest that that the enzyme may be used to reconstruct deboned Asian carp meat.

29. Mary McKinney, Dr. Jacob Cody Domenghini (Advisor)

Eastern Kentucky University

EKU's Red Barn Garden and Orchard – a hands-on learning laboratory for horticulture students

The Red Barn Garden and Orchard (RBGO) is a five-acre fruit and vegetable garden on the campus of Eastern Kentucky University in Richmond, Kentucky. RBGO began as a venue for students to apply classroom knowledge gained in the fruit and vegetable courses taught as part of the horticulture program. During the start-up year a kitchen garden, gourd tunnel and one acre of tomatoes, pumpkins, beans, peppers, zucchini, cucumbers, onions, corn, and several cole crops were established. By the end of the second year an additional two acres were planted including a small fruit orchard consisting of apples, pears, peaches, plums, brambles, and blueberries. Students participate weekly in the community farmers' market selling the student-grown produce alongside other local farmers. A farm to office program has been established where faculty and staff on campus can place orders online to have fruits and vegetables delivered directly to their offices. Research at the RBGO site, conducted by faculty and students, has initiated and the opportunities are increasing as the program continues to grow. RBGO has been designed as a recruiting tool and educational resource for the community with plans to host elementary school field trips, high school field days, and other seasonal outreach events.

30. Daniela Zieba, Michael Galloway (Advisor)

Western Kentucky University

QIIME 2 Cloud

Cloud-based architectures are changing the way people scale and utilize their computing resources. This project applies a cloud-based architecture to optimize QIIME, a command line software used in microbiology to analyze raw DNA sequences, and is unlike previous QIIME projects in that the goal is to deconstruct QIIME's internal composition with the intent to parallelize particular algorithms to distribute across virtual appliances instead of being implemented as a whole using virtual machines. The project attempts to include a cloud architecture, web interface, notification system, and load balancing in QIIME 2. The cloud architecture consists of virtual appliances working across systems. This benefits QIIME 2 by making tasks such as backing up, moving, and setting up servers easier. The web interface interacts with both middleware and users; the benefits include the ability to interact with other users and simply making QIIME more accessible. Unlike the console-based interaction that would

be previously needed, QIIME 2 is now accessible on any device. The notification system alerts users when their jobs are complete, and load balancing ensures that jobs will be completed more quickly by distributing tasks across compute nodes.

31. Vincent Gouge, Dr. Ann Morris (Advisor)

University of Kentucky

Analysis of hairy-related 9 (her9) during vertebrate ocular development

The *hairy-related 9 (her9)* gene—belonging to the *hairy/enhancer of split (hes)* superfamily of Basic-Helix-Loop-Helix-Orange (BHLH-O) transcription factors which are involved in many developmental processes—is expressed during vertebrate embryonic retinal development and in the regenerating adult retina. *Her9* was found to be upregulated in the retina of a transgenic line of zebrafish that exhibits constitutive rod photoreceptor specific degeneration and regeneration. *Her9* has been shown to be expressed throughout the developing central nervous system of the zebrafish, including the retina. Fluorescent in situ hybridization (FISH) experiments were conducted in a transgenic line of zebrafish that expresses the GFP reporter in vascular endothelial cells. We found that *her9* expression co-localizes with markers for retinal vasculature. Pharmacological manipulation of several signaling pathways starting during the appearance of the primordial eye field revealed that *her9* expression in the retina is sensitive to the Retinoic Acid (RA) signaling pathway. The CRISPR/Cas9 system was used to generate *her9* mutant lines. A guide RNA specific to *her9* developed in our lab was co-injected with Cas9 mRNA into 1-cell stage zebrafish embryos. These founders were crossed to generate F1 embryos that, upon sequencing, were found to have an insertion or deletion causing a frameshift mutation and no gene product. If our experiments confirm that *her9* plays a role in vasculogenesis, this may lead to key therapeutic treatments for eye diseases involving defects in retinal vasculature such as age-related macular degeneration (AMD), diabetic retinopathy (DR), and retinitis pigmentosa (RP).

32. Sarah Locke, Jalpaben Patel, Dr. Jessica Naber (Advisor)

Murray State University

HESI: A Quality Improvement Study

Health Education Systems Incorporated (HESI) is an Elsevier company that provides educational material and exams that aim to improve nursing education and pass rates on the nurse-licensing exam (NCLEX). Numerous studies have examined the relationship between HESI exams and NCLEX pass rates in various nursing programs throughout the country. However, improving the implementation of HESI in nursing programs has not been the focus of much research. The purpose of this study was to identify possible improvements that could be made in the use of HESI in order for it to better serve the educational needs of students in the Murray State University School of Nursing. A mixed methods approach was used in this study, and a one-time survey consisting of eight items was administered to nursing students at Murray State in each semester of the program during the fall of 2016. The data collected in these surveys was analyzed, and the results were used to improve the use of HESI in Murray State's School of Nursing and better the education of current and future nursing students.

33. Laura Guebert, Dr. David Pizzo (Advisor)

Murray State University

Imperial Correlations Between the German Kaiserreich in Eastern Europe and the Third Reich in Eastern Europe

This project is an examination of correlations between imperial enterprises of the Second German Empire and the Nazi Reich through the lenses of global and imperial critiques. The two primary case studies are the German Ober Ost and Nazi-occupied Eastern Europe, particularly the General Government. This research draws heavily on certain themes and theories developed by leading historians of modern German and Eastern European history, including Timothy Snyder, Alexander Watson, Ben Kiernan, Shelley Baranowski, and Peter Fritzsche. By understanding the shared trends of empire and genocide, it is my aim to bring the actions of the National Socialists out of its prolonged ideological isolation and into a global context of implication.

34. Anitha Kisanga, Shreya Patel, Dr. Avinash Tope (Advisor)

Kentucky State University

Evaluation of Potential Pathogens in Spices from Stores in Kentucky

The world spice and herb market is valued around US\$ 4 billion and expected to exceed US\$ 6.5 billion per year. While most dried foods are at low risk for causing food-borne illnesses, herbs and spices can harbor microorganisms. Worldwide, between 1973 and 2010 contaminated spices were responsible for 14 foodborne outbreaks. The American Chemical Society reported bacterial counts in the order of 10² and 10⁷ cfu/g in certain commercial spices. In order to retain their flavors, they are usually processed at low temperature, creating conducive conditions for microorganisms to survive or multiply. In the current study, using selective and differential media and petrifilms, a comparative evaluation of bacterial contamination due to *Enterobacteriaceae*, *E. coli*, *Listeria* and *Salmonella* in five frequently used household spices was carried out and the antimicrobial susceptibility of the isolates was tested against 14 antibiotics using Kirby-Bauer diffusion assay. Eight different brands of spices (n=46) were sampled from local grocery stores which included 12 whole and 34 powdered varieties. The isolated individual colonies were identified using differential biochemical profiling with API E 20 system. Approximately 45% of the samples were detected to be contamination with *Enterobacteriaceae*. No *E. coli*, *Listeria* or *Salmonella* were detected in any samples. *Stenotrophomonas maltophilia*, was most frequently detected in (28%) the tested samples. Powdered chili peppers and whole black peppers were more prone for contamination than other spices. Nearly, 14% of the isolates were resistant to at-least three antibiotics, indicating the possibility of consumer's exposure to multiple drug resistant bacteria.

35. Kenyatta Davis, Shreya Patel, Dr. Avinash Tope (Advisor)

Kentucky State University

Evaluation of Drug-Resistant Enterobacteriaceae on Produce from Small Farms in KY.

In recent years, the number of bacterial food-borne outbreaks associated with contaminated produce has increased substantially. *Escherichia coli* contributes to the majority of foodborne illnesses. In addition to the conventional practices, and with more small farmers starting organic production, there is a

vulnerable segment which demands continuous microbial safety assessments. In the current study, twenty small produce farms from fourteen counties in Kentucky participated in a survey outlining farmers' procedures during their routine operations. These farms were visited thrice, during the pre-growing, harvest, and post-harvesting seasons. A total of 119 produce samples was collected from 16 organic and 4 conventional farms, respectively. No *Escherichia coli* was detected in any of the samples. However, 58% of total samples detected positive for *Enterobacteria with Enterobacter cloacae* as the most frequently detected (21.62%) member. Microbial analysis was also taken to determine the antimicrobial resistance of the isolates to fourteen antibiotics. Approximately, 88% of the isolates were found resistant to Trimethoprim, 47% were resistant to at least three and 12% were resistant to at least ten of the antibiotics. We conclude that 'ready-to-eat' fresh vegetables which are consumed without cooking can be a source of exposure to pathogens with multiple drug resistance (MDR). MDR is defined as resistance to at-least three antimicrobial agents, leading to greater risks in immunocompromised individuals, and may serve as reservoirs for resistance gene transfers in human colon. All findings of the study were shared with participating farmers and they were counseled on the Good Agricultural Practices.

36. Naomi Sigler, Kayla Tunajek, Paul Grant (Advisor)

Eastern Kentucky University

Eastern Kentucky University's Program of Distinction: Highlighting Research within the College of Justice and Safety

This project is intended to represent the Program of Distinction at ECU. The fire program at Eastern provides students several unique majors and encourages students to do research within their respective fields. This research is then presented at numerous conferences throughout the United States. Some of the hosts include, but are not limited to, the National Association of Fire Investigators (NAFI) and the International Association of Arson Investigators (IAAI). By presenting research at these and other fire related forums, students are showcased to potential employers, the heads of various committees, and given countless networking opportunities.

This research highlights each of the three fire programs offered at ECU and elaborates on what type of careers the students will have once they graduate. This poster will then give examples of previous, and current, students' individual research projects. Topics which have been covered include fire pattern analysis, the use of 3D modelling, using pigs for accelerant/explosion detection, and how to rule out an outlet as the cause of a fire. Cutting edge research distinguishes the College of Justice and Safety as an invaluable asset to higher education in Kentucky.

37. Madison Swiney, Dr. Matthew Howell (Advisor)

Eastern Kentucky University

What Works? A Meta-Analysis of Quantitative Studies Regarding Heroin Policy

This project aimed to aid legislators by presenting quantitative evidence on what policies existing literature supports as working in dealing with the problem of heroin use in order to shift policies to a more effective approach. Chi Square analysis of 100 quantitative studies revealed that there is a

relationship between the type of approach and outcome of the study, indicating that maintenance-focused approaches are more likely to work than the other approaches examined. The study concluded that, while the literature finds consensus on the idea that “maintenance works”, the details of implementation cause disagreement between fields; overall, maintenance works for those who want it to work and policy makers should focus on implementing broad legislation where the details of policy can be worked out based on each community’s unique situation, the demand for services, and in seeking to use resources in the most effective and efficient manner.

38. Carson Price, Rachel French, Vishnu Karthik Boyareddygari, Ayush Prasad, Jacob Menix, Rachel Turner, Dr. Richard Schugart (Advisor)

Western Kentucky University

Using Parameter Estimation Techniques to Analyze a Mathematical Model in Wound Healing

Because the medical treatment of diabetic foot ulcers remains a challenge for clinicians, a quantitative approach using de-identified patient data and mathematical modeling can help researchers understand the physiology of the wounds. In this work, we utilized a previously developed mathematical model describing the interactions among matrix metalloproteinases, their inhibitors, extracellular matrix, and fibroblasts (Krishna et al., 2015). The model was modified and curve-fitted to individual patient data from Muller et al. (2008), while model parameters were estimated using ordinary least-squares. The parameter values were then analyzed using Latin Hypercube Sampling (LHS), a stratified sampling method for multidimensional parameter distribution, and Partial Rank Correlation Coefficients (PRCC), computed from a multivariable regression analysis, to describe how sensitive each parameter value is to changes in the system. Utilizing the patient data curve-fits, a mean and standard deviation may be used to formulate a normal distribution for each of the model parameters. The output of the ordinary differential equation model when the parameter values are substituted may be compared to an actual wound healing response to measure the validity of our model. A Bayesian approach, a different statistical method, is then used to analyze parameter values and establish confidence intervals. Upon comparison of the model with refined parameter estimates from the various techniques, the predictive ability of the model may be improved. The goal of this work is to quantify and understand differences between patients in order to predict future responses and individualize treatment for each patient.

39. Jared Hall, Dr. Claudio Maldonado (Advisor)

University of Louisville

Interaction Between Synthetic Exosomes and the Primo Vascular System

The Primo Vascular System (PVS) is a novel anatomical system discovered by Bong Han Kim, a Korean scientist, in the early 1960’s. The structure is composed of a systemic network of thread-like vessels and nodes. Previous studies have confirmed the presence of stem cells in Primo Nodes (PNs), however little is known regarding the physiological function of the PVS. A sub-type of the PVS has been found inside lymphatic and vascular vessels. A recent study reported visualizing intra-lymphatic Primo Vessels (IL-PVs) using Hollow Gold Nano spheres measuring 50-120nm in diameter. Our overall hypothesis is that the PVS collects exosomes from lymphatic fluid, channeling them towards PNs to facilitate their interaction

with stem and immune cells in response to physiological stimuli to maintain homeostasis. The purpose of this study was to develop synthetic exosomes (SEs) with a membrane lipid composition similar to those released by PC-3 prostate cancer cells. The SEs were then stained with victoria blue and injected into the lumbar lymph nodes of a Sprague-Dawley Rat. Over time IL-PV's and PNs were visualized by the contrast provided by the dye. SEs appeared to penetrate the IL-PV wall and PNs. In conclusion we were able to create SEs of the appropriate size and similar lipid composition of those derived from PC-3 cancer cells, and the SEs appear to penetrate IL-PVs and PNs based on the contrast provided by Victoria blue dye.

40. Maegann Hardison, Dr. David Pizzo (Advisor)

Murray State University

Education and Literature in the Third Reich

This research examines education in the Third Reich and specifically focuses on children's literature. German children were exposed to different persuasive techniques and influences that dramatically impacted their culture and mindset. The purpose of this research is to explain how the propaganda used in the educational system was directed towards the German youth. The use of this propaganda reveals the reasons why many children grew to defend the *Führer* and their *Volk*.

41. Kendra Dukes, Dr. Mary Janssen (Advisor)

Madisonville Community College

Effects of LED and Incandescent Light on Escape Behavior of Mealworms, Larvae of the Grain Beetle *Tenebrio molitor*

Mealworms, larvae of the grain beetle *Tenebrio molitor*, were presented green LED and incandescent lights in two phases, with either LED or incandescent light first. In each phase, 12 larvae in Petri dishes half-lit were given two 3-minute periods with intervening 180 degree rotation, and either a 3-minute period of dark or no dark period with another 180 degree rotation between Phase 1 and 2. Comparison groups received exposure to two lights of one type, either LED or incandescent in both Phase 1 and Phase 2, with or without an intervening 3-minute period of darkness between phases. The number of larvae in light at the beginning and end of each 3-minute period was counted and the difference in avoidance between Phase 1 and 2 for each group of 12 larvae was calculated. Results showed greater avoidance of light in Phase 2 when it was LED, but not when it was incandescent.

42. Shaumik Alam, Dr. Minsub Chung (Advisor), Dr. Moon-Soo Kim (Advisor)

Western Kentucky University

Pathogen-Specific DNA Detection Using Engineered DNA-Binding Proteins

DNA-binding proteins perform some of the most important functions of all biomolecular systems. They are frequent throughout nature, playing roles in cell apoptosis, protein folding, and DNA recognition. Consequently, engineered sequence-specific DNA-binding proteins are one of the most versatile biotechnologies currently being researched. There is high demand in global healthcare for an innovation that can sensitively and selectively detect pathogenic DNA. Our research on DNA-detection via

engineered DNA-binding proteins aims to deliver such a technology for use in sensitive medical diagnostic devices as well as for food and water safety assays in parts of the world with limited resources. We previously employed colorimetric Sequence-Enabled Reassembly with TEM-1 β -lactamase (SEER-Lac) to detect specific bacterial DNA sequence. SEER-Lac consists of the two inactive β -lactamase fragments which of each attached to a zinc finger protein (ZFP) would reassemble into an active full-length enzyme upon ZFPs binding to its target DNA. Here, we engineered two pairs of ZFPs which of each recognizes shiga toxin in *E. coli* O157 and staphylococcal enterotoxin B in *Staphylococcus Aureus*, respectively. The engineered ZFPs were immobilized in the acrylamide gel surface, which allows for protein arrays. The fluorescence detection system was used to improve the sensitivity of our system. In addition to developing biotechnology with other parts of the world in mind, we are expanding our worldview by collaborating research with a university in Seoul, Korea. During our recent summer in Seoul, we gained valuable experience with the laboratory practices as well as the culture of our fellow Korean lab mates. This opportunity to join hands with fellow researchers has been incredible, and we look forward to progressing global health solutions via our international collaboration provided by the NSF-IRES program.

