2014

Undergraduate Research and Creative Projects Conference

November 14 — McGregor Memorial Conference Center
The Academy of Scholars

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. Joyce Benjamins  
Professor, Neurology

Dr. Paul Karchin  
Professor, Physics

Dr. John F. Dolan  
Distinguished Professor, Law

Arthur Marotti  
Professor Emeritus, English

Dr. Paula Dore-Duffy  
Professor, Neurology

Dr. Yaddanapudi Ravindranath  
Professor, Pediatrics

Dr. Robert N. Frank  
Professor, Ophthalmology

Dr. Robert A. Sedler  
Distinguished Professor, Law

Dr. Seetha Shankara  
Professor, Pediatrics

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

Dr. Gang George Yin  
Professor, Mathematics

Dr. Gloria Heppner  
Associate Vice President for Research

Friday, November 14, 2014
McGregor Memorial Conference Center

8:15 a.m.  
Registration and continental breakfast — Atrium

9 a.m.  
Welcome — Room B/C  
Monica Brockmeyer, Associate Provost for Student Success

9:30 a.m.  
Oral Session I — Multiple locations; listed on session pages

10:30 a.m.  
Poster Session — McGregor Atrium and Community Arts lobby

Noon  
Oral Session II

1 p.m.  
Luncheon — Room L/M

Greeting  
Margaret E. Winters, Provost and Senior Vice President for Academic Affairs

Introduction of guest speaker  
Matthew Orr, Program Coordinator, Undergraduate Research Opportunities Program

Guest speaker  
Eranda Nikolla, Assistant Professor, Wayne State University Department of Chemical Engineering

Awards  
Introduction: Matthew Orr  
Presentation: Wayne State University Libraries  
Presentation: WSU Academy of Scholars

Closing statement  
Monica Brockmeyer

Resource Fair  
Alumni House  
9:30 a.m.-12:30 p.m.
Oral Session I
9:30-10:30 a.m.

Session 1: Genetics
Moderator: Dr. Rong Liu

Ahila Manivanna: Combined Technological Improvements for High Efficiency Genotyping of Genetically Modified Mice

Nathan Vengalil: Sequencing Lactate Dehydrogenase A (LDHA) and Analyzing its Adaptive Evolution Among Primates

Session 2: Improving Health Outcomes
Moderator: Dr. Caroline Maun

Maricruz Moya: Relationship between Psychological Distress and Inflammation in Pregnant African American Women

Mukund Mohan: Physician Perception in Predicting Good Neurological Outcomes in Patients Resuscitated from Cardiac Arrest

Session 3: Neurobiological and Sociocultural Frameworks for Disease and Disability
Moderator: Dr. Talia Weltman-Cisneros

Kristy Abraham: Involuntary Interference in Emotion Dysregulation: Amygdala Hyper-modulation of Brain Networks

Jacob Wilson: Investigating Social and Cultural Frameworks that Contribute to Educational Barriers for Chinese Students with Disabilities

Session 4: Role of Public Information
Moderator: Dr. Stephanie Tong

Gergana Sivrieva: The Institutionalization of Right to Information Laws

Brandon Burbank: Online Credibility

Session 5: From Outerspace to Innerspace
Moderator: Dr. Matthew Allen

Zachary Ellidge: Finding the Effect of Different States of Neutron Stars on Inner Accretion Disk Radius

Han Soul Lee: Guide, Focus and Alignment System for DESI

Devin Mills: Physical Variation in Lanthanide-Containing N-[1-(2,3-dioleyloxy)propyl]-N,N,N-trimethylammonium Chloride Complexes Across the Series and Their Impact on Chemical Exchange Saturation Transfer

Session 6: Detroit
Moderator: Dr. Andrew Newman

David Prince: Freemasonry and Urban Resilience in Detroit

Andre Gilford II: For the Betterment of the Race: The Efforts of the Detroit Urban League in Assimilating Black Families during the Early Great Migration, 1916-17

Bridget Franz: From Detroit to San Francisco: A Cultural Link with the Diego Rivera Frescoes

Session 7: Music
Moderator: Dr. Jeffrey Abt

Stephen Dueweke: playCAGE

Christian Shaum: New Music — When Opera and Slam Poetry Meet

Oral Session II
Noon-1 p.m.

