



UROP
Undergraduate Research
Opportunities Program

UNDERGRADUATE RESEARCH AND CREATIVE PROJECTS

2017 CONFERENCE



- The WSU Academy of Scholars was founded in 1979 to promote and recognize sustained excellence in scholarship and creative achievement. The academy provides support to promising young scholars and periodically hosts special programming for the campus community.

Election to the Academy of Scholars is the highest recognition that may be bestowed upon a Wayne State University faculty member by his or her colleagues. Membership in the academy is for life.

The Undergraduate Research Opportunities Program (UROP) would like to thank the following members of the Academy of Scholars for their participation as judges:

Dr. Paula Dore-Duffy
Professor, Neurology

Dr. Donald Haase
Senior Associate Dean,
College of Liberal Arts and Sciences

Dr. Paul Karchin
Professor, Physics

Dr. David H. Kessel
Professor, Pharmacology

Dr. Renu Kowluru
Professor, Anatomy and Cell Biology

Dr. Arthur Marotti
Professor Emeritus, English

Dr. Sergei Voloshin
Professor, Physics

Dr. Le Yi Wang
Professor, Electrical & Computer
Engineering

Dr. Gang George Yin
Professor, Mathematics



- Terry L. Orr-Weaver is an American Cancer Society Research Professor in the Dept. of Biology at MIT and a Member of the Whitehead Institute, which she initially joined in 1987. She obtained her PhD in the laboratory of Dr. Jack Szostak at Harvard University in 1984 and did postdoctoral training in Dr. Allan Spradling's laboratory at the Carnegie Institution of Washington. Her research addresses regulation of cell division during development, and her laboratory has discovered crucial control proteins for chromosome segregation and DNA replication as well as providing key insights into how cell size is regulated. She served as President of the Genetics Society of America and of the National Drosophila Board of Directors. She was the chair of the Scientific Advisory Committee of Children's Hospital in Boston. She is an elected fellow of the American Academy of Microbiology, of the American Association for the Advancement of Science, and a member of the National Academy of Sciences. She received the FASEB Excellence in Science award in 2013.

■ **Friday, November 10, 2017, Student Center Building**

- 8:00 a.m. Registration — *South entrance*
- 8:30 a.m. Continental Breakfast — *Ballroom C*
- 9:00 a.m. Welcome — *Ballroom C*
 Monica Brockmeyer, Associate Provost for Student Success
 Keith Whitfield, Provost
- 9:30 a.m. Oral Session I — *Multiple locations*
 See session pages
- 10:30 a.m. Poster Session
 Behavioral and Social Sciences - Room 20
 Engineering and Physical Sciences - Room 25
 Life Sciences and Arts and Humanities - Room 10
- Noon Oral Session II — *Multiple locations*
 See session pages
- 1:00 p.m. Luncheon and Awards Ceremony — *Ballroom C*
- Greeting and Introduction of Speakers*
 Matthew Orr, Program Coordinator Undergraduate Research Opportunities Program
- Guest Speaker*
 Stephen M. Lanier, Vice President for Research
- Keynote Speaker*
 Terry L. Orr-Weaver
- Awards*
 Introduction: Matthew Orr
 Presentation: Veronica Bielat, Student Success Librarian and Instruction Services Coordinator
 Presentation: WSU Academy of Scholars
- Closing Statement*
 Matthew Orr

■ Session 1, Hilberry A | Moderator - Andrew Port

Pedagogy, Performance, and Perceptions

Matthew Kolar, Larissa Gamble, and Jordan Parrish - *Chamber Music Pedagogy: Saxophonists' Versus Non-Saxophonists' Approach to the Quartet*

Patrick Roache - *Waltzing with Chekhov: Integrating Social Dance with Chekhov Technique in the Pursuit of Fostering Honest Relationships in Performance*

Benjamin Thomason - *American Perceptions and Weimar Relations: Lessons of Involvement in the Dawes and Young Plans*

■ Session 2, Hilberry B | Moderator - Carol Baldwin

Social Determinants of Health and Wellbeing

Gerald Nowak III - *Waiting on a Sick Day: The Motivational Antecedents of Presenteeism in the Full-Service Restaurant Industry*

Hanan Rakine - *Needs in Pediatric Oncology Families*

Alexis Tennessee - *Use of Mental Health Services among Urban Adolescents: Relations among Stigma, Church Attendance, Therapy Attendance*

■ Session 3, Hilberry C | Moderator - Matthew Allen

Metals, Sulfur, or Both

Amira Alnabolsi - *Synthesis of Rhenium (I) Complexes for Cathepsin L Inhibition and Cell Imaging*

Shane Jackowski - *Strategic uses for the Cysteine thiol protecting group, Allocam*

Kenneth Kutschman - *Synthesis of Sulfur-Containing Cryptands via Thiol-Ene Photochemical Reactions*

■ Session 4, Hilberry D | Moderator - Robert Akins

Health Needs and Treatments

Ashi Arora - *Exosomes of Candida albicans: Structure and Detection in Colonized Individuals*

Camilla Cascardo - *Manipulation of the Gut Microbiome Modifies Expression of Colorectal Cancer Cells*

Andrea Prenkocevic - *Identification of vaginal bacterial species that are mutually and differentially antagonistic with strains of Candida albicans*

- Session 1, Hilberry A | Moderator - Lisa Maruca

Cultures, Cognition, Community

Christiana Castillo - "A Town Called Hope"

Carolyn Hall - *Functional Use of Cursive vs. Printing in Personal Handwriting: Assessment of Adolescents' Use of Different Forms of Writing*

- Session 2, Hilberry B | Moderator - Kristin O'Donovan

The Varied Effects of Culture: Attitudes, Aspirations, and Behaviors

Emily Collette - *The Influence of Neighborhood Characteristics and Culture on Attitudes towards Sexual Assault*

Dhruvil Patel and Kanwar Bhullar - *Exploring Culture's Influence on Parental Educational Expectations for their Children's Educational Career*

- Session 3, Hilberry C | Moderator - Guangzhao Mao

Solid State Chemistry and Engineering

Albert Jose and Connor Tukul - *Comparing Detroit Ambulance Response Times with Those of a Novel Unmanned Humanitarian Vehicle (Ambulance Drone) in Emergent Overdose Situations*

Alex Wielbinski - *Optimization of Nano-crystal Growth for Gas Sensing Applications*

Todd Yee - *New Bond Valence Parameters for Metal-Acetate Complexes*

- Session 4, Hilberry D | Moderator - Francesca Luca

New Perspectives for Improving Health Outcomes

Kristin Dernay - *Dark rearing does not prevent prodromal rod oxidative stress in vivo in male Pde6brd10 mice*

Kizzmett Littleton - *Can the food in your cabinet save your life (part II)*

- Houda Ajrouche, Mohamed Hussain Mussa, and Sophia Neuenfeldt, Poster 1

Gestational Age and Emotion Regulation with its Relationship to Reciprocal Parenting

- Nahida Akkary, Poster 60

Growing and Applying Graphene

- Alon Albalak, Poster 50

Exploring environmental factors and happiness on a global scale

- Ashleigh Anderson, Poster 2

Emergency Department Utilization and Birth Outcomes

- Nicholas Ang, Poster 67

Characterization of midkine-a (Mdka) function during caudal fin and retinal regeneration in adult zebrafish

- Hasan Ansari, Poster 59

Solving All Pairs Shortest Path in Matlab Using GPU Based Floyd-Warshall Algorithm

- Afrah Arif, Poster 68

Intra-Amniotic Administration of Escherichia coli as a Model of Preterm Labor

- Minjun Bae and Murphy Joseph, Poster 61

Cleaner dual-fuel combustion engines with Syngas as a secondary fuel

- Abbass Berjaoui, Poster 3

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- Neha Bhagirath, Poster 69

Riluzole synergizes with Doxorubicin to induce apoptosis and prevent cell proliferation in triple negative breast cancer cells

- Amanpreet Bhogal, Poster 4

Hatching a Pokémon Egg By Closing Your Eyes: A new Paradigm for Measuring Resting-State in Preschoolers

- Brooke Billings, Poster 5

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- Obaidah Bitar, Poster 70

The Role of mRNA decay in Caulobacter crescentus Cell Cycle Regulation

- Elliott Blatt, Poster 49

Characteristics of Vaginal Enterococcus faecalis: A Reservoir for Virulent Strains?

- Xhenis Brahimi, Poster 6

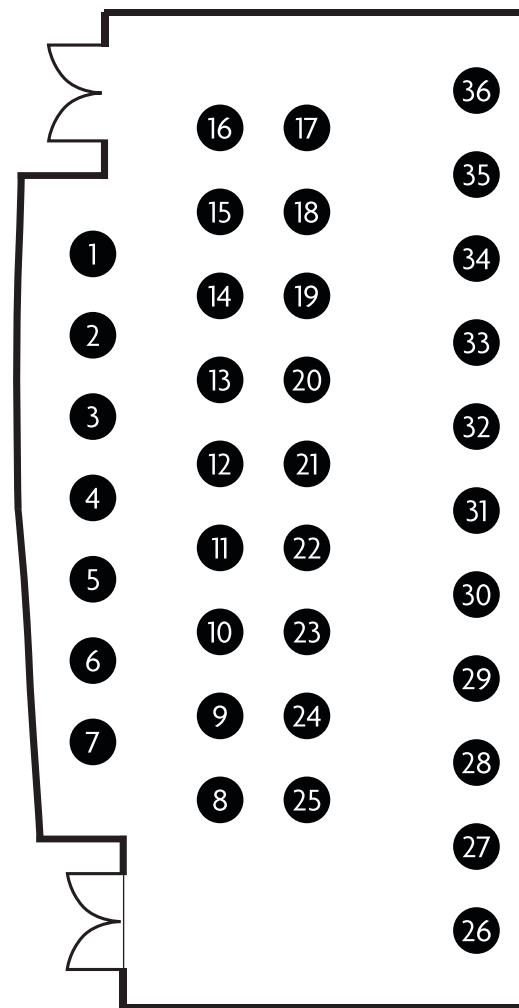
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- Ibrahim Chahrour, Poster 48