43. Noah Gripshover, Evan Gora, Dr. Stephen Yanoviak (Advisor)

University of Louisville

Swimming Mechanisms of Temperate Forest Ants

Environmental challenges shape the evolution of animal behavior and morphology. For wingless terrestrial invertebrates like ants, pools of water on the forest floor are particularly dangerous. Here we show that ants can overcome this obstacle using a modified gait to transverse the water surface. We compared the locomotor morphology and swimming performance of two arboreal ant species that are common in Kentucky (*Camponotus pennsylvanicus* and *Formica subsericea*). We defined performance as speed and efficiency (deviation from a straight path) and determined the importance of individual legs to swimming performance using leg ablation experiments. We found that the front legs of both species are only used in propulsion; ants were slower, but showed no difference in swimming efficiency after ablation. Mid legs reduced swimming velocity and efficiency, especially for *C. pennsylvanicus* losing the most velocity after mid leg ablation. Rear leg ablation greatly decreased swimming velocity and efficiency, and these effects were greater for *F. subsericea* than for *C. pennsylvanicus*. However, these results are due to a loss in stability which affected performance. We also showed that both ant species are unable to swim if water tension is decreased by 10% or more. The results of this comparative study revealed the different mechanisms used by ants to overcome a common obstacle in terrestrial ecosystems. They also provide a foundation for understanding the evolutionary pressures faced by wingless organisms that live or forage in the forest canopy.

44. Nathaniel Wilson, Megan Randolph, Brock Sigler, Dr. Kristen Mark (Advisor)

University of Kentucky

Demographic correlates of average, desired, and perceived average men's IELT in a global sexually diverse sample

Although some attention has been paid to actual and desired duration of foreplay (Denney et al., 1984; Hunt, 1974), prior research investigating actual and desired duration of vaginal and anal intercourse (intravaginal/anal ejaculatory latency time; IELT) is minimal and focused on heterosexual North American perceptions (Miller & Byers, 2004). The current research aimed to assess whether average IELT differed from desired IELT and perceived average man's IELT based on gender, race, age, sexual orientation, geographical location, and number of sexual partners. A sample of 9272 individuals: 2551 cisgender women and 6721 cisgender men, average 35 years of age, from six of the seven continents, were recruited for a larger online study of men's sexual health. There were no significant differences in gender or orientation for average IELT experienced. As age increased, average, desired, and perceived other men's average IELT decreased. As number of lifetime and past year partners increased, average, desired, and perceived other men's average IELT increased. Average, desired, and perceived other men's average IELT was significantly shorter in Asia and among Asian men and women (9.5 mins avg.) than in all other continents (North America: 12.4 mins; South America: 14 mins; Europe: 13 mins; Oceania: 13 mins; Africa: 11.4 mins) and races/ethnicities. Men desired an IELT significantly longer than women (14 mins vs. 16 mins) and perceived the other men's average to be longer as well (13 mins vs. 14 mins). Desired IELT was shorter among bisexual (14.5 mins) participants than straight (15.5 mins) or gay (16 mins) participants. Perceived other men's average was longest among gay participants (15 mins). Cultural and demographic variables significantly impact the average, desired, and perceived other men's average IELT. Implications of these findings will be discussed in the context of cultural perceptions of duration of intercourse.

45. Richard Applin, Dr. David Eaton (Advisor)

Murray State University

The Effects of Review Prohibition Periods on Video Game Consumer Purchasing Decisions

Video game developers typically prohibit media outlets from publishing reviews of upcoming video games until some specified date. This study hypothesizes that review prohibition periods that give consumers relatively little time to digest reviews result in consumers being more likely to have a negative perception of an upcoming game – thus, resulting in lower initial sales. To test this, a number of video game releases from the past decade are considered in order to model the extent to which initial sales of a game are a function of review prohibition periods while holding a variety of other variables constant. The discussion goes on to highlight whether the impacts of prohibition periods change in a significant matter when the sample data is narrowed in order to reflect certain aspects of a game – including, but not limited to genre, whether a developer is independent, and whether a game is a sequel. Furthermore, the study examines whether there is any evidence to suggest that developers knowingly take advantage of the impact that prohibition periods have on consumers in order to maximize initial sales. Discussion concludes with a summary of the potential ramifications that the results have for the video game industry going forward.

46. Michael Eldin, Dr. Jorge Ortega-Moody (Advisor)

Morehead State University

Delta Robot Applications for Training

Technical Training for industrial robots has been a concern in automation attributable to production cost, software, and fee for training. For a school to purchase an industrial robot, one must have setup space for work stations and be capable of affording each unit. Work space for stations and affordability has been a leading cause in why students lack hands on experience with robots in an industrial environment. Our team is providing research with design and manufacturing an affordable robot using SolidWorks 3D CAD design software, 3D printers, and the HAAS CNC Machine. Fully Designed in 3D software a transfer of the Delta Robot can be altered from reality into virtual reality. Virtual Reality has offered opportunities to provide hands on experience to students from industrial equipment without the possibility of ever touching the unity. We have found by producing a virtual environment to simulate real world applications is a safe way of training students for operation control, maintenance, and programming. Thus, training for automation transforms from an exclusive limited source in reality to an opportunity in the number of certifications increasing through virtual reality.

47. Abby Kincaid-Bohn, Mr. John Ward (Advisor)

Jefferson Community College-Louisville

Current Social Issues: To what degree do demographic factors account for point of view?

Daily the press bombard Americans via radio, newspaper, and screen with sensationalized stories of conflict, strife, science, medicine, politics, and the like. The shock factor of reported news has become a standard selling technique. This research will attempt to determine if there is a significant relationship between what and how often we hear reported news stories and our opinions of current events.

This observational study, using a survey of approximately twenty questions, will closely examine relationships between how peers receive their daily news and whether or not they trust the United States government and our police, whether or not they support the Black Lives Matter movement, what their highest level of education and political party affiliation is, if race plays a factor, and if they are gun owners. Also being recorded and included is any potential significant relationships between demographics such as age and religion as they may relate to opinions about these and other current divisive political issues.

48. Justin Baldwin, Dr. Ryan Baggett (Advisor)

Eastern Kentucky University

Boiling Over on the Back Burner: Why Downplaying North Korea's Nuclear Ambitions is a Dangerous Proposition

For over sixty years, the Korean Peninsula has teetered on the brink of violence between two countries still technically at war. Since the division of Korea at the 38th parallel in 1945, a power struggle between North and South and, ultimately, Communism and Democracy has become a dangerous stalemate.

While many have downplayed the Democratic People's Republic of Korea (DPRK) as a backwards, isolated nation with a leader thirsty for power and attention, the North has one significant advantage in international relations. Successful nuclear tests and visible advances in ballistic missile technology give the DPRK a valuable bargaining chip in international relations, military defense, and regime control over the isolated state.

While the DPRK's weapons technology may seem crude, the simplistic design of the two atomic bombs dropped on Hiroshima and Nagasaki should be a reminder of the potential power of nuclear weapons. With Seoul and Tokyo in the crosshairs of the Kim Jong Un regime, millions of lives are at stake if the DPRK successfully delivers a nuclear weapon. With that, if the United States and its allies were to take action against North Korea militarily, would Russia and China defend the North and launch a Third World War?

This presentation will first analyze the history of conflict on the Korean peninsula, from the early 20th century to present day. Next, this project will discuss the influence of Communism and how the DPRK's allies, both former and current, helped it become the military threat it is today. Last, this work will examine how the United States has influenced the North to accelerate its weapons program and increase tensions in the region.

49. Xinju Dong, Dr. Yan Cao (Advisor)

Western Kentucky University

The Heterostructure of the Langmuir-Blodgett assembled TiO₂ Nanotubearray/Graphene Oxide for A Visible Light Responsibility

Benjamin Franklin discovered monolayer films on the surface of a liquid, which is followed by two other scientists, Dr. Irving Langmuir and Dr. Katharine Blodgett, who greatly made a development of the Langmuir-Blodgett (LB) assemble film method. This study presented, in the first time, the preparation for a hetero-structure of the GO-coverage TiO₂ nanotube arrays (TNA)-GO using the Langmuir-Blodgett (LB) assembly method. The highly ordered TNA nano-structure was synthesized using the anodic oxidation method. The GO was synthesized using the modified Hummer method. The GO coverage on TNA-GO, in a larger dimension and uniform, was light-penetrable to make underneath TNA receivable to light. TNA-GO has a red shift of 0.2eV and more longer wavelength sunlight can be used to apply into photocatalyst. The photocurrent density was found to be 32 μAcm^{-2} for the TNA-GO electrode, comparing with 12 μAcm^{-2} of TNA only. The formation of the Schottky junction between TNA-GO likely made the recombination rate of the photogenerated electron-hole pairs being decreased significantly, and consequently enhancing the photocurrent. Also, the resistance of TNA-GO decreased especially under irradiation condition. Meanwhile, the coverage of GO on TNA improved the hydrophilicity of TNA-GO, facilitating aqueous chemical reactions with good kinetics. The synthesized TNA-GO material is inexpensive, nontoxic and highly photocatalytically active thus promising for various photocatalytic applications.

50. Whitney Hiner, Karen M. Butler (Advisor)

University of Kentucky

Lung Cancer Prevention: A Review of the Literature

Lung cancer is almost completely preventable with the elimination of exposure to tobacco smoke and radon. There are over 210,000 people diagnosed with lung cancer in the US every year, resulting in over 157,000 deaths. Of these, it is estimated that 15,000 to 22,000 deaths are related to radon. The purpose of the literature review was to look at the existing evidence pertaining to lung cancer and lung cancer prevention. Using Cinahl, a search was conducted using the terms “lung cancer”, “radon”, “tobacco smoke”, and “prevention. The search using the key term “lung cancer” yielded 7,244 articles; “radon” yielded 176 articles; “tobacco smoke yielded 566 articles’ and “prevention yielded 34,723 articles. Because the number found was so large, individual searches were combined to narrow the findings. After combining “lung cancer” and “prevention” there was 53 usable articles found. In addition to information on the prevalence of lung cancer, the review identified recommended strategies for the prevention of lung cancer. Smoking cessation is highly recommended, as is elimination of exposure to secondhand smoke and radon. A possible teaching moment is to approach someone about smoking cessation and/or exposure to second hand smoke following an abnormal lung cancer screening or test result. This can be done in person, via telephone or social media, and through words of encouragement from family and friends. Additional methods are working to enact comprehensive smoke-free workplace laws and encouraging radon testing in the home.

51. Konnor Jones, Olivia Obermyer, Dr. Matthew Nee (Advisor)

Western Kentucky University

Temperature and electric field dependence of asymmetric stretching of nitrate ion

The decomposition of ubiquitous nitrate ion by exposure to sunlight (photolysis) produces toxic gases such as nitrogen monoxide, nitrogen dioxide, and ozone, which are harmful to human health and the atmosphere. Different induced nitrate geometries in water environments may contribute differently to the amount of products that form during photolysis. To better understand the steps of nitrate photolysis, the effects of different concentrations of charged particles (ions) in solution on nitrate geometry distortion is needed. Infrared light was used to measure the different molecular distortions of nitrate ion at a series of specified constant temperatures with varying amounts of total ions in solution. The different charged particles (arising from water molecules and other ions in solution) in solution of nitrate ion distort the geometry of the nitrate ion. Computational energy maps are generated with different nitrate geometries to better understand nitrate ion distortions. Different molecular motions are observable in the experimental graph of the energies of different motions of nitrate ions dissolved in water. The difference in energy between the two geometries is determined to be linearly proportional to the number of ions in the solution. As number of ions increases, the lower energy geometries becomes more favored. A specific initial path may be favored in low salt concentrations, leading to different products (such as more ozone, or more nitrogen monoxide) when exposed to light. Thus, the ratio of the nitrate geometries in water can be correlated to the amount of each product produced during photolysis to help explain the ionic strength dependence of the yields of those products.

52. Katlin Masterson, Dr. M. Cynthia Logsdon (Advisor)

University of Louisville

Knowledge of Symptoms Indicating Risk of Maternal Mortality in New Mothers of Low Income

Study Aims: What do low-income, new mothers know about symptoms indicating risk of maternal mortality? What actions would they take if they experienced symptoms? The study design was descriptive and cross-sectional. A convenience sample (n=40) was recruited. Eligibility requirements included: Delivered live child, English speaking, 18 years of age or older. After IRB and site approval, new mothers were asked the following questions: (1) What symptoms could a new mother experience after hospital discharge? (9 danger symptoms listed from national safety bundles.) (2) What action would you take if you experienced symptoms above? (3) How long after birth could a new mother have complications from the birth? New mothers were unfamiliar with symptoms of blood clots (63%), feelings that you may harm yourself or your baby (58%), and fever (65%). Most would notify their MD (92%) if they recognized the risk. 57% did not realize that complications could occur up to a year after birth. New mothers are unaware of symptoms indicating risk of maternal mortality, providing a foundation for the development and testing of interventions by collaborations between nurse researchers, educators, and practitioners.

53. Olivia M. Gearner, Dr. T. Keith Phillips (Advisor)

Western Kentucky University

Documentation of New Species of the Bizarre South African Endemic Genus *Meziomorphum* (Coleoptera: Ptinidae)

South Africa is home to some of the highest spider beetle diversity in the world. However, due to their small body size, and often small populations with limited distributions, there are likely many species that remain undiscovered and undocumented. Further, this megadiverse region includes three biodiversity hotspots - regions with high diversity that are also under severe threat of environmental destruction. *Meziomorphum* is a genus of spider beetles only found in South Africa within two of these hotspots. Four species of this genus are known, including one that exists only within a single cave located in the Western Cape. Four new species were recently discovered in several museum collections and are described herein. This genus is one of the most morphologically unique and distinct within the spider beetles. Species are characterized by a bizarre meringue-like and thick covering composed of fused setae on the pronotum and rows of long, erect spines on the elytra, the latter potentially an adaptation for avoiding predation from ants. Importantly, these beetles are useful for determining where protected areas should be created, as their distribution reflects habitats with a wide variety of species with similar high levels of endemism that are also under a great risk of extinction.

54. Adria Neal, Dr. Laura Moyer (Advisor)

University of Louisville

Obergefell v. Hodges and Support for Same-Sex Marriage: Changes in National and State Public Opinion

Many have argued that Supreme Court decisions on culture war issues, issues that cause conflict between conservative and liberal values, stifle public progression on the very problems they are meant to resolve. They often cite political and electoral backlash following a decision as evidence of this stagnation. However, this backlash may not be representative of widespread public opinion. In order to understand the relationship between Court decisions and public opinion, changes in opinion on culture war issues following a Supreme Court ruling must be measured. This study utilized national and state survey data in order to examine this relationship. It measured changes in support for same-sex marriage nationwide as well as in the state of Kentucky following the Court's decision in *Obergefell v. Hodges*. Changes in support for same-sex marriage among various racial groups and political parties are also assessed. Changes in nationwide support following *Obergefell* did not reach significance and changes in support on the state level, following the ruling, also could not be determined because of differences in survey question wording. However, findings showed that other significant same-sex marriage court decisions have preceded changes in overall support for same-sex marriage. Also, the gaps in support between racial groups and parties changed following these rulings, suggesting that groups have differing reactions to Court involvement. Research conducted after Kim Davis's refusal to issue marriage licenses to same-sex couples suggested that Kentuckians are willing to acquiesce with the Court's decision in *Obergefell*, despite widespread disapproval of same-sex marriage. Future research should utilize survey data with consistent questions before and after the Court's ruling and should control for other variables in order to isolate the effect of Court decisions.

55. Chloe Chaplin, Dr. Kathy Callahan (Advisor)

Murray State University

Witchcraft in Scotland in Early Modern Europe

This research project centered around witchcraft in Scotland and England in Early Modern Europe (roughly late 15th century to mid 18th century). The witch hunts characterized Europe during this time; our research initially looked at how England and Scotland compared to the European continent in the frequency of witch hunts, victimhood, and the specific details of the hunt. Scotland and England differed in that Scotland resembled the witch hunts of the continent whereas England was less prone to witch hunts. England suffered less witch hunts because they had significantly less religious turmoil than countries on the continent. Since our research project focused on England and Scotland, we looked into forming a conclusion as to why England differed from Scotland on the frequency of witch hunts.

