19th Annual Research Symposium

April 5, 2017
Fisk University
April 4, 2017

Dear Fisk Family and Friends:

Welcome to the 19th Annual Fisk Research Symposium:

It is with great pleasure that we welcome you to Fisk’s 19th Annual Fisk Research Symposium. Fisk is renowned for engaging students in research and scholarly activities. Empirical research and scholarship are grounded in its academic curriculum, campus services, and community activities. Our students, faculty and administrators emphasize the discovery and advancement of knowledge through research in the natural and social sciences, business and the humanities.

The research symposium is a time for celebrating our research, scholarship and creative accomplishments; it is a venue to showcase, disseminate, and share scholarly contributions with other researchers and scholars. The poster presentations and dialogues with the researchers shows Fisk’s commitment to critical thinking and inquiry-based learning. This year’s symposium reinforces our trust that the students at Fisk receive the tools, techniques and skills essential to their intellectual growth.

This year, the symposium includes a new format, in which oral presentations are structured around theme-based sessions. These sessions highlight the interdisciplinary work that takes place in the Fisk scholarly community on a daily basis. The goal is to emphasize the cross-disciplinary conversations that constitute the vibrant and rigorous research agenda promoted by Fisk students and faculty.

We highly appreciate the dedication and commitment of students, faculty, and staff. This is an event for the entire Fisk family and we are glad to celebrate our scholarly achievements.

Join us in “Cultivating Scholars and Leaders One by One.”

Yours sincerely,

FRS-2017 Co-chairs:

Katharine Burnett & Sajid Hussain
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Program

Fisk Research Symposium 2017
Wednesday, April 5, 2017

Schedule

8:30 am – 9:00 am  
Registration — Meet & Greet  
Jubilee Hall, Appleton Room

9:00 am – 9:30 am  
Opening Plenary  
Jubilee Hall, Appleton Room

9:30 am – 12:00 am  
Poster presentations  
— Life Sciences & Graduate  
Jubilee Hall, Appleton Room  
  Theme-based Oral Presentations  
  (Concurrent)  
  Park-Johnson Hall

12:00 pm – 1:00 pm  
Lunch on your own

1:00 pm – 3:00 pm  
Poster Presentations  
— Business, Mathematics & Computer Science  
Jubilee Hall, Appleton Room  
  Theme-based Oral Presentations  
  (Concurrent)  
  Park-Johnson Hall  
  Creative Writing Reading  
  Student Presentations of Fiction, Poetry, and Nonfiction  
  Franklin Library, Bontemps Room

3:00 pm – 4:00 pm  
Closing Plenary  
Jubilee Hall, Appleton Room

4:00 pm – 6:00 pm  
Reception

Presenters

9:30 am – 12:00 am

Art, Representation, and Gender (PJ 303)  
Grace Adesina, Business Administration  
Samantha Robinson, English  
Michelle Jones, English

Networks, Local and Global – Part One (PJ 103)  
Clara Young, Sociology  
Howsikan Kugathasan, Mathematics

Personal Growth and Development (PJ 122)  
Alysa Martin, Sociology  
Aledra Jacobs, Psychology  
Brianna Acklin, Art

Pragmatic Applications for Computational Thinking (PJ 322)  
Bikki Nargarkoti, Computer Science  
Upendra Dhakal, Computer Science  
Marlon Portillo, Computer Science  
Oumar Karaga, Computer Science

11:00 am – 12:15 pm

The Modern Political Sphere (PJ 201)  
Christine Haile, Political Science  
Denae Clinton, Political Science  
Shalina Mohammed, Political Science

1:00 pm – 3:00 pm

STEM and Life Sciences (PJ 122)  
Howsikan Kugathasan, Mathematics  
Michael Davies, Physics and Astronomy  
Baffour Osei, Physics and Astronomy

The Gender Politics of Daily Life (PJ 305)  
Audria Porter, Sociology  
Najera Rogers, Business Administration  
Barbara King, Computer Science

Fisk and HBCU Life (PJ 209)  
Breanna Thomas, History  
Taylor Montgomery, Physics

Networks, Global and Local – Part Two (PJ 107)  
Grace Adesina, Business Administration  
Tina Watson, Business Administration  
Aliyah Farrow, Business Administration  
Vestavia Smith, Business Administration  
Joseph Gibson, Business Administration  
Lamar Allen, Business Administration  
Jasper Fulcher, Business Administration
Schedule for Oral Presentations

9:30am – PJ 303

**Art, Representation, and Gender** (Gender and Sexuality – Art and Literature)

1. “Cutting Beauty: The Evolution of Scarification & Cicatrization”
   *Grace Adesina, Business Administration*

2. “Sequential Art and Slavery: Trauma in Octavia Butler’s *Kindred* and Toni Morrison’s *Beloved*”
   *Samanda Robinson, English*

   *Michelle Jones, English*

9:30am – PJ 103

**Networks, Global and Local – Part One** (Global Affairs)

1. “The Effect of Income Area on Grocery Price and Food Consumption Choices”
   *Ciara Young, Sociology*

2. “A Bioethical Comparison of Food Fortification and Water Fluoridation Interventions”
   *Howsikan Kugathasan, Mathematics*

9:30am – PJ 122

**Personal Growth and Development** (Gender and Sexuality – Social Sciences)

1. “The Effects of Father Absence and Father Presence on Adults”
   *Alysa Martin, Sociology*

2. “P.R.E.S.E.N.T: Youth Suicide Prevention”
   *Aledra Jacobs, Psychology*

   *Brianna Acklin, Art*
9:30am – PJ 322

Pragmatic Applications for Computational Thinking (Mathematics and Computer Science)

1. “Nepal Internships”
   Bikki Nagarkoti, Computer Science

2. “Code With Voice”
   Upendra Dhakal, Computer Science
   Bikki Nagarkoti, Computer Science
   Marlon Portillo, Computer Science

3. “Course Dependency Graph”
   Oumar Karaga, Computer Science

11:00am – PJ 201

The Development of the Modern Political Sphere, 1651-2017 (Politics and Voting Rights)

1. “The Modernity of Man”
   Christine Hale, Political Science

2. “This Means War”
   Denae Clinton, Political Science

3. “The Post Hilary Clinton America”
   Shalina Mohammed, Political Science

1:00pm – PJ 209

Fisk and HBCU Life (Gender and Sexuality – Social Sciences)

1. “Now’s the Time for Women: The Impact of the Women’s Liberation Movement on ‘The Fisk Woman’”
   Breanna Thomas, History

2. “Love in College: The Climate of College Dating at Historically Black Colleges and Universities”
   Taylor Montgomery, Physics
1:00pm – PJ 107

Networks, Global and Local – Part Two (Global Affairs)

1. “An Analysis on the Relationship Between Income Inequality and National Growth (the Curious Case of Nigeria)”
   Grace Adesina, Business Administration

2. “Gender and Leadership: Women in Senior Leadership in the United States vs. Japan”
   Tina Watson, Business Administration
   Aliyah Farrow, Business Administration

   Jasper Fulcher, Business Administration

1:00pm – PJ 122

STEM and Life Sciences

1. “Biotransformation of Cycloastragenol and Curcumin”
   Howsikan Kugathasan, Mathematics
   Glenroy Martin, Mathematics

2. “HAT-P-36b TTVs (Transit Timing Variations)”
   Keivan Stassun, Physics and Astronomy
   Karen Collins, Physics and Astronomy
   Michael Davies, Physics and Astronomy
   Baffour Osei, Physics and Astronomy

1:00pm – PJ 305

The Gender Politics of Daily Life (Gender and Sexuality – Social Sciences)

1. “Young Women’s Perceptions of Facial Cosmetic Use”
   Aundria Porter, Sociology

2. “Misunderstood: Foot Prints of Black Women”
   Najera Rogers, Business Administration

   Barbara King, Computer Science
Cutting Beauty: The evolution of Scarification & Cicatrization
Adesina, Grace*
Dept. of Business Administration, Fisk University, Nashville, TN 37208

The concept of beauty and aesthetics is one topic that has been discussed exhaustively in every field from philosophy to popular culture with no resolution. The absence of agreed and accepted philosophical standards of measurement coupled with the existence of power structures of oppression make this already controversial subject more convoluted. In recent times, people have been vocal in questioning the widespread adoption of European beauty standards as the ideal standard. As a result, accusations of cultural appropriation, cultural bastardization, and whitewashing have been featured regularly on the news and on social media. There has been an increasing cry for the inclusion and representation of alternative beauty standards in Hollywood, fashion, music and makeup industries. In the midst of this politically and socially charged period, there has been a surge of scarification and cicatrization practices among the tattoo and piercing aficionados in Europe. These practices are seen in body modification circles as an edgier, more intense form of the new body art. This body modification, not to be confused with tattooing, is an ancient art practice in several ethnic groups in Africa notably West Africa. This paper is concerned with the cultural significance of scarification and cicatrization highlighting these decorative scars as emblems of identification, ritual rites, courage, and beauty. Following the transatlantic slave trade and colonialism, this practice was soon regarded as barbaric and demonic and was on the decline until its recent resurgence in the European extreme body art scene. This paper makes the claim that the acceptance of beauty depends on nuances like who wears the mask of beauty and how power structures influence perception of beauty in popular culture.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality, Literature and Literary Studies, Race Relations
Faculty Advisor: Katharine Burnett
2. **Culture vs. Literature: The Representation of Single Mothers in African-American Literature**
   Jones, Michelle

   1^English, Dept. of Arts & Languages, Fisk University, Nashville, TN 37208

   Literature is defined as writings in which expression and form, pertaining to ideas of permanent and universal interest, are characteristic or essential features, as poetry, novels, history, biography, and essays. The representation of the single mother throughout different forms of literature varies from hypersexual, to angry, hateful of the opposite sex, and very independent. Each form of literature represents the single mother in a different mode whether it consists of the statistics of the single mother or fictional/nonfictional character. To further understand the effects literature has on the single mother’s representation within the American culture, I will be closely reading different forms of literature. In my close readings, I will be examining Harriet Jacobs’ autobiography Incidents in the Life of a Slave Girl, Ann Petry’s novel The Street, and Gloria Naylor's novel The Women of Brewster Place in effort to express the similarities within the texts even though they were produced in different eras. What this literature does is push against these falsified tropes of African American single mothers popularly circulated within American culture. These selections will explain the constant negativity surrounding the expression of the single mother over the years and how this negativity has affected cultural aspects outside of literature.

   Presentation Type: Oral
   Presentation Themes: African-American History, Gender and Sexuality, Literature and Literary Studies
   Faculty Advisor: Katharine Burnett

3. **A Bioethical Comparison of Food Fortification and Water Fluoridation Interventions**
   Kugathasan, Howsikan

   1^Mathematics, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

   Food fortification and water fluoridation are two public health interventions that intend to alleviate nutritional deficiencies in the population. However, both of these interventions pose ethical conundrums when considering the importance of informed consent and deception in bioethics as they both involve the passive consumption of a nutrient by all members in a population without the express informed consent of any of them. This investigation considers the ethics of both food fortification and water fluoridation to determine whether both interventions are ethically similar. By reviewing the ethical frameworks used to evaluate these interventions (the justificatory approach of James Childress, the Nuffield Council on Bioethics’ stewardship model, and deductive ethics from the Nuremburg Code), I will establish that the all of the frameworks except the deductive approach from the Nuremberg Code fail to clearly address the role of deception in these interventions. The implications of this ethical comparison naturally extend to other proposed public health interventions that do not require the express consent of the patient such as propositions to deliver statins via water to prevent cardiovascular disease.

   Presentation Type: Oral
   Faculty Advisor: Patrick Fleming

4. **Love In College: The Climate of College Dating at Historically Black Colleges and Universities**
   Montgomery, Taylor

   1^Physics, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

   The purpose of this research was to unveil what the current college dating trends and definitions are as defined by students who attend Historically Black Colleges and Universities (HBCUs). The basic design
of this study includes literature reviews and a survey with data from several different college students across varying demographics. There is a strong consensus on a few questions asked in the survey such as approximately 70% of students surveyed have not used dating apps and an overwhelming majority (93.8%) of students expect respect of their standards while dating. There were several identical definitions for the dating terms “Bae” and “Netflix and Chill”. This data supports that most HBCU college students are dating on one accord and this information can prove to be helpful for students making decisions on relationships and dating.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality
Faculty Advisor: Katharine Burnett

5. Sequential Art and Slavery: Trauma in Octavia Butler’s Kindred and Toni Morrison’s Beloved
Robinson, Samanda

English, Dept. of Arts & Languages, Fisk University, Nashville, TN 37208

Walter Mosley states in “Black to the Future” (2000), “Science fiction allows history to be rewritten or ignored” (Mosley 405). Mosley speaks to the reason why it is essential that the African American narrative be included in this genre; a genre traditionally dominated by white males with subjects such as time travel, inter galactical journeys, and chemical reactions. Often, the academic and mainstream discussions of speculative fiction have ignored race. Because of these gaps, authors of speculative fiction in science fiction have a duty to be the gatekeepers and almost always have a moral stance or call to action in their texts. During the 20th century however, science fiction including Octavia Butler's Kindred (1979) discusses both race and more specifically the trauma associated with being a slave. Butler achieves this through the narrative of the travel tale. The protagonist, Dana, is forced to be retrospective by living the experience of a slave in the pre-Emancipation south. She experiences the horrific lash of the ship, sees the effects of the rape culture through the slave master’s patriarchy and the haunting of the institution of slavery itself. Toni Morrison’s Beloved (1987) is also a representative text that reveals the trauma associated with slavery especially in regards to slave women. The haunting that occurs within Morrison’s novel is not figurative, but literal through the ghostly arrival of her daughter who she killed as a sacrifice to protect from the institution of slavery. Although both the novels, Kindred and Beloved masterfully represent this trauma and violence on Black women’s bodies and their psyches, the graphic novel adaptation of Kindred (2017) by Damian Duffy and John Jennings accurately explains through iconography what Kindred and Beloved could not through the written word.

Sequential art is a broad term that encapsulates the genres of comics, graphic novels, and animation. Per Scott McCloud in his Understanding Comics, he defines comics as, “Juxtaposed pictorial and other images in deliberate sequence, intended to convey information and or to produce an aesthetic response in the viewer (McCloud 9).” Sequential art makes use of icons, closure and reader engagement, synaethetics, and the interplay of text and images. It is fitting to note that these complex techniques are employed because many literary critics discount comics and sequential art as a whole because it is often considered a low art form. Comics can convey topics such as racism, xenophobia, homophobia, and hierarchy in a way that is able to be digested by both the young and old. This realistically makes comics and sequential art more relatable and should not be considered a low art form because of its hidden complexities. But, Butler’s text is reimagined and given new life through the sequential representation.