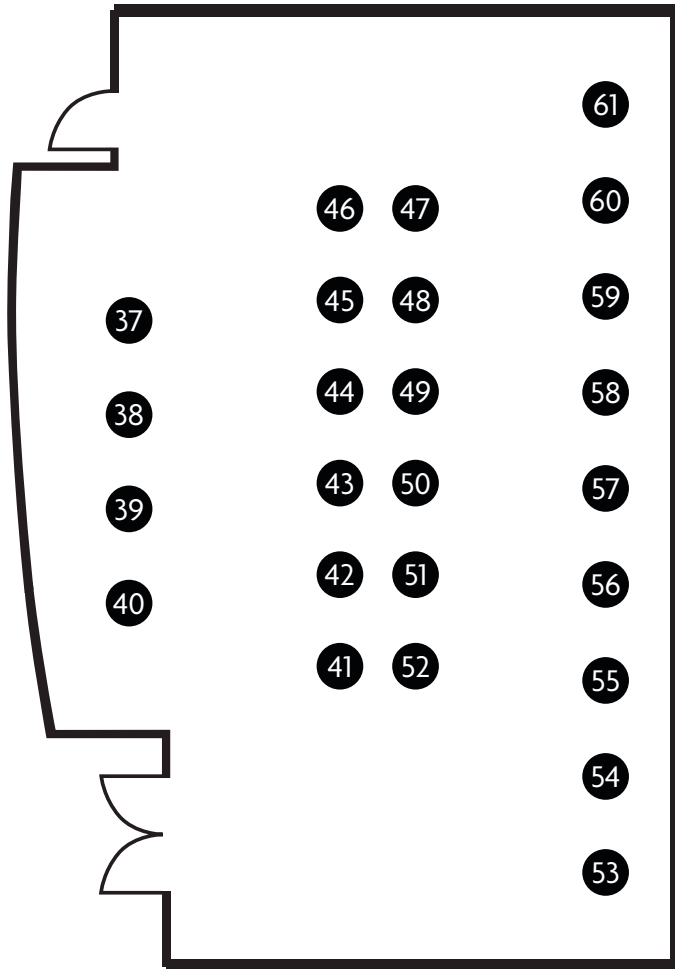
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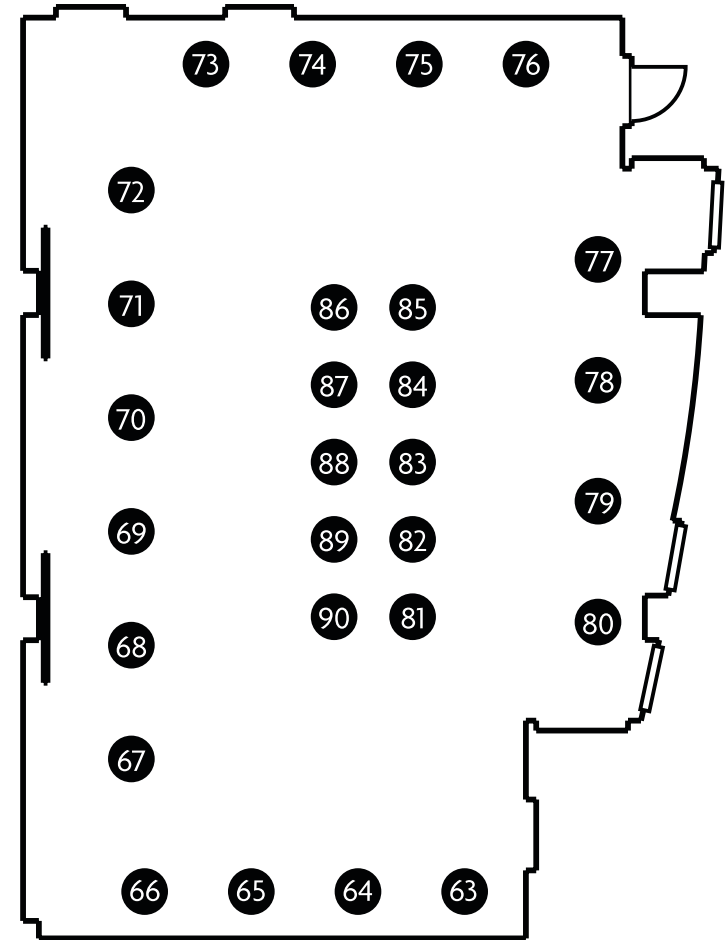
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Student Center Building room 20
Behavioral and Social Science



Student Center Building room 25
Engineering and Physical Sciences



Student Center Building room 10
Life Sciences and Arts and Humanities

■ **Houda Ajrouche** | Faculty Mentor - Moriah Thomason, and Marion van den Heuvel

“Gestational Age and Emotion Regulation with its Relationship to Reciprocal Parenting”

Research has shown that children born very preterm and extremely preterm will experience diminished emotion regulatory problems later in childhood. This study aims to explore the influence that parenting has on the relationship between gestational age and emotion regulation. The hypothesis was that babies born at an earlier gestational age will display more emotion regulatory problems later in childhood at ages 4-5. Additionally, it was hypothesized that parenting can serve as a moderator for the gestational age and emotion regulation relationship. The research conducted a longitudinal study, where we have gathered data from when the child was in the womb of the mother via 2 fetal fMRIs. This specific study gathers information from birth, and at a neurobehavioral visit at 3 and 5 years.

■ **Nahida Akkary** | Faculty Mentor - Mark Cheng

“Growing and Applying Graphene”

This research project was set with the goal to format a wearable biosensor that will be able to sustain a wireless internet connection to relay any information that it receives back to an app or network that it is linked to. We have started with the base of this sensor, which is made from a form of carbon, graphene, that can tolerate a higher level of conductivity and has a greater level of strength than the materials that are currently being used in sensors today. We have successfully been able to grow the graphene with minimal defects and have started to look into methods that we could incorporate to increase the accuracy and efficiency of such a device.

■ **Alon Albalak** | Faculty Mentor - Gang George Yin

“Exploring environmental factors and happiness on a global scale”

In the past, efforts have been made to incentivize the use of clean energy by the EPA in addition to international efforts such as the Paris Accords, by the UN. Some endeavors have been made to combat climate change. This study aims to bring additional motivation to the foreground.

In this study, we look at correlations between environmental factors of the World, and the happiness of citizens of each country. In order to study these factors, we have taken data from 3 sources and compared to the World Happiness Index. To discover which factors most affect happiness, multiple dimensionality reduction algorithms are used as well as techniques that show which factors the algorithms considered most significant.

■ **Amira Alnabolsi** | Faculty Mentor - Jeremy Kodanko

“Synthesis of Rhenium (I) Complexes for Cathepsin L Inhibition and Cell Imaging”

Cysteine cathepsin proteases are enzymes found in the human body that are involved in various human state diseases. They are often called proteases because they break down proteins found in the body. The inhibition of these proteases can help to find cures for diseases such as cancer. Each of the 11 human cysteine cathepsins has specific inhibitors. The goal of this project is to maximize the production of a Cathepsin L inhibitor and use it to study and find cures for these diseases.

■ **Ashleigh Anderson** | Faculty Mentor - Dawn Misra

“Emergency Department Utilization and Birth Outcomes”

Infant mortality rates in the city of Detroit are extremely high when compared with national rates. Knowing that low birthweight and preterm birth are main predictors of infant mortality rates, this study evaluated how they and along with other factors relate to Emergency Department utilization during prenatal care. This research was apart of an ongoing study being conducted through Henry Ford Health System under the guidance of Dr. Martina Caldwell and Dr. Dawn Misra. Through primary data collection, retrospective chart review, and preliminary data analysis, a few findings were deemed significant for future potential obstetrical and neonatal intervention.

■ **Nicholas Ang** | Faculty Mentor - Ryan Thummel

“Characterization of midkine-a (Mdka) function during caudal fin and retinal regeneration in adult zebrafish”

Zebrafish have the ability to regrow many different tissues, including the retina, heart, and fins. This study aims at determining the role of a protein called Midkine-a (Mdka) during caudal fin and retinal regeneration. We utilized a genetically modified zebrafish line that removes Mdka function and tracked fin and retinal regeneration over time. We found that loss of Mdka reduced the initiation of regeneration in both tissue types. However, loss of Mdka during retinal regeneration significantly impaired restoration of the retinal tissue, suggesting that retinal tissue may be more sensitive to loss of Mdka function. This study adds to our understanding of fin and retinal regeneration in the zebrafish and future studies aim to reveal the role of Mdka in the regeneration of other tissues.

■ **Hasan Ansari** | Faculty Mentor - Loren Schwiebert

“Solving All Pairs Shortest Path in Matlab Using GPU Based Floyd-Warshall Algorithm”

This research attempts to take advantage of the graphics processing unit (GPU) architecture solve a computationally difficult problem, using CUDA, a language created by Nvidia to run code on the GPU, inside a Matlab program used to quantify brain topology in patients.

■ **Afrah Arif** | Faculty Mentor - Nardhy Gomez-Lopez

“Intra-Amniotic Administration of Escherichia coli as a Model of Preterm Labor”

Infection is a leading cause of premature labor and birth. This study provides a model for studying the mechanisms through which infection-induced preterm labor occurs. We injected live bacteria into the uterus of pregnant mice in order to resemble the infections that can occur during human pregnancy. The introduction of bacteria triggers an inflammatory reaction in the body as a defense system to the foreign pathogen. We found that this injection results in a 100% rate of preterm birth, showing that we can successfully model infection-induced preterm labor in mice. This study is important in that it provides a new and more relevant model of infection-induced preterm labor that can be applied in future studies.