The primary targeting of women characterized the witch hunts in both Scotland and England, and, while this became more apparent when massive witch hunts would break loose in communities, there was a clear gender connection even in isolated cases. The stereotypes surrounding witchcraft were commonly associated with women, especially older, isolated members of a community, leaving these women vulnerable to accusations.

Often an accusation began between neighbors and once the accused was questioned the risk arose that they could name accomplices when confessing. Confessions were often coerced under torture that left the accused with no choice but to name others. If left to spiral out of control, these small cases turned into large witch hunts in the hands of church and local officials. Our research project looked closely at the documented witch trials throughout Scotland to look for consistencies and aimed to link individual

cases that spiraled into large witch hunts to draw a conclusion about what types of accusations, victims, demographics, or officials were involved.

56. Shelby Tyring, Alice Jones (Advisor)

Eastern Kentucky University

Changing Conductivity Levels of Waterways in Southern Appalachia: Health Implications, Significance and Solutions

It is no secret that Appalachia--both the landscape and its people--face a plethora of social, environmental and economic issues. Many of these issues stem from a long dependence on resource extraction that has polluted and ravaged water ways throughout Eastern Kentucky. One way of measuring water quality in areas of industrialization and resource extraction is conductivity, or the ability for something to hold an electrical current from the presence of hard metals. Over a three-year period from 2006-2008, "The Big Dip" citizen-science water project tested more than 1600 locations in Appalachian Kentucky. In September of 2016, "The Big Dip Redux" event, was organized to resample a portion of those sites as part of the September 11th National Day of Service. The Redux event attracted more than 74 volunteers and 79 total sample sites around the communities of Hazard, Cumberland and Whitesburg Kentucky. The data from the Big Dip and the Big Dip Redux projects are compared to analyze changes in water quality and conductivity in southeastern Kentucky since 2006. ArcGIS tools like cluster analysis and space-time cluster analysis gives a better understanding of the significance of the changes both in a temporal and geographic context. Clusters of increasing and decreasing conductivity over time will be used to analyze possible water-related health implications and solutions for those communities affected the most by poor water quality.

57. Kimberly Heller, Dr. Lynne Hall (Advisor), Tim Crawford (Advisor)

University of Louisville

Sleep Quality in Female Caregivers of Children with Special Healthcare Needs

Due to role strain, caregivers often report depressive symptoms and emotional stress which can negatively impact their health. The purpose of this study was to determine if levels of depressive symptoms, negative thinking, and chronic stressors were inversely related to sleep quality in female caregivers of children with special healthcare needs. Data for this cross-sectional study were collected from 44 female caregivers. The women were recruited at clinics for children with special healthcare needs; all had a high level of depressive symptoms as measured by Center for Epidemiologic Studies – Depression Scale scores > 16. In-person interviews were conducted using the Pittsburg Sleep Quality Index (PSQI), the Everyday Stressors Index, and the Automatic Thoughts Questionnaire. Correlational analysis was used to evaluate interrelationships among the variables. Eighty-two percent of the caregivers had poor overall sleep quality (PSQI total score >5). Caregivers' total PSQI score was not associated with higher depressive symptoms, negative thinking, and chronic stressors. However, higher levels of chronic stressors ($r = .41, p = .01$) and more negative thinking ($r = .30, p = .05$) were associated with greater sleep disturbance. Higher levels of daytime dysfunction due to sleepiness was correlated with higher levels of chronic stressors ($r = .40, p = .01$) and negative thinking ($r = .47, p = .001$). The higher the depressive symptoms, the longer the caregivers' sleep duration ($r = .41, p = .01$). Interventions that focus on ways to decrease levels of chronic stressors and negative thinking in

caregivers of children with special healthcare needs may reduce their sleep disturbance and daytime dysfunction due to sleepiness. In turn, this may decrease caregivers' level of depressive symptoms.

58. Joshua Preston, Dr. Kevin Pearson (Advisor), Dr. Leryn Reynolds (Advisor)

University of Kentucky

Maternal Nicotine Exposure Prior to and during Pregnancy and Nursing Increases Offspring Obesity Risk

Smoking during pregnancy remains a pervasive problem in the state of Kentucky despite the well-known negative effects. In a pilot study performed by our lab, we found that over 30% of women who delivered at UK Chandler Hospital admitted to smoking during pregnancy. Recent research shows that babies born to mothers who smoke during pregnancy are at increased risk for obesity later in life. Nicotine is considered one of the most deleterious chemicals in cigarette smoke. Thus, we examined the potential mechanisms of offspring obesity susceptibility following perinatal nicotine exposure in a mouse model. Dams were exposed to vehicle or nicotine before and during pregnancy and nursing. Skin fibroblasts were isolated from the pups, grown in culture, and incubated in media that stimulated the cells to develop into lipid droplets. Lipid levels and mRNA markers related to obesity (chemerin and adiponectin) were quantified. Strong trends toward greater lipid staining ($p = 0.053$) and adiponectin ($p = 0.067$) expression levels were observed, as well as significantly increased chemerin expression levels.

59. Parker Graff, Dr. Ali Er (Advisor)

Western Kentucky University

Photodeactivation of Pathogenic Bacteria using Photosensitizers and Graphene Quantum Dots

Deactivating bacteria through photosensitizing compounds has been extensively studied and proved effective in isolated scenarios. However, these compounds are often hindered by their low singlet oxygen yield (102) and their bio incompatibility. Graphene quantum dots (GQDs) are an exciting new possible solution to the issues facing previously studied bacteria-deactivating substances. GQDs are single-layer thick, hexagonal lattices that have a high chemical stability and low toxicity due to their carbon structure. To synthesize GQDs, a solid state Nd:YAG pulsed laser operating at 1064 nm and 10 Hz was used to irradiate a mixture of nickel oxide and benzene. Multiple processes such as transmission electron microscopy (TEM) and nuclear magnetic resonance (NMR) were used to characterize the GQDs. Methylene blue (MB) was used as a reference as it is capable of a bacteria deactivation through high 102 production. However, MB was not able to accomplish this in blood due to protein binding, thus GQDs could be used to replace MB as an effective alternative for treatment of bacterial infections. Preliminary results have produced GQDs of less than 10 nm peaking around 310 nm. These promising results indicate that GQDs could be used to eliminate harmful pathogens in the body. This would be especially beneficial in a time of increasing bacterial resistance.

60. Michaela Herbig, Dr. Jonathan Gore (Advisor)

Eastern Kentucky University

The Relationship between Self-Construal and Parenting Practices

Two studies examined the link between participants' physical and relational self-construal, and their physical and relational parenting practices. We predicted that the type of self-construal would correlate with the corresponding type of parenting practices when participants thought about parenting hypothetically (Study 1) and in their own lives (Study 2). Participants completed an online survey that assessed their self-construal and their hypothetical or actual parenting practices. For hypothetical parenting, physical self-construal correlated positively with both physical and relational parenting practices. For actual parenting, relational self-construal and parenting practices were correlated positively. Experience in parenting influenced participants to show greater consistency between their relational self-construal and their relational parenting practices than they showed when thinking about parenting hypothetically.

61. Brittny P. Moore, Dr. Patricia Kambesis (Advisor)

Western Kentucky University

Bedrock Collapse Sinkhole Analysis in Bowling Green, Kentucky

Warren County, Kentucky is located atop bedrock consisting of Mississippian age limestones eroded by dissolution which formed sinking streams, springs, caverns and sinkholes. Though sinkholes are common throughout the state, southcentral Kentucky has the highest density. The most common type of sinkhole in Kentucky is the cover (or sediment) collapse which occurs in the soil or other loose material that overlies soluble bedrock. A second type of sinkhole is called a bedrock collapse, which occurs when the ceiling of a cave collapses, exposing the cave passage to the surface. In Warren County, Kentucky there are over 350 cave entrances and more than 30 km of cave passages. Despite that, bedrock collapse sinkholes are relatively rare. However, since 2001 two significant bedrock collapse sinkholes have occurred in the city of Bowling Green including the Dishman Lane collapse in 2001 and the Corvette Museum collapse in 2014. Both affected human infrastructure and were remediated at great expense. The purpose of this study was to determine the risk of bedrock collapse sinkholes as a geohazard in Bowling Green, Kentucky and to produce a bedrock collapse risk map indicating those areas that may be at risk. Known cave entrances were assessed to determine if they were caused by bedrock collapse or other processes. Bedrock collapses and associated cave passages along with geology were plotted on a GIS basemap and overburden was measured and calculated above known cave systems. Landuse and infrastructure locations were also plotted as a layer on the map. Areas of high risk were identified where overburden is thin over cave passages, where geologic fractures are evident and where infrastructure is located. Areas without existing infrastructure were also noted. Potential bedrock collapse zones were identified and highlighted on the map. There are over 350 cave entrances in Warren County and more than 30 km of cave passages and among those bedrock collapse sinkholes are relatively rare.

62. Adaline Heitz, Stephanie Boone, Delvon Mattingly, Richard Baumgartner

Dr. Kathy Baumgartner (Advisor)

University of Louisville

Healthy Lifestyle Impact on Breast Cancer-Specific and All-Cause Mortality

Individual lifestyle factors have long been associated with cancer mortality. The impact of these factors has been evaluated in combination through the creation of a healthy behavior index (HBI), but this relationship has not been extensively evaluated in minority populations. This study constructed an HBI to evaluate the impact of modifiable factors on breast cancer specific and all-cause mortality in non-Hispanic white (NHW) and Hispanic (H) women. Diet and lifestyle questionnaires were completed by women (n=837 cases) diagnosed with invasive breast cancer between 1999 and 2004 as part of the 4-Corners Women's Health Study. A score ranging from 0-12 was assigned based on dietary pattern, physical activity, smoking, alcohol consumption, and body size and shape, with a lower score representing greater adherence to national guidelines. An increased risk of breast cancer-specific mortality for HBI Q2-Q4 compared to Q1 was present but was not statistically significant overall by ethnicity or stage of disease. A significantly increasing trend across HBI quartiles was observed among all women, NHW women, and those diagnosed with localized or regional/distant stage of disease for all-cause (AC) mortality (p-trend=0.006, 0.002, 0.03, respectively). A significant >2-fold increased risk of AC mortality was observed for all women and NHW women in HBI Q4 vs. Q1 (HR=2.18, 2.65, respectively). These findings indicate an association between the HBI and all-cause mortality and are suggestive of an association between the HBI and breast-cancer specific mortality. However, the influence of the HBI appears to differ by ethnicity and stage at diagnosis.

63. Sara Assef, Dr. Kristin Ashford (Advisor)

University of Kentucky

An examination of the misclassification rates of prenatal smoking behaviors throughout each trimester of pregnancy.

Smoking during pregnancy is the most modifiable risk factors associated to poor pregnancy outcome (CDC, 2012). Self-reported smoking status has been associated with high misclassification rates (Lawrence et al., 2003). The aim of this research study was to examine misclassification rates of prenatal smoking behaviors during each trimester of pregnancy and evaluate personal characteristics associated with women who misclassify their smoking status. We hypothesized that third trimester self-report would be the most reliable measure of prenatal smoking status. This study was a secondary analysis of a prospective, multicenter trial of pregnant women. Each trimester, prenatal smoking status was assessed via maternal self-report and validated using preset urine cotinine limits. Nonsmokers were defined by a urine cotinine level of < 100 ng/mL; compared to smokers with a level of > 100 ng/mL Bivariate statistics including the two-sample t-test or chi-square test of association were conducted using SAS version 9.3, with an alpha level of .05 throughout. The present study included 380 women in the first trimester, 271 in the second trimester, and 256 in the third trimester. As pregnancy progressed, there was a decrease in misclassification of smoking status. In the first trimester, 35% of pregnant women self-identified as nonsmokers; however, were biochemically validated as smokers. In the second trimester and third trimesters, 31.9% and 26.6%, respectively, misreported their smoking status. Comparisons

among those who did or did not misreport their smoking status, yielded no differences in age, education, or planned pregnancy: however smokers who self-reported as non-smokers were more likely to be non-White ($p < .001$) and had significantly fewer smokers living in the ($p = .043$). Misclassification of prenatal smoking status decreases as pregnancy progresses. Biochemical validation of smoking status should be considered when assessing prenatal tobacco use; as misclassification rates remain high throughout each trimester of pregnancy.

64. Merideth Jewell, Dr. Kenneth Henderson (Advisor), Dr. Steve Chen (Advisor)

Morehead State University

Understanding Insights for Building Effective Marketing Strategies for Women's Volleyball

Despite the success on the court, many women's collegiate sport programs are consistently confronted by the issues of low fan attendance, budget constraint, and unsupportive gender stereotypes. This study examined college students' perception of women's volleyball and willingness for attending the competitions. A 24-question self-created survey based on literature (Bodenner, 2015; Imbriano & Downing, 2010; Wann et al., 1999) were administered to 139 college student participants who were randomly solicited on campus or an online platform. The results indicate that volleyball is the most popular and attended female spectator athletic event. Participants' perceptions of this sport are categorized by three main factors: (1) standard motivational factor, (2) socioeconomic and geographic concern, and (3) value and time constraint. Apparently, participants with athletic participation experience have a significant higher rating on the standard motivational factor than those who were non-athletes ($p < .05$). Participants who are affiliated with fraternity or sorority have a lower rating on standard motivational factor than who are not. Practical marketing strategies are drawn to promote and solicit attendance of various Greek student organizations by creating theme nights. More giveaways can be offered to reward more frequently attended and enthusiastic fans with athletic participation experience. Better and more direct marketing strategies can be used in order to draw fans to games. These strategies can be promoting the game around campus with side-walk chalk and flyers. It is best to remind student the day of the game, as college students do not tend to plan ahead.

65. Catherine Woosley, Meredith Cundiff, Keely Lawrence, Dr. Sharon Mutter (Advisor)

Western Kentucky University

Ambiguity Leads to Context-Specificity in Predictive Learning

Everything learned is acquired in some form of context; however, context is not always encoded. Learned information can become context-specific once one attends to context. Ambiguity has been shown to cause attention to context. In this experiment, we used Callejas-Aguillera and Rosas' (2010) restaurant and food-illness procedure to determine whether ambiguity in learning trials leads one to attend to, and therefore encode, context. College student participants learned food-illness associations by predicting whether the food would lead to the gastric illness and then receiving feedback on their response. The food-illness associations were presented in two different restaurant contexts. To manipulate the amount of ambiguity during learning, participants received either six blocks of true discrimination (TDTD), three blocks of pseudo discrimination and three of true discrimination (PDTD),

or six blocks of pseudo discrimination (PDPD). In true discrimination blocks, all food-illness associations were continuously reinforced. The associations were partially reinforced in pseudo discrimination blocks which introduces ambiguity. Thus, the TDTD condition had no ambiguity and the PDPD condition had the most ambiguity. At the end of the learning phase, participants' predictions for target cues were tested in their learned contexts or in switched contexts. We hypothesized that 1) participants in the conditions with ambiguity (PDTD, PDPD) would show context specificity; i.e., they would predict a higher probability of gastric illness during the test for target cues presented in the same context as the learning trials than for those presented in the switched context, 2) participants in the condition without ambiguity (TDTD) should show no attention to context during learning and thus rate the target cues the same in both contexts. Our results supported the claim that ambiguity during learning leads to context-specificity. Participants showed context effects in the conditions with ambiguity and did not show a context effect in the condition without ambiguity.

**66. Kristen Hamilton, Emily Bryan, Ms. Elizabeth Gordon (Advisor), Dr. Cynthia Corbitt (Advisor)
University of Louisville**

Evaluating sex differences and the effect of perinatal testosterone in the VPA mouse model of autism

Autism spectrum disorder (ASD) is more common in males than females, but the mechanism of this bias remains unknown. Elevated levels of fetal testosterone (fT) have been correlated with ASD diagnosis. Valproic acid (VPA), an antiepileptic medication, increases ASD risk in humans when used during pregnancy. The VPA rodent model of ASD mimics many of the behavioral and morphological features of ASD, with male rodents more vulnerable to some VPA effects. We used this model to test differential susceptibility by sex to prenatal insult (VPA), and to determine whether masculinizing females perinatally with testosterone propionate (TP) following prenatal VPA treatment would also masculinize their risk for abnormalities in ASD-related brain development and behavior. We demonstrated that VPA exposure in utero resulted in both delayed maturation and regression of skill development in motor development tests. In addition, VPA-TP males appeared to have reduced anxiety in the elevated plus maze, as measured by increased frequency and duration of open arm entries and the shortest duration in the closed arms, while displaying the highest velocity. In the wheel running assay all mice displayed normal routine gaining and cognitive rigidity; however, females, regardless of treatment group, displayed higher sociability as measured by time spent following a novel mouse. Finally, we found that cerebellum volume was unrelated to treatment group. Our study supports previous findings that prenatal VPA treatment impacts motor development; however, we did not find major effects of sex on vulnerability to VPA treatment or an effect of perinatal testosterone.