Scholarship is lacking on the representation of race in sequential art and the effects this has on readers. It is also rare for a slave narrative to be depicted through graphic form (another notable text includes a slave narrative is Kyle Baker’s Nat Turner (2008)). Butler’s text is unique in that it employs devices employed by the genre of Afrofuturism but with a focus on the past. So how does the representation of Dana aid in understanding the horrors of slavery? How is patriarchy revealed in both
the novel and graphic novel? What is the value of sequential art to the complex issues discussed in the novel? Has sequential art traditionally left out conversations of race? Is science fiction a catalyst for awakening social justice movements? What icons used in the graphic novel evoke a sense of trauma and violence? How can a novel published in the 70s correlate to the contemporary?

This project will compile evidence from numerous written sources relating to slave narratives and texts in the Afrofuturism genre, while also researching the current and scarce scholarship on the effects of sequential art, race, and trauma/violence. A close reading of Kindred, Beloved, and Octavia Butler’s Kindred: A Graphic Novel Adaptation and Understanding Comics will be essential to the discussion.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality, Literature and Literary Studies
Faculty Advisor: Katharine Burnett

6. Now’s The Time for Women: The Impact of the Women’s Liberation Movement on “The Fisk Woman”
   Thomas, Breanna
   History, Dept. of History & Political Science, Fisk University, Nashville, TN 37208

   For over 100 years, Fisk University administrators created and implemented policies to cultivate male students into “Fisk Men” and female students into “Fisk Women.” The administration defined the speech, dress, character, morals, and essence of the university’s graduates and pushed students to fit these standards. While many women students benefited from conforming to the standard, many non-conforming women faced harsh penalties spanning from ostracization to expulsion. This historical analysis of “Fisk Women” in the 20th century illustrates the social and political context of developing college women, the barriers that these same women faced, and the social, political, and cultural impact that the Women’s Liberation Movement of the 1960s and 1970s had on the redefining “The Fisk Woman.”

   Presentation Type: Oral
   Presentation Themes: African-American History, Gender and Sexuality
   Faculty Advisor: Katharine Burnett
The current study compared varied outcomes for adults whose fathers had been absent or present from birth to age 18. The data were obtained from the National Survey of Families and Households, Wave 3. The focal children in households were approximately 27-33 years old when interviewed in 2005. The sample size consisted of 1,952 respondents and 9,637 households. The outcomes compared in these father absent or father present households were related to sexual activity, drug use, alcohol use, grades, marital status, marital happiness, depression, self-esteem, and educational attainment. Sex was used as a control variable. In this particular study, the independent variable was the presence of fathers measured as father never present (separated from father birth to age 18), father absent (separated from father for a period of 4 months or more), and father always present from birth to age 18. More females in both father absent and father never present households had felt depressed for two weeks or more. More females in father absent households earned poorer grades and had never been married. Also, more father absent individuals had sex at earlier ages, had more sexual partners, and frequently used marijuana.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality
Faculty Advisor: Dani Smith
The current study examined women's perceptions of beauty and cosmetics use. Twenty predominantly Black female college students between the ages of 18 to 22 were engaged in face-to-face interviews. Specific questions asked how the respondent defined beauty, if the respondent believed the cosmetics industry had a specific target, and if the respondent believed skin tone plays a role in the beauty of women. In addition, questions asked whether the respondent used cosmetics, how often she used cosmetics, and what facial cosmetics do for the respondent. Women who do not use facial cosmetics were asked why not. Also asked were respondents' opinions of women who use and do not use facial cosmetics, whether they believed men or women dominated the cosmetics industry, and how respondents perceived beauty/fashion models. The respondents from the current study defined beauty in terms of internal characteristics. These women were ambivalent about cosmetics use and primarily supportive of natural beauty. Participants saw no effect of skin color on attractiveness. Actual cosmetics use ranged from daily to rarely. The women believed marketers of cosmetics failed Black women and focused on a narrow range of women as models. Most of the women agreed that social norms promote cosmetics use.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality
Faculty Advisor: Dani Smith

9. The Effect of Income Area on Grocery Price and Food Consumption Choices
Young, Ciara

The purpose of this study was to determine whether store area median income level affects grocery prices and food consumption choices. An observation in six Metropolitan Nashville neighborhoods, which were chosen using the 2010 Census of Population to determine their socioeconomic makeup and to ensure the study included all income levels, was conducted. The sample included eight grocery stores, six of the same chain grocer and two matched to geographic location and income level. The socioeconomic independent variables were store area median income, education level (percent high school graduates, percent college degree), and percent Black of population. The dependent variable was the consumption choices offered by grocery stores. The price, variety, quality, and organic counterpart of five generic produce and food items, along with the size of organic food sections were observed. Other dependent variables observed were whether a deli, bakery, or hot foods counter was available, and store cleanliness and appearance. Grocery stores in lower class neighborhoods did not charge higher prices on staple products than stores in middle or upper class neighborhoods. Stores in lower class neighborhoods had fewer organic product offerings and less overall variety in the category of products studied. Almost all of the stores, regardless of neighborhood, contained delis or bakeries and were rated fairly high in terms of cleanliness.

Presentation Type: Oral
Faculty Advisor: Dani Smith
10. This Means War
Clinton, Denae¹; Leach, A. Hannibal²

¹Psychology, Dept. of Behavioral Sciences & Education, Fisk University, Nashville, TN 37208; ²Political Science, Dept. of History & Political Science, Fisk University, Nashville, TN 37208

This article was written in order to address the prevalent issues surrounding the election of Donald Trump to the US Presidency. The idea was to highlight some of Trump’s most grievous offenses against many segments within the American public, and also to reinforce the need to stand up for the values and principles that make our democracy great. My article sketches some of the reactions and steps that many students from Fisk University undertook in an effort to make our collective voices of opposition heard. These steps included boycotting, marching, and other forms of peaceful protests. In a time where the youth are generally thought to be disengaged from politics, this article helps to undermine these notions by shedding light on various political activities taken by students at Nashville’s oldest HBCU – Fisk University. It is made very clear that this is only the beginning of much opposition to come.

Presentation Type: Oral
Presentation Themes: Politics and Voting Rights
Faculty Advisor: Jennifer Adebambo

11. The Modernity of Man
Hale, Christine¹

¹Political Science, Dept. of History & Political Science, Fisk University, Nashville, TN 37208

This essay examines the modernity of man through ancient philosophers such as Aristotle, and modern philosophers such as John Locke and Thomas Hobbes. By examining this significant change, I am able to clarify the different hypothesized definitions of man, along with man’s individual purpose and end. The political and philosophical time period that is studied sets a foundation for who man is in his state of nature, his natural aversions, and his ultimate purpose in society. In this piece, I reference John Locke’s
Two Treaties of Government and Thomas Hobbes’ Leviathan, with emphasis on the latter piece. These pieces of writing stand as my foundation, as factual information is collected from these sources then synthesized to create an argument of who the modern man is today. This essay not only illustrates the difference of man define, but it also compares and confirms the risen suggestion of modernity within the political philosopher’s realm.

Presentation Type: Oral
Presentation Themes: Modern Political Sphere
Faculty Advisor: Holly Hamby

12. The Post Hilary Clinton America
Mohammed, Shalina1; Leach, A. Hannibal1

1Political Science, Dept. of History & Political Science, Fisk University, Nashville, TN 37208

This article focuses on the American political atmosphere – post Hillary Clinton. The main idea is to address the pertinent issues surrounding women’s rights and family issues. These issues moving forward will be especially interesting given that Hillary Clinton prioritized these topics throughout her campaign, and of course, is no longer actively engaged in the political process. Even though former Secretary Clinton is no longer at the forefront of these issues, they are still present and must be addressed. My article highlights potential figures who may take up the baton and effectively champion women’s issues. I also speak to whether policies toward women and families will be addressed during the tenure of the Trump administration, and who should address them if they are not inscribed effectively by the new administration. Equality and other concerns surrounding women’s rights, have for a while been viewed as less important than other issues. This article seeks to open a gateway of intellectual discussion when it comes to the Trump administration’s plans for women and family rights. The basic assumption here is that our democratic republic can and is willing to hold elected officials accountable – even the president.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality
Faculty Advisor: Jennifer Adebanjo
13. An Analysis on the relationship between Income Inequality and National Growth (The Curious Case of Nigeria)
   Adesina, Grace
   Dept. of Business Administration, Fisk University, Nashville, TN 37208

   This paper seeks to explore the relationship between factors such as income inequality and national growth holding constant other variables. In the introductory paragraphs, I will establish an underlying assumption based on the correlation of the two variables. Unlike earlier hypotheses proposed by economists that income inequality stimulates national growth, I will make a case that uneven income distribution can hinder economic growth in the long run. The policy analysis and recommendation will be based on the assumption that the level of income inequality of country posits an effect on the total national growth of that country. Using Nigeria as a case study, I will analyze the policies that have been legislated in order to combat inequality and their effects on national growth. If there an absence of policies enacted to even out income inequality, I will make a case for why policies that address income inequality should be enacted for economic growth.

   Presentation Type: Oral
   Faculty Advisor: Stafford Cargill

14. Project U.Y.R (Use Your Resources)
   Campbell, Kelson; Ambrose, Jayson; Shaw, Erik; Lomax, Theron
   Dept. of Business Administration, Fisk University, Nashville, TN 37208

   Fisk University Information Technology Services Center have been experiencing difficulties with the wifi, CANVAS and other minor technological issues around campus. The current staff is diligently
finding remedies to these problems, but unfortunately their staff numbers are too low to be able to handle the situation.

Project U.Y.R., also known as Project “Use Your Resources”, serves as a solution to the current Fisk University Information Technology Services (ITS) issues. We developed a recruiting strategy, where 80% of the ITS staff will be Fisk University’s very own intelligent, energetic and ambitious students. Our strategy is influenced by our research that we conducted through surveys and interviews with several students and campus officials. Part of our recommendation is an initial three way collaboration between the ITS, Computer Science and Business Administration departments. We found that the students in these two disciplines have acquired enough skills to execute the current tasks in the Information Technology Services Center. However, our strategy is not only limited to these students. Our survey results suggested that students pursuing other disciplines are also interested in being exposed to IT related projects. One of the biggest skills we found is that the Fisk students are passionate and are willing to learn these new skills. This skill alone sets the foundation for Information Technology as they typically only look for people that has this passion. Our plan also suggest ways to compensate students for their efforts, based off of the current source of funding that Fisk University has access to. We envision a more diverse funding source in the near future, which allows Fisk University to leverage the talents and skills of its students to solve this endemic IT problems.

Presentation Type: Poster
Faculty Advisor: Nicholas Umontuen

15. “Is Athletic Programs the Way out of Fisk University Financial Woes?”
   Diaz, Che
   Dept. of Business Administration, Fisk University, Nashville, TN 37208

Fisk University is one of the most prestigious HBCU’s in the southern region of the United States and its reputation for academic excellence and producing well-educated students is a known fact. These characteristics along with the rich history have not been able to help the university through its recent financial struggles and there is room for an innovative proposal that may be the formula to help the university conquer its current financial dilemma. It is obvious that the athletic program is not the top priority of the university but one needs to realize how impactful having a well-rounded and vibrant athletic program could be to the student body. Athletics could also attract potential students who see the potential of belonging to an athletic program at Fisk University.

   Our proposal would research and present how the university can use more of its resources to strengthen and develop its current weak athletic program to increase enrollment and thus increase cash flow to the university. Having a respectable athletic program is a great way to improve the reputation of the university and as a college student, one would expect to get the full experience or at least have the choice of experiencing college from both an academic and an athletic point of view. Having a better athletics program with more sports would attract a much broader scope of students who have a different interest in varying sports but also have an interest in getting a sound education. This is, in fact, an achievable goal and other top HBCU’s such as Howard University and Xavier University are tangible proof. In the case of Howard University, the school spent $4,795,237 on men's teams and received $5,497,958 in revenue. On average, Howard University gave male athletes $15,949 in sports-related student aid. In women teams, Howard spent $3,705,396 and received $4,090,480 in revenue. On average, Howard University gave female athletes $17,460 in sports-related student aid. It is evident that Howard has benefited from its investments in its athletic programs. This has also increased enrollment since student athletes see that there are more opportunities to receive for student aid.

Presentation Type: Oral
Presentation Themes: African-American History
16. The Millennial Effect: How a band of misfits changed the world’s greatest economy

Fulcher, Jasper

*Dept. of Business Administration, Fisk University, Nashville, TN 37208

America today is made up of 4 major generations, the baby boomers, Gen. X, Generation Y or Millennials and Generation Z or Boomlets. Out of all of these generations the one generation that has shifted the foundation of this country’s economy the most were the Millennials. This shift moved the American economy a state of “what’s next”, to an economy that looks to utilize technology and individuality to merge the world we live in with the world we work in. This shift is exemplified by the decline of large industries that older generation believed would remain the same forever. The Print and News industry are on the decline on the one hand, while industries like social media are on upward swing. The shift has also created a new marketplace. Marketplace that no longer has a physical place but that of a cybernetic network of customers and merchants.

These examples of the “Millennial Effect” have been tracked and documented through a number of various sources and this paper will serve to enlighten the individuals that may have a misunderstanding of Millennials and to connect the dots of how the shift happened and the projections of how the American economy will move with the impact that Millennials have on the U.S. economy.

Presentation Type: Oral
Presentation Themes: Global Affairs
Faculty Advisor: Nicholas Umontuen

17. The Black Dollar: A Look Inside the Lives of the African-American Wallet

Lowe, Christopher

*Dept. of Business Administration, Fisk University, Nashville, TN 37208

African-Americans have historically garnered lower economic status in comparison to other races in America, including when in comparison to other minority communities throughout the nation. With an accelerated growth and population rate, these numbers can often leave one confused about just how African-Americans seem to find themselves in this economic condition. One primary contributor to this reality is that of African-American consumer traits. The black consumer when observed often leaves one to question the majority of it’s consumer habits. Why is it assumed that African-Americans are as a community poor, while studies show it a fact that African-Americans had a spending power of 1.1 trillion dollars in 2015, slightly increasing to 1.3 million in 2017. The gaping hole between how long a dollar circulates in the black community in comparison to how long a dollar may circulate in other racial communities, including other minority communities, is astonishing, and seemingly remains a mystery. This research sheds a light on various consumer habits in the black community that contribute to the continuing decline of the black economy in America. The research also aims to provide basis for establishing a short-term solution to an issue that has plagued the black community for decades.

Presentation Type: Poster
Faculty Advisor: Nicholas Umontuen


Rogers, Najera

Faculty Advisor: Nicholas Umontuen
The goal of this research project is to provide a basic level of understanding about the United States' national debt. In addition, I want to inform the citizens of the United States of America about the National Debt and how they are affected by it. I will analyze how the United States became in massive debt, how they are currently spending their money, and how the national debt compares to other major countries. The countries that I will compare the United States debt to are Japan and Liberia. Japan has the highest national debt of all countries in 2014 and Liberia has had the lowest national debt in 2014. I chose to compare the United States national debt to those countries because I wanted to compare the United States to a broad range of economies.

The main purpose is for the United States citizens to gain knowledge about their countries economy and be able to understand basic economic terminology.