Session 1: Computing
Moderator: Xingbo Wu

Michael Moore: A Three-Dimensional Approach to Cache Replacement

Jason Shepherd: Vehicle-to-Vehicle Communications: A Software Approach to Develop Cluster-based DSRC Safety

Alyssa Wilkins: Comparison of R-Implemented Topology-based Pathway Analysis Tools using Target Pathways

Session 2: Materials and Systems
Moderator: Dr. R. Darin Ellis

Olamide Alabi: Edge-cracking and its Effect on Formability in Advanced High-Strength Steels (AHSS)

Kayla Jordan: Arduino Banking System

Camille Williams: Enhancing Liquid Lens using Electrowetting and Graphene Material

Session 3: Cancer
Moderator: Dr. Q. Ping Dou

Nikhil Adapa: Increased Sensitivity of Disulfiram on Cadmium-Enriched Prostate Cancer Cells

Tayson Lin: Immunohistochemistry of Breast Cancer Microenvironment Immunology as a Prognostic Tool

Bhavana Tetali: Determination of Tumor Manganese Content Using a Ratiometric and Colorimetric Method

Session 4: Biochemical Approaches to Drug Targeting
Moderator: Dr. Robert Akins

Ashi Arora: Deletion Analysis of a Novel Regulatory Gene in Candida Albicans that Switches its Target Pathways

Harjot Mann: Studies on Reaction Mechanism and Product Characterization of Oplatin and Cytidine

Jasmine Vickery: Investigation of Mechanisms of Antifungal Resistance in Candida Albicans

Session 5: Exploring the Meaning of Place
Moderator: Dr. Caroline Maun

Jihad Fahs: The World Cup Runneth Over

Jason Huyghe: Exploring Turkey: A Secular Society in Transition

Vincent Perrone: A Poetic Investigation of the Modernists in Paris
Session 6: Biomolecules: Organization and Synthesis  
Moderator: Dr. Matthew Allen

Joshua Fischer: Adaptation of Water-Tolerant Asymmetric Precatalysts to the Michael Reaction

Fariha Ghazi: Functional Significance of Lipid Droplet and Organelle Interactions in Brown Adipose Tissue

Sanjana Kulkarni: Glucose-Stimulated Insulin Secretion in Cells Reconstituted with the Insulin-Secreting Porosome Complex

Session 7: Injury and Treatment  
Moderator: Dr. Andrew Newman

Shobi Mathew: Comparison of Quantitative EEG with Current Clinical Decision Rules for Head CT Utilization in Acute Mild Traumatic Brain Injury in the Emergency Department

Tahsin Rahman: Safety and Efficacy of Emergency Department Antihypertensive Prescription

Atika Singh: Prescription Patterns of Analgesics in Mild Traumatic Brain Injury in the Emergency Department

Poster Session  
10:30 a.m.

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Tazeen Abbas  
**Faculty mentor:** Dr. Noa Ofen  
“Marital Conflict from a Child’s Perspective and Emotional and Physical Health in Youth With Asthma”  
Research over the years has demonstrated that family hostility, especially in the form of marital conflict, is associated with poorer health outcomes in children. Our study investigated the associations between marital conflict present in homes and emotional and physical health in children with asthma. Specifically, we examined marital conflict from the child’s perspective and its links between daily mood, asthma symptoms and overall child health.