**67. Aubrey N. Penn, Dr. Hemali Rathnayake (Advisor)
Western Kentucky University**

Environmentally Friendly Metal Nanoparticle Synthesis Method for Application in Organic Solar Cells

Chemical research on solar cells, and more specifically organic solar cells (OSCs), is an increasingly large and impactful field of chemical and environmental research. Commercially available silicon-based solar

cells, while highly efficient, are large, rigid, heavy, and expensive, and for this reason the applicability of these devices is limited. We present a highly efficient OSC of widely accepted architecture constructed through our novel device fabrication method. Our process allows for less reaction time and lower energy input by replacing the commonly used thermal processing method with solvent processing. These OSCs have given high short circuit current and power conversion efficiencies (PCEs) of 6-6.5%, which is higher than similar devices. More complex active layer organic materials have also been tested for their applicability to OSCs and have shown improved oxidative stability, higher reproducibility, and moderate PCEs. Conductive metal nanoparticles, reduced from metal salts, can be placed in the active layer of OSCs, and have been shown to increase PCE values, but current synthesis methods for metal nanoparticles utilize harsh reagents, toxic to the environment. Our synthesis method is run in the aqueous phase, without heat, and with the mild reducing agent, sodium borohydride, making for an environmentally benign reaction. Nanoparticles of iron, nickel, copper, and their alloys have all been successfully synthesized, and preliminary conductivity measurements have been promising. Future work will be focused on optimizing nanoparticle deposition onto the OSCs, for highly efficient and widely applicable photovoltaic devices. If successful, these devices could be used in everyday electronics and for large-scale energy harvesting, reducing society's dependency on fossil fuels.

68. Adda Coleman, Dr. Christina Conroy (Advisor)

Morehead State University

Virtue Epistemology and Narration in 'Beowulf'

The *Beowulf*-poet utilizes a third-person omniscient narrator, telling *Beowulf* entirely through the third-person narration. While the epic poem offers a single narrative style, the *Beowulf*-poet incorporates two perspectives, namely those of the third-person omniscient narrator and *Beowulf*. Scholars like Taylor Culbert frown upon the *Beowulf*-poet's narrative choice, viewing it as anticlimactic. Other scholars, like Charles Moorman, hold that the *Beowulf*-poet's choice reinforces the role of omniscient narration in epic tradition, posing little, if any, problem for climactic appeal. This paper approached *Beowulf* through a virtue epistemic reading. Virtue epistemology holds that (1) there are certain epistemic virtues, like open-mindedness and a desire for knowledge which (2) aid in one's acquisition of knowledge. Fate is a pervasive force in epic tradition; it is neither avoidable nor changeable. Likewise, heroism is an integral theme to the heroic epic, with these epics chronicling the journeys, battles, and the like of a protagonist. This paper argued that the third-person narrator, being a determiner of fate, also holds as an epistemic standard through which to measure *Beowulf*'s heroism. Passages written in *Beowulf*'s perspective expose *Beowulf*'s epistemic virtues and the development of those epistemic virtues through the course of *Beowulf*. This paper appealed to virtue epistemology to contend that the *Beowulf*-poet's placement of *Beowulf*'s perspective is not an arbitrary or anticlimactic one, but rather an intentional one that reveals *Beowulf*'s growth as a hero. A virtue epistemic reading does not beg the question the way appealing to literary conventions does, providing a new theoretical framework through which to measure characterization in *Beowulf*.

69. Alexander Banaszak, Tyler Smith, Dr. Sanju Gupta (Advisor)

Western Kentucky University

Molecular sensitivity and selectivity of metal nanoparticles decorated graphene as 'smart' surface-enhanced Raman scattering (SERS) platforms [Hybrid Poster 2-A]

Raman scattering signal enhancement that uses graphene as support, graphene-enhanced Raman scattering (GERS), is a recent phenomenon. It can produce clean and reproducible Raman signals of chemical molecules with significantly enhanced signal intensity in contrast to traditional surface- (SERS) and tip- enhanced Raman scattering (TERS) techniques. While enhancement in SERS and TERS arise due to the electromagnetic mechanism, GERS also relies on a chemical mechanism and therefore shows unique molecular sensitivity and selectivity. In this work, we developed graphene materials decorated with noble metal (silver and gold) nanoparticles for detection of different chemical molecules *e.g.* methylene blue (MB) and rhodamine 6G (Rh6G) keeping in view of their optical and biological importance. The results illustrate that silver and gold nanoparticles immobilized on graphene and its derivatives (graphene oxide and reduced graphene oxide) significantly enhance the signal, in general, and as cascaded amplification of SERS signal on multilayer architecture, in particular, larger than those on the metal nanoparticles in absence of graphene. Additionally, the sensitivity can be tuned by controlling the size of nanoparticles and the highest SERS enhancement factor of almost three to four orders of magnitude is achieved at the optimal 30 nm silver and 40 nm gold nanoparticles on reduced graphene oxide. Moreover, these highly-sensitive graphene-nanoparticle sensors are capable of detecting MB and Rh6G molecules over a broad range of concentration ranging 10 pM to 100 mM. Therefore, these substrates are promising as advanced 'smart' SERS platforms for detection of chemicals with ultrasensitivity. The GERS enhancement is discussed in terms of 1. molecular structures (molecular symmetry; face-down and edge-on and substituents similar to graphene), 2. charge-transfer interaction between molecules and graphene and 3. graphene-metal nanoparticle interfacial hybridization. They are found to be favorable for Raman signal enhancement and corroborated with UV-vis absorption spectra of molecules in contact with or in presence of graphene helping to guide molecular detection useful in medicine and biotechnology.

70. Tyler Smith, Alexander Banaszak, Dr. Sanju Gupta (Advisor)

Western Kentucky University

Graphene quantum dots electrochemistry and development of sensitive electrochemical biosensor [Hybrid Poster 2-B]

Graphene quantum dots (GQDs) are zero-dimensional material derived from graphene derivatives with characteristics from the structure of graphene with quantum confinement and edge effects possessing unique properties. Intense research activity in GQDs is attributed to their novel physical-chemical phenomena arising from the sp^2 -bonded carbon core surrounded with edge functional moieties. In this work, GQDs of optimal 5-7 nm size are investigated for their fundamental electrochemical properties and use in electrochemical sensing including enzyme-based glucose biosensor. Glucose oxidase (GO_x) was immobilized on GQDs modified glassy carbon (GC) and the UV-Vis absorption and fluorescence spectroscopy, electron microscopy, cyclic and differential pulse voltammetry and electrochemical impedance spectroscopy, techniques were used for characterizing the electrochemical biosensor. The

well-defined quasi-reversible redox peaks were observed under various electrochemical conditions (pH, concentration, scan rate) to determine diffusion coefficient and heterogeneous electron transfer rate constant. The developed biosensor based on GO_x/GQD responds efficiently to glucose presence over the concentration range 10 mM - 3 mM with limit of detection 4.57 mM. The relatively high-performance is attributed to large surface-to-volume ratio, excellent biocompatibility of GQDs, mesoporous GQD/GC and abundant hydrophilic edges and hydrophobic plane in GQDs that favors the GO_x adsorption on electrode surface. We also carried out similar studies with other graphene-based electrode surfaces and biomolecules for electrochemical comparison opening ways for potential sensing applications in medicine as well as biotechnology.

71. Albina Laskovtsov, Amber Lawson, Dr. Bernadette Barton (Advisor)

Morehead State University

College Parties and Raunch Culture

“Raunch” culture, sometimes called the “sexual-ization” of culture, describes a hyper-sexualized climate that over-sexualizes women while encouraging women to sexualize other women and themselves. Raunch culture influences much of our social life. Drawing on observation at five parties, and interviews with 25 women and men about their experiences at college parties, this study explores manifestations of raunch culture at college parties. This research finds that some male party-goers display an aggressive entitlement to female bodies that we speculate is a consequence of sexist cultural norms.

72. Sarah Krull, Dr. Douglas Krull (Advisor)

Northern Kentucky University

What Traits Make the Best President?: The Role of Intrinsic Religiosity in Predicting the Importance of Ability and Morality for Presidential Candidates

The current study was intended to discern the importance of ability and morality in a presidential candidate and the degree to which religiosity predicts valuing these characteristics. As part of a large questionnaire, 258 college students (46 male, 208 female, 4 not reported) completed a measure of intrinsic religiosity (the view that one’s religion is important in itself and not merely for social benefits). Participants also rated the degree to which 10 traits, five pertaining to ability (e.g., intelligence) and five pertaining to morality (e.g., integrity), were among the most important for a presidential candidate to possess, on 9-point Likert-type scales anchored with the phrases “Strongly disagree” and “Strongly agree.” All 10 traits were judged to be relatively important, but the degree of importance varied. A descriptive analysis revealed the following means: good judgment (8.18), knowledgeability (8.08), self-control (8.03), honorableness (7.97), integrity (7.85), ethicalness (7.78), intelligence (7.71), interpersonal skill (7.30), articulateness (7.00), and humility (6.98). Indices were also created by summing the ability traits ($\alpha = .86$, mean = 38.28) and the morality traits ($\alpha = .82$, mean = 38.70). Intrinsic religiosity was correlated with the morality index ($r = .164$, $p = .012$), and with two of the moral traits, humility ($r = .195$, $p = .003$) and honorableness ($r = .136$, $p = .036$). Intrinsic religiosity was not correlated with the ability index or any of the ability traits (all r s < .044, all p s > .50). Overall, both ability and morality were valued, as demonstrated by the means, but religious participants were more likely to value certain moral traits than were participants lower in religiosity.

73. Erica Lindsey Fields, Dr. Jasmine Farrier (Advisor), Dr. Laura Moyer (Advisor)

University of Louisville

United States Federal Courts and Inter-Branch War Powers

When a separation of powers issue arises between the branches of the United States government, they can seek remedy in the federal courts. This has become especially relevant in the area of war powers. Over the past 40 years, members of Congress have challenged Presidential encroachment of war powers 10 times in the courts. Purpose: to determine if the rulings in the 10 war powers cases could best be explained by the ideologies of the judge(s) serving on the cases, or if institutional pressures regarding the judiciary's place in the separation of powers system compromised the Court's ability to rule on their policy preferences. H1 (The Attitudinal Hypothesis) There will be a positive relationship between the ideological predictors of a judge and rulings in war powers cases. H2 (The Institutional Hypothesis) There will be no relationship between the ideological predictors of a judge and their rulings in war powers cases, reiterating the idea that courts make decisions based on other factors relating to its role as an institution within the separation of powers system. Federal courts ruled in favor of Congress twice on the District Court level and once on the Appellate level, regardless of party affiliation, which suggested evidence for H2, although some instances of party loyalty throughout the data were displayed that provided support for H1. Regarding war powers cases, federal courts do not tend to strike down Presidential action that Congress feels encroaches on its Constitutional powers. This hesitancy to declare a Presidential act unconstitutional demonstrates an institutional fear of an activist court regarding separation of powers issues, and gives unprecedented foreign policy power to the Executive branch.

74. Kylie Colvin, Dr. Bruce Webb (Advisor)

University of Kentucky

Suppression of Heliothine Pest Populations by HZNV-2 Nudivirus

Heliothine pests, including *Helicoverpa zea*¹, *Helicoverpa armigera*, and *Heliothis virescens*², are noctuid³ moths and invasive species⁴ that cause billions of dollars of damage to crops each year. Their damage can be catastrophic to numerous host plants such as tomatoes, cotton, tobacco and corn because these pests feed on the fruit of the plant. Current natural and biological controls⁵ often fail to prevent damage caused by these insect pests, which supports continued research into other control methods for *Helicoverpa zea*. The HZNV-2 nudivirus⁶ is a sexually transmitted insect virus that causes insect sterility when it is in the lytic cycle. HzNV-2 deforms the reproductive tracts of both males and females, reduces eggs produced by females, creates sterile progeny, increases the amount of pheromones produced by females, and fails to produce pheromone static peptide⁷ in males when infected. Unfortunately, this wild-type virus enters a latent⁸ phase two-thirds of the time and causes no damage to the reproductive organs or reduction in fecundity. Our lab has produced viral mutants⁹ of HVNZ-2 that increase virulence of the disease. Virus latency is decreased in the insects with viral mutants causing sterility from 80-100% of the time. This report describes wildtype HZNV-2 and mutant HzNV-2 infections in a non-host pest species, *Heliothis virescens*, commonly referred to as the tobacco budworm, to determine if this virus will replicate and cause similar defects in other, closely related pest insects. We are investigating the

suppression of Heliothine pest populations₁₀ by producing virus-infected sterile moths, and we predict that HZNV-2 will be an effective biological control of Heliothine pests in the future.

75. Emily Baltes Thompson, Caitlin Turner, Clare Mearns, Dr. Cecile Marczynski (Advisor)

Northern Kentucky University

Acute Effects of Alcohol mixed with Energy Drinks versus Alcohol Alone on Balance and Aggression

The purpose of this study was to determine whether the consumption of Alcohol mixed with Energy Drinks (AmED) versus alcohol alone alters balance and motor control. Alcohol mixed with energy drinks (AmEDs) have been associated with increased drinking resulting in greater levels of intoxication and increased rates of injuries compared to alcohol alone (Price et al., 2010; Thombs et al., 2010; Velazquez et al., 2012). Prior research from our lab has shown that consumption of AmED may result in better balance when compared to the same dose of alcohol. These findings might alter performance on the standardized police field sobriety task. Using a within subjects 2x2 research design, subjects (n = 14) attended four different test sessions where they were presented with alcohol and energy drinks, alone and in combination. Following dose administration, participants completed an automated Biosway assessment of balance, the standardized field sobriety task, and several computer tasks to measure aggression. The results indicated that participants display better balance following the AmED dose when compared to alcohol alone. Furthermore, some aspects of the field sobriety test also appear to be less sensitive to impairment following AmED administration compared to alcohol alone, including the measure of visual nystagmus (i.e., the involuntary jerking of the eye). The findings indicate that stimulant drugs, when mixed with alcohol, might alter the reliability of the police standardized field sobriety test. This research was funded by NIH grants AA019795 and GM103436 (Kentucky Biomedical Research Infrastructure Network - KBRIN).

76. Adam Stanley, Matthew Hezseltine Dr. Sanghyun Lee (Advisor)

Morehead State University

Feasibility of Efficient Photovoltaics in Eastern Kentucky" / "Developing a 3-D printed solar vehicle with Computational Fluid Dynamics (CFD) simulator"

Feasibility of Efficient Photovoltaics in Eastern Kentucky: Photovoltaics (PV-also called solar photovoltaic devices) are used to harness the power of the sun via the electronic process that occurs within semiconductor cells. The solar energy is absorbed by the cells, which causes the electrons to break away from their atoms, allowing them to flow within the material to produce electricity. This electricity will become the renewable energy for Kentucky, as the generation of coal will but come to a stop within the near future. Like Denmark who is running on 100% renewable generation we must stride to become fully operational on solar.

In the present work, we systematically studied about renewable energy resources, in particular, solar energy for the application of photovoltaic cells in Eastern Kentucky. By analyzing data from our installed panels incorporating MPPT charge controllers we have constructed a maximum power algorithm that performs best for the location. With this algorithm and PV cells at Morehead State University designed to follow the direction of the sun for optimized output, the measurements of the daily electricity

production have validated our research. With the advancements in solar cell technology what was once impossible is now reality, as energy gathered within just 1/5th the land can power the state. Knowing this, the area is a prime location for the use of PV as a production source of renewable energy. This can enable the advancement of this region to become less dependent on fossil fuels and begin the creation of an infrastructure that will run off solar power.

Developing a 3-D printed solar vehicle with Computational Fluid Dynamics (CFD) simulator:

A solar vehicle is completely powered by solar energy using an array of solar cells its converts the suns energy into electrical energy and then stores this in a onboard battery. The use of renewable energy in vehicles is important for us to become less dependent on fossil fuels. In the present work, we propose a new concept of designing a solar cell-powered vehicle by 3-D modeling with Solid Works and an industry standard commercial simulator with SC/Tetra Computational Fluid Dynamics (CFD). Focusing on the goal of developing a 3-D printed solar vehicle in Eastern Kentucky , we are designing our new type of vehicle to their specifications by drawing upon the technology from areas such as aerospace, solar energy, and the automotive industry. We are working to develop a more efficient vehicle by using simulation software to minimize our drag coefficient, along with other negative forces such as tire friction and brake loss.