**Presentation Type:** Poster  
**Presentation Themes:** Global Affairs, Politics and Voting Rights  
**Faculty Advisor:** Stafford Cargill

19. Misunderstood: Foot Prints of Black Women  
**Rogers, Najera**

The goal of this research project is to provide a basic level of understanding about how society misunderstands African-American women. I want to inform the citizens of the United States of America about how Black women have been portrayed by Society and who Black women truly are. This paper covers American society’s perception and portrayal of Black women from the course of 1619, when African American women first landed in what would be known as the United States to now. African American women have faced a complex and dynamic change in characterization that centered around economical, societal and political control which led to a societal misconception reflecting “isms” rather than reality.

**Presentation Type:** Oral  
**Presentation Themes:** African-American History; Creative Writing; Gender and Sexuality; Race Relations  
**Faculty Advisor:** Stafford Cargill

20. The Disproportionate Representation of Minorities in Upper Level Management  
**Starkes, Charisse**; **Scott, Jasmine**

The purpose of this research is to identify the degree to which top firms in the United States diversify their senior leadership teams. The majority of upper level management in companies is represented by white men. For the purpose of this study we have defined diversity as women, to include white women, and people of color, who are not white. The method by which we will conduct research is to utilize secondary data collected on both top S&P and Fortune 500 companies. We will then analyze the firm’s overall profitability, employee demographics, and target consumers.

The research team’s hypothesis is that diverse representation in high level positions allows a company insight that they would not have otherwise gained. This insight in areas such as community relations, point of view, educational background, to name a few, positively affect the success of a corporation.
One’s background heavily influences their perceptions and actions as an adult. Having diverse minds in the “C-Suite” or other upper level positions allows the company perspectives that would not be available if it were filled with white men. Many companies are now focused on a specific clientele, and with minority groups quickly becoming the majority in America, companies that cater to a minority group are founded daily. These companies’ success is largely based on their ability to create and market a product that either meets the need of some minority group, or will appeal to all populations.

Presentation Type: Poster
Faculty Advisor: Nicholas Umontuen

21. Gender & Leadership: Women in Senior Leadership in the United States vs Japan
Watson, Tina†; Farrow, Aliyah‡
†Dept. of Business Administration, Fisk University, Nashville, TN 37208

Gender plays a significant role in the workplace. Diversity and Inclusion departments are a staple in companies across the world to not only address racial equality in the workplace but also gender equality. The continual need for such efforts is evident due to the incongruity of the number of men and women in key leadership positions in many organizations. Despite legislative efforts to significantly narrow the gender gap in these positions both domestically and globally, the gaps are not making timely improvements to effectively narrow the gap. This research is geared at examining women in senior leadership positions in the United States and Japan. We will consider the following areas: the number of women chief executive officers or presidents, the effect of profitability in the company by having women in leadership positions and the opportunities available to women to cultivate the needed leadership skills for advancement.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality; Global Affairs
Faculty Advisor: Nicholas Umontuen

22. The Wash
Webb, DeAngelo†
†Dept. of Business Administration, Fisk University, Nashville, TN 37208

Sixty-two percent of car owners believe car appearance is essential. The purpose of this research is to convince investors to invest in my carwash business. Car washing is very important because it prevents contaminants like dust, dirt, pollen, tree sap, bug guts, salt, air-borne pollutants from adhering to your vehicle. The goal of washing your car is to keep it in excellent condition by maintaining its appearance and protecting its’ resale/trade-in value. My goal for my business is to develop a fast-automated drive through car wash booth, that will leave the car shining all month. This car wash will also have an area that people can freely vacuum their cars for free after a wash. I found the perfect area in Maryland to open this carwash and according to similar carwashes in other states, there’s a high probability of a great return. The carwash industry remains very attractive as the young urban population continues to grow. This demographics are known to be conscious of their image, a part of which is expressed through their automobiles. Research shows that carwash business has the potential of breaking even within the nine months of operation.

Presentation Type: Poster
Faculty Advisor: Nicholas Umontuen
There are a variety of factors that contribute to cardiovascular disease such as: lifestyles, the environment, finances, and family medical history. The intent of this intervention is to reduce the risks of cardiovascular disease and obesity by educating college students on the importance of making healthy food choices and engaging in physical activity. The target population for this intervention is African-Americans college students ages 18-21 on the campus of Fisk University. Fifty-five students signed up for this study. A questionnaire was administered to each participant. Their weights, blood pressure and blood sugar values were also acquired. Each participant was fitted with an activity band. This ongoing intervention includes weekly workout sessions: line dancing classes, hip-hop dance classes and short seminars on healthy living. In addition to group workout sessions, each residence hall on the Fisk campus was equipped with a treadmill. After six weeks of routine exercise, participants were required to weigh-in. Significant differences in weights were not observed. After twenty weeks of exercise, the blood pressure, blood sugar and weights of participants will be recorded again. Correlations between these metrics and BMI values will be reviewed and the effectiveness of the activity monitors in aiding weight loss will also be determined.

Presentation Type: Poster
Faculty Advisor: Patricia McCarroll
Grant: Tennessee Department of Health, Office of Minority Health

24. Investigating the Correlation Between Mutations in the FKH-8 Gene and Oxidative Stress
Coca, Timothy†
†Department of Biochemistry, Fisk University, Nashville, TN 37208
Reactive oxygen species (ROS) cause oxidative stress which are known to damage a number of cellular structures including proteins, lipids, and nucleic acids. The transcription factor fkh-8 is expressed in dopaminergic neurons and plays a key role in the regulation of dopamine, whose metabolism leads to the creation of ROS. I used Caenorhabditis elegans as a model to elucidate how mutations in the fkh-8 gene affect levels of oxidative stress.

Presentation Type: Poster
Faculty Advisor: Brian Nelms
Grant: National Science Foundation HRD-1547757

25. The transcription factor fkh-8 is involved in sustaining CO2-sensing function in C. elegans
Garrett, Destane1; Cawthon, Bryan2; Nelms, Brian1
1Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Cell and Developmental Biology, Vanderbilt University, Nashville, TN 37235

Sensing and responding to changing levels of oxygen and carbon dioxide is an important function across the animal kingdom. In the model organism Caenorhabditis elegans, the inability to sense fluctuations in CO2 levels can potentially lead to death. The BAG neuron is one cell type that can function as a mediator of high CO2 avoidance and sense decreases in O2 levels. Known transcription factors, such as ETS-5 and EGL-13, are required for BAG CO2/O2 sensing. We observed through genetics and behavioral studies that the transcription factor FKH-8 also plays a role in CO2 sensing. We are specifically studying the role of FKH-8 in regulating gene expression in BAG neurons. This will be investigated by examining expression decreases or increases in specific BAG CO2 sensing reporter genes through loss of FKH-8 function, as well as through the continuation of behavioral assays with fkh-8 mutants. Through this experimentation, we hope to uncover results that identify which important signaling components in BAG neuron CO2-sensing are controlled by FKH-8.

Presentation Type: Poster
Faculty Advisor: Brian Nelms
Grant: NIH R25 #1R25GM107754-01, NSF RIA #1401091, FISK/NSF BioSS CREST Center #HRD15-477757

26. Correlations Between Lower Weights and Diabetes
Nurse, Taryn1
1Wellness & Healthcare, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

The purpose of this experiment was to build on the findings from previous interventions targeted at spreading awareness of the genetic risks factors which predispose individuals for acquiring diabetes. This experiment elaborated on previous points as well as the dangers of pre-diabetes and how lifestyle and diet can possibly increase the likelihood of acquiring the disease, regardless of BMI. Participants were taught to identify early warning signs in order to catch the disease in its preventable state. The project consists of an intervention in which new data from studies conducted by the American Diabetes Association will be presented. A pre-test/post-test quasi experimental design will be used to determine the change in knowledge. Participants will be able to identify the symptoms of pre-diabetes and how to combat this condition before it becomes full blown. Participants will be more likely to make healthy lifestyle and diet choices and leave the intervention better equip to combat pre-diabetes. Based on the pre-test/post-test results, a measurable change in the knowledge of genetic risk factors will be noted.

Presentation Type: Poster
27. Discovering Molecules Required for Dopamine Neuron Function

Quinde, Jennifer1; Roach, Corey1; Toms, Jiah2

1Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Wellness & Healthcare, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

The neurotransmitter dopamine (DA) is an important regulator of voluntary movement and cognition. Proper dopaminergic transmission controls various neurobiological functions with aberrant signaling often resulting in a number of psychomotor disorders. One prevalent neurodegenerative motor disorder, Parkinson's disease (PD), is marked by progressive dopaminergic (DA) neuron loss. As a result, there is also a reduction in DA signaling which underlies the motor deficits and symptoms exhibited by PD patients. Identifying the essential components in the DA signaling pathway will allow us to better understand the normal function of dopaminergic neurons and gain insight into the mechanisms that could cause disease, and therefore lead to potential therapeutic strategies for treating DA-related disorders.

To this end, we have generated a genetic profile for DA neurons using the model invertebrate species Caenorhabditis elegans (C. elegans). C. elegans is a simple organism with less than 1000 cells and only 8 dopamine neurons, but it is very similar at the molecular level and has many genes in common with humans. To discover genes defining DA neuron identity in an unbiased manner, we employed next generation (NGS) sequencing technology, RNA-Seq, to assess mRNA transcripts that are highly expressed in DA neurons as compared to the whole worm. I will highlight the genes we have found to be most abundantly expressed in DA neurons and results from assays for a phenotype associated with excess DA in the synapse known as swimming induced paralysis (SWIP). The identification of these genes, many of which have not been studied in dopamine neurons to date, may give us new insight into mechanisms of dopamine neuron function and disease.

Presentation Type: Poster
Faculty Advisor: Brian Nelms
Grant: NIH R25 Bridges to the Doctorate Award #5R25GM107754-02, NSF Research Initiation Award #HRD14-01091 to BLN

28. Assessing the Role of the Forkhead-8 Transcription Factor in Dopamine Metabolism

Shelton, Debresha1; Cawthon, Bryan1; Nelms, Brian1

1Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Rationale: Per the National Institutes of Health, in 2015, 1.1% of the US adult population suffered with schizophrenia, 4.3% of US adults experienced major depression with severe impairment, and the diagnosis rate for new cases of Parkinson’s disease was approximately 60,000 per year. Dysregulation of dopamine signaling is a common hallmark for each of these diseases. Studies of aberrant dopamine signaling linked to human disease have shown that systemic loss of dopaminergic neurons, mutations in the dopamine transport protein (DAT-1), and loss of dopamine receptors are involved in disease onset. However, less is known about mediators involved in regulation of dopamine metabolism machinery. Thus, there is a need to further elucidate new targets involved in regulating dopamine signaling and metabolism.
**Hypothesis:** The forkhead domain-containing protein, Forkhead-8, in Caenorhabditis elegans (C.elegans) is a transcription factor that acts on dopamine metabolism machinery, including the genes encoding catechol-o-methyl transferase (COMT) and monoamine oxidase (MAO).

**Methods:** Using wild-type worms (N2), and various deletion mutants (for fkh-8, dopamine transporter dat-1, and monoamine oxidase amx-2), I am assessing changes in swimming induced paralysis (SWIP) after COMT and MAO inhibitor treatments. The drugs clorgyline and tolcapone were used to inhibit MAO and COMT, respectively. Each worm genotype was separated into 3 groups: clorgyline only (treated with 25uM clorgyline), tolcapone only (treated with 100uM tolcapone), and dual treatment (25uM clorgyline/100uM tolcapone).

**Presentation Type:** Poster
**Faculty Advisor:** Brian Nelms
**Grant:** NSF CREST grant #1547757

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29. **The Alpha Crystalline B-Like Protein HSP-12.6 impacts Dopamine related function**

*Williams, Tyree*; *Stuckett, Sidney*; *Nelms, Brian*

1Physics, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Dopamine neurons are vital for motor control and cognitive functions, and impairment of the dopamine neurons is associated with Parkinson’s disease, addiction, ADHD, and schizophrenia. There is a lot still to learn about the molecules that are needed for the proper function and protection of dopamine neurons. I am currently investigating the influence of the alpha-crystallin B (CRYAB)-like heat-shock protein HSP-12.6 in dopamine neurons in the model organism Caenorhabditis elegans (C. elegans). I began this project with the knowledge that alpha-crystallin B is found in Lewy bodies associated with Parkinson’s disease models. I want to verify if the HSP-12.6 protein is expressed in and required for C. elegans dopaminergic neuron function. To test this, I first set out to examine co-expression of hsp-12.6::gfp and dat-1::mCherry, a dopamine neuron marker, through fluorescent microscopy, under normal conditions and two environmental stressors: heat shock and starvation. I observed positive co-expression of hsp-12.6::gfp with a dopaminergic neuron marker in the head of the worms. Strong co-expression only became visible under these severe conditions. To examine the functional role of hsp-12.6, we also examined two mutant strains for dopamine-dependent movement defects, VC281 ([hsp-12.6](gk156)) and RB1098([hsp-12.6(ok1077)]). Preliminary data shows that at least one of these mutants displays swimming induced paralysis (SWIP), a presumably extrasynaptic dopamine defect. We will continue to investigate the role of hsp-12.6 in dopaminergic neurons hoping to gain insight into potential mechanisms of protein misfolding in Parkinson’s disease.

**Presentation Type:** Poster
**Faculty Advisor:** Brian Nelms
**Grant:** MARC U*STAR Undergraduate Research (Grant T34GM105551-030, NSF HBCU-UP “Research Initiation Award: FKH-8 control of dopamine signaling” (HRD14-01091), NSF HRD-1547757
30. Interfacial Polymerization of Poly(xylitol sebacate) for Improved Drug Delivery  
Brown, Jerry¹; Grier, Tecia²; Arnett, Natalie²  
¹Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; ²Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

The most widely recognized utilized medications given to obliterate or to facilitate the malignancy manifestations incorporates surgery, chemotherapy, and radiation treatment. Without the capacity to focus on the tumor particularly lessens the take-up accessible for the tumor bringing about intemperate harmfulness and serious reactions with low odds of survival. Cancer is the second cause of death because of the unusual cells continuation of develop and survival subsequent to being motioned to quit separating or to start customized cell passing. Nanoparticles has been investigated for drug delivery due to the ability to modify the material, size, surface, and shape. Polymeric nanoparticles have the capacity of direct cell access to the tumor cell by controlling the size and the surface. The goal of this project is to increase the molecular weight of Poly (xylitol sebacate) (PXS) via interfacial polymerization. PXS is a biodegradable polymer with greater biocompatibility compared to PLGA, which is FDA affirmed for therapeutic devices. The polymeric nanoparticle properties are influenced by the weight of the polymer, therefore an increase can enhance the physiochemical properties including the size of the polymer. An organic-organic interfacial polymerization using dichloromethane and hexane with a base (NaOH) was the method used. ¹H-NMR, ¹³C-NMR, and ATR-FTIR spectra confirms successfully synthesis of fully branched PXS. The effect of the polymerization technique and the amount of base on thermal stability, crystallinity, and MW is shown in the DSC and TGA graph and MW determination chart.