■ **Ashi Arora** | Faculty Mentor - Robert Akins

“Exosomes of Candida albicans: Structure and Detection in Colonized Individuals”

Candida albicans, an opportunistic fungal pathogen, is known to produce extracellular vesicles that carry discrete protein and RNA cargo, and influence immune cells and survival in a model organism. Past research in the Akins lab has demonstrated that when oxidative stress is induced in Candida albicans in vitro, the nanovesicles released during stress protect naive C. albicans cells from subsequent oxidative stress. This study aimed to characterize these protective nanovesicles and to study nanovesicles that are detected in bodily fluids of healthy participants colonized with C. albicans.

■ **Minjun Bae** | Faculty Mentor - Mohsen Ayoobi, Wen Li, Ming-Chia

“Cleaner dual-fuel combustion engines with Syngas as a secondary fuel”

In modern times, fossil fuel is one of the most common natural resources used in a variety of fields. However, fossil fuel combustion causes severe environmental problems. To reduce pollutants from the combustion process, it is important to focus on greener alternatives. We have tried to work on a more environmentally-friendly engine technology with greener fuel, Syngas.

■ **Chelsey Bejarano** | Faculty Mentor - Fatmir Menkulasi

“Development of a Hybrid Braced Frame for Cold-Formed Steel Mid-Rise Construction”

Cold-formed steel is a common term for products made by rolling or pressing steel into semi-finished or finished goods at relatively low temperatures (cold working). Cold-Formed steel construction offers many advantages in terms of strength, durability, stability and cost effectiveness. However, existing cold-formed steel frames have limited the use of the full potential of this type of steel. Traditional cold-formed steel frames that feature tension straps in each direction can provide a limited amount of capacity due to the strength of the straps. This project focused on developing a high capacity hybrid braced frame and load bearing wall system that can allow the extension of cold-formed steel construction to taller buildings while reducing the cost of construction.

■ **Abbass Berjaoui** | Faculty Mentor - Wassim Tarraf

“Health Disparities among Middle Eastern Immigrants in the United States: Results from the 2006-2016 National Health Interview Survey”

Most observational epidemiological studies examining health outcomes combine Arab Americans (AA), a minority group with distinct health risks, with Non-Hispanic Whites (NHW). The lack of separate classification can mask existing health disparities among Arab Americans and prevent evidence-based health interventions that could properly address the health and healthcare needs of the community. The National Health Interview Survey (NHIS) provides a region of birth question with a Middle Eastern classification. Using NHIS data from 2006-2016, I examined differences in health outcomes between middle eastern immigrants (including Arab Americans) and white immigrants from Europe.

■ **Neha Bhagirath** | Faculty Mentor - Cecilia Speyer

“Riluzole synergizes with Doxorubicin to induce apoptosis and prevent cell proliferation in triple negative breast cancer cells”

The deadliest of diseases, cancer is the uncontrollable growth and division of cells in the body. Specifically, breast cancer is the 2nd leading cause of cancer death in the United States, affecting 1 in 8 women. There are four main subtypes of breast cancer that are classified based upon the expression of specific receptors. The focus is on Triple Negative Breast Cancer, which does not have cells that can be targeted with treatment due to lack of receptors. This research attempts to develop an effective treatment to target Triple Negative Breast Cancer cells.

■ **Amanpreet Bhogal** | Faculty Mentor - Marion I. van den Heuvel

“Hatching a Pokémon Egg By Closing Your Eyes: A new Paradigm for Measuring Resting-State in Preschoolers”

Research at the Social Cognitive Affective Neurodevelopment (SCAN) Lab analyzes the development of brain networks in children, starting in utero. In this longitudinal project, I work on follow up visits with preschoolers and their mothers. I was part of a project in which we developed a method for assessing resting state brain activity in preschoolers, which is typically hard to measure in children within this age group.

■ **Kanwar Bhullar** | Faculty Mentor - Zachary Brewster

“Exploring Culture’s Influence on Parental Educational Expectations for their Children’s Educational Career”

To explore the influence of culture on students educational aspirations, we conducted both a quantitative and qualitative analysis by administering surveys and conducting semi-structured interviews respectively, investigating the parents and communities rhetoric on education, under a lens of culture and their perceived effects on the students. It was found that generally, those of immigrant descent were more likely to have parents who promoted higher education as well as be heavily involved in their children’s careers. Also finding that immigrant communities value stability, something that can be acquired by excelling in education, that is internalized parents of the community and reflected in their rhetoric on educational choices of their children.

■ **Brooke Billings** | Faculty Mentor - Lisa Rapport

“Neuropsychological Correlates of Lipreading in Hearing Impaired and Normal-Hearing Adults”

Research has indicated that age-related hearing loss is associated with impairments in cognitive functioning; however, many clinical tests use auditory stimuli. This modality may underrepresent abilities of adults with hearing loss because accurate speech perception is essential to complete the task. Lipreading can compensate for the adverse effects of hearing loss on auditory tests; therefore, we examined the relationship between lipreading ability and cognitive tests commonly used in clinical assessment. Assessment of lipreading skill can help identify whether poor performance on auditory tests reflects inability to compensate for hearing loss or actual memory impairment.

■ **Obaidah Bitar** | Faculty Mentor - Jared Schrader

“The Role of mRNA decay in Caulobacter crescentus Cell Cycle Regulation”

In bacterial cells, some networks in the cell act as a “brain” by making logical decisions as to when to grow and divide. As bacteria are unicellular organisms, this decision is accomplished by a series of events known as the cell cycle. The Schrader Lab has found that alteration of a protein called RNaseE has significant impacts on the cell cycle of bacterial cells. I have identified the specific aspects of the cell cycle checkpoints that are controlled by this protein. While *Caulobacter* cells studied here are nonpathogenic, the findings here lay an important foundation to the control of growth of harmful bacterial.

■ **Elliott Blatt** | Faculty Mentor - Robert Akins

“Characteristics of Vaginal Enterococcus faecalis: A Reservoir for Virulent Strains?”

Enterococcus faecalis (*E. faecalis*) is a bacterium that is a main trigger to the onset and recurrence of Bacterial Vaginosis. In this project, we want to test *E. faecalis* for its ability to break down Red Blood Cells and for resistance to Vancomycin, Ampicillin, Gentamicin, Daptomycin, Streptomycin, and Metronidazole. We designed a media using Clindamycin and Nutrient Agar to isolate *E. faecalis* from a rare 10⁻⁴ occurrence. Since the beginning of the project, 162 colonies have been isolated using the Clindamycin medium. Of the 84 colonies tested, 41.7% were found to be hemolytic positive. We continue to test the remaining colonies. The next step in the project is to test the isolated colonies against the 6 previously mentioned antibiotics.

■ **Xhenis Brahimi** | Faculty Mentor - Christine Rabinak

“Age-Related Changes in Reversal Learning in Children”

Reversal learning tests the ability to flexibly alter behavioral responses in the face of changing environmental contingencies. Reversal learning deficits are observed in various neurodevelopmental disorders, including attention-deficit hyperactivity disorder and anxiety disorders. Here, we tested age-related changes in reversal learning ability and the underlying neural correlates in children. We found age-related increases in context, but not cue reversal. Further, these behavioral gains were accompanied by age-related increases in activation and connectivity of the parahippocampal gyrus, a brain area involved in contextual processing.

■ **Camilla Cascardo** | Faculty Mentor - Francesca Luca

“Manipulation of the Gut Microbiome Modifies Expression of Colorectal Cancer Cells”

In this study we investigated the role of *Collinsella aerofaciens*, a microbe found in the gut, in gene expression changes of human colorectal cancer cells. Previous results in our lab indicated that varying levels of *Collinsella aerofaciens* changed the expression of over 1,500 genes in healthy colonic epithelial cells. Through this project, we determined that several genes possessed unique responses to *Collinsella aerofaciens* in cancerous cells versus healthy cells. This data and further research will aid in the identification of genes important for the interaction of cancerous cells and the microbiome and may lead to a further understanding of cancer onset and progression.

■ **Christiana Castillo** | Faculty Mentor - Lisa Maruca

“A Town Called Hope”

“A Town Called Hope” is a twenty five page bilingual (English and Spanish) children’s book. It exists to promote children to be introduced to other cultures, languages, and to help aid those who are learning a new language. The book focuses on community and environmental justice. “A Town Called Hope” book includes illustrations, to help engage children. The book was created after careful research was collected to show the importance of bilingual literature for English language learners who are new to the United States.

■ **Ibrahim Chahrour** | Faculty Mentor - Gang George Yin

“Phase Portraits and Stability Analysis of Nonlinear Differential Equations”

Differential equations are equations that relate a function to its derivative(s). The vast majority of differential equations don’t have simple solutions and are extremely sensitive to initial conditions. To study these equations, we plot the function’s derivative versus the function itself. This provides a method of finding points from which either all trajectories are repelled, attracted, or trapped around their neighborhood. In this research we focus on physical systems such as the damped oscillators and study their equilibrium points.

■ **Eric Chang** | Faculty Mentor - Yifan Zhang

“Molecular Subtyping of Antibiotic-Resistant Bacteria Isolated from Urban Community Gardens”

Detroit has been historical figure for leading the urban agriculture movement. As urban gardens become a substantial food source, the food safety of these gardens must be inspected. This project will focus on characterizing bacteria that have developed antibiotic resistances. Specifically, we will investigate *Enterococcus* species obtained from both soil and vegetable samples. By using different scientific techniques, we will identify the association between antibiotic resistances of bacteria and their molecular identities.

■ **Emily Collette** | Faculty Mentor - Matthew Larson

“The Influence of Neighborhood Characteristics and Culture on Attitudes towards Sexual Assault”

The study attempts to measure the extent to which an individual’s acceptance of rape myths can be attributed to the cultures and characteristics of the neighborhoods they come from. There is a significant body of work that shows disadvantaged neighborhoods experience greater levels of violence and consequently develop cultures that view violence differently. Such cultures influence the beliefs and attitudes of those living within them, which may matter in understanding beliefs towards sexual assault, a specific form of violence.