77. Martha Tillson

Mr. Justin C. Strickland (Advisor), Dr. Michele Stanton-Tindall (Advisor)

University of Kentucky

Age of first arrest, sex, and drug use as correlates of adult risk behaviors among rural women in jails

Incarcerated women frequently report initiation of substance use and sexual encounters at an early age, and often engage in high-risk drug use and sexual behaviors as adults. Less is known, however, about the relationship between age of onset of these risk behaviors, as well as the timing of first arrest, and risky behaviors in adulthood. Objectives of the present study were to: 1) profile age of first arrest, age of first illicit drug use, and age of first sex in a sample of rural women drug users (N=400) recruited from jails and screened for high-risk behaviors; 2) to examine the relationships among the age of onset of these risk behaviors; and 3) to examine the unique contributions of these onset variables to adult high-risk drug use and high-risk sexual practices. Ages of initiation were all positively and significantly correlated at the bivariate level, indicating that onset of sex, illicit drug use, and arrest are related among high-risk rural women. In logistic regression models, each onset variable independently increased the likelihood of several specific adult risky substance-using or sexual behaviors; independent effects of demographic covariates were also noted. In describing rural women's initiation of risky behaviors and involvement with the justice system and exploring associated differences in adult trajectories, this study has contributed to an understanding of the development of high-risk rural women. Implications are discussed for screening, intervention, and treatment targeting vulnerable women and girls in rural areas, particularly within criminal justice settings.

78. Matthew Waters, Dr. Ryan Baggett (Advisor)

Eastern Kentucky University

The Identification and Prevention of Insider Threats

Insider threats, or attacks against a company from within, are a pressing issue both domestically and internationally. Frequencies of these threats increase each year adding to the overall importance of further research analysis. In fact, many case studies have been conducted which state that these employees who participate in insider attacks tend to exhibit certain personality and characteristic traits, as well as certain observable behaviors, that would indicate to other employees that an attack is imminent. It is hypothesized that companies will be able to take a more preventative stance of security as opposed to a reactive stance by identifying these characteristics and behaviors, as well as the motivations that drive them. In order to accomplish this task, companies must implement multiple layers of technological means of security, as well as take a more hands-on, holistic approach with company-wide involvement.

79. Andrew M. Davis, Dr. Bruce Kessler (Advisor)

Western Kentucky University

Density-Dependent Leslie Matrix Modeling for Logistic Populations With Steady-State Distribution Control

The Leslie matrix model allows for the discrete modeling of population age-groups whose total population grows exponentially. Many attempts have been made to adapt this model to a logistic model with a carrying capacity, with mixed results. This poster describes a new model for logistic populations that tracks age-group populations with repeated multiplication of a density-dependent matrix constructed from an original Leslie matrix, the chosen carrying capacity of the model, and a chosen steady-state age-group distribution. The total populations from the model converge to a discrete logistic model with the same initial population and carrying capacity, and growth rate equal to the dominant eigenvalue of the Leslie matrix minus 1.

80. Madison Furnish, Dr. David Hein (Advisor)

University of Louisville

Investigation of Arylamine N-Acetyltransferase 1 Knockout in MDA-MB-231 Cell Lines via Anoikis and Invasion Assays

Arylamine N-acetyltransferase 1 (NAT1) was originally discovered as a xenobiotic metabolizing enzyme. NAT1 is ubiquitously expressed in human tissue. The endogenous role of NAT1 in breast cancer piqued our interest due to high levels of expression of NAT1 in ER positive breast cancers. We investigated the MDA-MB-231 cell line, which has relatively lower NAT1 expression than its ER positive counterparts. MDA-MB-231 CRISPR/Cas9-mediated knockouts have been created with no detectable NAT1 activity. These cell lines showed a dramatic difference in the ability to form colonies in soft agar, which suggests that the absence of NAT1 affects anchorage-independent growth. Therefore we utilized the MDA-MB-231 CRISPR/Cas9 NAT1 knockouts in this investigation to test anchorage-independent growth and invasive abilities. We hypothesized that the knockouts would be susceptible to anchorage-dependent

apoptosis (anoikis) and have a decreased invasive ability compared to the parental line. Both the CRISPR/Cas9-mediated NAT1 knockout and the parental line were compared side by side in anoikis assays spanning six days, Transwell® invasion, and migration assays. Albeit prior literature reported a decrease in invasive ability *in vitro*, we determined that the absence of NAT1 in MDA-MB-231 cell lines had little to no effect on anchorage-independent growth and the cellular invasion ability (P= 0.19). Thus, the absence of NAT1 in MDA-MB-231 cells did not affect anchorage-independence or invasion, but rather the ability of those cells to grow in close proximity to one another.

81. Rachel LeDuc, Judy Voelker (Advisor)

Northern Kentucky University

Examining the Prehistoric Record in Southeast Asia: Clay Pellets as an Indicator of Social Change

In the wildly overlooked region of Southeast Asia lies a wealth of archeological data depicting the society's antiquity and culture. Only recently unearthed, the research conducted in this area suggests discrepancies concerning the fundamental understanding of the region's prehistory and archeological record, and the evidence observed through this project intends to enlighten researchers of the potential anthropogenic and environmental changes occurring. The focal point for the investigation was clay pellets found in northeast Thailand. Developed during prehistory and continued as a modern day practice, these marble-sized artifacts were used in accompaniment with a bow to hunt for small game, such as lizards and birds, which provided a source of sustenance for the society. Archeometric analysis was conducted on these artifacts, and the clay pellets were also examined in their stratigraphic contexts to determine whether the variance in the clay or temper additives changed diachronically during the occupation of the site. As a tangential observation, clay pellets from other areas of Southeast Asia were compared to those found in northeastern Thailand, which discloses information concerning similar processes as well as cultural changes. The interpretation of the results allows for a better understanding of the region's past and sheds light on this region of Southeast Asia.

82. Sydney Gebka, Dr. Johnathan Nelson (Advisor)

Morehead State University

An Inductive Study of Perceived Susceptibility to Unethical Behavior

Well-publicized ethics scandals and research on ethical behavior provide evidence that just as everyone is capable of making mistakes, the vast majority of individuals are capable of making unethical decisions. Despite this evidence though, the vast majority of people tend to think of themselves as very ethical people. However, there is often a gap between how ethical people are compared to how ethical they perceive themselves to be. While individuals differ in the level of trust they place in themselves to make ethical decisions in the workplace, we tend to view ourselves as more ethical than we really are. While research to date has largely focused on reasons why we fail to live up to our highest ethical ideals, we believe that it is important to examine those situations where we are aware of our capacity to engage in unethical behavior. We define this awareness of our potential to enact unethical behavior, perceived susceptibility to unethical behavior. Because little attention has been paid to this construct, we conducted an inductive research study to develop a model of behaviors and outcomes associated with perceived susceptibility to unethical behavior. We report the experiences and outcomes of individuals

who have experienced this perceived susceptibility to unethical behavior. We examined the perceptions people have of themselves and the actions they take as a result of experiencing perceived susceptibility to unethical behavior. We developed a construct to define what makes individuals susceptible to making unethical decisions in the workplace. We discuss the implications of perceived susceptibility to unethical behavior for creating a greater openness for individuals to discuss ethical temptations, to be more open to interventions for promoting ethical behavior, and actions taken to reduce their level of perceived susceptibility for making unethical decisions.

83. George Pate, Mrs. Janelle Hager (Advisor), Dr. James Tidwell (Advisor)

Kentucky State University

Comparison of The Production of Bibb Lettuce Reared In Indoor Aquaponics System using Large Mouth Bass (*Micropterus salmoides*) Vs. Nile Tilapia (*Oreochromis niloticus*)

Aquaponics is a sustainable food production system that combines hydroponic plant growth with fish rearing in a recirculating aquaculture system. Nile tilapia (*Oreochromis niloticus*) are predominantly raised in aquaponics due to their fast growth rates and ability to tolerate a variety of water conditions. As aquaponics becomes more popular in temperate climate zones, farmers are looking for alternative fish species that are more compatible with cooler temperatures and have a higher market value than tilapia. Authors will determine if plant growth factors as well as, the availability of nutrients in aquaponic systems are affected by the difference in nutrient requirements among fish species,

This study evaluated plant growth factors between aquaponic systems stocked with Nile tilapia and largemouth bass (LMB) (*Micropterus salmoides*). Six replicate systems were used that included a 415-L fish tank, a 190-L settling tank, a 115-L clarifier, and two 1.5 m² floating raft beds with a 72 plant capacity. Bibb lettuce (*Lactuca sativa*) and Red Russian kale (*Brassica napus*) were evaluated in successive planting cycles. Fish were stocked at approximately 1,400g per system and fed five percent body weight per day. Tilapia and LMB were fed a floating feed containing 32% and 45% protein, respectively. At harvest, total plant biomass in each system was recorded. Sixteen representative samples from each system were also collected and analyzed for plant and root weight, number of leaves, leaf surface area, root/shoot ratio, and chlorophyll content. Representative samples from each system were also dried and analyzed for micro and macro nutrient content.

Upon conclusion of this study, researchers will determine if differences exist in plant growth factors between tanks stocked with tilapia and LMB. This information will determine if producers are able to maximize their production and potential profits in aquaponics using LMB.

84. Kylie Heupel, Haley Sizemore, Dr. Judith Jenkins (Advisor)

Eastern Kentucky University

Using fundamental chemistry to make functional materials for solar energy conversion applications

Population growth and rapidly increasing energy consumption necessitate innovative materials for energy conversion and storage. Gains in solar electricity and battery technologies are evidenced by the availability of commercial products. However viable solar fuel platforms—where the energy in sunlight

is used to form storable fuels such as hydrogen gas—have not yet been realized, motivating the work presented here. In order to produce hydrogen gas from sunlight and water, a photocatalyst is required. The ideal photocatalyst for hydrogen gas generation absorbs solar photons (sunlight), producing high-energy electrons necessary for the reduction of hydrogen ions in water. The host nanocrystal studied here, zinc sulfide (ZnS), can reduce hydrogen ions to form hydrogen gas, but this material does not absorb very much sunlight. Our research focusses on increasing the amount of sunlight absorbed by the nanocrystals so that more high energy electrons are generated. We use a technique called cation exchange to substitute copper ions into the ZnS crystal; the resulting material will absorb more sunlight. Systematic control of the amount of copper incorporated into the ZnS is necessary. We hypothesize that by varying the size, shape, and flexibility of the copper source, we can sterically control the availability of copper to the ZnS nanocrystal, thereby affording controlled incorporation of copper. The experiments presented here demonstrate the synthesis and characterization of several copper sources. Preliminary cation exchange results demonstrate progress towards functional photocatalytic materials. Energy sources such as these—which have the potential to be clean, affordable, and abundant—simultaneously help solve societal energy challenges and provide opportunities for further innovation and job growth in the energy sector. The work presented here represents concrete ways that Kentucky’s students and academic institutions actively contribute towards the development and implementation of clean energy technologies in meaningful ways.

85. Logan Bailey Parker, Dr. Yan Cao (Advisor)

Western Kentucky University

The Visible-light Responsive TiO₂/Graphene Heterojunction Materials

Titanium dioxide is a known photocatalyst, but can only be responsive to the UV light spectrum of the sun’s emitted light. Previous research has shown that combining graphene with titanium dioxide highly enhances the photocatalytic ability of the Dye Sensitized Solar Cell (DSSC) by allowing the solar cell to access the visible light spectrum, which is majority of the sun’s emitted light. This project studied the effects of the size of the titanium dioxide nanoparticle on the photocatalytic ability of the solar cell, assuming that smaller titanium dioxide nanoparticles would have greater contact with graphene sheets, which would create a higher photocatalytic ability. Through a modified hydrothermal method (Chae et. al., 2003), titanium dioxide was synthesized with varying sizes, this was followed to be combined with reduced graphene sheets using a modified hydrothermal method. To determine the photo-responsibility of obtained composite materials, we used the photodegradation tests of rhodamine B to demonstrate their effectiveness. It was found that the smaller the size of the titanium dioxide nanoparticle, the greater the degradation of rhodamine B, which validated the project hypothesis.

86. Christina Seibert, Elizabeth Paige Hart, Tess Quesenberry, Dr. Joseph Steffen (Advisor)

University of Louisville

Serum Testosterone, Total Adiponectin, and Vascular Adiponectin Receptor R1 during Maturation of the Rat

Adiponectin, a protein hormone secreted from adipocytes, has been linked to obesity and diabetes as well as vascular co-pathologies such as hypertension and atherosclerosis. Secretion of adiponectin has been reported to be regulated by testosterone, and the focus of this work is to evaluate serum testosterone and adiponectin, as well as vascular adiponectin receptor 1 levels during maturation in male and female rats. Our previous work has verified similarities in circulating levels of adiponectin and sex differences between rats and humans, and the present work presents a more complex attempt to verify the usefulness of the rat as a model. Serum and blood vessels were isolated from 3 week, 6 week and 9 week old rats and stored frozen until utilized. Serum testosterone was determined by ELISA (Enzo), serum adiponectin was determined by ELISA (ALPCO), and receptor 1 concentrations determined by ELISA (NeoBiolab). Serum adiponectin concentrations did not differ between 3 week old male and female rats, but the levels of adiponectin had fallen by 80%.

87. Emily Ann Israelson, Dr. Shauna Reilly (Advisor)

Northern Kentucky University

Learning Liberties: The Role of Educational Institutions and Programs in Determining Political Tolerance

The relationship between higher levels of education and political tolerance has been well documented among scholars for decades. Building on theories that suggest that enhanced cognitive abilities are responsible for this increase in tolerance, we hypothesized that certain educational institutions would increase individuals' willingness to extend civil liberties to nonconformist groups. We found that high school civics programs lead to an increase in tolerance, and that students who majored in the arts and social sciences in college were also more likely to be politically tolerant. Altogether, these findings suggest that tolerance is directly related to educational programs from which students can learn democratic values.

88. Rhiannon Cecil, Demetrius Davis, Garrett Heiby, Dr. Tamara Sluss (Advisor)

Kentucky State University

Survey of Stream in Central Kentucky

Aquatic insect communities are often used as a measure of stream health as some species are sensitive while other species are tolerant to habitat degradation and poor water quality. This study measured and compared aquatic insects, habitat scores, dissolved oxygen, PH, and conductivity from three streams in Central Kentucky. The objectives of this study were to compare the data between the three streams, and to determine if the habitat and water quality parameters are effecting aquatic insect communities. Water quality data was collected at each stream with a Hach water quality probe and aquatic insects were collected using the kick-method with a D-frame net. Our results indicate that there is a significant difference (p0.05) in sensitive aquatic insects and habitat score between the three streams although the

substrate in Little Six Mile and Student Branch were dominated by bedrock, no cobble or gravel was present to provide habitat structure. Our results indicate that the channelization and therefore habitat degradation of Little Six Mile and Student Branch have negatively impacted the sensitive insect taxa as their absence is linked with the absence of habitat in the bedrock streams. These ecosystems and their biota would benefit from habitat restoration.

89. Keiti Rueter, Dr. Ivan Novikov (Advisor)

Western Kentucky University

Utilization of Random Walk MC Diagnostics for Calculations in the Glauber Model

The Random Walk MC algorithm returns a sequence of random numbers from a desired probability distribution by making random steps in an appropriate space. We are using obtained random numbers to calculate reaction and interaction cross sections for nuclei with $A < 40$ in the framework of the Glauber Model. Calculated cross sections are then compared to the experimental results to estimate parameters of the nuclear density distribution. It is clear that the accuracy of integration, and, hence, the accuracy of parameter estimation, depends on how well a finite random sequence converges to the desired distribution, i.e. on the efficiency of sampling. In the ideal case, the correlation between neighboring elements of the chain should be zero, and the power spectrum should be a constant. In the presented work, we demonstrate how variation in quality of the random number sequence affects results of the reaction cross section calculations.