Presentation Type: Poster  
Faculty Advisor: Natalie Arnett

31. Virtual screening of S100A12 inhibitors  
Byrd, Kinara¹; Amoah, Kofi¹; Damo, Steven²; Little, Saffron³
The human protein S100A12 (Calgranulin C, EN-RAGE) is a member of the S100 class of EF-hand calcium binding protein family. Overexpression of S100A12 has been linked to systemic inflammation and has been implicated as a drug target for the treatment of inflammatory disorders. To characterize potential molecular scaffolds for the development of S100A12 inhibitors, we conducted in silico virtual screening using the Swiss Dock molecular docking program. These computational studies identified two anti-allergic compounds, cromolyn and tranilast that bind to a hydrophobic region of the s10a12 structure. Fluorescence spectroscopy validated the interactions between tranilast and s100a12. A computational model of the S100A12-RAGE complex suggests that tranilast can inhibit receptor activation by S100A12. These results will be potentially useful in the development of small molecule inhibitors that can be used to treat inflammatory disease.

32. Synthesis of Sulfonated Poly(ether sulfone) Copolymer with Enhanced Proton Conductivity
Cole, Jessica1*; Carley, Taylor1; Wadsworth, Ophelia2; Arnett, Natalie2
1Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

A fuel cell is a device that converts chemical energy from fuel into electrical energy. A proton exchange membrane (PEM) located between the anode and cathode facilitates proton transfer. Perfluorosulfonated polymers are widely used because they facilitate good proton conductivity. Krishnan et al synthesized a copolymer consisting of 4-fluorophenyl sulfone, bisphenol A and hydroquinone 2-potassium sulfonate. Proton conductivity was measured at 0.091 S/cm.1 In this research a copolymer was synthesized with sulfonated dichlorodiphenyl sulfone (SDCDPS), bisphenol A (Bis-A) and hydroquinone (HQ) via condensation polymerization. The monomers were combined in a 3-neck flask along with solvents dimethylacetamide and toluene. The reaction was heated to 150°C in a N2 atmosphere to allow toluene to trap any moisture that may be present in the reaction. The toluene was then removed and the reaction was heated to 180°C for 12 hours. After cooling the polymer was precipitated in methanol, filtered and dried in a vacuum oven at 80°C for 24 hours. The copolymer will be characterized via Proton Nuclear Magnetic Resonance Spectroscopy (1HNMR) and Fourier Transfer Infrared Spectroscopy (FTIR) to verify successful synthesis, Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) to determine the thermal properties.

33. Inhibition of EZH2, Androgen receptor, and SKP2 Genes Leads to a Decrease in Proliferation Rates of Prostate Cancer Cells
Esedebe, Favour1*; Lu, Wenfu2; Chen, Zhenbang2
The over expression or mutation of EZH2, androgen receptor (AR), and SKP2 genes has been observed to be involved in the development and progression of many forms of cancers, including prostate cancer. Because of this, we sought to determine if the inhibition of the above genes could slow the proliferation rate of prostate cancer (PCa) cells. C25, GSK126 and MDV3100, inhibitors of SKP2, EZH2 and androgen receptor (AR) respectively, were introduced at different concentrations to five cultured PCa cell lines. These cells were left to grow on 12-well and 24-well plates in order to monitor and record their proliferation rates over the course of seven days. The growth curves, determined using crystal violet staining, showed that each cell line had a significant decrease in their rate of proliferation when the inhibiting compounds were added in the medium. Growth rates reversely correlated with the concentrations of inhibiting compounds in all cell lines. In addition, cell-free lysates were also subject to western blot analysis in order to detect the inhibition of the proteins of interest. The western blot analysis results showed the decreased bands of target proteins when the inhibiting compounds were added for the cell lines. Overall, our results showed that the inhibition of these genes resulted in a decrease of proliferation rates in PCa cells.

Presentation Type: Poster
Faculty Advisor: Lee Limbird

34. THE IMPACT OF SUSPENDED FIBROBLAST CELL CULTURE RNA SEQUENCING PROTOCOL ON GENE EXPRESSION
Esedebe, Favour1*; Eltom, Nihal2; Krebs, Catharine3; Ophoff, Roel3
1Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Psychology, Dept. of Behavioral Sciences & Education, University of Colorado, Denver, Denver, Colorado 80204; 3Biology, Dept. of Life & Physical Sciences, University of California, Los Angeles, Los Angeles, CA 90095

Genomic sequencing technologies have contributed to a better understanding of the genomic landscape and how it relates to heritable diseases. Specifically, RNA sequencing (RNA-seq) reveals gene expression by sequencing and quantifying RNA from cells. The Assay for Transposase-Accessible Chromatin with sequencing (ATAC-seq) similarly reveals the open chromatin sites of the genome. The broader scope of this project is to determine how genetic variation impacts gene expression and open chromatin in the context of bipolar disorder using RNA-seq and ATAC-seq on fibroblast cell lines from cases and controls. The typical RNA-seq procedure for fibroblasts is to lyse cells directly as they grow adherent to culture plates. The typical ATAC-seq protocol for fibroblasts involves dissociating adherent cells from culture plates using trypsin, creating a single cell suspension. Because trypsin induces cellular stress and alters gene expression, and because we want both assays to reflect concordant biological states, we sought to determine if there are major transcriptomic differences between RNA collected through the typical adherent RNA-seq protocol and a more ATAC-seq-like suspension protocol. In this pilot study, we collected RNA-seq data from fibroblast cells of subjects with bipolar disorder using the adherent and suspension methods. We ran basic quality control on the fastq files with FastQC, aligned the reads to a human genome reference (hg19) with TopHat2, quantified gene expression with HTSeq, and performed principal component and differential expression analyses using DESeq2. We found 1161 differentially expressed genes between conditions, confirming our belief that trypsinization has a large effect on gene expression. However, we suspect that chromatin structure is more stable than gene expression and therefore ATAC-seq would vary less across adherent and suspended conditions. Future work will be needed to examine differential openness of chromatin.
between adherent and suspended ATAC protocols. We therefore suggest that the typical RNA-seq procedure be used in the expanded project.

Presentation Type: Poster
Faculty Advisor: Lee Limbird

35. Ceftriaxone: Upregulation of GLT-1 to Reduce the Effects of Kainic Acid Induced Seizures
Eugene, Angeline$^1$; Dixit, Shilpy$^2$; Harrison, Fiona$^2$
$^1$Cellular and Molecular Pathology, Fisk University, Nashville, TN 37208; $^2$Department of Medicine, Vanderbilt University, Nashville, TN 37235

While seizures are not a disease themselves, they can be the symptoms of a disorder such as epilepsy or comorbid with neurodegenerative diseases such as Alzheimer's. Prolonged or multiple seizures can lead to brain damage and cognitive decline. Glutamate is an excitatory neurotransmitter that can lead to the propagation of seizures throughout the brain. Ceftriaxone is an antibiotic typically used to treat bacterial infections but can also upregulate the glutamate transporter GLT-1. Therefore we tested the hypothesis that treatment with ceftriaxone would upregulate GLT-1, enhance glutamate clearance, and therefore diminish the effect of kainic acid-induced seizures. In this study, wild-type mice were bred and given daily injections of either saline or ceftriaxone for two weeks. All mice were then given a dose of kainic acid before being observed for seizure-like behaviors. These behaviors included freezing, rearing and falling, tail extension, and rapid face washing. Instances of these behaviors as well as total immobile versus active time were recorded for thirty minutes per mouse. A t-test comparison between the saline and ceftriaxone mice revealed the mice given doses of ceftriaxone spent significantly less time immobile. This result suggests that ceftriaxone does upregulate GLT-1 and prevent the spread of seizure activity.

Presentation Type: Poster
Faculty Advisor: Lee Limbird
Grant: NIH #4T34GM105551-04

36. The Synthesis and Characterization of Polymeric Blends of Poly (mannitol sebacate) and Poly (xylitol sebacate)
Fowler, Jahmel$^1$; Arnett, Natalie$^1$; Gray, Ryan$^2$
$^1$Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; $^2$Department of Chemistry, Fisk University, Nashville, TN 37208

Many individuals suffer from major tissue damage as a result of injury, trauma, and disease. Occasionally surgical procedures, which have numerous disadvantages, are necessary to repair the damage to the tissue. As a means of rectifying these problems, biocompatible polymers are being investigated. They must fit the characteristics of excellent biodegradability, possess good mechanical properties and great scaffold architecture and manufacturing technology. To improve the biocompatibility properties of current biopolymers, scientists have combined the properties of various polymers through physical and chemical blending. The objective of this research is to synthesize polymeric blends of poly (mannitol sebacate), PMS, and poly (xylitol sebacate), PXS, through solution blending and melt blending in order to improve and fine-tune the biocompatible properties of both polymers. $^1$H-NMR of the PMS, PXS and copolymers showed that the appearance of peaks at 1.2, 1.5 and 2.2 ppm represent the presence of the sebacic acid and 3.5 to about 4.5 ppm illustrated the presence of the mannitol and xylitol in the substance. FT-IR results showed the presence of a carbonyl stretch of a carboxylic acid at approximately 1715 cm$^{-1}$. A peak at 1735 cm$^{-1}$ demonstrated the formation of the ester bond due to the reaction of sebacic acid with the mannitol or xylitol. Alkyl groups were also
The S100 class of EF-hand calcium binding protein family play an important role in the immune and inflammatory response. Several members of the family have strong binding affinity for transition metals. S100A12 for example, binds the essential metals zinc and copper which actively play a role in fighting pathogens. This metal sequestration is a critical aspect of the host-response to starve invading bacteria, a process termed nutritional immunity. We have developed an optimized method that allows for the expression, growth, and purification of S100A12 in large quantities. Additionally, we have demonstrated S100A12 exhibits antimicrobial activity against Helicobacter pylori. This bacterial pathogen lives in the stomach and can lead to infections, ulcers, and cancer. Together, these results establish an approach to interrogate S100 protein biochemistry and the mechanisms of nutritional immunity.
bacteria during infection. CP withholds these metals as part of the host-immune response to starve invading pathogens, a mechanism referred to as nutritional immunity. Additionally, crystals of S100A12, an important initiator of inflammation have been grown and the structure determined to 2.0 angstroms resolution. Current efforts are underway to co-crystallize S100A12 with anti-allergen compounds to establish the feasibility of structure-based drug discovery with an eye toward developing anti-inflammatory and anti-cancer compounds.

Presentation Type: Poster
Faculty Advisor: Steven Damo
Grant: NSF HRD1500320, NSF/HBCUP RIA HRD1400969, NSF HRD1547757, TS LAMP Bridges to the Doctorate

39. The Synthesis and Characterization of Poly(mannitol sebacate) (PMS) Blends for Use as scaffolds in Tissue Engineering
Gray, Ryan1*; Arnett, Natalie2
1Department of Chemistry, Fisk University, Nashville, TN 37208; 2Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Severe tissue damage can come from a disease, injury, or trauma and as a result require surgical procedures including autografts or allografts to be repaired. Allografts, however, can produce an immune response in the body, which is a major limitation. To address the disadvantages of transferring human tissue from the patient (autograft) or a donor (allograft), non-human tissue scaffolds on which the patient’s own tissue can grow are being developed from many biocompatible polymers such as (poly(lactic acid) (PLA), poly(glycolic acid) (PGA), and poly(caprolactone) (PCL). These polymers offer the advantage of an appropriate degradation time in vivo, after tissue regeneration has occurred; nonetheless, further improvements to these polymer’s biocompatibility are needed. Combining the properties of commercial polymers with other polymers, such as poly(mannitol sebacate) (PMS), allows polymers with greater biocompatible features and outstanding degradation time to be prepared. The objective of this research is to synthesize PMS polymers and prepare blends with other biocompatible polymers in order to increase the degradation time of PMS in vivo while maintaining its excellent biocompatibility properties. The successful synthesis of PMS via melt polymerization and PCL via ring opening polymerization has been confirmed by 1H-NMR. The proton peaks for the C-O ester linkage show up at 4.5-5.0 ppm for PMS and shows up at 2.3 ppm & 4.0 ppm for PCL. The C-O ester linkage represent successful synthesis of both PMS and PCL.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett

40. Synthesis and Characterization of High MW Poly(xylitol sebacate) Based Polymers for Improved Targeted Nanoparticle Drug Delivery
Grier, Tecia1*; Pryor, Kierra1; Brown, Jerry2; Arnett, Natalie1
1Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Cancer is the second major cause of death in the world due to the growth of abnormal cells and survival after being signaled to stop dividing or to begin programmed cell death. The most commonly used treatments given to destroy or to ease the cancer symptoms includes surgery, chemotherapy, and radiation therapy. Lacking the ability to target the tumor specifically reduces the uptake available for the tumor resulting in excessive toxicity and severe side effects with low chances of survival. The use of
nanoparticles with tunable properties for drug delivery has increased over the last several years due to its ability to directly target cancer cells. Polymeric nanoparticles have the capability of direct cell access to the tumor cell due to size and the attachment of ligands to target antigens on the tumor cell. The polymeric nanoparticle size is affected by the molecular weight of the polymer. Poly (xylitol sebacate) \( (\text{PXS}) \) is a biodegradable polymer with increased biocompatibility compared to PLGA, which is FDA approved for therapeutic devices. Bulk, solvent, and interfacial polymerization were conducted with attempts to increase the molecular weight. The MN will be determined by end group analysis of 1H-NMR, \( ^{13} \text{C-NMR} \), ATR-FTIR spectra proves the successful synthesis of PXS. Further analysis of DSC and TGA will show how the polymerization techniques affects the properties of the polymer.

Presentation Type: Poster  
Faculty Advisor: Natalie Arnett  
Grant: NIH R 25

41. The Search for Novel Bioactive Actinomycetes from Fresh Water Habitats  
Harris, Taylor\(^1\); Martin, Glenroy\(^2\)  
\(^1\)Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; \(^2\)Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Actinomycetes are Gram-positive bacteria that are known to produce bioactive secondary metabolites that are useful in medicine. For over 50 years most of the drugs were obtained from terrestrial sources. With a decline in the number of new drugs from these sources the ocean was seen as the next source of potentially new pharmaceuticals. The ocean has a rich untapped biodiversity and has been shown to produce new bioactive compounds. In this study, the diversity of cultivable marine sediment-derived microorganisms was examined and their potential as antimicrobial agents was investigated. The microorganisms were inoculated on three different isolation media to enhance the number and diversity of cultivable microbes. Eighteen microorganisms were isolated and five exhibited antimicrobial activities. These five microorganisms were grown in large scale fermentations and the identification of the natural products from the extracts obtained are currently under investigation.