■ **Kristin Dernay** | Faculty Mentor - Bruce Berkowitz

"Dark rearing does not prevent prodromal rod oxidative stress in vivo in male Pde6brd10 mice"

There are a family of genetic disorders that cause loss of the light-detecting cells of the retina leading to blindness. One popular explanation for why the light-detecting cells die is that a genetic mutation causes fatal levels of oxidative stress. The role of light in this process, however, is unclear because animal models reared in the dark also show loss of light-detecting cells, although at a slower rate. In this study, we asked if an animal model with a genetic mutation that is raised in the dark will also showed oxidative stress in light-sensing cells. Using a new MRI method, we tested and confirmed that light is not needed to generate oxidative stress in the light-sensing part of the retina.

■ **Oksana Doubrovski** | Faculty Mentor - Heather Dillaway

"Human Trafficking and Medical Education"

Human trafficking victims visit hospitals and clinics seeking help for injuries and illnesses acquired during captivity, but they often go unrecognized. Training healthcare providers to identify and intervene on human trafficking can prevent and alleviate this serious human rights violation. Educating medical students may therefore be one solution in the combat against trafficking. This presentation will report findings from an online survey answered by over 150 Wayne State medical students in March 2017. Survey questions focused on current knowledge about, exposure to, and confidence in identifying human trafficking. Findings reveal that upperclassmen have limited information pertaining to human trafficking and its interventions, whereas underclassmen were better educated. Most students recognized the value in this training and were eager for additional information.

■ **Kareem Elhage** | Faculty Mentor - Peter Hoffmann

"Distinguishing single and multiple biotin-avidin bonds using atomic force microscopy"

We attempted to combine atomic force microscopy and fluorescence microscopy in order to test the interactions between biotin - a vitamin - and avidin - a biotin binding protein. The goal of the experiment was to be able to distinguish single biotin-avidin bonds from double bonds using force curves which were obtained using the atomic force microscope. Challenges we faced included unwanted interactions between the cantilever and the substrate. Also, it was very difficult combining the two types of microscopy. Nonetheless, we were able to distinguish double bonds from single bonds at the end of this experiment.

■ **Sabina Emerenini** | Faculty Mentor - Phillip Levy

"Effects of Post Traumatic Stress of individuals with Hypertension"

Minimal research has been conducted that focuses on the effects of post- traumatic stress (PTS) of individuals with hypertension (HTN). This study aims to see if there is a correlation between PTS and hypertension with individuals in an urban setting. The research took place in the city of Detroit, including patients that were in the emergency rooms in Receiving Hospital, Harper Hospital, and Sinai Grace Hospital. Dr. Phillip Levy previously had an ongoing HTN registry in the sites, and then a 20 question self-survey on posttraumatic stress disorder (PTSD) was included to seek for a correlation between PTSD and HTN.

■ **Florentine Friedrich** | Faculty Mentor - Ann Stacks

"Mindfulness as a Moderator of the Relationships among ACES, Depression, and JobStress in Early Head Start Teachers"

Past research has shown that mindfulness is effective in decreasing depression and stress. Likewise, it was also found that adverse childhood experiences correlate positively with depression, and depression correlates positively with stress. Moreover, research with early head start teachers is also limited in this area. Thus, our project aimed to investigate whether mindfulness moderates the relationship between adverse childhood (ACEs) relationships and depression and the relationship between ACEs job-stress in early head start teachers.

■ **Larissa Gamble** | Faculty Mentor - Matthew Younglove

"Chamber Music Pedagogy: Saxophonists' Versus Non-Saxophonists' Approach to the Quartet"

Although music is a "universal language" there are many pedagogical differences that are specific to each instrument. This study was to examine how different pedagogues approach the same chamber ensemble, the saxophone quartet. Research was gathered during a ten-day long workshop in Minot, North Dakota where Wayne State students interacted with several different professional musicians. Each coach gave insight on how to improve the quartet, and those insights were cataloged and examined. The results were revealing of the different tendencies between pedagogues.

■ **Klaramari Gellci** | Faculty Mentor - Christine Rabinak

"Effects of Community Distress on Whole-Brain Functional Organization in Children"

To date, studies examining the effects of socio-economic disadvantage(SED) on brain organization in children have exclusively focused on isolated brain areas and household-level factors, including family income and parental education. However, brain areas do not operate in isolation and SED experienced at the community level may have unique or interactive effects compared to those of household SED. This study will test how community-level SED affects whole-brain functional organization using resting-state functional magnetic resonance imaging.

■ **Sandi Gorges** | Faculty Mentor - Susanne Brummelte

"Trans-Generational Effects of Preconceptional Stress and Gestational Antidepressant Exposure on Hypothalamic-Pituitary-Adrenal Axis Response in F2 Generation"

Epigenetic Changes can be transmitted from one generation to another, for example from a grandparent to a grandchild. Stress is one factor that has been associated with transgenerational epigenetic inheritance. Many pregnant women are currently taking antidepressants, however it is still not known whether these antidepressants can affect the second generation. Thus, this study aims to investigate whether antidepressant use during pregnancy affects the second generation and in particular if the second generation's response to stress will be altered.

■ **Bhavna Guduguntla** | Faculty Mentor - Prahlad Parajuli

“Mechanism of Leukocyte Infiltration in the Brain Following Intermittent Alcohol Exposure”

Chronic alcohol usage is associated with a spectrum of neurodegenerative problems, however many of these issues are still shrouded in mystery, and therefore remain untreatable. Previous studies have shown that chronic alcohol usage is associated with an inflammatory immune response, which activates several brain pathways, a response that can lead to neuronal degradation. This research project is focused on identifying the specific immune cell types that infiltrate into the brain and the molecular mechanisms that cause neurodegeneration following chronic alcohol exposure.

■ **Urvashi Gupta** | Faculty Mentor - Noa Ofen

“Systematic Review of the Influence of Preterm Birth on Hippocampal Volume”

Premature birth can alter the brain development in preterm born individuals which may affect memory and other cognitive abilities. Here, a systematic meta-analysis was used to evaluate findings of previous studies that tested memory functioning in preterm and full-term born individuals and measured the volume of hippocampus, a brain region critical for memory. Preterm-born individuals tended to have moderately smaller hippocampal volume. This difference increased with age, suggesting that some cognitive deficits in preterm born individuals may not be present until later in adolescence and adulthood.

■ **Carolyn Hall** | Faculty Mentor - Rita Casey

“Functional Use of Cursive vs. Printing in Personal Handwriting: Assessment of Adolescents’ Use of Different Forms of Writing”

Research presented at “Handwriting in the 21st Century: An Educational Summit” (Washington, D.C., 2012), brought together educators and handwriting researchers to debate the implications of including or excluding handwriting instruction from lower level curricula. The research presented at the Summit demonstrated handwriting’s support of students’ cognitive development and academic achievement. The studies showed a positive correlation between handwriting and proficiency in producing clear and coherent writing. In their observations of students who used handwriting, researchers found that the students wrote more words, wrote words faster and expressed more ideas than students who used keyboarding as their method of writing. My research focuses on whether using cursive handwriting rather than manuscript (printing) produces higher cognitive results such as longer sentences or longer length words.

■ **Salma Hassanieh** | Faculty Mentor - Noa Ofen

“Systematic Review of the Influence of Preterm Birth on Hippocampal Volume”

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■ **Aneesh Hehr** | Faculty Mentor - Christine A. Rabinak

“Can children learn to discern dangerous from safe environments?”

The development of stress related disorders is associated with trauma exposure during childhood development. This can disrupt a child’s ability to distinguish between safe and dangerous environments. Therefore, it is essential that we develop methods to measure disruptions in fear-associated learning. For this reason, this study involves the use of a virtual reality fear conditioning paradigm to measure fear responses in children. In this study, we focused on the role of context in modulating fear responses in a pediatric population. Using this paradigm, we determined if children are able to distinguish between safe and dangerous environments and whether or not they retain this information. Our ultimate goal is to better understand the underlying mechanisms of stress related disorders that frequently develop in children.

■ **Emma House** | Faculty Mentor - Robert Akins

“Impact of Candida albicans exosomes on infections in wax moth larvae”

The larval stage of the Greater Wax Moth, *Galleria mellonella*, is used as a model for innate immune response. *C. albicans* secretes extracellular vesicles in the form of exosomes, utilized to communicate with other populations to prepare them for stress. These exosomes carry specific RNA and protein cargo which may enhance virulence. Additionally, they may be immunogenic and able to function as a vaccine for the host. Pre-infection injections of exosomes in one study showed limited host protection from infection. In our study I have utilized the *G. mellonella* model to examine the effects of pre-injections of exosomes created by cells exposed to oxidative stress.

■ **Sanaya Irani** | Faculty Mentor - Nitin Chouthai

“A Comparative Study of Clinical Parameters in Newborns with Hypoxic Ischemic Encephalopathy in Presence And Absence of Severe Mri Abnormalities.”

Hypoxic Ischemic Encephalopathy (HIE) is a leading causes of developmental impairment among infants. To provide counseling to parents whose babies suffer from HIE, it is important to develop parameters which correlate with severity of MRI injury. SNAPPE and CRIB scores are known to correlate with future developmental outcomes in sick newborns. Additionally, Ambalavanan Death Scoring is a fairly new severity outcome measure. Irani will present on the effectiveness of various clinical parameters such gestational age, birth weight, appgar score at 5 minutes, HIE stage, level of C-reactive protein, CRIB, SNAPPE and Ambalavanan scores as reliable predictors of HIE by their correlation with patients’ MRI classification. Our findings will help establish clinical parameters as reliable predictors of newborn outcome and help physicians develop holistic treatment plans.