90. Nicole Robertson, Kara Miller (Advisor), Dr. Julia Hanebrink (Advisor)

University of Louisville

Cervical Cancer Infrastructure, Knowledge and Attitudes in Kabale, Uganda

Cervical cancer has increasing prevalence in southwestern Uganda and is the most common cancer among women in sub-Saharan Africa. Despite this increased prevalence, the biomedical infrastructure in Uganda lacks support for cervical cancer screening and treatment. At the same time, cervical cancer carries a stigma as an incurable sexually transmitted disease similar to the history of HIV/AIDS. This study explored the knowledge and perspectives of cervical cancer among community members and healthcare providers in the Kabale District of southwest Uganda. Therefore, we conducted a mixed-methods pilot study consisting 105 semi-structured interviews with female and male interviewees at four health centers to account for cancer knowledge and perspectives. Structured interviews were conducted with eight biomedical practitioners to evaluate the health infrastructure in regards to prevention, diagnosis, and treatment of cervical cancer. We found most participants described cervical cancer relating to pain and diminishment. Participants attributed sexual practices, hygiene and using family planning as causes. The willingness to receive and pay for cervical cancer screening and human papillomavirus (HPV) vaccination was high. However, inadequate training and supplies currently inhibit cervical cancer diagnoses. Also, the region's infrastructure lacks support for cervical cancer treatment, leading to a low survival rate. Unfortunately, this leads to several negative implications for women because cervical cancer treatment can cause infertility, so women face unforeseen reproductive consequences that transform family relationships. As a result, we found women of southwestern Uganda face disproportionate health outcomes thus leading to health disparities. Additionally, men should be

included in conversations to decrease HPV transmission. In conclusion, a lack of cancer education contributes to low knowledge and overall awareness of cancers. To address cervical cancer, additional training to perform screenings and increased diagnostic capabilities are needed. Improved funding and prioritizing screening are needed to increase prevention to reduce overall incidence.

91. Cory Black, Dr. Patrick Hare (Advisor)

Northern Kentucky University

Estrogen Photodegradation Depends on Solvent and Photolysis Wavelength

Hormones pose a threat to wildlife when they enter the water supply. Estrogens in particular have been shown to cause adverse effects at low concentrations. There is much variation in reported products, rates, and which wavelengths are most effective in photolysis of the estrogens. Here, estrone and 17 β -estradiol were photolyzed in various solvents and with several wavelengths, and analysis was performed using gas chromatography-mass spectrometry. Appreciable degradation was observed for both molecules. A dominant photoproduct was observed for estrone, which was produced faster in hydrogen-bond-donating solvents and with lower wavelengths. These results may be helpful for waste water remediation.

92. Megan Gearhart, Mr. Kirk Pomper (Advisor), Jeremy Lowe (Advisor), Sherri Crabtree (Advisor)

Kentucky State University

The Kentucky State University Sunflower Project: Celebrating KSU's 130th Anniversary

The Kentucky State University (KSU) Sunflower Project celebrates KSU's 130th anniversary and gives continued support for small farmers and gardeners. The sunflower (*Helianthus annuus*) is a beautiful and versatile flowering plant that can be grown for food or for ornamental purposes. Sunflowers grown for seed can be classified as either an oil type or confection (non-oil) type, each with its own distinct market. Ornamental sunflowers can be dwarf or tall for cut flower or container production; these flowers have great variation in color and form. Sunflowers grow well in a variety of soil types and can be used to smother weeds in cover crop systems. The objective of this study was to evaluate a range of ornamental sunflowers grown in Kentucky for cut flower consumer preference. Seven sunflower cultivars were grown in one gallon pots in the Kentucky State University Harold R. Benson Research and Demonstration Farm greenhouses including the selections: 'Infared Mix', 'Sunny Smile', 'Procut Red', 'Choco Sun', 'Fun N Sun Hybrid', 'Evening Sun Mix', and 'Premium Light Yellow'. Vases were numbered in a blind labeling system, flowers from each variety were placed in vases, and participants rated each selection for color, size, shape, and overall appearance on a 1 (being poor) to 5 (being excellent) scale. Demographic information was also collected from participants. There were significant differences in preference for color, size, shape, and overall appearance for the selections. Choco Sun had the most desirable color, size, shape, and overall appearance compared to the other selections. Infared Mix, Fun N Sun Hybrid, and Premium Light Yellow were poorly ranked in color and overall appearance.

93. Kendall Collins, Dr. Lindsay Calderon (Advisor)

Eastern Kentucky University

Pt-Mal-LHRH Mediates Breast Cancer Cell Cytotoxicity Through Increased Apoptosis

In the United States one in eight women will be afflicted with breast cancer. It is estimated that in 2016 there will be approximately 246,600 new invasive breast cancer cases and 61,000 new non-invasive cases. Triple negative breast cancers account for 15% of all breast cancers and are significantly more aggressive than other subtypes. Treatment options for triple negative breast cancer are limited due to the cancers not expressing the estrogen, progesterone, or herceptin receptors making them unresponsive to hormonal therapy. Our recent work centers around developing a novel chemotherapeutic agent that will direct therapy selectively to triple negative (4T1) cancer cells while decreasing systemic distribution.

Others have reported an upregulation of the luteinizing hormone-releasing hormone (LHRH) receptor on 4T1 cells. We have designed and synthesized a Pt-Mal-LHRH compound that uses the LHRH peptide to selectively target and deliver Platinum intracellularly to the 4T1 cells. Platinum has been used in chemotherapy for approximately 20 years in the commonly used compounds cisplatin and carboplatin. Both cisplatin and carboplatin are effective chemotherapeutic agents, however, they are not cancer specific and elicit debilitating side effects including nephrotoxicity, myelotoxicity, and neurotoxicity.

To address, whether Pt-Mal-LHRH is more selective and efficacious than carboplatin we have designed in-vitro experiments to compare the chemotherapeutic agents. First, we verified that Pt-Mal-LHRH reduces 4T1 proliferation through an MTT assay. We found that Pt-Mal-LHRH significantly reduces 4T1 viability compared to carboplatin. Next, we found through flow cytometry that Pt-Mal-LHRH significantly increases 4T1 apoptosis compared to carboplatin. In addition, we found there is a 20 fold increase in cellular uptake of Pt-Mal-LHRH compared to carboplatin. Taken together we have found that Pt-Mal-LHRH significantly increases 4T1 cell death through increased cellular uptake. Our future directions will decipher the molecular mechanism of action including DNA binding rates and adduct formation.

94. Alexander Antonious, Dr. Buddhi Gyawali (Advisor), Dr. George Antonious (Advisor)

Kentucky State University

Variability of Hot Pepper Genotypes in Ascorbic Acid Content

Seeds of twenty nine (29) genotypes from *Capsicum* species (Family: Solanaceae) of hot pepper were selected from the USDA National Germplasm Collection (Griffin, GA) to represent four hot pepper species: *Capsicum annum L.*, *C. baccatum L.*, *C. chinense Jacq.*, and *C. pubescens Ruiz & Pav.* Seedlings of 60 days old were planted in a randomized complete block design (RCBD) under field conditions. At harvest, fruits were collected from each genotypes and analyzed for ascorbic acid content. The main objective of this investigation was to select candidate genotypes for use in commercial pepper production and as parents in breeding for fruit quality characteristics. Hot pepper producers look for pepper varieties that yield large quantities of high-quality peppers. Consumer's characteristics of interest include fruits with great antioxidants content. The project could help KSU meet its objective of assisting limited-resource farmers who may grow and produce new *Capsicum* cultivars for use as a cash crop. Our preliminary

results revealed that fruits of PI 631144, PI 439420, and PI 209028 contained 583, 566, and 244 µg ascorbic acid per gm fresh fruit, respectively.

95. Shelby Davis, Dr. Michael Lane (Advisor)

Eastern Kentucky University

Putting the Athletic back in the Trainer

Athletic Training Students are taught about the benefits of physical activity and how to create specific exercise programs to maintain overall wellness. Although athletic training students have knowledge about the positive effects of physical activity, they continually score lower on activity level scales when compared with the average college student. A rigorous course schedule and long clinical hours seem to be a common factor that play into the poor health habits of the athletic training student. Therefore, the purpose of this study is to determine the variables that negatively affect the exercise habits of undergraduate athletic training students.

Students from the Exercise and Sports Science Department will be tested in this study. The Baeke Questionnaire will be used to assess factors that affect student's wellness habits. BodPod measurements will be used to assess body composition. Vertical jump performance and hand grip dynamometer performance will be recorded also. Data will be analyzed utilizing ANOVAs for significant differences between each of the groups.

96. Maya Rene Jackson, Amit Kumar Yadav, Waldemar Rossi, Dr. Wikas Kumar (Advisor)

Kentucky State University

Early nutritional programming to enhance the utilization of plant based diets in fish (largemouth bass, *Micropterus salmoides*)

Aquaculture has been the fastest growing animal food-producing sector for over half a century. Sustainable aquaculture should include replacement of fish-based feed sources by plant-based ingredients. However, this approach is often impeded by poor growth in carnivorous fish such as largemouth bass (LMB, *Micropterus salmoides*) fed high levels of plant-based protein. Therefore, our overall goal of the present work was to develop alternative methods of utilizing the plant-based diets (PBD) for sustainable LMB production. When fish is exposed to PBD early in their life, they may accept them more efficiently at later stages (so called Nutritional Programming, NP). Therefore, we conducted a 3-phase (6 weeks each, 18 weeks total) feeding trial to evaluate the NP of a PBD in LMB (Figure-1). **On phase I**, fish-larvae stocked into tanks 1 and 2 were fed a fishmeal-based diet (FM) or a soybean-meal-based diet (SBM), respectively. **On phase II** fish from each tank were divided into 2 tanks (tanks 3 and 4, respectively). Fish in tanks 1 and 2 continued to be fed the FM and SBM diets, while fish in tanks 3 and 4 were fed SBM and FM diets, respectively. **On phase III**, tanks 1 and 2 remained unchanged, while fish in tanks 3 and 4 were fed the FM and SBM diets, respectively. At the end of the study, no statistically significant differences were found for growth performance and whole-body proximate composition of fish. However, blood analyses revealed that LMB in tank 1 (fed FM throughout the study) had higher alanine amino-transaminase and lower blood phosphorus than other groups. The liver, muscle and intestine samples were collected for further physiological study and will be presented. Overall, this

study developed an alternative method of utilizing the PBD at early stage of life, which can reduce the cost of largemouth bass production.

97. Nathan Kring, Dr. Andrew Ray (Advisor)

Kentucky State University

Polyculture of Pacific white shrimp, *Litopenaeus vannamei*, and juvenile tilapia, *Oreochromis niloticus*, in indoor biofloc aquaculture systems

Biofloc aquaculture systems contain a dense community of microorganisms in the water column which is responsible for maintaining water quality and can provide supplemental feed for animals. These systems use very little water and allow for inland production of marine animals, as salt can be conserved. This study examined the effects of juvenile tilapia (*O. niloticus*) on the water quality and production of marine shrimp (*L. vannamei*) in biofloc systems. Eight sets of two tanks were used with one tank raised above the other, shrimp were stocked in all eight of the raised tanks while only four of the lower tanks were stocked with tilapia, creating two treatments: one with tilapia and one without. Water was constantly pumped between each pair of tanks. Shrimp were fed a commercial diet while tilapia were not given feed directly; they were left to consume the microbial community. Final data are still pending, but we expect to find that tilapia consumed a portion of the microorganisms, helping to improve water quality by controlling particulate matter concentration. Food-size shrimp are expected at the same time that fish reach a pond “stocker” size, thereby creating two marketable products with only one source of feed inputs. This study may assist in the development of ecologically-sustainable, integrated food production systems.

98. Stephen Scalf, Emily Major, Katherine Kloska, Lydia Fletcher

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

University of Kentucky

Development of a Model Post-Translationally Modified Protein Library

As the use of proteins has become widespread in biotechnology and medicine (> \$60B/year industry world-wide), the demand for these engineered molecules to specifically perform their desired/designed functions (without side effects) increases significantly. While combinatorial libraries have been utilized as powerful technology for the development of novel protein specificity, post-translational modifications, which nature uses to alter protein activity, are overlooked. To incorporate these regulatory elements into combinatorial libraries, we previously developed a bacterial co-expression system, utilizing calmodulin methyltransferase (CaM KMT) as a model system, 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. In addition, we show that trimethylation differentially altered the conformational changes of the protein associated with the binding of calcium, the protein's thermal stability, and binding specificity towards CaM-peptide binding target sequences. However, to guide future library designs and applications of this technology, it is necessary to gain a better understand the binding specificity of CaM KMT. We constructed and verified 22 different mutations designed to alter/disrupt the charges around the CaM KMT target and solvent-accessible residue, Lysine-115. Collectively,

these data and ongoing studies suggest that the use of CaM KMT to produce an unbiased and targeted post-translationally modified library of novel sequences is possible, thereby providing an additional tool for designing and generating protein with stringent protein-target specificities for biomedicine.

99. Danielle Gibson, Mark Will Casto Jr., Dr. Michael Fultz (Advisor)

Morehead State University

Effect of Microgravity on the Contraction and Cytoskeletal Remodeling of A7r5 Smooth Muscle Cells

Smooth muscle presents several unique contractile properties when compared to striated muscle. Data suggests that differential remodeling of the alpha-actin and beta-actin and the regulation of such remodeling may play an essential role in smooth muscle contraction. At rest both alpha- and beta-actin both exhibit a cable-like appearance. During contraction, alpha-actin appears to undergo significant remodeling with dissolution on the majority of the cables and the formation of podosomes where it demonstrates co-localization with myosin while beta-actin retains a cable-like appearance. While the remodeling of the two actin domains has been characterized under normal gravity little is known regarding cytoskeletal dynamics in A7r5 smooth muscle cells. A7r5 cells will be subjected to the microgravity environment of the International Space Station. We speculate that the absence of gravity as an organizing force on biological structures may produce different effects than what is observed on Earth. In collaboration with SpaceTango Inc., a cell culturing module has been engineered that will allow the cells to ascend into space and maintain homeostasis while on orbit. The module will also administer phorbol ester, a contractile stimulant, followed by acetone to “fix” the cells in their contracted state so observations can be made about the aforementioned processes when they return from orbit.

100. Lusekelo Nkuwi, George Antonious (Advisor)

Kentucky State University

Recycled Waste Increased Tomato Production Under Field Conditions

As more municipal sewage sludge (SS) treatment districts turn to composting as a means of sludge stabilization and because of the rapid growth in the poultry industry, significant chicken manure (CM) and municipal SS generation will become available in increasing quantities. A field trial area was established at the University of Kentucky South Farm. Tomato (*Lycopersicon esculentum* var. Mountain spring) seedlings of 52 days old was planted in 30' × 144' beds of freshly tilled soil at eight inch row spacing on June, 2016. The entire study area contained 30 plots (3 replicates × 10 treatments). Each bed was divided into three replicates in a randomized complete block design (RCBD) with the following 10 treatments: 1) control (no-mulch untreated soil); 2) sewage sludge; 3) horse manure; and 4) chicken manure; and 5) yard waste compost. Each of the 5 treatments was also mixed with 1% bichar to make a total of 10 treatments. Results revealed that yields obtained from CM and CM mixed with biochar were highest whereas, yield obtained from yard waste compost was lowest compared to other soil treatments. Accordingly, recycling CM waste for use as a low-cost fertilizer resulted in a positive effect on the growth and yield of tomato.

101. Terra Riggs, Dr. Wesley White (Advisor), Dr. Ilsun White (Advisor)

Morehead State University

Acute withdrawal from nicotine involves reduced activity and may be due to temporary disruption of a brain reward pathway

The present study was part of a research program that uses an animal model approach to identify the motivational deficits arising from intermittent drug use and the brain circuits involved in these deficits. In prior research, administration of amphetamine or morphine reduced activity, in most rats, 15-24 hours later. This reduction appeared to be a sign of acute withdrawal. When administered 30 minutes after amphetamine or morphine, a dopamine D1 antagonist prevented the reduction in activity. A dopamine D1 antagonist is a drug that blocks the brain circuit that produces the rewarding effects of drugs. The current study looked at whether nicotine also produced a reduction in activity that could be prevented by a D1 antagonist. Two groups of rats each underwent a series of five-day tests. Groups received a control treatment on Day 1 of a test, and on Day 3 groups received the experimental treatment. The experimental treatment for tests 1-4 included only nicotine, whereas for tests 5-8 the experimental treatment included nicotine followed 30 minutes later by a D1 antagonist. One group received a moderate dose of nicotine (0.3 mg/kg), and the second group received a high dose (1.0 mg/kg). Treatments were administered subcutaneously. Following treatments, rats were placed in individual open fields, and their activity was monitored for 24 hours. In the moderate dose group, half of the subjects had reduced activity 15-24 hours following nicotine, and the D1 antagonist prevented this reduction. In the high dose group, all of the subjects had reduced activity 15-24 hours following nicotine, and the D1 antagonist partially blocked this reduction. Nicotine, amphetamine, and morphine may all produce signs of acute withdrawal by disrupting the reward pathway. Supported by NIH grant DA015351.