Presentation Type: Poster  
Faculty Advisor: Glenroy Martin  
Grant: NIH T34GM105551-03

42. Synthesis and Characterization of PXS-Based Polymers for Enhanced Biocompatibility and Biodegradability  
Hillman, TaNaisha\(^1\); Robinson, Kyra\(^1\); Wadsworth, Ophelia\(^2\)  
\(^1\)Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; \(^2\)Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Biodegradable polymers are used as scaffolds in tissue repairing, surgical sutures and drug delivery capsules, among other applications. Currently, poly(lactic-co-glycolic acid) \( (\text{PLGA}) \), synthesized with the monomers 1,4-dioxane-2,5-dione and glycolic acid, is the primary synthetic polymer being used to regenerate soft tissue in the body due to its biocompatibility and biodegradability. Bruggeman et al synthesized poly(polyol sebacate) polymers via melt polymerization as a biocompatible option to PLGA. Varying concentrations of the monomers were used to ascertain the effect on in vitro and in vivo biocompatibility; results determined that the synthetic polymers demonstrated similar biocompatibility to PLGA. In this study, similar poly(polyol sebacate) polymers were synthesized with different varying concentrations to ascertain the effect on the thermal properties. Xylitol and sorbitol were reacted with
sebacic acid separately. The monomers were placed in a 3-neck flask and heated to 165°C and allowed to melt. The reaction was mechanically stirred for two hours in a nitrogen atmosphere. The product was cooled then dried in a vacuum oven at 80°C for 48 hours. Characterization will be conducted via Proton Nuclear Magnetic Resonance (¹H NMR) and Fourier Transform Infrared (FTIR) Spectroscopy to verify successful polymerization, and Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) to determine thermal properties. Ultimately, viable polymers will be subjected to in vitro and in vivo biocompatibility and biodegradability analyses.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: NSF TIPS 1533516

43. The Synthesis and Characterization of Poly(mannitol-co-xylitol sebacate) (PMXS) Blends for Use in Tissue Engineering
Howze, Shadiamond¹*
¹Department of Chemistry, Fisk University, Nashville, TN 37208

Severe tissue damage in many women, specifically ACL injuries, occur regularly and require immediate medical attention. To repair injuries to the ACL and other ligaments, surgical procedures like autograft and allograft are commonly utilized to correct severe tissue damage in patients. However, limitations in allografts, which are prone to triggering an immune response in the body due to the transfer of tissue from the donor to the patient, have led to alternative methods to repair tissue and are currently being investigated. One method uses non-human tissue scaffolds that allows human tissue to proliferate rapidly are being synthesized from biocompatible polymers, such as poly(lactic-co-glycolic acid) (PLGA) and poly(mannitol sebacate) (PMS).

The objective of this research is to improve the degradative properties of PMS polymer by synthesizing poly(mannitol sebacate)-co-poly(xylitol sebacate) (PMXS) copolymers. The formation of PMS and PXS homopolymers was successful due to the appearance of the C-O at 65 ppm in ¹³C NMR. However, NMR showed unsuccessful synthesis of PMXS copolymers due to the differences in the predicted results of the copolymers and the actual results of the homopolymers and synthesized PMXS. Instead, NMR results of PMXS via melt polymerization demonstrate the preparation of physical blends between the homopolymers.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett

44. Synthesis and Characterization of PXS Based Polymers for Improved Nanoparticle Drug Delivery
Jones, Angelle¹*; Moore, Mauri²*; Wadsworth, Ophelia²; Arnett, Natalie²
¹Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; ²Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Biodegradable elastomeric polymers are used as surgical sutures, drug delivery capsules and scaffolds in tissue engineering, among other applications. Currently, poly(lactic-co-glycolic acid) (PLGA), synthesized with the monomers 1,4-dioxane-2,5-dione and glycolic acid, is the primary synthetic polymer being used to regenerate soft tissue in the body due to its biocompatibility and biodegradability. Bruggeman et al synthesized poly(polyol sebacate) polymers via melt polymerization as a biocompatible option to PLGA. Varying concentrations of the monomers were used to ascertain the effect on in vitro and in vivo biocompatibility; results determined that the synthetic polymers
demonstrated similar biocompatibility to PLGA.\textsuperscript{1} In this study, similar poly(polyol sebacate) polymers were synthesized with different varying concentrations to ascertain the effect on the thermal properties. Xylitol and mannitol were reacted with sebacic acid separately. The monomers were placed in a 3-neck flask and heated to 165°C and allowed to melt. The reaction was mechanically stirred for two hours in a nitrogen atmosphere. The product was cooled then dried in a vacuum oven at 80°C for 48 hours. Characterization via Proton Nuclear Magnetic Resonance (\textsuperscript{1}HNMR) and Fourier Transform Infrared (FTIR) Spectroscopy to verify successful polymerization, and Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) to determine thermal properties, will be conducted. Ultimately, viable polymers will be subjected to in vitro and in vivo biocompatibility and biodegradability analyses.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: NSF TIPS 1535316

45. Biotransformation of Cycloastragenol and Curcumin
Kugathasan, Howsikan\textsuperscript{1*}; Martin, Glenroy\textsuperscript{2}

\textsuperscript{1}Mathematics, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208; \textsuperscript{2}Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Cancer and aging are two medical challenges that are faced in our society and research is being conducted to address them. Two natural products that have been considered for each of these respective ailments are curcumin and cycloastragenol. However, problems such as solubility and poor bioavailability render them difficult to pass through the bloodstream to reach their target sites. This investigation seeks to apply the principles of fungal biotransformation reactions to obtain transformed metabolites of curcumin and cycloastragenol with potentially enhanced biological activities. The chosen microbes for this project are Beauvaria bassiana, Aspergillus niger, and Rhizopus oryzae, all of which have well-documented records of transforming a broad range of organic compounds. The methodology consists of three phases: 1) culturing and fermentation of fungi, 2) isolation and characterization of biotransformed metabolites, and 3) biological assays of biotransformed metabolites. A guiding theme in this project is adherence to the principles of green chemistry by minimizing toxic waste and utilizing milder reaction conditions.

Presentation Type: Oral
Faculty Advisor: Glenroy Martin

46. Structural studies of S100-RAGE complexes
Lashley, marshae\textsuperscript{1*}; Little, Saffron\textsuperscript{2}; Jackson, Emmanuel\textsuperscript{1}; Warner, Rukiayah\textsuperscript{3}

\textsuperscript{1}Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; \textsuperscript{2}Department of Chemistry, Fisk University, Nashville, TN 37208; \textsuperscript{3}Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

The receptor for advanced glycation end products (RAGE) is a pattern specific, transmembrane protein receptor that is involved in the onset of inflammatory responses. Activation of RAGE signaling by the S100 class of EF-hand calcium binding proteins results in upregulated RAGE expression and is correlated to a number of inflammation based diseases. In order to stop the progression of diseases that are caused by inflammation, more knowledge must be obtained about the structure of S100-RAGE complexes. Toward this end, we conducted computational docking experiments of S100 proteins with the V domain of RAGE. Computational analysis of the models revealed a conserved basic and hydrophobic patch of the V domain that is important for ligand binding. To validate these computational
models, we expressed and purified recombinant S100B, S100A8/S100A9, and the V domain of RAGE and conducted crystallization screening experiments. Future directions will involve optimization of crystal growth conditions to produce samples amenable to high-resolution structural determination. Together, these results are an important first step in understanding S100-RAGE binding interactions.

Presentation Type: Poster
Faculty Advisor: Steven Damo
Grant: NSF awards #’s 1400969, 1547757, NIH R25MD010396

47. Tyrosine and phenylalanine inhibit growth of WHI2 mutant Saccharomyces cerevisiae strains

Mhonda, Lorado1,2*; Stolp, Zachary2

1Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Biology, Dept. of Life & Physical Sciences, *Not Listed, , 0

Cells require the ability to sense nutrients (e.g. glucose, amino acids, lipids) to regulate normal growth and division. Cells restrict proliferative processes and signaling in low nutrient conditions. In addition, cancer cells often rely on abnormal regulation of these mechanisms to proliferate in low nutrient environments. Our lab identified WHI2 as a key negative regulator of cell growth in response to low leucine levels. Notably, Dwhi2 overgrowth is not dependent on total amino acid concentration but on the ratio of leucine present in comparison to other amino acids, especially tyrosine, threonine, phenylalanine and aspartic acid. The aim of the study was to determine the specific amino acids among those four that are sensed in ratio to leucine. The growth phenotype of wild type yeast cells and Dwhi2 was observed on media containing different ratios of leucine with either each of the four amino acids or a combination of all four after an incubation period of 3 days. WHI2 knockout strains grew significantly better than wild type strains on a low nutrient medium. A no growth phenotype of Dwhi2 is observed in media containing low levels of leucine relative to high levels of either phenylalanine or tyrosine. In addition, we have further shown that the Dwhi2 overgrowth is dependent on the presence of glutamic acid. The data suggests that high levels of either phenylalanine and tyrosine inhibit growth in the presence of both high and low levels of leucine.

Presentation Type: Poster
Faculty Advisor: Lee Limbird
Grant: NIH MARC Award T34GM105551, NIH R01 NS083373

48. Synthesis and Characterization of p-Phenylenediamine Based Polyamide Thin-Film Composite Reverse Osmosis Membranes

Mittal, Anisha1*; Haque, Zareen2*; Wadsworth, Ophelia1

1Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Desalination membranes, which separate salt from water, are an essential part of the water purification process, which means that they may be the answer to solving the world’s water crisis. The commercial membrane synthesized with m-phenylenediamine (MPD) and trimesoyl chloride (TMC) achieved a water permeation flux of 52 LMH and salt rejection of 99.6%. This research work substituted m-phenylenediamine with its isomer p-phenylenediamine (PPD) and adjusted and compared thermal properties. First the free polymers consisting of MPD/TMC and PPD/TMC were synthesized via interfacial polymerization to verify successful polymerization. MPD and PPD were dissolved in the aqueous layer while TMC was dissolved in the organic layer for 30 minutes. Polymerization reactions
were allowed to proceed for 15 minutes and the products were filtered, rinsed and dried in a vacuum oven. FTIR analyses indicated presence of the –N-H amide peak at 3500-3100 cm⁻¹ that indicates successful synthesis. Both polymers will be analyzed via Differential Scanning Calorimetry (DSC) and Thermogravimetric Analyses (TGA) to ascertain if there are any differences in the thermal properties. Furthermore, MPD/TMC and PPD/TMC RO membranes will be synthesized and characterized via crossflow filtration to ascertain the differences in water flux and salt rejection.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: NSF TIPS 1533516

49. Investigation of the Microbial Diversity and Bioactive Potential of Microorganisms from Fresh Water Ecosystems
Onabolu, Oreoluwa¹; Harris, Taylor¹; Martin, Glenroy²
¹Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; ²Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Marine habitats consist of an array of microorganisms that have numerous benefits to humans and the environment. Some of these microbes have served as potential drugs to treat infectious diseases and certain types of cancer due to the toxins they produce. Marine sediment samples were collected along the shallow shoreline of the Duck River in Horton Haven, Tennessee. The microorganisms were isolated on ISP2, nutrient agar and actinomycetes media in order to increase the number of cultivatable microbes. Gram-staining was carried out to aid in the morphology and identification of the microbes isolated. Microbes that exhibited unique morphologies and antimicrobial activities were grown in large scale fermentations to obtain crude extracts. The purification and identification of the biologically active chemical entities from these extracts are presently under investigation.

Presentation Type: Poster
Faculty Advisor: Glenroy Martin

50. The Melt Polymerization of Poly(Xylitol Sebacate) Using Drying Agents
Pryor, Kierra¹; Grier, Tecia²; Arnett, Natalie²
¹Department of Chemistry, Fisk University, Nashville, TN 37208; ²Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Cancer is the second leading cause of death in the world due to the abnormal cells continuation of growth and survival after being signaled to stop dividing or to begin programmed cell death. The most commonly used treatment to destroy cancer cells is chemotherapy. Chemotherapy, however, lacks the ability to attack the point of action and affects vital tissue in the other areas of the body producing adverse side effects. Therefore the overall motive of this research is to utilize nanoparticles as a means to improve cancer drug delivery and minimize potentially life threatening side effects. Nanoparticles exhibit unique physiochemical and biological properties and can be easily modified in either shape, size, their ability to attach, or material. PXS is a biocompatible polymer that will be used to prepare nanoparticles in this research. Compared to PLGA, PXS shows a high level of structural integrity throughout degradation. This current research focuses on using drying agents to remove water created during the synthesis of PXS and increase the molecular weight of the polymer. FTIR and ¹³C-NMR confirmed that PXS was successfully synthesized due to the presence of the ester peak between 1735 cm⁻¹ and 1750 cm⁻¹ and 170ppm to 185ppm, respectively. Next TGA, DSC, GPC, and End Group
analysis will be conducted to determine if molecular weight is increased and how structurally stable the polymer is through degradation.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett

51. Synthesis and Characterization of Polyamide Thin-Film Composite Reverse Osmosis Membranes for Water Desalination
Rogers, Christian

Currently, billions of people live in regions with limited or no access to clean drinking water. This has given rise to the development of reverse osmosis desalination technology, which boasts greater capacity and lower energy costs than the thermal distillation methods that currently dominate the industry. In order to meet the growing demand for drinking water, the development of polymeric RO membranes with enhanced water flux, a minimum 99.5% salt rejection rate, and increased chlorine tolerance and fouling resistance is essential. Various polymers were synthesized using the multifunctional monomers Melamine, Methyl Triazine Diamine, and Aminophenol/MPD using interfacial polymerization. Successful synthesis were confirmed appearance of the characteristic amide C=O stretch appearing at 1690-1630 cm⁻¹. Multi-layer membrane synthesis was attempted using interfacial polymerization. FT-IR Data shows that while the polymer was successfully synthesized in its bulk form, a membrane did not adhere to the Polysulfone support due to oxidation.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: TLSAMP Bridge to Doctorate

52. Fabrication and Characterization of Benzyl Phosphonic Acid doped poly(arylene ether sulfone) composite membranes for hydrogen fuel cells
Smiley, Adrienne; Thompson, Tiffany; Arnett, Natalie

Scientific research into developing more economic and performance efficient proton exchange membranes (PEM) is driven by its potential to decrease fossil fuel dependence and carbon emissions. Hydrogen fuel cells are especially attractive due to their harmless emissions of water and heat. However, its high production cost as well as mechanical limitations have hindered its widespread use. Current membranes experience a significant decrease in proton conductivity when operating at temperatures above 80°C due to its dependence on hydration. In addition, these membranes suffer from low proton conductivity at low relative humidity and high levels of sulfonation, which is needed to facilitate proton transfer. To address the issues of hydration, sulfonation, and temperature, phosphonic acid groups were incorporated into the matrix of the proton conducting polymer. This project seeks to synthesize a polyfunctional acid composite membrane using BPSH-35 doped with a monomer, benzyl phosphonic acid (BPA). The monomer was first synthesized by combining benzyl bromide with triethyl phosphite (TEP) and was followed by acid hydrolysis. The acidified BPSH copolymer membrane was doped with varying BPA concentrations [0%, 1%, 3%, 5%, 7%, 10%]. Nuclear Magnetic Resonance (NMR) confirmed the synthesis of the monomer. The desired hydroxyl peak was present at 5.3 ppm on the ¹H NMR. The ¹³C complimented the ¹H NMR with the appearance of the peak at 40 ppm. This is indicative of the carbon bonded to the phosphorous. Additionally, the peak for the phosphorous bonded to the oxygen was present at 23 ppm in ³¹P NMR. Proton conductivity studies were then conducted on the BPA doped membranes in the wet state. Overall the 1% membrane performed the best. All of the
membranes displayed high thermal stability with their 5% degradation occurring around 350°C. ATR-FTIR analysis was performed as well. Future work involves conducting proton conductivity studies under relative humidity conditions.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: NSF CLiPS (DMR-0423914), NSF CAREER AWARDS (DMR-1454451)

53. Synthesis And Characterization of 3,3'-Diphosphonic Acid-4,4'-Biphenol As a Precursors For Use In Proton Exchange Membranes For Fuel Cell Applications
Smith, Justin1*; Adderley, Qutell1*
1Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Polymer electrolyte membrane fuel cells (PEMFC) are electrochemical devices, equipped with a proton exchange membrane (PEM), which convert chemical energy to electrical energy through oxidation potential. PEMFCs exhibit the potential to produce clean energy in an efficient manner. However, inadequacies in membrane performance and properties at temperatures >180°C, at low relative humidities (RH) and at high sulfonation levels add limits to the widespread commercialization of these membranes.