■ **Sarosh Irani** | Faculty Mentor - Mohammadreza Nasirivanaki

“The Use of Optical Coherence Tomography to Analyze the Efficacy of Skin Care Products”

Wrinkle reducing products often make very significant claims about their effects on human skin, which can be hard to verify with qualitative analysis. Optical Coherence Tomography, or OCT, is a non-invasive imaging technique that can take high-resolution images of human skin without the need for preparation. Quantitative analysis of the roughness of this imaged skin before and after application of the cream can show exactly how much the product improved skin quality. Irani will present on a specific cream that was used, and his findings regarding the change in skin roughness throughout the 28-day trial.

■ **Shane Jackowski** | Faculty Mentor - Jennifer Stockdill

“Strategic uses for the Cysteine thiol protecting group, Allocam”

Our focus is to use the thiol protecting group Allocam with two different projects. The first one is using allocam and different derivatives to use in a peptide to form the correct disulfide bond formation. This application is important to science specifically dealing with medicine. If we develop proper ways to fold proteins, we can use them in medicine for selectively binding to certain substrates. The second project focuses on Native Chemical Ligation which is the process of forming two peptides into one. With the use of allocam and its derivatives, we hope to be able to make a one pot solution of 3 or more peptides thereby allowing access to peptides that were inaccessible before to become achievable.

■ **Jahanzeb Javed** | Faculty Mentor - Vaibhav Diwadkar

“Using dynamic causal modeling to compare modulation of frontal-thalamic network interactions between OCD patients & healthy controls during basic motor control.”

This project revolves around the brain activation differences between OCD patients and healthy controls. Initially both the OCD patients and the healthy controls were asked to do a finger tapping task under both periodic and random conditions (tap their finger whenever a stimulus appeared), while being hooked up to an fMRI to monitor their brain activity. My project specifically chooses to focus on the four brain regions most utilized by this task- the thalamus, dACC, SMA, and MI. Using a process called Dynamic Causal Modeling I was able to monitor the strength of these connections and see which ones are most activated during the task.

■ **Ayushi Jharia** | Faculty Mentor - Mohammad Mehrmohammadi

“Utility of Ultrasound and Photoacoustic Imaging for Accurate Catheter Tracking and Temperature Monitoring During Endovenous Laser Ablation”

Nearly 60% of the United States’ population is affected by varicose veins. Currently, the common minimally invasive treatment options include endovenous ablation which employs laser energy to induce localized heat at the tip of the catheter and close the diseased blood vessels. Ultrasound (US) imaging is used as gold-standard imaging modality to help vascular surgeons visualize the catheter and for accurate placement of the ablation catheter within the diseased vein. However, ultrasound US imaging has certain limitations especially for placement of catheters in small perforating veins. The researchers have conducted experiments to explore the issues of angular dependency, comet tail artifacts, and temperature monitoring to develop a means of accurate catheter tip location.

■ **Murphy Joeseph** | Faculty Mentor - Mohsen Ayoobi, Wen Li, Ming-Chai Lai

“Cleaner dual-fuel combustion engines with Syngas as a secondary fuel”

In modern times, fossil fuel is one of the most common natural resources used in a variety of fields. However, fossil fuel combustion causes severe environmental problems. To reduce pollutants from the combustion process, it is important to focus on greener alternatives. We have tried to work on a more environmentally-friendly engine technology with greener fuel, Syngas.

■ **Ashley Johnson** | Faculty Mentor - Julie Lesnik

“Integration of dental microwear texture analysis into studies of mandibular shape in three prehistoric populations in Peru”

Microwear signatures on the first and second molars can provide insight into the types of diets populations are consuming. These signatures in comparison to craniometric data can indicate a relationship between types of diets and jaw size among differing populations. My research is focused on three sites in Peru. The study compares Huaca Prieta, where agriculture is not fully developed (Preceramic Period, 3100-1880 BC) to Nasca (Early Intermediate Period (EIP), 1-800 AD), and HualcayÁin (EIP, 1-600 AD), who’s agriculture is fully developed, in order to test the hypothesis that Huaca Prieta’s population will reflect a larger jaw size in relationship to their less agricultural diet.

■ **Marsalis Jolley** | Faculty Mentor - Thomas Pedroni

“Youth Perspectives on Urban Discipline Policies”

Youth Perspectives on Urban Discipline Policies is intended to inspire dialogue regarding youth experience within the School to Prison Pipeline. This research assessed the opinion of urban public high school students regarding punishment and establishment of community within school settings as it relates to thoughts on functionality by measuring dimensions. These dimensions were: (1) teacher administration role in deviant behavior, (2) positive opinion while attending school setting, (3) Management of problematic behavior in schools, (4) Community establishment with school settings, (5) the experience and/or witnessing of deviant behavior while in school settings. It is hoped that findings from this research may help researchers to better engage marginalized populations and spark dialogue regarding the social ramifications of harsh polices of punishment.

■ **Albert Jose** | Faculty Mentor - Amar Basu

“Comparing Detroit Ambulance Response Times with Those of a Novel Unmanned Humanitarian Vehicle (“Ambulance Drone”) in Emergent Overdose Situations”

This research project aims to investigate the viability of using drones to get to the scene of an emergency opioid overdose faster than traditional first responders in order to deliver pre-hospital interventions, namely Naloxone (a medication that can be safely given, even by lay people, to reverse the effects of overdose within a matter of minutes), that can be rapidly administered by bystanders, thus decreasing the amount of time the patient goes without treatment and theoretically leading to better patient outcomes. In other words, this undertaking involves surveying the efficacy of a novel, “aerial telemedical” model by looking at its theoretical application in overdose situations.

■ **Ali Kahil** | Faculty Mentor - Aeron Retish

“General Henri Mathias Berthelot: Savior of Romania and Founder of Greater Romania”

General Henri Mathias Berthelot: Savior of Romania and Founder of Greater Romania is an inquiry into how the French military mission under the General Henri Mathias Berthelot impacted the Eastern Front as well as Romania's post-WWI politics. In 1918, Romania achieved its national ideal of uniting most Romanian speaking country under one flag. This achievement was a direct result of its involvement during the Great War and the French intervention.

■ **Klevis Karavidha** | Faculty Mentor - Shane Perrine

“Increased locus coeruleus activity and altered brain monoamine levels correlate with increased exploratory behavior in a novel environment in rats previously exposed to chronic cocaine.”

Substance use disorder is a devastating mental illness that impacts approximately 21.5 million adults across the nation and causes massive financial burdens to society. For this reason, it is imperative to study the effects drugs of abuse have on the brain and potentially reverse or prevent these detrimental effects. The goal of this research was to investigate changes in behavior and brain chemistry of rats that were exposed to new environments and large amounts of cocaine in a short span of time. We found that animals exposed to chronic cocaine displayed more “œrisky” exploratory behavior compared to those without cocaine exposure. Additionally, we found relationships between these behaviors and multiple brain regions involved in emotion, motivation, and arousal.

■ **Ramasahitya Karra** | Faculty Mentor - Moriah Thomason

“Fetal Brain Volume as a predictor of pre-term birth”

Recent research has indicated that brain size in premature infants is significantly smaller than in term-born infants. We were interested in examining this phenomenon in regards to fetal brain volumes of pre-term and term-born infants to see whether this finding was still robust. We utilized MRI to scan the fetal brain in utero, manually segmented the brain from surrounding maternal tissue, and calculated brain volume based on the mask size. We controlled for gender and also the gestational age at scan by matching every pre-term subject with a control term-born subject. Performing a statistical analysis revealed that there was no significant relationship between brain volume and gestational age at birth. We would need further investigation with more participants to reinforce this relationship on a larger scale.

■ **Matthew Kolar** | Faculty Mentor - Matthew Younglove

“Chamber Music Pedagogy: Saxophonists’ Versus Non-Saxophonists’ Approach to the Quartet”

Although music is a “universal language” there are many pedagogical differences that are specific to each instrument. This study was to examine how different pedagogues approach the same chamber ensemble, the saxophone quartet. Research was gathered during a ten-day long workshop in Minot, North Dakota where Wayne State students interacted with several different professional musicians. Each coach gave insight on how to improve the quartet, and those insights were cataloged and examined. The results were revealing of the different tendencies between pedagogues.

■ **Kenneth Kutschman** | Faculty Mentor - Matthew J Allen

“Synthesis of Sulfur-Containing Cryptands via Thiol-Ene Photochemical Reactions”

Contrast agents in magnetic resonance imaging most commonly use the element gadolinium. Although useful for many purposes including anatomical imaging, new agents are needed for molecular imaging. Europium offers a potential alternative to gadolinium for imaging of oxygen content. Europium-based agents respond to oxygen by losing an electron and turning off contrast enhancement. My research aims to synthesize compounds called cryptands which bind to europium and to influence the response to oxygen. The cryptands that I am synthesizing are sulfur-based due to the ability of sulfur to stabilize europium. By using a photochemical reaction called the thiol-ene reaction, I aim to efficiently synthesize sulfur-based cryptands that can be used to stabilize europium-based agents.

■ **Natalie La Bruzzy** | Faculty Mentor - Professor Evan Larson-Voltz

“Niello Development”

This project involved researching and making the alloy known as Niello. In order to better understand Niello's capabilities numerous experiments with a variety of recipes were performed involving the application, casting and finishing processes of Niello. Throughout the centuries the alloy Niello was commonly used as an inlay within silver, gold or bronze hand engraved metal pieces. The goal of this research was to create new casting and application techniques that could be used within the metalsmithing community.

■ **Dayzsa Lewis** | Faculty Mentor - Matthew J. Allen

“Stability of Divalent Metals with Tertiary Amine Complexes”

The goal of this project is to find new ways to stabilize metals in unusual oxidation states. By placing the metals in a stable environment, we expect to be able to explore new magnetic and luminescence properties. We start by making a cage in which to place the metal. This cage will produce the stable environment necessary to the access properties of the unusual oxidation states. After the cage is made, a metal will be placed inside, and testing for new properties will begin.