Ryan Abbott  
**Faculty mentor:** Dr. Noa Ofen  
“Visual Memory in Children and Adults: The Impact of Category Similarity and Assessment Method”  
Visual memory is an important cognitive ability that improves with age. This study compared visual memory of within-category (e.g. two cars) versus across-category (e.g. flower vs. football) objects in children aged 5-6 years and adults. Participants viewed 140 objects and then were tested using a two-alternative-forced-choice (2AFC) task (studied item and non-studied item shown simultaneously) and a yes-no recognition task (test items shown individually). Results showed that adults had better memory than children, and that the 2AFC task was easier than the yes-no recognition task. Adults were also disproportionately better than children in remembering within-category objects, suggesting that adults are better than children at remembering rich, detailed information, which is required for making accurate within-category object distinctions.

Kristy Abraham  
**Faculty mentor:** Dr. Vaibhav Diwadkar  
“Involution Interference in Emotion Dysregulation: Amygdala Hyper-Modulation of Brain Networks”  
Emotion dysregulation disorders including borderline personality disorder (BPD) are characterized by emotional instability and impulsive behavior. BPD tends to express emotional reactivity, particularly to negative affective context. It is unclear whether involuntary emotional reactivity impacts brain network function that may ultimately impede cognitive processing. In this framework, hyper-modulatory effects of the amygdala, a core region at the center of the limbic system, may selectively impede brain network function. To investigate this novel question, we adapted the classic Go-No-Go paradigm, using affective stimuli, where the response characteristics were gated by the affective and driven by whether the stimulus was consistent with affective context. In our analyses, we were interested in whether BPD were characterized by inappropriately increased amygdala modulation of cortical structures.

Nikhil Adapa  
**Faculty mentor:** Dr. Q. Ping Dou  
“Increased Sensitivity of Disulfiram on Cadmium-Enriched Prostate Cancer Cells”  
A study conducted by the CDC determined that 18.1 percent of the American population smokes cigarettes daily and thereby deposits numerous harmful compounds including nicotine, carbon monoxide, tar, arsenic, ammonia and cadmium into their lungs and bodies. Research from our lab and others has found that cadmium increases cancer cell growth and could contribute to the carcinogenic properties of cigarette smoking. However, the combination of 1 uM Disulfiram (antabuse) — a drug currently available for the treatment of alcoholism — with 1 nM Cadmium resulted in a 97 percent reduction in the cell viability of the prostate cancer cell lines. This data offers the hope that Disulfiram may serve a therapeutic role for smokers who have increased levels of cadmium in their blood and currently suffer from prostate cancer.

Rizwan Ahmed  
**Faculty mentor:** Dr. Vaibhav Diwadkar  
“Gray and White Matter Density Changes in Middle Adulthood Predict Changes in Learning Proficiency”  
While it is very well-understood that brain atrophy occurs in late adulthood and elderly age, brain volume changes and associated cognitive performance are less understood in post-adolescence and middle-adulthood. We addressed this question by exploring changes in brain morphometry in brain structures associated with learning and comparing learning performance in post-adolescent adults. In this cross-sectional sample, we demonstrate that gray and white matter density reductions in middle adulthood are associated with decrements in learning and memory performance. This data provides information on the integrated dynamics of brain and cognitive changes in middle adulthood, underlining enduring patterns of lifelong brain plasticity.

Olamide Alabi  
**Faculty mentor:** Dr. Xin Wu  
“Edge-Cracking and its Effect on Formability in Advanced High Strength Steels (AHSS)”  
Advance high strength steels (AHSS) have many advantages in the auto industry. Unfortunately, these materials are subject to edge-cracking during autobody stamping deformation that is difficult to predict. This project studied the plastic behaviors of dual phase-steels through uniaxial tension and punch stretch forming with digital image correlation (DIC) technique, the metallurgical microstructure analysis of martensite distribution patterns, the topologies of mechanically sheared edges from blanking operation prior to sheet forming, and the topology of fractured surfaces. The results indicate that edge-cracking and the overall formability of dual phase steels are affected by several factors including the severe pre-deformation and edge damage from blanking operation, the two-phase microstructure distribution pattern, and the strain paths.
Role of Inflammatory Cytokines in Glioma Progression