Polyfunctional acid materials have garnered much interest in recent years for addressing these challenges. Through the fabrication of solid electrolytes that exhibit proton conductivity in the solid state, improved proton conductivity at high temperatures and low relative humidities is portrayed. The current study describes the synthesis and characterization of 3,3’-diphosphonic acid-4,4’-biphenol (PBP) for use as a hybrid precursor in phosphonated proton exchange membranes for fuel cell applications. PBP was synthesized by the reaction of brominated biphenol (Br-BP) and Triethylphosphite (TEP), followed by acid hydrolysis with hydrochloric acid (HCl). 31P NMR and 1H NMR confirmed the successful synthesis of the PBP by the appearance of chemical shift around 2.5 ppm in the 31P NMR and 7.6, 7.4, 7.1 ppm (aromatic protons) and 4.8 ppm (O-H protons) in the 1H NMR. The PBP will be reacted with DCDPS (dichloro-diphenyl-sulfone) and SDCDPS (sulfonated dichloro-diphenyl-sulfone) to create a phosphonated poly(arylene ether sulfone) copolymer, which will be tested against current market standards.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: NSF DMR #1454457

54. Synthesis of Sulfonated Poly(arylene ether sulfone) Copolymer for Proton Electrolyte Membrane Fuel Cell Application
Taylor, Drew1*; Baldon, Jaelyn2*; Savage, Niara2*; Wadsworth, Ophelia3; Arnett, Natalie3
1Physics, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Biology, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 3Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Sulfonated poly(arylene ether sulfone) s-PAES copolymers have been investigated for their viability as Nafion® replacements. Nafion® manufactured by Dupont, is the gold-standard proton exchange membrane (PEM) used in fuel cell technology and its proton conductivity achieved is 0.8 S/cm. Lee et al synthesized s-PAES copolymers with sulfonated dichlorodiphenyl sulfone (SDCDPS), dichlorodiphenyl sulfone (DCDPS) and biphenyl (BP) with the solvents DMAC and ethanol in a one-step reaction in an argon atmosphere. Reaction times were varied to ascertain the effect on molecular
weight. In this research study ethanol was replaced with acetonitrile and the reaction was extended to 24 hours. SDCDPS, DCDPS and BP were combined in a 3-neck flask with K₂CO₃ to deprotonate BP. Acetonitrile and ethanol were added to the flask and the reaction was stirred mechanically and heated to 160°C for 24 hours in a nitrogen atmosphere. The copolymer was vacuum filtered, rinsed and dried in a vacuum oven at 80°C for 48 hours. Synthesis was confirmed via FTIR and the thermal properties were analyzed via Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA). The original polymerization conditions will be replicated to ascertain the effects the change in reaction conditions would have on the thermal properties of the copolymers. Ultimately the viability as a PEM of the copolymer synthesized with acetonitrile will be determined via proton conductivity measurements.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
Grant: NSF TIPS 1533516

55. Synthesis and Characterization of Disulfonated Poly(Arylene Ether Sulfone) Triazine Hybrid Copolymers with Applications in Fuel Cells
Zlibut, Emanuel*

Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

Proton exchange membranes (PEMs) are a key component of proton exchange membrane fuel cells (PEMFCs) that must maintain good mechanical strength to efficiently conduct protons for long term fuel cell operation. Previous studies have demonstrated disulfonated poly(arylene ether sulfone)(PEAS) copolymers as being capable of efficiently conducting protons at rates comparable to Nafion, the leading standard in the field. However, the high degree of sulfonation required by PAES to achieve such conductivity compromises the integrity of the polymer backbone limiting its sustainability. Therefore, the objective of this research is to synthesize post-modifiable disulfonated poly(arylene ether sulfone) triazine hybrid polymers (PAEST). The incorporation of triazine based monomers into the PAES backbone could provide available sites for membrane structure-property adjusting post polymer synthesis.

The successful synthesis of PAES with triazine derivatives incorporated directly into the polymer backbone was confirmed by NMR. However the viability of the material was limited due to its low molecular weight observed via gel permeation chromatography. Catering towards achieving a high molecular weight polymer, this research has focused on better understanding the reactivity of cyanuric chloride chlorine groups with biphenyl derivatives by first investigating the reactivity of cyanuric chloride with simpler mono-functional alcohols. Sample characterization achieved via both Ion-mobility mass spectrometry(IM-MS) and ¹³C NMR revealed that the reactivity of cyanuric chloride chlorines can be controlled by adjusting reaction conditions such as temperature and time. Synthesized monomers are in the process of being incorporated into the PAES copolymer backbone.

Presentation Type: Poster
Faculty Advisor: Natalie Arnett
56. Evaluation of Storage Oil Moisture Content for Strontium Iodide and other Hygroscopic Crystals

Francis, Nadia1; Rowe, Emmanuel1; Bhattacharya, Pijush1; Goodwin, Brandon1; Buliga, Vladimir1; Stassun, Keivan2; Burger, Arnold1

1Physics, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; 2Department of Physics and Astronomy, Vanderbilt University, Nashville, TN 37235

Many of the existing high performance inorganic scintillators are hygroscopic and so are typically stored in oil to avoid interaction with moisture. However, it has been found that over time crystals that are stored in oil still deteriorate due to moisture within the oil. The goal for this research project is to measure the moisture content in light mineral oil, heavy mineral oil, silicone oil, and paraffin oil typically used to store crystals, as well as to analyze the effect of these various types of oil on the optical transmission of strontium iodide crystals. To measure the moisture content in the oils, the Water Test Kit from Sandy Brae labs was used with a modified procedure to insure saturation. A treatment was developed to remove the innate moisture in the oils. Heavy mineral oil was found to have the lowest innate moisture content, but with the use of the developed oil treatment we were able to reduce the moisture content of light mineral oil by 86% to a final value of 18 ppm (treated heavy mineral oil had 38 ppm moisture). This study is still in progress and future work includes evaluating the effects of the oil on the crystals. Based on preliminary results, it appears that the treated light mineral oil will cause the least amount of change in the crystal’s optical transmission.

Presentation Type: Poster
Faculty Advisor: Arnold Burger
Grant: # HRD-1547757 (CREST-BioSS Center)

57. HAT-P-36b TTVs (TRANSIT TIMING VARIATIONS)

Stassun, Keivan1; Collins, Karen2; Davies, Michael1,4; Osei, Baffour3,4
Transiting exoplanets can be utilized to detect planets in their solar system through measurements of Transit Timing Variations (TTVs). The objective of the research is to analyze the TTVs of the known transiting exoplanet HAT-P-36b through observations of six full transits. We combined our light curve data with radial velocity data and stellar parameters from the literature and performed a global system fit. The global fit provided a new set of system parameters, including a TTV measurement for each light curve. Our system parameters for HAT-P-36b were very similar to those of the original discovery literature, except our Rp/R* was significantly larger. We found a more precise orbital period. In addition, no TTV’s greater than 30 seconds were observed, with the exception of one observation which was likely not reliable since the corresponding transit had no pre-ingress baseline. Thus, our TTV results are consistent with hot Jupiter orbital evolution theory that hot Jupiter’s tend not to have planetary companions.

Presentation Type: Oral
Faculty Advisor: Arnold Burger
Grant: NSF, Vanderbilt University

Wellness & Healthcare

58. Pre-Conception Health: Life Leading to Labor
Toms, Jiah1

1Wellness & Healthcare, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

The purpose of this intervention was to educate African-American females 18 to 35 years of age who live in North Nashville, on the importance of pre-conception health. Through this intervention participants learned the importance of making healthy life style choices such as handling stress, eating properly, and engaging in routine exercises. In addition to an educational session, a Scholarly Soiree was held to provide information on pre-conception health, birth control, healthy eating and the importance of exercise. Females were pampered with facials, makeovers and garment fittings. Participants were given a pre-test/survey upon arrival. Prior to participants departing, they were given a post test. Through the Soiree, participants became more knowledgeable on the rates and causes of infant mortality. They also learned about resources provided by community health facilities in the Nashville area. This study emphasized the correlation between the education of African-American females and the reduction of infant mortality rates.

Presentation Type: Poster
Faculty Advisor: Yvette Spicer
Art Therapy is defined by Oxford Dictionaries as a form of psychotherapy involving the encouragement of free self-expression through painting, drawing, or modeling, used as a medial activity or an aid to diagnosis. In this work, a website is developed that includes examples, institutions, and facilities that focus on the education and implementation of Art Therapy. Art therapy is one of many modalities that is capable of helping guide anyone to health and happiness, as it is an expressive language of the conscious and the unconscious minds. The pursuit of art can be accomplished through various mediums including: sculpting, drawing, mosaics, painting, clay making, music and variety of art modalities. Art therapy is instrumental in assessing and treating a variety of psychological, as well as, physically disorders. “Numerous case studies have reported that art therapy benefits patients with both emotional and physical illnesses. Case studies have involved many areas, including burn recovery in adolescents and young children, eating disorders, emotional impairment in young children, reading performance, childhood grief, and sexual abuse in adolescents. Studies of adults using art therapy have included adults or families in bereavement, patients and family members dealing with addictions, and patients who have undergone bone marrow transplants, among others. Some of the potential uses of art therapy to be researched include reducing anxiety levels, improving recovery times, decreasing hospital stays, improving communication and social function, and pain control.” (American Cancer Society, 2012, Online) This website provides a deeper understanding to the mental and physical benefits of Art Therapy, as well as access to facilities that provide these services.
60. Art Expression and Mental Health
Alston, Maya*

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

In America, an estimated 26% of Americans ages 18 and older—about 1 in 4 adults—suffers from a diagnosable mental disorder a given year. Approximately 9.5% of American adults ages 18 and over will suffer from a depressive illness in the categories of major depression, bipolar disorder or dysthymia each year. (John Hopkins Medicine). Living with mental illness can affect the balance of daily life; leading to money issues, difficulty securing work and maintaining relationships. Mental illness is often overlooked, dismissed or ignored because of the lack of understanding. Although mental illness has its many affects, with understanding and support in expression, mental illness does not have to be a life sentence.

Art Therapy is a form of expressive therapy that uses the creative process of making art to improve a person's physical, mental and emotional well-being. Art for the Soul is a website/blog built on expression. This site provides therapeutic art activities, how-to-do videos, and a calendar which provides updated art therapy events in the area based on location. In addition Art for the Soul provides a 24-7 blog section where people affected by mental illness are encouraged to post their art and tell their story.

Art for the Souls understands the affects of mental illness in America, and serves as an outlet and platform to encourage the bravery that is expression.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

Aryal, Surabhya*

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

Modern handheld devices such as smartphones have become increasingly powerful in recent years. Dramatic breakthroughs in the processing power along with the number of extra features included in these devices have opened the doors to wide range of commercial possibilities. As mobile devices are becoming more like PC’s, they are replacing objects such as credit cards, cameras, mp3 players and such. In short, we all use our mobile devices to accomplish our daily tasks. One application that falls in this category is "Capture and Catch" that detects similarity between two hard copies just by uploading the pictures.

Capture and Catch is an iOS Application that allows users to select two pictures from their device gallery or camera. Once these pictures are selected, Capture and Catch uses Google Vision API to extract text from these images. After text is extracted, Capture and Catch uses Dandelion API to find similarity confidence between these two texts blocks and provides the information to the user. With the use of this application, one does not have to read multiple pages of documents to detect plagiarism. One will be just few clicks away from detecting plagiarism with their mobile devices making the process much more convenient and reliable.

Presentation Type: Demo
Faculty Advisor: Lei Qian
62. VIA: Improving Internet Telephony Call Quality Using Predictive Relay Selection
Aryal, Surabhya

\*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

Internet voice call is one of the most popular features for any communication applications such as Skype, Google Hangouts, Facebook Messenger, What’s app or Facetime. In spite of the increasing volume and importance of Internet telephony we have very little understanding of (1) how network performance impacts user-perceived call quality, and (2) why and where such quality problems occur in the wild.

In order to resolve these issues, 430 million calls from Skype clients across 1900 ASes and 126 countries were analyzed and it was observed that call quality problems were quite pervasive. More importantly, these problems were significantly spread out geographically and over time, thereby making simple fixes targeted at specific "pockets" of poor performance largely ineffective.

Hence to alleviate call quality problems, an architecture called VIA is presented that revisits the use of classical overlay techniques to relay calls. VIA architecture is said to be timely and pragmatic with the emergence of globally distributed datacenters, which can serve as a readily available infrastructure for a managed overlay network.