■ **Kizzmet Littleton** | Faculty Mentor - Yuson Jung

“Can the food in your cabinet save your life (part II)”

Previous research found that Detroiters place a high emphasis on how food taste. To better understand why taste was so highly valued, this research explores the effects one's environment has on their health and overall outlook on food. This was a case study done on the food environment in Detroit and it's relations to health.

■ **Chloe Luyet** | Faculty Mentor - Jeffrey Potoff

“Predicting the Environmental Fate of Fluorinated Surfactants”

Fluorinated surfactants have many consumer applications, such as food packaging coatings, kitchenware coatings, and fabric protection. When oxidized in the environment, they can form perfluorocarboxylic acids, among the most common being perfluorooctanoic acid (PFOA). The strength of the C-F bond contributes to the incredible stability of fluorinated surfactants, making them extremely resistant to biodegradation. Insufficient information is known about the persistence and biological activity of these compounds in the environment. Using computer simulations to understand the physical properties of these molecules will promote the development of alternative surfactants that could serve the same industrial applications, with substantially lower potential for bioaccumulation.

■ **Nour Mahmoud** | Faculty Mentor - Andrew Fribley

“Perphenazine’s ability to activate the Unfolded Protein Response (UPR) in leukemia cells”

More than 62,000 Americans are expected to be diagnosed with leukemia in 2017, and although survival rates have improved about four-fold in the last five decades, relapse and refractory disease continue to provide unacceptably high morbidity and mortality. Our approach to improving current leukemic therapies is to identify small molecules from a 2400 compound screen that enforce the unfolded protein response (UPR) through the upregulation of the apoptotic cell death machinery in cancer cells. Furthermore, to determine which compounds inhibit proliferation in a CHOP-dependent fashion. Perphenazine emerged as a promising hit compound that reduced proliferation in a CHOP dependent fashion. An RT- qPCR analysis performed on a panel of leukemia cell lines confirmed that Perphenazine could induce ER stress leading to the accumulation of UPR transcripts.

■ **Yashshree Majaliker** | Faculty Mentor - Mohammad Mehrmohammadi

“Ultrasound and Photoacoustic Imaging of Cervical Collagen: Towards More Accurate Prediction of Preterm Delivery”

Preterm birth remains the largest factor that leads to neonatal death and severe complications for infants who survive. Cervical remodeling occurs over the course of delivery causing changes in the structure of cervical extracellular matrix and therefore, reorganization of collagen structure. Current methods either lack clinical utility in terms of accessibility or sensitivity, or have low performance and fail to have a high predictive success rate. This project will aim to use photoacoustic paired with ultrasound to quantify collagen concentration (e.g. ratio of collagen to water) in cervix and introduce this parameter as a new dimension in the prediction of preterm delivery.

■ **Mohsyn Malik** | Faculty Mentor - Noa Ofen

“Direct brain recordings from children and adolescents reveal diverse patterns of PFC involvement in memory formation”

Memory is a critical cognitive function and ample research demonstrates that it is supported by the coordinated function of regions in the prefrontal cortex (PFC) and medial temporal lobe (MTL). In adults, research examining neuronal oscillations during memory formation has demonstrated increases in power of two notable frequency bands: [theta (3-8 Hz) and gamma (30-150 Hz)] within the PFC and MTL predictive of memory formation. Evidence from noninvasive neuroimaging methods such as functional MRI provide evidence of memory-related activation in these regions in both children and adults. In this study, we investigated the spatial and temporal dimensions of neural activity in the PFC supporting subsequent memory formation using electrocorticography recordings (ECoG) obtained from pediatric epilepsy patients implanted with intracranial electrodes as part of clinical management.

■ **Ria Manimalethu** | Faculty Mentor - Vaibhav Diwadkar

“Negative valence and dys-modulation of cortical activity in borderline personality disorder: Differential effects during response inhibition and response activation”

Borderline Personality Disorder (BPD) is an emotional disorder in which the mechanisms and effects of the disorder is relatively understudied. My research project compares how an emotional task affects the BPD brain differently than a healthy adult brain. Over the past few months, the researcher has analyzed fMRI brain images of BPD patients and healthy controls while they participated in an emotional task.

■ **Cassidy Miu** | Faculty Mentor - Matthew J. Allen

“Stability of Divalent Metals with Tertiary Amine Complexes”

The goal of this project is to find new ways to stabilize metals in unusual oxidation states. By placing the metals in a stable environment, we expect to be able to explore new magnetic and luminescence properties. We start by making a cage in which to place the metal. This cage will produce the stable environment necessary to the access properties of the unusual oxidation states. After the cage is made, a metal will be placed inside, and testing for new properties will begin.

■ **Greta Mulbauer** | Faculty Mentor - Howard W.T. Matthew

“Development of a Low Cost, Low-Force Mechanical Testing Device and its Application in Measuring Mechanical Properties of Polyelectrolyte Capsules for Engineered Tissue Assembly”

Tissue engineering muscle is a promising approach to restoring function in cases of volumetric loss due to cancer or trauma. We previously developed GAG-chitosan microcapsules as a platform for modular tissue engineering, and modified the capsule technology to generate directly extruded hollow fibers. The hollow fibers require significant enhancement to their mechanical properties before deployment into the skeletal muscle problem, thus we are studying the effects of exposing hollow fibers to long-wave UV light. We are measuring burst strength of spherical microcapsules with a system designed and developed in-house from commercially available products. The testing system is currently being used to evaluate the effects of the degree of substitution of GMA-chitosan on the burst strength of GAG-GMA-chitosan capsules with or without UV-mediated photocrosslinking.

■ **Mohamed Mussa** | Faculty Mentor - Moriah Thomason, and Marion van den Heuvel

“Gestational Age and Emotion Regulation with its Relationship to Reciprocal Parenting”

Research has shown that children born very preterm and extremely preterm will experience diminished emotion regulatory problems later in childhood. This study aims to explore the influence that parenting has on the relationship between gestational age and emotion regulation. The hypothesis was that babies born at an earlier gestational age will display more emotion regulatory problems later in childhood at ages 4-5. Additionally, it was hypothesized that parenting can serve as a moderator for the gestational age and emotion regulation relationship. The research conducted a longitudinal study, where we have gathered data from when the child was in the womb of the mother via 2 fetal fMRIs. This specific study gathers information from birth, and at a neurobehavioral visit at 3 and 5 years.

■ **Cedric Mutebi** | Faculty Mentor - Phillip Levy

“Would You Say “Yes” to an HIV Test?”

With 1.2 million people in the United States living with HIV and 1 in 7 of them unaware of their status, HIV is a large public health problem. A strategy introduced by the Centers for Disease Control to tackle this epidemic is emergency department HIV screening aimed to diagnose HIV positive patients earlier. There are many approaches to this, but they all involve some form of consent. This study aims to discover whether men are more likely to refuse HIV testing in the emergency department and to determine whether the gender of the tester has an influence on consenting rates among patients. This research can help us to improve the ways we engage with our community to decrease the transmission and prevalence of HIV.

■ **Sophia Neuenfeldt** | Faculty Mentor - Moriah Thomason, and Marion van den Heuvel

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■ **Logan Nguyen** | Faculty Mentor - Christopher V Kelly, Jeffrey Potoff

“Molecular Dynamic Simulations of Lipid Membranes: How Curvature Affects Diffusion”

Molecular dynamics simulations use various computer programs to help simulate the behavior of molecules on small scales. In this system lipid bilayers of a specific type of lipid have been simulated in planar and curved scenarios. The locations of the lipid heads are then tracked and used to calculate the rates of diffusion in different dimensions for the two systems. In general curvature slows the diffusion rates of the lipids.

■ **Manon Nitta** | Faculty Mentor - Lisabeth Hock

“Reconciling the Functional with the Aesthetic: the Body and the Machine Â”

The boundaries between man and machine have merged due to a number of technological developments. The project “Reconciling the Functional with the Aesthetic” is an investigation into the relationship between beauty ideals and the functionality afforded to the users of artificial limbs. It is based on research of the development of prosthetics in the 20th Century and museum collections of prosthetics in Germany.

■ **Cassandra Northrup** | Faculty Mentor - Alisa Moldavanova

“The ‘Education Crisis’ in Detroit and Potential Policy Solutions”

This research project is an examination of the public education system in Detroit. The analysis consists of interviews of educators working in Detroit schools, newspaper articles, scholarly peer reviewed articles and journals, and relevant meeting minutes. The purpose of this research is to identify what the ‘education crisis’ in Detroit is and to formulate potential policy solutions towards more equitable education throughout Detroit.

■ **Gerald Nowak III** | Faculty Mentor - Zachary Wayne Brewster

“Waiting on a Sick Day: The Motivational Antecedents of Presenteeism in the Full-Service Restaurant Industry”

My research idea is derived from having spent the last 15 years in the full-service restaurant industry. Having noticed over the years that many of my colleagues willingly worked while sick, I decided to administer a survey to a sample of restaurant workers in order to investigate the motivational forces in play. The motivational independent variables in my research design include financial need, managerial coercion, co-worker loyalty, and work ethic. Each of the aforementioned variables had a positive, significant effect on my dependent variable of presenteeism (aka working while sick). I’m currently working with my faculty mentor to perform multi-level regression analysis on my data to extract any secondary findings.

■ **Keerthana Palani** | Faculty Mentor - Mohammad Mehrmohammadi

“Utility of Ultrasound and Photoacoustic Imaging for Accurate Catheter Tracking and Temperature Monitoring During Endovenous Laser Ablation”

Nearly 60% of the United States’ population is affected by varicose veins. Currently, the common minimally invasive treatment options include endovenous ablation which employs laser energy to induce localized heat at the tip of the catheter and close the diseased blood vessels. Ultrasound (US) imaging is used as gold-standard imaging modality to help vascular surgeons visualize the catheter and for accurate placement of the ablation catheter within the diseased vein. However, ultrasound US imaging has certain limitations especially for placement of catheters in small perforating veins. The researchers have conducted experiments to explore the issues of angular dependency, comet tail artifacts, and temperature monitoring to develop a means of accurate catheter tip location.