Faculty mentor: Dr. Rohit Anand

“Role of Inflammatory Cytokines in Glioma Progression”

Recently, there has been an increasing body of evidence to suggest that inflammation plays a crucial role in the progression of tumors. Gliomas are one of the most prevalent and aggressive types of cancers, affecting more than 22,000 Americans each year. In this study, we examined the role of the inflammatory cytokine IL-17 in the progression of patient-derived glioma samples as well as the glioma cell line U251. We tested our hypothesis using cytokine/chemokine analysis, western blotting techniques, immunohistochemistry, flow cytometry and in-vivo experimentation. The results of this study provide insight into the role of inflammatory cytokines in the progression of gliomas and can potentially lead to the development of clinical interventions and therapies to treat patients with this lethal form of cancer.

Yasir Altamimi
Faculty mentor: Dr. Donal S. O’Leary

“How Nano Particles and Molecules Approach a Cell Membrane — Exploring the Effect of Water Structure”

Future therapy, with special interest in cancer, requires targeted drug delivery into cells. Particles must interact with the cell’s membrane in order to enter the cell. Atomic force microscopy (AFM) uses a cantilever tip that represents the particle approaching the membrane. AFM can generate force curves, which are analyzed to set an upper limit on the rate at which particles can approach the cell membrane in a specific environment. Water is not a passive medium, behaving differently when compressed, and may be just as resistant in an environment similar to the human body. Understanding the relationship between a particle and its environment, we have used synthesized lipid bilayer as models and are measuring the force between the tip and the bilayer using an AFM.

Muhammad Amin
Faculty mentor: Dr. Peter Hoffmann

“Deletion Analysis of a Novel Regulatory Gene in Candida Albicans That Switches its Metabolism”

Faculty mentor: Dr. Robert Akins

“Metal caging complexes are actively being developed as therapeutics. Ruthenium-caging complexes have been shown to be able to cage varying inhibitors and selectively release them in the presence of directed light. By controlling the cage and release of inhibitors, we gain spatial control over enzyme inhibition. N4Py is a derivative of the well-known TPA ligand. This new ligand is meant to develop a pentadentate ruthenium-caging complex with new, specialized properties. The new caging complex can potentially cage and release a different class of inhibitors, providing new therapeutic. My project is to synthesize N4Py and bind it, along with a known inhibitor of an enzyme that upregulates disease, to a ruthenium center. Then I can test and observe the caging complex’s chemical and photochemical properties.”

Ashi Arora
Faculty mentor: Dr. Robert Akins

“Deletion Analysis of a Novel Regulatory Gene in Candida Albicans That Switches its Metabolism”

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Nicholas Ancona
Faculty mentor: Dr. Jeremy Kodanko

“Development of N4Py Caging Ligand and Other TPA Derivatives to Form Ruthenium Caging Complexes”

Future therapy, with special interest in cancer, requires targeted drug delivery into cells. Particles must interact with the cell’s membrane in order to enter the cell. Atomic force microscopy (AFM) uses a cantilever tip that represents the particle approaching the membrane. AFM can generate force curves, which are analyzed to set an upper limit on the rate at which particles can approach the cell membrane in a specific environment. Water is not a passive medium, behaving differently when compressed, and may be just as resistant in an environment similar to the human body. Understanding the relationship between a particle and its environment, we have used synthesized lipid bilayer as models and are measuring the force between the tip and the bilayer using an AFM.