Trace-driven analysis shows that an oracle-based overlay can potentially improve up to 53% of calls whose quality is impacted by poor network performance. However, a key challenge was realizing there was a large number of relaying choices. Hence, a practical relay selection approach was developed that intelligently combines prediction-based filtering with an online exploration-exploitation strategy. A trace-driven analysis and a small-scale deployment shows that VIA cuts the incidence of poor network conditions for calls by 45% (and for some countries and ASes by over 80%) while staying within a budget for relaying traffic through the managed network.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

63. MathEval: An application that solves mathematical problems
Dhakal, Upendra

\*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

Computation is one of the primary functions that computers do well. Therefore, computers are used over the decades to solve mathematical problems that we encounter everyday, be a complex mathematical modeling in cutting edge research or be a simple addition. As the computation power of the computers grew exponentially over couple of decades, their uses have been made to accomplish complex tasks like image processing. In this application, I tried to combine image processing techniques with computation power to solve the mathematical expression that exist in an image. An command line interface is built in web where as an User Interface application is built in Android to allow user to quickly upload/capture an image with mathematical expression. Once the image is uploaded, the text in the image is extracted using OCR.space API. The extracted text is then parsed in java to check the validity of mathematical expression and user is presented with a solution if the expression is valid or an error message otherwise. The expressions are evaluated using the techniques of Artificial Intelligence like Rule Based Expert and Goal Trees. In Order to support both web and cellular applications, an API is designed using Google Endpoints.
64. Web App for Fisk Research Symposium
Dhakal, Upendra*

*Computer Science, Dept. of Mathematics & Computer Science

A Web App is developed for the Fisk Research Symposium (FRS) in order to provide easy browsing for abstracts related information. While this app has been in existence from the 2014 Research Symposium, there was the need to make the app more robust. We have developed an in-house abstract submission system, and have integrated this system with the Research Symposium Web App. This added feature automates our entire process from abstract submission, to generation of web apps, to the final printing of the abstracts for the 2017 research symposium. The app is developed using standard open software tools such as HTML5, JavaScript, jQuery Mobile, PHP, and MySQL. As it is a web-based app, it can be viewed on all smart phones (e.g., Android, iOS, Windows) and all computer systems (e.g., Windows, Mac, Linux). Further, it can be used as a mobile app for Android and Windows based smart phones. The user can browse abstracts based on: Faculty Advisors, Discipline, Department, School, or by presentation type (poster, oral, demo, faculty).

Presentation Type: Oral
Presentation Themes: Pragmatic Applications for Computational Thinking
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

65. Code with Voice
Dhakal, Upendra*; Nagarkoti, Bikki**; Portillo, Marlon1

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

‘Code with Voice’ is a computer application (text editor) that gives users the ability to write computer code using voice commands. The main objective of developing this application is to help people with physical disabilities, who may have interest in computer science, explore the world of programming. We developed Code with Voice during the Google Atlanta Hack. Code with Voice has its own terminal. CMU Sphinx API is used for voice recognition and Swing, a GUI widget toolkit, is used for the front end of the application. Stack Exchange API allows users to perform Stackoverflow search within the text editor.

Presentation Type: Oral
Presentation Themes: Global Affairs
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

66. Foducate: a licence to market yourself
Dhakal, Upendra*

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

It is evident that there’s nothing worse than scrambling to come up with an accurate and interesting resume when there are only two days remaining to meet the important deadline. To solve this problem, we developed a web application, Foducate, that allows user to keep records of benchmarks and
accomplishments of their life, so that the resume will remain up to date every time. Easy to use user interface was created to allow users add their information such as self summery, education, work experiences, awards, projects, publications and skills. Users can also to edit/update the existing information at any time. The application also allows users to share their resume directly with the recruiting teams using their email. Further, it allows the users to download their resume either as a PDF file or as a word document. And to save the users time to search for jobs, Foducate suggests appropriate jobs based on information on the resume. Though the application was developed keeping PC users in mid, further development will be undertaken as a follow-on initiative to support-smart phones.

Presentation Type: Poster
Faculty Advisor: Lei Qian

67. “Kidney Care Health Care” an interactive website to combat the prevalence of Chronic Kidney Disease.
Ewers, Jazmin*

*Chemistry, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208

According to the National Institute of Health, 14 percent of people in the US suffer from Chronic Kidney Diseases (CKD). Unfortunately, Kidney Diseases have not been given enough recognition, despite the fact the major causes for CKD are very common illnesses such as diabetes, high blood pressure and genetics. More importantly, CKD has devastated individual belonging to the minority communities more than its Caucasian counterpart with the African American community being 3 times more susceptible to this disease. To increase the awareness for kidney health, a website entitled “Kidney Care Health Care” featured an interactive questionnaire that allowed the user to answer kidney related health questions. Instant feedback would be provided in the form of an entertaining cartoon kidney because its animation changes for every response. Based on the questionnaire the user will be given a score that would rank them at a low risk, somewhat at risk, and at a high risk for CKD. The user would then click on the score that will send them to the corresponding information page on the National Kidney Foundation site. The purpose of this website would be to educate individuals about Kidney Health through determining their possible risk for CKD.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

68. The Prevention of Juvenile Delinquency
Frierson, Breonna*

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

This website is developed due to an interest in Juvenile Justice. I am aspiring to be a Juvenile Justice Attorney and this website is geared toward the prevention of juvenile delinquency, giving advice to both the youth as well as educators who can help to close the school to prison pipeline gap. Not only does this website show current statistics of juvenile delinquency, but it also gives alternatives to calling the police for educators as well as a after school programs or activities that will help youth let out any excess energy or anger. This website can connect students directly to programs in their area in which there are staff who are trained to help youth express themselves in a healthy way and give them the time and attention they need to succeed in life. Youth can also directly request a counselor or big brother, big sister that they can talk to who can also directly help them become successful in life by
building connections and relationships that will last them a lifetime. Educators may also get trained on how to deal with a certain type of student or find outreach programs that will come in and create a restorative justice program from students to learn from, that way instead of jail time or any police involvement students will learn for themselves the harm they caused and to whom. The creation of this site can and will lead to healthier school environments as well as happier and successful students.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

69. CollegeBond: Guidance for Achieving Higher Education
Gales, Jordan

*Political Science, Dept. of History & Political Science, Fisk University, Nashville, TN 37208

This project is known as “CollegeBond” which is a program that will assist in school research for students in all levels of education that is pursuing a higher education. In developing a computer website program that will help students, in all grade levels, will definitely prepare them properly for the next steps. In gaining knowledge of almost each university will broaden their opportunities and world view as well. This website will consist of information of each partnering Universities: Location, a brief summary of the history of the school, GPA Average, SAT or ACT Average, programs they offer, tuition (all components that make up the total tuition). This website will also consist of Universities ranging from PWI’S to HBCU’s. The unique things about this website it is partnering with universities, so if the student is interested in knowing more about a certain University then they will be directed to a link which will direct them to the official website of that school. This website is not designed to take away from other Universities that it partners with but actually gain more students interest and excitement for the next steps. This will also be a stress reliever for the students because the information they seek will be easy to access. This program will also be usable for students going to a post graduate programs as well and also to students who aspire to study overseas. This website is designed to be an easy gate way for students, in hope, to pursue a higher education.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

70. Web Application for Developing and Sharing Resume
Gardiner, Keemo

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

A resume also called curriculum vitae or CV, is a document that contains a summary or listing of relevant job experience and education. The résumé or CV is typically the first item that a potential employer encounters regarding the job seeker and is typically used to screen applicants, often followed by an interview, when seeking employment. In the job search process, a well-written and well-designed resume is essential. There are times that you would not have a hard copy of your resume to give to a potential employer. The resume website is developed to enable you to visit the digital copy from anywhere with full details listed with a user friendly format so the sections can be easily accessed like my education, work experiences and volunteer service and achievements.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain

**Gauli, Ashish**

Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

Countries have distinct culture, so do the cities inside them. For example, Boston is heavily known for an academic culture whereas Las Vegas is a very vibrant touristic city. Cities also have their own food culture and based on food features, it would be interesting to see how similar cities are to each other. In this project, 26 business data features were extracted for 444 cities from publicly available Yelp data and utilizing the Spark's MLib K-Means algorithm, the cities were clustered to obtain SSE of 294.78. The analysis was done with spark language on Cloudera Hadoop ecosystem.

Presentation Type: Poster
Faculty Advisor: Lei Qian

72. Course Assignment and Scheduling using Bipartite Graph Matching Algorithm

**Ghimire, Parasher**

Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

Class scheduling at University is a difficult resource allocation and assignment problem. The goal is to minimize the number of classroom used and create a schedule that is feasible for both students and professors. We came up with set of hard constraints, constraints that must be met, and soft constraints, constraints that will keep our schedules reasonable, to define our search space. With the set of classes as input, we decided to create two and one-hour block for each day and put the classes on the block. The second part of the algorithm assigns the blocks created in part one to classroom/time pairs. We perform this assignment by performing a maximum cardinality bipartite matching where each vertex in V1 represents a block while V2 represents the set of classroom/time pairs. Every assignment should fulfill all the hard constraints. Furthermore, we place weights on the edges to represent the degree of compatibility between a block and a classroom/time pair. Through this method we were able to generate reasonable course schedules.

Presentation Type: Poster
Faculty Advisor: Lei Qian

73. Building Political Awareness

**Grant, Austin**

Political Science, Dept. of History & Political Science, Fisk University, Nashville, TN 37208

Martin Luther King Jr. once said “Life's most persistent and urgent question is, ‘What are you doing for others?’” If the common goal is not to enhance the community around us, then we as a community have failed it. Minorities around the city are unaware of their basic human and first amendment rights. Advocates for Justice is an organization designed to empower the minorities of Modesto, California by providing information about your civil liberties and rights. Organization co-founders Jacq and Jaque Wilson have agreed to collaborate on this project to increase consciousness in the minority community in Modesto on their human rights. Thus, creating a website that demonstrates and exemplifies the organizations platform on the basis of the first amendment and what it implies. This will help establish a
network between the organization and the minority community. The website also includes status updates of current political events and bills that are up to date with our current lives.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

74. P.R.E.S.E.N.T
Jacobs, Aledra
Psychology, Dept. of Behavioral Sciences & Education, Fisk University, Nashville, TN 37208

Yearly, the percentage of youth suicides are increasing. Research shows that several young adults result to suicide because they feel alone. Mental illness is still not be recognized as an authentic illness, and this is where the problem begins.

The members of P.R.E.S.E.N.T believe that a 24 hour communication service can help decrease the annual percentage of youth suicides. Members have assumed that by providing a service that allows youth to vent, and receive feedback, is a way to symbolize to youth that they are not alone. The primary goal of this online, 24 hour communication service is to reach out to youth that are in need of a mentor, counselor, or simply a listener.

The purpose of P.R.E.S.E.N.T is to ensure that young adults around the world are heard. We, the P.R.E.S.E.N.T team, understand the significance of venting, or expressing oneself. Whether you want to share your thoughts, or feelings, someone at P.R.E.S.E.N.T is always there. WE ARE HERE FOR YOU!

Presentation Type: Oral
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

75. Social Issue Awareness: Suicide and Human Trafficking
Johnson, Laia
Psychology, Dept. of Behavioral Sciences & Education, Fisk University, Nashville, TN 37208

My project is going to be a website that raises awareness to issues that are a serious problem within our communities but gets little to no recognition until it is too late. My website will highlight two major issues such as suicide within college students and human trafficking. I will display suicide rates and prevention. I will define suicide as well as discuss ages, genders, ethnicity and race of individuals who commit suicide. I will also include the contact information to the suicide prevention hotline so that individuals who are contemplating suicide, but too afraid to talk to their peers or parents, can have a number to call. My website will also talk about the behavior cues of a suicidal individual so that if they recognize the signs they can know how to help their friend. I will also try to include stories from families of those who have committed suicide as well as stories of those who have attempted suicide but did not succeed. I am also going to talk about human trafficking and how it is a growing epidemic within our communities. I will define human trafficking, the history of human trafficking and who it effects. I will also discuss the current issue of human trafficking and the lack of news coverage regarding the issue. I will also have a list of signs to look out for, in order to be able to identify if someone is involved in human trafficking. Within my website I will include clickable pictures with stories about human trafficking. I will
also include contact information to authorities for those who believe someone is involved in human trafficking.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

76. Jump Rope for Maintaining Physical Health
Jones, Taylor*
Dept. of Business Administration, Fisk University, Nashville, TN 37208

Jumping rope is beneficial because it's good for the heart, physical fitness, and can serve as a competitive team. Since the age of 13, I've been on a jump rope team called the Pink Panthers. The Pink Panthers is a competitive jump rope team based out of the South Suburbs of Chicago. Being on a jump rope team spreads positivity in communities while also showing off skills that are so unknown to many. Having workshops is a way to spread positivity while also working on physical health and having fun learning the fundamentals of jumping rope. Since there isn’t a jump rope team in Nashville. Having workshops are a good way to expose the world of Jump Rope. My website provides information on how jump rope helps with physical health, providing demonstrations of jump rope tricks that can be done, and the history of jump rope.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

77. Course Dependency Graph
Karaga, Oumar*
Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

In order to address the difficulties that students have when deciding which courses to choose after having taken a given course, a simple visualization tool that displays a graph of courses that students must take to fulfill requirements is offered as a solution. The tool abstracts courses and their prerequisites with a Directed Acyclic Graph where the nodes are courses and the links indicate the order in which courses have to be taken by the student. Essentially instead of dealing with a simple balance sheet, students now have at their disposal a web application from which they can see courses and prerequisites, which are topologically sorted. The tool also allows students to select a course and view how it relates topologically to other required courses. The tool is written primarily in d3.js, JQuery, HTML and pure JavaScript.

Presentation Type: Oral
Faculty Advisor: Lei Qian

78. Strengthening Girls through Leadership and Christian Service
King, Barbara*
Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

The goals are to strengthen the confidence of girls by helping them develop tools for leadership and service. Throughout a five month range I have been a counselor with the organization Knights of Peter
Claver, Ladies Auxiliary Jr. Daughters Jr. Court 5 of St. Vincent De Paul Church in Nashville, Tennessee. My goal as their counselor is to help them develop the leadership skills to conduct a meeting, plan and execute community service opportunities, bond with other young girls, and to help them love themselves. The goals were to help them gain confidence, knowledge and a passion for service. The researcher hoped to prevent the usual gossip and cliques made by young girls, but to develop a relationship among them that would be enjoyable for all. Through bonding exercises and giving them actual leadership roles, and voice that can be heard, the researcher created a group that is conducive to one another. The girls I worked with are between the ages of seven to fourteen. They come from a range of financial homes. Every girl was minority, specifically a person of color, and most of the girls identified themselves as African American.

Presentation Type: Oral
Presentation Themes: Gender and Sexuality, Race Relations
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

79. Bitrate Selection and Adaption For Video over a Network
Magala, Wakitalo

Streaming video is a large part of the internet experience. The vast majority of internet traffic actually comes from streaming video and streaming video giants such as Netflix. Accurately predicting throughput allows for dynamic readjusting of videos to suit network capabilities. Predicting throughput allows the network to select a starting bitrate to minimize delay and while also maximizing video resolution. In addition mid-stream bitrate adaption is key to ensuring a high quality video experience. If the bitrate slows or speeds up, the throughput prediction needs to dynamically adjust. Previous models of throughput prediction have not been particularly accurate. In this paper, a new protocol for bitrate selection and adaptation was discovered called (CS2P) Cross Session Stateful Predictor based off of big data. CS2P outperforms the other models in median predictor error by more than 40%. CS2P gets 3% higher Quality Of Experience over previous models.

Presentation Type: Oral
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

80. Unreal Gaming
Magala, Wakitalo

The Unreal engine is used in many popular games over the last couple of years. Games such as the Arkham Batman series, Borderlands as well as a plethora of other popular games. My goal is to develop a 3rd person shooter game not with the sophistication of those video games since they take huge development teams to build). My game will not have as nearly an expansive world as professional games but I will be able to design my own characters and mechanics which is something I always wanted to explore. My game’s main focus will be gun combat with an limited storyline as its not the focus of this project. The game will have multiple levels with enemies and a couple of boss fights. While
C++ will be used primarily in the creation of this video game, the Unreal blueprint schemata will be used when necessary.