■ **Kimberly Palmer** | Faculty Mentor - Markus Friedrich

“Ecologies of IOB Variation”

Interommatidial bristles (IOBs) are bristle-like structures between the ommatidia of compound eyes. They are famously present on the eyes of fruit flies, a popular model organism used in research. However, they are not present on the eyes of all fly species. This study explores the variability of IOBs within the order diptera (true flies). Ancestral reconstructions were constructed to see how often IOBs were lost or gained through the evolution of diptera. This was then compared to the evolution of other character traits to provide a frame of reference. Finally preliminary studies were done to explore the potential sensory function of IOBs. Do flies have hairy eyes for a reason?

■ **Sommer Pappas** | Faculty Mentor - Paul Burghardt

“Aerobic Capacity & Neural Function”

Eating and exercising seem purely physical in nature, but are heavily influenced by emotion. The brain is responsible for the regulation of emotion, which indirectly plays an important role in metabolism. This project aims to understand the impact of personality on physical ability, hunger, and cravings, in order to find solutions to problems concerning overall fitness. By examining internal changes to the brain and body before, during, and after a set of tests involving food intake and physical exercise, we can develop innovative nutrition and fitness-based therapies dependent upon individual personality.

■ **Harsh Parekh** | Faculty Mentor - Vaibhav Diwadkar

“Developmental Trajectories of Cortical-Thalamic Connectivity in Obsessive Compulsive Disorder”

Obsessive-compulsive disorder (OCD) is a severe and disabling clinical condition that usually arises in late adolescence or early adulthood and, if left untreated, has a chronic course. Whereas previous studies have provided analysis based on group differences (OCD vs HC), OCD symptomology (YBOCS), and resting state functional connectivity, the role of neurodevelopmental differences of thalamo-cortical connectivity in OCD remain unclear. In other words, I am interested in studying whether age predicts thalamo-cortical network profiles differently in OCD and HC. I have extended my task-active analysis of thalamic modulation to create developmental profiles of cortical-thalamic functional connectivity in OCD and healthy controls.

■ **Jordan Parrish** | Faculty Mentor - Matthew Younglove

“Chamber Music Pedagogy: Saxophonists’ Versus Non-Saxophonists’ Approach to the Quartet”

Although music is a “universal language” there are many pedagogical differences that are specific to each instrument. This study was to examine how different pedagogues approach the same chamber ensemble, the saxophone quartet. Research was gathered during a ten-day long workshop in Minot, North Dakota where Wayne State students interacted with several different professional musicians. Each coach gave insight on how to improve the quartet, and those insights were cataloged and examined. The results were revealing of the different tendencies between pedagogues.

■ **Dhruvil Patel** | Faculty Mentor - Zachary Brewster

“Exploring Culture’s Influence on Parental Educational Expectations for their Children’s Educational Career”

To explore the influence of culture on students educational aspirations, we conducted both a quantitative and qualitative analysis by administering surveys and conducting semi-structured interviews respectively, investigating the parents and communities rhetoric on education, under a lens of culture and their perceived effects on the students. It was found that generally, those of immigrant descent were more likely to have parents who promoted higher education as well as be heavily involved in their children’s careers. Also finding that immigrant communities value stability, something that can be acquired by excelling in education, that is internalized parents of the community and reflected in their rhetoric on educational choices of their children.

■ **Sonu Patel** | Faculty Mentor - Vaibhav A. Diwadkar

“Brain Network Interactions in Youth Predicted by the Familial Environment”

The familial care environment of a child has been predicted to influence the development of functional brain responses especially the regions associated with emotional and cognitive processing. The modulation of these processes originates in the prefrontal cortex of the brain, specifically the dorsolateral and the ventromedial prefrontal cortices. Although multiple studies have been done individually on these topics, the opportunity to study both on the same group of subjects is rare. In this study, we explore a potential relationship between the level of familial care and the modulation of the emotional processing regions of the brain.

■ **Andrea Prenkocevic** | Faculty Mentor - Robert Akins

“Identification of vaginal bacterial species that are mutually and differentially antagonistic with strains of Candida albicans”

The pathogenic yeast *Candida albicans* causes vulvovaginal candidiasis (VVC) in 29% of adult women, but its relationship with vaginal bacteria and bacterial vaginosis (BV), is unknown. The purpose of this study is to determine whether vaginal bacterial species exist that inhibit the growth of various species of *Candida*, or conversely are themselves inhibited by *Candida*, in vitro. Our hypothesis is that *Candida* and *Lactobacillus* do not have direct antagonistic or synergistic interactions in vitro, but *Candida* inhibits bacterial species which in turn inhibit *Lactobacillus*. Early results indicate that these interactions do exist; detecting amounts of these species among BV and healthy vaginal samples is underway. If confirmed, this offers new possibilities in managing both VVC and BV.

■ **Sharmi Purkayestha** | Faculty Mentor - Ann Stacks

“Mindfulness as a Moderator of the Relationships among ACES, Depression, and JobStress in Early Head Start Teachers”

Past research has shown that mindfulness is effective in decreasing depression and stress. Likewise, it was also found that adverse childhood experiences correlate positively with depression, and depression correlates positively with stress. Moreover, research with early head start teachers is also limited in this area. Thus, our project aimed to investigate whether mindfulness moderates the relationship between adverse childhood (ACEs) relationships and depression and the relationship between ACEs job-stress in early head start teachers.

■ **Gabriel Rababeh** | Faculty Mentor - Donald DeGracia and Zhi-Feng Huang

“Nonlinear dynamic study of brain ischemia: I. Protein aggregation measurement”

Despite over 100 clinical trials, there are still no successful therapies to prevent neuron death after brain ischemia and stroke. As opposed to the qualitative approach often used in clinical research, we developed an alternative, quantitative approach to brain ischemia as a system of differential equations modelling cell injury dynamics based on the mutual antagonism of total damage, D, and total stress response, S. This project aimed at deriving the most accurate possible quantification of D by measuring the time variation of protein aggregates after brain ischemia in the rat. The observed D time course estimates in a surviving (CA3) or dying (CA1) brain region are consistent with theoretical expectations.

■ **Hanan Rakine** | Faculty Mentor - Christine Rabinak

“Needs in Pediatric Oncology Families”

Due to advances in treatments, more children are surviving pediatric cancer today than ever before. While this is certainly one of modern medicine's great success stories, pediatric cancer remains a tremendously stressful experience for children and their families. Here, we assessed parent reports of family needs during and after their child's cancer treatments. Major areas of need identified by parents included financial and emotional support. While there are several organizations and resources that can help to address these needs, a major challenge will be to get this information to families in need, who may already be overwhelmed by a cancer diagnosis.

■ **Sruthi Ramesh** | Faculty Mentor - Noa Ofen

“Memory for Rapidly Presented Images is Related to Hippocampal Subfields Volume”

The hippocampus, a structure important in memory formation and retrieval, is composed of several distinct subfields. Previous studies have demonstrated that each of these subfields likely plays a unique role in memory processes. However, the precise roles of each of these hippocampal subfields in the formation of perceptual representations of rapidly presented images are currently unknown. The objective of this study is to explore the relationship between memory for rapidly presented images and hippocampal subfield volumes, in order to better understand the functions of these subfields in memory formation and retrieval.

■ **Patrick Roache** | Faculty Mentor - Jill Dion

“Waltzing with Chekhov: Integrating Social Dance with Chekhov Technique in the Pursuit of Fostering Honest Relationships in Performance”

“Waltzing with Chekhov” is a creative exploration of the integration of patterns and styles of social dance with the physical acting approaches of Michael Chekhov and Konstantin Stanislavsky's Active Analysis in scene study. Actors learned and practiced leader and follower roles in ballroom dance and then applied what they learned in an active, more-or-less spontaneous approach to building their characters, the conflict, and their relationship to test the effective potential of such an approach.

■ **Robert Roose** | Faculty Mentor - Donna Kashian

“Effect of Heavy Metals on Round Goby (Neogobius melanostomus) and White Sucker (Catostomus commersonii) in Streams”

Many streams in urban environments are impacted by high concentrations of heavy metals. These metals can enter urban streams through human activities including industrial waste production, sewage, and stormwater runoff. At high concentrations, heavy metals can be detrimental to fish, causing negative effects through all stages of development. The objective of this research is to determine the correlation between heavy metals, cadmium (Cd), copper (Cu), nickel (Ni), zinc (Zn) and the health of fish in seven Michigan streams. The concentration of metals in water samples were assessed for correlation with metrics of health in two benthic fish species: the native white sucker (*Catostomus commersonii*), and the invasive round goby (*Neogobius melanostomus*).

■ **Sonya Royzenblat** | Faculty Mentor - Markus Friedrich

"Light entrains circadian activity rhythm in the extremely microphthalmic cave beetle Ptomaphagus hirtus"

Circadian rhythms are 24-hour cycles made endogenously and regulated by clock genes found in most organisms. These rhythms may be entrained, meaning the period is matched to that of an external cue, such as temperature or sunlight. Ptomaphagus hirtus is a tiny carrion beetle living in the twilight zone of the Mammoth Caves of Kentucky. It has a near-reduced eye with a rudimentary lens, and is known to exhibit photonegative taxa. In the lab, I tested whether P. hirtus has a circadian rhythm, and whether its rhythm is entrainable by light.

■ **Jyoti Saha** | Faculty Mentor - Paul Burghardt

"Aerobic Capacity & Neural Function"

Eating and exercising seem purely physical in nature, but are heavily influenced by emotion. The brain is responsible for the regulation of emotion, which indirectly plays an important role in metabolism. This project aims to understand the impact of personality on physical ability, hunger, and cravings, in order to find solutions to problems concerning overall fitness. By examining internal changes to the brain and body before, during, and after a set of tests involving food intake and physical exercise, we can develop innovative nutrition and fitness-based therapies dependent upon individual personality.