Rohit Anand
Faculty mentor: Dr. Prahlad Parajuli

“Neural Development Supporting Memory Formation in Young Children and Adults”

Faculty mentor: Dr. Robert Akins

“Role of Inflammatory Cytokines in Glioma Progression”

Recently, there has been an increasing body of evidence to suggest that inflammation plays a crucial role in the progression of tumors. Gliomas are one of the most prevalent and aggressive types of cancers, affecting more than 22,000 Americans each year. In this study, we examined the role of the inflammatory cytokine IL-17 in the progression of patient-derived glioma samples as well as the glioma cell line U251. We tested our hypothesis using cytokine/chemokine analysis, western blotting techniques, immunohistochemistry, flow cytometry and in-vivo experimentation. The results of this study provide insight into the role of inflammatory cytokines in the progression of gliomas and can potentially lead to the development of clinical interventions and therapies to treat patients with this lethal form of cancer.
violation in charm decays is sensitive to physics beyond the SM. Comparing the CP-, and CP-neutral, and CP+ decay lifetimes. The level of CP- cross-check the observed mixing signal and to search for CP-violating effects by decaying to CP+ and CP neutral modes. We are studying a CP- D0 decay to Mixing has been established in charm decays by comparing the lifetime of D0 to that from a normal pregnancy, suggesting that the lack of HBEFG plays a significant role in trophoblast apoptosis during the first trimester of pregnancies that develop preeclampsia. I studied the HBEFG pathway and its order of chronological events.

Matthew Brown
Faculty mentor: Dr. Sandro da Rocha
“Synthesis, Characterization and Cellular Internalization of Mitochondrial Targeting Nanocarriers”
Lung cancer resulted in more deaths in the United States than colon, breast and prostate cancer combined in 2012. Mitochondria-targeted drug therapy has emerged as a means to target lung cancer because mitochondria of cancer cells are more permeable and structurally different than those in healthy cells. In this work, mitochondrial targeting agents were conjugated to PAMAM dendrimers via a poly(ethylene glycol) (PEG) linker that directs them to mitochondria within a lung cancerous cell line (A549). The conjugates were found to be effectively internalized by the cell and to target the mitochondria, while not being significantly more toxic than bare dendrimer. The results suggest that this conjugation system may be a viable strategy to deliver anti-cancer therapeutics to the mitochondria for treating lung cancer.

Brandon Burbank
Faculty mentor: Dr. Stephanie Tong
“Online Credibility”
A further look into how online credibility is perceived through impression formation by students observing raters’ comments on the website RateMyProfessor.com — a site dedicated to reviewing professors on classes they have taught at their respective universities.

Yasiel Cabrera
Faculty mentor: Dr. David Cinabro
“Searching for D0 -> K-pi+eta0 in Belle Data”
Mixing has been established in charm decays by comparing the lifetime of D0 decaying to CP+ and CP neutral modes. We are studying a CP+ D0 decay to cross-check the observed mixing signal and to search for CP-violating effects by comparing the CP-, and CP-neutral, and CP+ decay lifetimes. The level of CP-violation in charm decays is sensitive to physics beyond the SM.

Colin Colter
Faculty mentor: Dr. Carolyn Dayton
“Understanding Risk and Resilience Factors Associated With Fathering in an Urban Sample of Men Preparing to Parent a New Baby”
Using qualitative analysis, this study gathered data regarding expectant fathers’ previous life experiences and their views and aspirations for parenting. (N=43). Three themes emerged from the data: 1) Men experienced positive and negative relationships with their own fathers and understood these relationships according to how they want to parent their child. 2) Men described their parenting support systems now and in some situations turned to maternal figures for their primary parenting support. 3) Fathers described what they believe to be examples of good fathering, especially in terms of activity they would like to engage in with their child. Many past studies have relied on maternal understandings of fathering. This study interviewed fathers directly and data point to themes of risk as well as resilience.

Jack Dischler
Faculty mentor: Dr. Mohammad R.N. Avanaki
“Identifying Ventricular Arrhythmias in an Electrocardiograph Signal”
Our project was to design a code to reduce noise and decipher signal abnormalities, such as ventricular arrhythmias, when given a signal from an electrocardiograph. The code is also responsible for immediately informing the use of any potentially dangerous abnormalities in a given signal to quicken the process of identifying possible heart problems.