102. Hillary McLean, Dr. Travis Thomas (Advisor)

University of Kentucky

Higher Unsaturated Fatty Acid Intake and Aerobic Training are Related with Lower Intramyocellular Lipid in Older Adults

Intramyocellular lipid (IMCL) is associated with metabolic dysfunction in aging. Exercise is known to influence IMCL accumulation and was recently observed to have a direct association with vitamin D status (25(OH)D) in our lab. In addition, we observed an inverse association between IMCL and dietary unsaturated fatty acid (USFA) to saturated fatty acid (SFA) ratio that was independent of age, BMI, and physical activity. The purpose of this study was to further examine the relationship between IMCL, vitamin D status, and dietary fatty acid intake in older adults with and without the combined effect of an aerobic training (AT) program. Healthy participants (age>60) were randomized into a program of 7-consecutive days of AT or were asked to maintain regular daily routine. Anthropometrics, dietary recalls, and 25(OH)D were measured. Magnetic resonance spectroscopy was performed to analyze IMCL noninvasively. Average age and BMI were 67.2±5 years and 25.4±4 kg/m², respectively. 25(OH)D was not associated with IMCL between groups or over time. Participants who completed the AT program (n=13) had lower IMCL at end study (0.28±0.19 au) than those who remained sedentary (n=9; 0.46±0.26 au). IMCL percent change decreased in participants who exercised (-17.01±73%) and

increased in those who remained sedentary ($4.9 \pm 35\%$). Dietary fatty acid intake and IMCL were significantly related in participants who were involved in the AT program; whereas this relationship was not found in those who maintained their regular daily routine. As polyunsaturated fatty acid to SFA ratio increased, IMCL decreased in the AT trained participants ($n=13$; $p=0.003$). These results suggest that AT combined with a diet higher in USFA may result in greater muscle lipid turnover in aging when compared to exercise alone. Future studies should examine the interaction between dietary fatty acid intake and exercise on muscle lipid turnover to determine if metabolic function is altered.

103. Shelbie Crowe, Kim Nettleton (Advisor)

Morehead State University

Let there be light: Does light influence transition behavior?

Typical classroom transitions include changing textbooks, rotating between learning centers, and leaving the classroom. Instructional time may be lost during transitions. When students move between structured activities, their unstructured, transition time often becomes an opportunity for misbehavior. Students frequently become distracted, begin talking, or wander around the classroom. Handling transitions is an aspect of classroom management that is often difficult for preservice teachers and new teachers. When trying to teach rules and procedures, there is a struggle to find balance between establishing rules and procedures and the need to move through the daily curriculum. This six-week study conducted by a pre-service teacher, examined the effect of light on transitional behaviors in a K-1 classroom. Data, collected when students left the classroom and returned, was analyzed to determine if the amount of light in the classroom had any effect on appropriate student transitional behaviors.

104. Anna Reeves, James Wells (Advisor)

Eastern Kentucky University

Reintegrating Returning Citizens in Kentucky

The purpose of this paper is to discuss the rehabilitation of ex-offenders and the impact that rehabilitation has on recidivism rates. Recidivism of general offenders and drug offenders in both the U. S. and Kentucky will be addressed. Next, the paper will explore the program that Mission Behind Bars and Beyond facilitates, the Nurture Support and Accountability Group (NSAG), and give details about NSAG's mission and how it assists ex-offenders with reentry from incarceration back into our communities. Ryan Rivard, an ex-offender, is currently a core member of the NSAG group at Eastern Kentucky University. His progress since he has been involved with the student-led group will also be discussed. Lastly, the effects that Mission Behind Bars and Beyond has on all offenders who participate in their program will be presented.

105. Brian Bates, Robert Neely, James Donovan, Alon Robinson, Dr. Andrea Friedrich (Advisor), Dr. Steven Arthur (Advisor)

University of Kentucky

Academic Integrity: Effects of the University Pledge on Cheating and Plagiarism

Academic integrity is emphasized at a university. Students are expected to uphold academic honesty, and instructors are expected to make decisions about students' academic conduct. However, academic dishonesty is not always clearly defined, which can lead students and instructors towards different perceptions of whether academic rules have been violated (Donovan, et al. 2016). New technologies involving social media may exacerbate these discrepancies, since students can easily access large amounts of information through resources such as Google, Facebook, etc. As such, it may be unclear to students whether they are in violation of university standards when they use these technologies to collaborate or complete assignments.

The following experiments test two possible methods of changing students' perceptions of these behaviors using two separate between-subjects designs. Experiment 1 primed half of the participants with academic integrity by providing portions of the University of Kentucky student code of conduct. Experiment 2 provided explicit definitions of plagiarism taken from the University of Kentucky Senate Rules. Students then evaluated 15 behaviors that could be interpreted as academically dishonest.

Findings indicate that these manipulations changed students' overall perceptions on which behaviors are acceptable in an academic environment. The implications for providing students with information on the parameters of what counts as unacceptable academic behavior are discussed.

106. Joanna Guerrant, Dr. Gina Blunt Gonzalez (Advisor)

Morehead State University

Motor development and skill acquisition in elementary aged students

Mastering physical movement occurs through motor learning and experience. Motor development is needed for successful acquisition of sport and other physical skills. A lack of motor skills has been associated with decreased physical activity later in life, which has been linked to a variety of hypokinetic diseases. This study examined motor learning and skill acquisition in elementary age children. Twenty 2nd-5th grade students were recruited through the local school system. Subjects did not have any injuries that would preclude them from performing three basic skills (modified squat, tree, and arm and leg raises). IRB approval, parental consent, and student assent were obtained prior to the start of the study. Each participant completed a demographic questionnaire that included age, grade, gender, and right or left hand and leg dominance. Subjects were randomly assigned into one of three groups: visual, auditory, or no feedback. Subjects viewed a video that demonstrated the proper form and technique for each of the three movements. After a light warm-up, each subject performed each of the movements 12 times while receiving feedback based on their group. Each subject was asked to give self-efficacy feedback on how confident they were that they could master each movement before the movements began and then after trials 4, 8, and 12. At the end of the trials, subjects were asked an open response question regarding their experience. The research team determined at what trial, if at all, mastery was met for each movement based on specific set of skill requirements. Statistical analysis determined if differences in mastery existed based on feedback mechanisms, self-efficacy, or other demographic data. This project was supported by the MSU Undergraduate Research Fellowship.

107. Khrista Neville, Adam Lawson (Advisor)

Eastern Kentucky University

Personality Traits that Influence Truthfulness and Deception

Everyday deception reflects lying and misrepresenting the truth as part of our daily lives. While everyday deception is by definition commonplace and often reflects a normal and even healthy state of mind, the frequency and intent behind such deception could also reflect mental illness. One major component of individual differences in everyday deception is personality. Identifying personality traits that coincide with everyday deception is crucial to understanding how individual differences relate to both social and antisocial tendencies. The current study tested the hypothesis that the sensation seeking personality trait and psychopathy can predict everyday deception. Seventy-nine undergraduate students participated in an online study to assess these personality traits. Participants completed the Zuckerman's Sensation Seeking scale form V, impulsive sensation seeking, the Triarchic Psychopathy scale, and 60 questions that assessed the frequency and depth of everyday deception. A simultaneous linear regression analysis found that disinhibition psychopathy was a strong positive predictor of everyday deception. Also, the experience seeking subtrait of sensation seeking was a significant negative predictor of everyday deception. These findings show that personality does influence deception, and that everyday deception can characterize both normal and disordered behavior.

108. Kevin Shankle, Matt Belcher, Emily MacFarland, Dr. Elizabeth Perkins (Advisor)

Morehead State University

Exploring Young Males' Vulnerability to the Sex Trafficking Industry in a Rural State

Currently there are between 27 and 30 million slaves in the world, 22% of those are trapped in the sex trafficking industry, 2 million of the sex trafficking victims are children. That being said, it is incredibly important to recognize that trafficking occurs here in Kentucky as well (Sex Trafficking. (n.d.). Retrieved from <https://www.ijm.org/casework/sex-trafficking>).

Our research project focuses on data collected through interviews with 50 homeless young adult males in Louisville, KY for the purpose of achieving a clearer understanding of the nature and scope of male sex trafficking in the state of Kentucky. This information is providing us with a clearer picture of the amount and types of services male victims of sex trafficking require.

Our interview team has been conducting semi-structured, open-ended interviews with homeless young adult males about their background, spending habits, market involvement, customers, pimps, health and needs, experiences with police, and their future expectations. While this study focuses on sex trafficking we are also asking questions pertaining to labor trafficking as well. It should be noted that this research is currently still in progress.

109. The Nu Sandar (Kendra) Oo, Dr. Tammy Stephenson (Advisor), Dr. Dawn Brewer (Advisor), Amanda Hege (Advisor), Jessica Houlihan (Advisor), Luisyana Gamboa (Advisor), Lauren Serra (Advisor), Leslie Hildesheim (Advisor)

University of Kentucky

Development and Evaluation of an Innovative Gleaning and Nutrition Education Program Among Food Insecure Children in Lexington, Kentucky

In Kentucky, 22% of children are food insecure. Consumption of fruits and vegetables among food insecure children is low, including during the summer months, a time when fresh produce is readily available but children are not in school. Meanwhile, 40% of edible food goes uneaten every year in the United States, which is equivalent to approximately \$165 billion in waste. The Campus Kitchen at the University of Kentucky (CKUK) provides a sustainable approach to reducing food waste and providing healthy meals to those struggling with hunger. The objectives of this project were to evaluate (1.) if serving snacks using gleaned produce would increase fruit and vegetable consumption of food insecure children participating in the Building Blocks for Healthy Kids Program in Lexington, Kentucky and (2.) if a six-week nutrition education intervention would increase nutrition knowledge. Twenty-six children between the ages of 6 and 11 years participated in the program, and twenty-four children completed the pre- and post- evaluation surveys and the plate waste study. The CKUK summer gleaning program recovered 1,755 pounds of produce that would have otherwise gone to waste, including 57 different types of fruits and vegetables. The six-week nutrition education intervention resulted in an overall increase in knowledge related to nutrition and food systems. As well, plate waste data showed that, on average, over half of the gleaned fruits and/or vegetables provided as snacks to the children was consumed. The project results indicate that this sustainable approach to reducing food waste and providing healthy snacks to food insecure children during the summer months was effective. Further larger scale behavioral and social research projects involving food insecure children in Kentucky are necessary; however, this pilot project serves as model for reducing food waste and re-purposing fresh fruits and vegetables to help in the fight against childhood hunger.

110. Shelby Blanton, Claye Parks, William Staddon (Advisor)

Eastern Kentucky University

Quantification of heavy metal resistant bacteria adjacent to a wastewater treatment plant

The objective of this study was to characterize metal resistant bacteria around a wastewater treatment plant. Sediment samples were collected from the Town Branch wastewater treatment plant near Lexington Kentucky, both where the effluent discharges and approximately 10m upstream. Plate counts for heterotrophic bacteria resistant to zinc, cobalt and cadmium were performed. Preliminary results suggest that there are more bacteria resistant to zinc than either cadmium or cobalt at both sampling sites. However, no differences were found between sites. While requiring confirmation, the latter suggests that wastewater treatment plants may not be a source of heavy metal resistant bacteria.

111. Sandhya Paudel, Craig S. (Advisor), Fernanda C. (Advisor), Horohov D. (Advisor)

University of Kentucky

The use of IgG(T) as a diagnostic tool in foals with naturally acquired *Rhodococcus equi* pneumonia.

While rhodococcal pneumonia is among the leading causes of foal mortality, its diagnosis remains a challenge. Antibodies specific to VapA (virulence-associated protein A) were previously evaluated as a diagnostic tool using foals that had been challenged with *R. equi*. With the exception of IgG(T), VapA-specific IgG subclasses were poor predictors of disease. The objective of this study was to further investigate the use of IgG(T) as a diagnostic tool under field conditions. Healthy foals on a farm with a history of endemic *R. equi* infections were enrolled in the study (n=46). A serum sample from each foal was collected monthly at ultrasound screening times or when a trans-tracheal wash was performed. Sample collection was discontinued when antibiotic therapy for rhodococcal pneumonia was begun. Additional positive control serum samples were obtained from confirmed cases of rhodococcal pneumonia admitted to a local hospital (n=3). All samples were analyzed utilizing a previously validated ELISA for VapA-specific IgG and its subclasses (IgGa, IgGb, and IgG(T)). Foals were classified into one of the four groups: no respiratory abnormalities, subclinical disease, rhodococcal pneumonia, non-rhodococcal pneumonia. One-way ANOVA was used to compare the concentrations of VapA-specific IgG and its subclasses amongst the four different groups at each time point with significance level established at $\alpha=0.05$. No statistical differences were identified and only 2/5 foals with rhodococcal pneumonia had elevated IgG(T) at four months of age. No foals without respiratory abnormalities (32), or with non-rhodococcal pneumonia (1) had high IgG(T) concentrations. Thus, IgG(T) was a poor indicator of rhodococcal pneumonia within the studied population. One factor that may have contributed to these results is the high number of subclinical foals that were started on treatment based solely on ultrasonographic abnormalities or on unspecific clinical signs. Therefore, it is possible that the early removal of these foals precluded our detection of a significant IgG(T) response.

112. Jacob Peoples, Dr. Mike Collier (Advisor)

Eastern Kentucky University

The Conflict in Syria: Should the United States Get More Involved?

The purpose of this research is to explore the relations between Syria, Russia, and the United States in the Syrian civil war. The relationship has been in turmoil because of the complexities of the situation. Syria has been a designated state sponsor of terrorism since December 29, 1979, five years before the next designated state of Iran. Syria is a very important and strategic country and now more than ever has a large risk of being completely overrun by the newest terrorist group ISIS. The turmoil is possibly stemming initially from the result of a failed 1957 Central Intelligence Agency (CIA) coup attempt to topple Syrian President Shukri al-Quwaitli. Ten years later in 1967, tensions rose again after the Six-Day War (Israeli-Arab War) which resulted in Israel's occupation of the Golan Heights, a large geographical area between the two countries. The US is currently bombing parts of Syria with drones, and have sent US Special Forces to assist and provide intelligence to the forces on the ground, but the US does not want to get into another war, making the conflict difficult. The question that will be answered in this paper

will be, “Should the US become more involved in the Syrian conflict and potentially start another war with Russia?”

113. Nikhil Krishna, Arjun Kanthawar, Stefan Stryker, Dr. Richard Schugart (Advisor)
Western Kentucky University

Using Optimal Control Theory to Treat Chronic Wounds with Oxygen Therapy

Chronic wounds such as diabetic foot ulcers are the leading cause of non-traumatic amputation in developed countries. In order for researchers to better understand the physiology of these wounds, a mathematical model describing oxygen levels at the wound site can help predict healing responses. Daulton (2013) used optimal control theory to formulate a differential-equation model to optimize hyperbaric oxygen treatment strategies. The model consisted of three variables - oxygen, bacteria, and neutrophils - and a control variable for supplemental oxygen. Using a similar approach, we formulated a differential equation model with four variables adding a chemoattractant to better describe the healing response of the wound. We then numerically solved these differential equations using a finite volume approach. The solutions to these equations will later be incorporated into a mathematical model to find the optimal amount of supplemental oxygen that would result in the most rapid rate of healing in a chronic wound.

114. Alberto Rondon, Dr. Matthew Gentry (Advisor)
University of Kentucky

Protein Engineering to Efficiently Degrade Carbohydrates for Biofuel Production

Traditional fermentation of starch-rich biomass requires significant energy and resource input to degrade the starch into simple sugars like glucose for downstream processing to convert it into ethanol. Starch accumulates in plants when the excess glucose sugars produced in the presence of sunlight are joined together into chains. During the night, plants must access the glucose energy within starch to continue cellular functions. Enzymes called amylases release the glucose units from starch. However, because starch is water-insoluble, it clumps up and is difficult for the amylases to access. The Gentry lab has been investigating the enzymes plants use that enable the starch to become more accessible to degradation. These enzymes contain two regions, a binding region and an action region. The binding region attaches the enzyme to the starch while the action region modifies the starch into a more soluble form. We hypothesized that different binding regions could be appended to the action regions of the modifying enzymes in order to target and modify different carbohydrates. As proof of principle, we engineered new enzymes that would also modify starch to show that the action regions would still function with a different binding region. When comparing the activity of the original and engineered enzymes, we found that one of our engineered enzymes possessed greater activity than the original. These results allow us to expand our work to other carbohydrates such as cellulose, the most abundant carbohydrate found in nature. This project contributes to efforts in diversifying energy resources and increasing sustainable fuel sources with investigations into second-generation cellulosic biofuels that are exploring more efficient methods for breaking down cellulose into more simple sugars for fermentation.