Presentation Type: Poster
Faculty Advisor: Lei Qian

81. HBCU Knowledge Board
McPherson, Donae*†

*Psychology, Dept. of Behavioral Sciences & Education, Fisk University, Nashville, TN 37208

My project is a website to help inform students about Historically Black Colleges (HBCUs), what they have to offer, and scholarship opportunities. The website is known as the HBCU Knowledge Board. Many African American students have little to no knowledge about HBCUs and some of the advantages they have. I am not pushing HBCUs but I am giving students the opportunity to learn about HBCUs. My website lists all HBCUs and the scholarships they have to offer. The HBCUs are grouped by region. I am also going further to highlight special programs and majors each school offers. This website is different from other sites like this due to its target audience and the information it provides. There is a page or section highlighting different scholarships that most students do not take advantage of. The website I created is important to the upcoming generation to inform them on their history and what their ancestors have left for them to take advantage of. Many HBCUs are lacking in enrollment and funds and the lack of student knowledge on HBCUs is a reason why. The goal of this website is to improve knowledge of HBCUs and scholarship opportunities. Hopefully, this website will increase HBCU enrollment.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

82. Nepal Internships
Nagarkoti, Bikki*†

*Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

Nepal Internships is a centralized web platform developed as a way of changing how students apply for internships in Nepal. In Nepal, a lot of undergraduate students do not apply for internships during their school years. It is uncommon for students to apply for internships. They only apply for jobs after graduation, which will make getting jobs really competitive because candidates are not experienced enough for the jobs they are applying for. Companies need interns but they cannot spread the word to students. With that in mind, I worked on Nepal internships while learning web development for my sophomore seminar project, which will help students find internships based on their area of interest and preferred locations and apply for them. Similarly, companies can post available internships with their details. The front end of the project “Nepal Internships” is implemented using HTML5, CSS and Javascript and the backend is implemented using Google App Engine in python. Google Cloud Datastore is used for data storage for Nepal internships and Google Query Language (GQL) for query. Google Mail API is used to send emails to students reminding about the application status and deadlines of internships.

Presentation Type: Oral
Presentation Themes: Global Affairs
Faculty Advisor: Lei Qian
83. The Development of Today’s Juveniles
Parks, Gerron¹*

¹Psychology, Dept. of Behavioral Sciences & Education, Fisk University, Nashville, TN 37208

The goal is to develop a web application for training of a juvenile detention counselor. The website is going to contain steps to be taken while preparing to become a juvenile detention counselor. First recruit young males and possibly young females as well and mentor them. The target audience are troubled youth and the goal is to attempt to correct their problems. This will be more of a legacy and the plan is to deal with them for years to come. Various activities and heart opening conversations are going to take place. As the teens are being rebuild to expectations, the pursuit of achieving a counseling license is going to be in progress. Once licensing is achieved, the team of youths to help with getting the troubled teens in the detention center on the right track. Since they are going to typically be around the same age, the team of youths should be able to relate to the troubled teens, therefore, having easy access to their intentions. The website will provide: the age range of the team of youth, the activities and treatment being provided, time and locations of activities, information about counselor, and the targeted audience.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

84. Natural Hair 2.0: Millennials Educating Millennials
Porter, Aundria¹,²*

¹Sociology, Dept. of Behavioral Sciences & Education, Fisk University, Nashville, TN 37208; ²Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

This website is targeted toward young African American female millennials who practice the state of natural hair. In practicing natural hair, it is one in which the hair is currently and/or completely natural from root to end, or striving and putting to use the effort to become natural (i.e. transitioning from relaxer or texturized hair to natural). While there are so many websites and guides already created for natural hair, this site gives life to uplifting and motivation through a specific generation. This website explains and defines exactly what it means to be 100 percent natural in comparison to what it is currently or publically (to say the least) perceived to be. The creator of this website has strived to make this website a resource for these young women, aiding them in their natural hair journey. One of the most important things to remember about natural hair is how to care for and tend to it without harsh maintenance. The tabs will guide you through the site. Each tab represents an important aspect of natural hair which will make the journey that much easier. In summary, this website serves the purpose of assisting young girls, teens, female college students and young adult females of the millennial generation (and future generations) through education, sharing of testimonies, and depicting how to maintain the health of your hair through the process.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

85. Purple America For the 2016 Election
Portillo, Marlon¹*

¹
With the recent President election this past Nov, a lot of sensitive subjects were brought to light and discuss. My goal of creating this Purple America presentation, is to show that every states has supporters for both the Democratic and Republican party. Thus, disproving the belief or common rumor that all, southern states, such as Tennessee, are fill with Republicans or that states like New York and California also have Republican supporters. Thus, allowing people to see the distribution of the two parties across, the United States. The method used to solve or display this data, was to created a program capable of reading the information from files across each state and combining them into their own mixture of red and blue. The results clearly show a “Purple America” in which not one state is completely red nor blue, but a purple like mixture. In order to accomplish, this I used java to draw and display the data, and then used webmatrix to display the drawings and give addition information. In conclusion, my project aims to united, people into understanding or in order words this probing and making it easier to see the distribution of votes across each state.

Presentation Type: Poster
Faculty Advisor: Lei Qian

86. Developing Ecommerce Applications using Python and Django
Pruitt, Rahmi

This project's motivation was to create a reusable e-commerce site using multiple Django frameworks. During the research phase, the most challenging aspect was designed decisions. Some frameworks cannot be combined, and others were not useful. I started small with implementing to Stripe’s payment framework and eventually made a reusable app using Django-Shop and Django-Pinax.

My goal was to become familiar Django framework to create a reusable Django Ecommerce app. Entrepreneurs often start with an e-commerce site, and companies offer high rates for e-commerce customization. This is the perfect opportunity to experience entrepreneurship.

Some people might say Django has no reliable framework for e-commerce sites. Other languages such as PHP have a vast library, but Django is relatively new. I also tried not to reinvent the wheel by starting from scratch.

I felt the most important aspect was to write integrate a system of payments. For this, I used pinax-stripe to deal with payments. Then, I decided to use another framework to handle items. Django shop is the second framework I used to create the shop. With this app, I would integrated shop.in conclusion, I was able to create a working e-commerce site for people to use.

Presentation Type: Demo
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

87. Improvements to Robotron
Pruitt, Rahmi
Robotron is Facebook Network Management tool. It is used to provide networks for users all around the world to use. Robotron in early stages was nothing more than an ad hoc script, but today it was the used for Facebook’s data centers, global backbone, and edge point preference. My research was to study Robotron and come up with ideas to improve the system.

My goal was to research Robotron, Facebook’s networking system, to understand Computer Networking at the application. My project is interesting to anyone who is interested in the history of Facebook’s Networking evolution, or anyone interested in how information travels to their devices.

Robotron went through many development stages. At first, it was nothing more than an ad hoc script. The information gathered by Robotron, at the ad hoc stage, was useless. The data was only valuable in being able to combine with other data.

The two biggest user complaints were config updates were too slow, and circuits would need to be added in order to match increasing demand. Programs were written to ensure an efficient config loadout. Still, the latter has only received an update, but no real solution has been created.

In order to fix the problem for circuit increase demand, Facebook has started to make Robotron open-source. Open source projects give the community a chance to reuse the code. This gives Facebook a chance to find new bugs.

Fbpush is currently open source. To better improve Robotron, fbpush is only a small part of Robotron. Facebook should open source the monitoring and network designing parts of Robotron. The networking designing combines all the useless data into a fb object. This fb object is useful for ip addresses and circuits. Monitoring allows for better adaption to network blockage.

Presentation Type: Poster
Faculty Advisor: Saji Hussain
Grant: NSF 1222432

88. NewsReader2.0
Qian, Lei

NewsReader2.0 is a simple news reader application that aims to create a rich experience for users by allowing them to curate their news and headlines from their news outlets. NewsReader 2.0 is being developed as mobile application using the iOS operating system. The app is powered by “newsapi.org” which provides the app with news from several outlets with varying parameters such as latest news, top news etc depending the API calls made to it. News API is a simple and easy-to-use API that returns JSON metadata for the headlines currently published on a range of news sources and blogs. We chose News API because it's free, easy to use and lightning fast.

Presentation Type: Demo
Faculty Advisor: Lei Qian

89. PROPOSED EVENT SCHEDULING SYSTEM UPDATE FOR STUDENT GROUPS
Williams, Joshua; Dendy, Gregory
At Fisk University, online services are provided to students for their convenience, such as an online event schedule for future events. While the current system works, the format is outdated and inefficient. An example of this inefficiency is seen in the input fields; improvements could be made to make the page ergonomically sound, such as including all student groups in a dropdown list as opposed to manual entry. Likewise, information concerning campus advisors could be stored to make filling out applications increasingly more fluid. Other issues, such as slow response times for submitted forms, can be amended to produce timely results.

By utilizing coding languages such as HTML, CSS, JavaScript and PHP, work can begin immediately to improve the submission page, streamlining it to make the process easier and more efficient. These changes will make the page easier to maintain in the future, especially on an annual basis, or as changes are needed.

Presentation Type: Poster
Faculty Advisor: Sajid Hussain
Grant: NSF 1222432

90. NewsReader 2.0
Yagboyaju, Sultan*

NewsReader2.0 is a simple news reader application that aims to create a rich experience for users by allowing them to curate their news and headlines from their news outlets. NewsReader 2.0 is being developed as mobile application using the iOS operating system. The app is powered by "newsapi.org" which provides the app with news from several outlets with varying parameters such as latest news, top news etc depending the API calls made to it. News API is a simple and easy-to-use API that returns JSON metadata for the headlines currently published on a range of news sources and blogs. We chose News API because it's very easy to use, fast and free.

Presentation Type: Demo
Faculty Advisor: Lei Qian
91. Algorithm for landmine detection using combinatorial approach.
Eba, lemi$^{1,*}$; Karaga, Oumar$^{2,*}$; Hussain, Sajid$^2$; Li, Qingxia$^3$

$^1$Physics, Dept. of Life & Physical Sciences, Fisk University, Nashville, TN 37208; $^2$Computer Science, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208; $^3$Mathematics, Dept. of Mathematics & Computer Science, Fisk University, Nashville, TN 37208

It is estimated that there are 110 million active landmines. This means that there is one landmine for every 17 children in the world. Or, in other words, one landmine for every 52 people. Looking at this and many other fact, it shows the need for providing cheap and efficient ways of detecting landmines.

Because of huge advances in remote sensing and computer vision, there are different ways and devices used for detecting these landmines. However, the ability of the actual devices to collect data are usually the same. It is the software area that needs improving. In this research paper, a continuation and extension of a research result presented during the 2016 Mathematical Problems in Industry workshop will be undertaken. There are different methods, steps, and scoring practices used during landmine detection stated on this paper from the conference.

Nevertheless, this research paper will be specifically concerned about generating alarm sets from confidence maps using a combinatorial approach which takes into consideration the eligible configuration of landmines. It will analyze the method in more detail, try new scenarios and configurations, and add additional suggestions. The paper will also include results from applying different mathematical methods on generating alarm sets.

Presentation Type: Poster
Faculty Advisor: Qingxia Li

92. Auctions on advertisements
Watson, Tykeena$^1$; Brewer, Sharee$^{2,*}$; Montgomery, Taylor$^1$; Li, Qingxia$^1$
Advertising agencies want to place television advertisements for their clients which will expose their products to a particular target audience. The project is based on the findings which were developed during the Mathematical Problems in Industry Workshop, held at Duke University June 13-17, 2016. Typically, an advertiser would like a certain amount of impressions for each advertising campaign, either for the target audience or the total audience. Agencies (buyers) place orders with the networks (sellers) for desired commercial slots. The orders come in two types: constrained orders, where the order specifies a certain number of impressions for a particular target audience. In this project, we study several such auction scenarios so that the sellers may maximize their revenue.

Presentation Type: Poster
Faculty Advisor: Qingxia Li
Grant: MAA Tensor-SUMMA
Authors List

Acklin, Brianna: 59'
Adderley, Qutell: 53'
Adesina, Grace: 1', 13'
Alston, Maya: 60'
Ambrose, Jayson: 14'
Amoah, Kofi: 31
Arnett, Natalie: 30, 32, 36, 39, 40, 44, 50, 52, 54
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Collins, Karen: 57
Damo, Steven: 31, 37
Davies, Michael: 57'
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Frierson, Breonna: 68'
Fulcher, Jasper: 16'
Gaddy, Jennifer: 37, 38
Gales, Jordan: 69'
Garcia, Velia: 38'
Gardiner, Keemo: 70'
Garrett, Destane: 25'
Gauli, Ashish: 71'
Ghimire, Parasher: 72'
Goodwin, Brandon: 56
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Jones, Michelle: 2'
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Lowe, Christopher: 17'
Lu, Wenfu: 33
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Martin, Glenroy: 41, 45, 49
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Mhonda, Lorado: 47'
Mittal, Anisha: 48'
Mohammed, Shalina: 12'
Montgomery, Taylor: 4', 92
Moore, Mauri: 44'
Nagarjoti, Bikki: 65', 82'
Nelms, Brian: 25, 28, 29
Nurse, Taryn: 26'
Onabolu, Oreoluwa: 49'
Ophoff, Roel: 34
Osei, Baffour: 57
Parks, Gerron: 83'
Patel, Dhara: 38
Porter, Aundria: 8’, 84’
Portillo, Marlon: 65, 85’
Pruitt, Rahmi: 86’, 87’
Pryor, Kierra: 50’
Pryor, Kierra: 40
Qian, Lei: 88
Quinde, Jennifer: 27’
Roach, Corey: 27
Robinson, Kyra: 42’
Robinson, Samanda: 5’
Rogers, Christian: 51’
Rogers, Najera: 18’, 19’
Rowe, Emmanuel: 56
Savage, Niara: 54’
Saxena, Sunil: 38
Scott, Jasmine: 20’
Shaw, Erik: 14’
Shelton, Debresha: 28’
Smiley, Adrienne: 52’
Smith, Justin: 53’
Starkes, Charisse: 20’
Stassun, Keivan: 56, 57
Stolp, Zachary: 47
Stuckett, Sidney: 29
Taylor, Drew: 54’
Thomas, Breanna: 6’
Thompson, Tiffany: 52
Toms, Jiah: 27, 58
Wadsworth, Ophelia: 32, 42, 44, 48, 54
Warner, Rukiayah: 46
Watson, Tina: 21’
Watson, Tykeena: 92’
Webb, DeAngelo: 22’
Williams, Joshua: 89’
Williams, Tyree: 29’
Yagboyaju, Sultan: 90’
Young, Ciara: 9’
Zlibut, Emanuel: 55’
19th Annual Research Symposium