■ **Yash Saxena** | Faculty Mentor - Nithin Chouthai

"Clinical spectrum of Osteomyelitis of newborns a single center retrospective observational study."

Osteomyelitis is a type of bone infection that causes redness and inflammation of the infected area. This type of infection is common in newborns who have had incisions, mainly due to the use of catheters and other similar devices. Various techniques are used to treat Osteomyelitis, these treatment techniques range from having the newborn undergo surgery to giving the newborn a series of antibiotics. In this study, newborns who were diagnosed with Osteomyelitis were examined on the treatment they received and the trends that followed.

■ **Karrington Seals** | Faculty Mentor - David Njus

"Detecting Production of Hypochlorite-Oxidized Cysteiny-Dopamine (HOCD) in PC12 Cells"

This research project aims to explore the production of a hypochlorite-oxidized cysteine derivative produced in PC12 cells (cells derived from the adrenal medulla of rats) and its hand in Parkinson's Disease. HOCD or Hypochlorite-Oxidized Cysteiny-Dopamine is a potent redox cyler that promotes the production of superoxide. Treatment of cells with rotenone, which enhances the expression of myleoperoxidase (an enzyme that produces hypochlorite) increases the cytotoxicity of the cells. Taurine scavenges hypochlorite and protects cells against cysteiny-dopamine being converted into HOCD.

■ **Iman Shamen** | Faculty Mentor - Howard Matthew

"Improving Conditions for Chondrogenesis of MSCs for Regenerative Tissue Engineering"

Stem cells have been successfully induced to grow into cartilage through in-vitro encapsulations with regenerative tissue engineering implications. This research project worked to improve the conditions for the regeneration of human cartilage by altering the glycosaminoglycan (GAG) - a main component of the capsules - through chemical modification and crosslinking, with the hopes of improving the mechanical properties of the capsules and thereby creating a more stable environment for cartilage cell differentiation and growth.

■ **Limi Sharif** | Faculty Mentor - Christine Rabinak

"Modulation of Negativity Bias on Electrocortical Activity in the Perception of Ambiguous Facial Expressions"

Emotional facial expressions are critical for the communication of emotion and intent between individuals. This study focuses on the perception of ambiguous (i.e. neutral) facial expressions on both a behavioral and neural level in healthy individuals. Previous studies have suggested the presence of a bias when viewing neutral facial expressions, such that they are not necessarily viewed as "neutral". This study expands on this literature by investigating the negativity bias (the tendency to view something more negatively than it objectively is) and perceived trustworthiness of neutral facial expressions.

■ **Jason Smith** | Faculty Mentor - David M. Merolla

"Black, Blue, and Blow: The Effect of Race and Criminal History on Perceptions of Police Violence"

Recent incidents of police violence against people of color have catapulted the issue of police violence to the forefront of social justice campaigns. Many see these incidents as indicative of a larger social problem that is rooted in racialized policing strategies, while others shrug these incidents off as isolated events that are justified due to the specific circumstance of each incident. Through an experimental design, this article examines the role that race and criminal history play on shaping perceptions of police violence. The implications that perceptions can have on institutionalizing social beliefs are critical, therefore understanding what motivates individual's attitudes towards justification for police violence should be better understood.

■ **Ray Souder** | Faculty Mentor - Mel Rosas

"Hamtramck Stories"

Hamtramck Stories is a creative research project in which artist Ray Souder creates illustrations based on his conversations with the people who live and work in Hamtramck. The process is social and circular, in which the illustrations are shared with participants who give further feedback to refine and prepare the images for public exhibition. This project serves as a springboard to a public art project to follow in the summer of 2018.

■ **Timothy Susman** | Faculty Mentor - Christopher V Kelly, Jeffrey Potoff

“Molecular Dynamic Simulations of Lipid Membranes: How Curvature Affects Diffusion”

Molecular dynamics simulations use various computer programs to help simulate the behavior of molecules on small scales. In this system lipid bilayers of a specific type of lipid have been simulated in planar and curved scenarios. The locations of the lipid heads are then tracked and used to calculate the rates of diffusion in different dimensions for the two systems. In general curvature slows the diffusion rates of the lipids.

■ **Shreya Sutariya** | Faculty Mentor - Donald DeGracia and Zhi-Feng Huang

“Nonlinear dynamic study of brain ischemia: II. Theory and data fitting”

The process of a cell dying after an acute cell injury such as stroke or cardiac arrest can be modeled using a system of nonlinear differential equations. The dynamical theory models how D, the total damage, and S, the induced stress response, both covary over time as a function of injury intensity I. This project tested how well the estimates of D and S fit with the injury time courses predicted by the theory. Measurements of protein aggregates estimated D, and S was estimated by changes in polysome mRNA levels by microarray. The theoretical predictions were qualitatively supported by the measured data.

■ **Phillip Sylvester** | Faculty Mentor - Wendy Matthews

“Composition in the Classroom:”

In music classrooms across America, the use of technology is making composing easier for students. In the past students would have needed to know music theory and harmony in order to compose music with. Now with graphic notation software's, students can begin creatively composing music prior to the understanding of this knowledge. Scaffolding techniques can be applied to students over time through these software's to teach them standard music knowledge such as pitch, rhythm, key signatures, timbres and give them tools to compose creatively.

■ **Alexis Tennessee** | Faculty Mentor - Marilyn Franklin

“Use of Mental Health Services among Urban Adolescents: Relations among Stigma, Church Attendance, Therapy Attendance”

Mental illness in adolescents is a growing problem. Stigma towards seeking mental health is a contributing factor as to why adolescents are not using resources available. Church and engagement in religious practices has been shown to have a positive impact on mental health, which suggests church attendance can be beneficial for adolescents. However, this is also a factor in the stigmatization of mental health treatment. My research examined the relationship between stigma related to mental health treatment, church attendance, and mental health services utilization.

■ **Benjamin Thomason** | Faculty Mentor - Andrew Port

“American Perceptions and Weimar Relations: Lessons of Involvement in the Dawes and Young Plans”

This project explores and explains American involvement in the issue of German war reparations after World War One and Two. I traveled to Washington DC and the National Archives to study how American experiences with the reparations issue influenced US policies toward reparations and the occupation of Germany after World War Two. In my research paper I look for actions and failings of the Interwar Era and try to uncover the extent to which policy makers identified those failings and worked to avoid making the same mistakes.

■ **Connor Tukel** | Faculty Mentor - Amar Basu

“Comparing Detroit Ambulance Response Times with Those of a Novel Unmanned Humanitarian Vehicle (“Ambulance Drone”) in Emergent Overdose Situations”

This research project aims to investigate the viability of using drones to get to the scene of an emergency opioid overdose faster than traditional first responders in order to deliver pre-hospital interventions, namely Naloxone (a medication that can be safely given, even by lay people, to reverse the effects of overdose within a matter of minutes), that can be rapidly administered by bystanders, thus decreasing the amount of time the patient goes without treatment and theoretically leading to better patient outcomes. In other words, this undertaking involves surveying the efficacy of a novel, “aerial telemedical” model by looking at its theoretical application in overdose situations.

■ **Joseph Urbiel** | Faculty Mentor - Jamey Lister

“Injection Use among African-American Patients in Medication-Assisted Treatment for Opioid Use Disorder”

Injection opioid use is associated with negative consequences that include overdose-related death and blood-borne illnesses. African-Americans are less likely to inject than Whites. Therefore, we are examining factors (social support, mental health, cultural perceptions) related to injection within a sample of African-Americans with opioid use disorder. The fellow and faculty mentor worked jointly to receive approval for the protocol from the (Psychiatry) Departmental Review Board. Data collection will commence in mid-November. The fellow's training included developing the protocol, questionnaire, and information sheet. The study design includes a brief questionnaire administered to 100 African-American participants (equal number by gender and injection status). The fellow plans to analyze and write up the data for a master's thesis, and present the findings at a national drug addiction conference.

■ **Wan Wang** | Faculty Mentor - *Susanne Brummelte*

“Effects of Probiotic Treatment (Bifidobacterium Infantis) on Hippocampal Neurogenesis Levels in an Animal Model of Depression”

Depression is a prevalent mental health disorder with severe consequences negatively affecting individual health and wellbeing. Although pharmaceutical treatments for depression exist, many such treatments can have undesirable and even harmful side effects on the body. Previous research suggests that probiotics such as Bifidobacterium Infantis (B. infantis) may have antidepressant properties through gut-brain interactions. The current project investigates the effect of B. infantis on hippocampal neurogenesis in a rodent model of depression.

■ **Alex Wielbinski** | Faculty Mentor - *Guangzhao Mao*

“Optimization of Nano-crystal Growth for Gas Sensing Applications”

Organic nano-crystals are being studied for their potential in high sensitivity and high selectivity gas sensing applications. This technology has also shown potential in being environmentally friendly and less expensive as other technologies. In this research, different crystal growth scenarios will be studied alongside different sensor designs in order to find an optimal combination. This combination can then be further studied for use in environmental, industrial, and public safety applications.

■ **Todd Yee** | Faculty Mentor - *Federico Rabuffetti*

“New Bond Valence Parameters for Metal-Acetate Complexes”

The bond valence sum (BVS) method is a theoretical framework in coordination chemistry for calculating the oxidation (or valence) state of the atoms in a compound. The method utilizes an electrostatic model of bonding between cationic metals, and anionic ligands in order to determine the strengths of bonds between the two. Largely, BVS is used for validating solved structures obtained from crystallographic analytical techniques, but it can also be used to predict possible structures of unknown compounds. Analyzing solved structures of compounds created in our laboratory, with current literature parameters of BVS, shows that the reported values do not coincide with known oxidation states of the metal centers. By analyzing solved structures with the relevant metal centers and ligands, and applying various fitting techniques, new BVS parameters can be obtained.



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