115. Kaleb Toller, Dr. Jorge Ortega-Moody (Advisor)

Morehead State University

Applications of Industrial Robots in The Classroom

Parallel robots are growing in popularity in industry for their agility and speed. Although they may have a smaller work space compared to serial robots they are able to move within their workspace more efficiently. A growing concern about industrial robots in general is training. The costliest portion of the hiring process in any field is training, to tackle this issue a group of students at Morehead State University have created a Delta robot including a functioning teach pendant that functions and feels like a real Fanuc teach pendant. The teach pendant allows students to program a virtual delta robot and run simulations and later use the same program on the physical classroom robot shared by multiple students. For half the price of a Fanuc LR Mate 200iD a classroom could have a fully functioning delta robot with ten teach pendants making industrial training affordable and allowing young students a competitive edge in the job market.

116. Erica Cecelia Dawn Leach, Dr. Jonathan Gore (Advisor)

Eastern Kentucky University

The Link Between Time Orientation and Religious Orientation

The purpose of this study was to explore how an individual's religion relates to their time orientation. Specifically, we hypothesized a) intrinsic orientation would positively correlate with future orientation, b) extrinsic orientation would positively correlate with present hedonistic orientation, c) quest orientation would positively correlate with present hedonistic and future orientations, d) orthodox orientation would positively correlate with past positive orientation, and e) secularism would positively correlate with past negative orientation, present-fatalistic and future orientations. Participants ($n = 150$) completed an online survey of time orientation and religious orientation. The results showed that perceptions of the past are strongly linked to religious orientation, with more positive perceptions being linked to the more traditional orientations, and less positive perceptions linked to the looser and secularist orientations.

117. Heather Gosnell, Eric Rush (Advisor)

University of Kentucky

The Emerging Genetics Workforce: A Study of Physician Geneticists' Professional Lives

The purpose of this study is to explore the current practice and geographic location trends of physicians certified in clinical genetics, clinical biochemical genetics, and medical biochemical genetics during the 2011, 2013, and 2015 certification cycles. Physicians' personal data was collected from public internet domains including the American Board of Medical Genetics and Genomics (ABMGG) provider database, the CMS National Plan and Provider Enumeration System, publically available professional-biographies, and university affiliations. The search results were cross-referenced for the greatest accuracy. Geographic location data was plotted onto maps. Approximately 27% ($n=69$) physicians board-certified in genetics are currently practicing in non-traditional roles. The physicians practicing outside of the traditional genetics field were categorized as follows: Obstetrics and Gynecology (27%, $n=19$), Research

(20%, n=14), Maternal-Fetal Medicine (13%, n=9), Neurology (7%, n=5), Internal Medicine (7%, n=5), Pediatrics (6%, n=4), or other fields (19%, n=13). Geographic data determined twelve states have no practicing geneticists, and nearly 60% (n=30) of states have 2 or fewer geneticists from recent certification cycles. Although geneticists practicing in non-traditional roles make contributions to other medical disciplines, these physicians are helping to perpetrate the growing deficit of practicing clinical geneticists. Further discussion is warranted on recruiting geneticists and geographic to improve the quality of genetic services in the United States.

118. Sathya Govindasamy, Karen Friley, Kirk Pomper, E. Kyle Slusher, Mamata Bashyal, Jeremiah Lowe, Sheri Crabtree, Dr. John Sedlacek (Advisor)

Kentucky State University

Spotted Wing Drosophila, Drosophila suzukii, Captures using Two Commercial Lures in Sustainably Grown Blackberries in Central Kentucky

A new invasive pest of small fruit and tree fruit crops, the spotted wing Drosophila (SWD), *Drosophila suzukii*, appeared in Kentucky in 2012. This fruit fly is very destructive to soft-skinned fruit such as blackberries and raspberries. Female SWDs have a saw-like ovipositor, which they use to insert eggs inside undamaged ripening or ripe fruit. Larvae hatch and eat the fruit from the inside. Because of this, damage and larval presence is difficult to determine. Monitoring for SWD is important so that growers can begin a control method. One monitoring tool is to use a trap with a lure and apple cider vinegar to attract SWD. The objective of this research was to quantify numbers of captured SWD females and males in two commercial traps using lures. One such trap and lure is the Pherocon® SWD Trap, with Specificity Lure, by Trécé, Inc. and a second, the Scentry® SWD Trap by Scentry Biologicals, Inc., were used in this study. To both trap types, 150 ml of apple cider vinegar (ACV), 5% acidity and two drops of Dawn® Original Scent Dishwashing Liquid were added. A third trap, only contained ACV and dishwashing liquid. One of each trap type was placed in two organic blackberry rows at Kentucky State University's Harold R. Benson Research and Demonstration Farm in Franklin County. Traps were also deployed at four grower collaborators in Fayette, Scott and Shelby Counties. Traps were collected weekly. Fruit flies were sorted by SWD females, SWD males and all other Drosophilidae, sexes combined. Preliminary results show that while the Scentry® trap captured more female and male SWD than the Trécé and control traps, the Scentry® trap also caught a far greater number of all other Drosophilidae.

119. Patrick Steven Ueltschi, Dr. Robert Mitchell (Advisor), Dr. Radhika Makecha (Advisor)

Eastern Kentucky University

The Effects of Environmental Enrichment on Bobcats

Environmental enrichment is a crucial aspect of keeping animals in captivity. It is adapted and used differently for each individual species. When used correctly, enrichment activities should benefit the animals by reducing stereotypic behaviors and helping them to exhibit natural behaviors. This study used multiple enrichment techniques to attempt to enhance the lives of two different bobcats (*Lynx rufus*) at the Salato Wildlife Center. The enrichments attempted to alter the environmental aspects of the enclosure and introduce new stimuli to the animals; we attempted to make them think and act in a

different manner, and we did this through many different methods, such as, introducing new scents, allowing them to experience different natural tastes, covering various areas of their enclosure, and in many other ways. It was expected that the enrichments would reduce pacing and sleeping, while increasing foraging and social behaviors.

120. Mikinley Lustenberg, Cullen Lee Beard, Michelle Lustenberg (Advisor)

Morehead State University

Neptune's Farm: Research in Underwater Agriculture

The goal of our research is to test the possibility of an alternative source of agriculture which could one day help to grow food in areas with adverse environmental conditions. This project is motivated by the idea of utilizing our oceans which cover 71% of the earth's surface to generate growth of food which cannot be grown elsewhere. Neptune's Farm is an underwater garden where vegetables are grown for human consumption. The first step in this research was to design underwater transparent air-bells under which plants are grown. The transparent air-bell allowed the sunlight to reach the growing plants, while the inside of the air-bell exposed to sunlight became warmer than the outer water temperature. Because of the differences in temperature between the air inside the air-bell and the water around the structure, the water at the base of the air-bell evaporates and creates condensation in the bell thus watering the greenhouse vegetation. Air-bell prototypes were tested in both fresh water and salt water tanks in the lab. Air-bells were weighted to keep them stable and plants were placed on weighted stands in soil under the air-bells (out of the water). Desalinated or freshwater was used to irrigate the seeds to begin growth. Soil contains micro-organisms that can favor the mold formation in the surrounding environment. For this reason, researchers have tested plant growth in perlite soils. All plants germinated in between 3-5 days and for some of them the growth was very fast. Neptune's Farm researchers are currently working on a larger scale model based on the air-bell prototypes from the lab. Permission has been granted for this model to be placed in a local quarry in late spring to test the garden in a larger environment allowing for greater plant growth.

121. Charles Whitehead Jr, Dr. Atilla Sit (Advisor)

Eastern Kentucky University

An Algorithmic Approach to Determining the Spatial Configuration of a Protein

Determining the 3-dimensional structure of a protein is a significant problem that still poses a major challenge. The ability to determine the spatial orientation of a protein is highly desired, as it offers great insight into its functionality. Current mainstream experimental methods include X-Ray Crystallography and NMR Spectroscopy. Using NMR results, the primary objective is to obtain a solution such that the distances between atoms within the predicted, computed structure, are as close as possible to the experimental distances; this is referred to as the "Molecular Distance Geometry Problem". Once a true structure is acquired, it is then uploaded to an online protein database (PDB).

Our approach first began by collecting statistical data from the PDB, and coupled it with NOE data (distances between atoms lacking chemical bonds), in order to more accurately define distances within the target protein. We then implemented a "Branch-and-Prune" A.I. (artificial intelligence) algorithm to

consider various physical and chemical assumptions when constructing a solution. Without this consideration the computational time is exponential, however, by necessitating the validation of these assumptions, the algorithm can decide when to stop constructing a potential solution and discard it. The uniqueness in our approach comes from developing a tolerance of violation for these assumptions. This violation tolerance is controlled through assigning weights of importance amongst all assumptions, and "balancing" these weights to produce optimal solutions. By allowing this kind of tolerance, we were able to produce a higher output of solutions, founded on the idea that although a solution may contain some degree of violations, it is still a candidate for being a true solution. The algorithm will be presented and a predetermined protein structure from the protein database will be used as an example to demonstrate the accuracy and performance of the algorithm.

122. Jordan Bach, Dr. Janet Ratliff (Advisor), Mr. Steve Chen (Advisor)

Morehead State University

MSU College Students' Perceptions and Concerns of Studying Abroad

The purpose of this study was to identify the perceptions and concerns of college students while studying abroad. The project was supported by MSU Undergraduate Research Fellowship. Fifty-two Morehead State University college students from a variety of majors in both graduate and undergraduate levels completed the survey. Data collection occurred in Spring 2016. Among these 52 students, there were two different educational study abroad experiences, one to England, Ireland, and Wales in May and one to Germany and Switzerland in June of 2016. The survey instrument contained nine constructs: (1) career and social, (2) diversity and financial management, (3) language, (4) importance of study abroad, (5) academic learning, (6) travel issues, (7) individual multi-development, (8) appreciation for travel, and (9) overall satisfaction. The findings demonstrated differences in gender and locations among the students who traveled on these two educational study abroad experiences. The results also provided us with information regarding what students valued the most about studying abroad experience, and what their perceptions and concerns were after learning a business-focused curriculum traveling abroad. Respondents indicated the study abroad experience had a positive gain in academic learning as well social, personal, and career development.

123. Jessica L. Johnson, Dr. Jarrett Johnson (Advisor)

Western Kentucky University

Growth and Survival of Salamanders Exposed to Different Formulations of Glyphosate-based Herbicide

Amphibian populations have been experiencing rapid declines worldwide in the past few decades. There are many proposed causations, including the use of agricultural chemicals such as herbicides. Glyphosate based herbicides are one of the most widely used herbicides. This study looks at the effects of different brands of glyphosate based herbicides, including those intended for aquatic use, on the survival and growth of axolotl salamander larvae. Out of the four brands of glyphosate herbicide (Aquamaster, Aquaneat, Helosate plus, and Roundup Pro), the survival rates of Roundup Pro were the lowest. Most mortality occurred between the 3 mg/L and 6 mg/L concentrations, during which all those

treated with Roundup Pro died. The growth, measured in terms of total snout to tail length and also head width, appeared to be greatest in length for those larvae treated with Aquaneat brand herbicide. These results indicate that Roundup Pro is lethal at concentrations of 6 mg/L, and that the composition, which includes a surfactant, may be responsible. We subsequently tested the concentration at which different adjuvant surfactants meant for use with aquatic safe herbicides (Dyne-Amic, Kinetic, and Cygnet) affected larval growth and survival and compared results with Roundup Pro. The larvae exposed to the initial 5 mg/L concentration of Roundup Pro had total mortality, but survival was unaffected by exposure to aquatic safe surfactants at low concentrations. At high concentrations, Dyne-Amic and Kinetic significantly increased larval mortality while Cygnet did not. Of the surviving larvae, there was no difference in growth. The findings of this study are significant in that they give insight regarding how the use of herbicides could be contributing to the decline of amphibian populations.

124. Kendai Williams, Ms. Julie Lasslo (Advisor)

Eastern Kentucky University

Perceptions of Gynecological Visits; Contributing factors to Fear and Anxiety

Women's health is a complex and important field of study. Routine gynecological screenings play a vital role in maintenance of overall good health but are often underutilized. Engaging in the gynecological medical encounter provides women with an understanding of general health, allows for the detection of various infections, like the Human Papilloma Virus (HPV), and equips women with knowledge and tools to prevent disease. Of particular importance is the early detection of cervical cancer caused by HPV. The current study examined factors that encourage and/or discourage gynecological care seeking behavior. Specifically this study examined correlations between how fear, embarrassment, cost, history of sexual abuse, transportation challenges, social stigmas, and access to care are associated with gynecological care seeking behavior. Additionally, this study looked at difference between care seeking behavior and race. Participants were recruited via social media and ranged in age from 18 to 26. A total of (n=82) participants completed an online quantitative link style survey. Results revealed that majority of the participants identified themselves as Black or African-American, with 56% and 39% of the participants identified themselves as White or Caucasian. When the participants were asked if they currently have health insurance 98% answered yes and 3% answered no; examining this factor gave insight to a possible limitation to gynecological visits. Participants were asked how often they make an appointment to their gynecologist 29% answered never, and 44% of the respondents answered once a year acknowledging their commitment to a routine physical with their gynecologist. This research study was developed to see if certain factors such as; fear, embarrassment, sexual abuse, cost, transportation, and certain ethnicities negatively influence the attendance of routine checkups to the gynecologist. The group of 82 participants provided insight to their own health and presented how these factors have some correlation influencing gynecologist visits.

125. Kaitlyn Dennis, Denise Vulhop Watkins (Advisor)

Morehead State University

Research and Study of Fashion and Costume History Spanning from Ancient Egypt to Modern Day

Through a generous donation to Morehead State University, research has been conducted on thousands of slides containing images of artwork and artifacts of historical significance. These images span from Egyptian hieroglyphs to the inaugural dress of every first lady of the United States. The slides are in the process of being recorded and catalogued for future use by students in hopes of furthering academic comprehension and awareness of the influence of fashion and costume history through the ages. Special thanks to the family of Gretel Geist Rutledge, faculty mentor Denise Watkins, as well as the Department of Music, Theatre, and Dance and the Caudill College of Arts, Humanities and Social Sciences at Morehead State University.

126. Justin Elswick, Dr. Lesia Lennex (Advisor)

Morehead State University

Technology Use in Secondary Chemistry and Physics Classrooms in Kentucky

As the presence of technology grows, so does its importance and usefulness to chemistry and physics education. This study focused on how technology is being used in secondary chemistry and physics classrooms across Kentucky and its perceived classroom effects. Using SurveyMonkey, 74 secondary chemistry and physics teachers in 34 Kentucky school districts were asked about the kinds of technology they used in their classrooms and in what way(s) they used technology. The survey response was 23% (N=17). Survey results indicated that teachers used videos, various apps and websites, cell phones, tablets, lab aids, and SMARTboards in their classrooms. Teachers reported using technology for enhancing instruction, easing data collection, and student research. Overall, teachers felt that technology makes instruction better and easier, but can also become a huge distraction for students.

127. Daniel Rush, Haley West, Dr. Thomas Pannuti (Advisor)

Morehead State University

An Analysis of Archival Observations Made of Galactic Supernova Remnants by the Chandra X-ray Observatory

Since its launch in 1999, the *Chandra* X-ray Observatory has spurred explosive growth in the study of Galactic supernova remnants (SNRs) due to its unsurpassed angular resolution (1 arcsecond at 1 keV) and its moderate sensitivity. We are currently analyzing archival observations made by *Chandra* of two particular classes of SNRs: mixed-morphology SNRs (which feature contrasting center-filled thermal X-ray morphologies with shell-like radio morphologies) and synchrotron X-ray SNRs (which feature X-ray spectra dominated by synchrotron emission). To illustrate some of our initial results, we present spatially resolved spectroscopic analyses of the mixed-morphology SNR 3C 397 and the synchrotron X-ray dominated SNR G353.6-0.7. In the former case, we have fit extracted spectra with a recombination-dominated thermal plasma model to determine the ionization state of the plasma associated with this SNR. In the latter case, we have fit extracted spectra with synchrotron models to determine the maximum energies of cosmic-ray electrons accelerated by the SNR.