Jiayin Dong
Faculty mentor: Dr. Peter Hoffmann
“Measuring the Interaction of DDR Cell Receptors and Extracellular Matrix Collagen in Breast Cancer Cells”
Transmembrane proteins detect extracellular changes and send signals to inside the cells. Discoidin domain receptors (DDR1 and DDR2) are the special transmembrane receptor proteins that play a role in cancer progression and metastases. DDRs bind to and are activated by extracellular matrix (ECM) collagens, and DDR-collagen interactions are considered to play a key role in the signaling pathway in cancer progression. We examined such interactions in live cells using an atomic force microscope (AFM). We measured mechanical forces of the interaction to analyze the strength of the bonds and studied the structure of collagen interacting with DDR. By comparing cancer cells and normal cells, we hope to shine some light on the mechanism of cancer progression and contribute to new cancer therapies.

Stephen Dueweke
Faculty mentor: Dr. Jeffrey Abt
“playCAGE”
As John Cage prepared a piano, so playCAGE raves a guitar. Inspired by the first Detroit exhibition of the visual art of the American avant garde composer John Cage, playCAGE asks: Can an art exhibit exist once the works of art have left the exhibition? Introducing the concept of readymedia, configuring commonplace materials into a performance installation physically interactive in real time, in our “real world”, that conforms to its exhibition spaces. As part of the Undergraduate Research Program, playCAGE had its first test performance on May 2, 2014, at Center Galleries on the campus of Detroit’s College of Creative Studies, and was the grateful recipient of a Seed Grant from the Frey Foundation to fund its appearance in ArtPrize SIX in Grand Rapids.
Bioactive molecules are used to form the carbon-carbon bonds necessary for the fabrication of complex structures. Control over the dimensional arrangement is imperative. This control can be achieved with the use of a catalyst. I report the adaptation of a previously successful lanthanide-based precatalyst to the Michael reaction. I was trying to find the reasoning behind the variability in neutron stars. What I was testing was the theory that inner accretion disk radius is the thing that drives the changes in state of the neutron stars. This control can be achieved with the use of a catalyst. I report the adaptation of a previously successful lanthanide-based precatalyst to the Michael reaction. I was trying to find the reasoning behind the variability in neutron stars. What I was testing was the theory that inner accretion disk radius is the thing that drives the changes in state of the neutron stars.

**Zachary Elledge**  
Faculty mentor: Dr. Edward Cackett  
**“Finding the Effect of Different States of Neutron Stars on Inner Accretion Disk Radius”**

My summer primarily consisted of a series of computer programming projects, followed by the task of coming up with an efficient way to implement my code into a much larger master code. I then compared the results of the new code with experimental results to verify the accuracy of my contribution.

**Jacob Elledge**  
Faculty mentor: Dr. Abhijit Majumder  
**“Jet Quenching in Heavy Ion Collisions”**

I participated in the Wayne State University Research Experience for Undergraduates this past summer, where I worked on Theoretical Nuclear Physics research under Dr. Abhijit Majumder. I used FORTRAN to calculate different properties of Heavy Ion Collisions that take place at the LHC and RHIC. Helix 69 (H69) of 23S rRNA plays a central role in ribosome structure and function. Our main interest lies in post-transcriptional modification of H69, which leads to more efficient growth of bacterial culture. Chemical modifications of H69 are expensive and difficult to perform, and there are currently no known proteins capable of isolating H69 from 23S rRNA to perform model studies. In this project, we designed a specific DNAzyme that will be applied to cleave the 5' terminus of H69 from 23S rRNA. Selectively developing a DNAzyme to obtain H69 from natural sources would potentially disrupt bacterial protein synthesis, thus creating a novel antibiotic.

**Ahmad El-Moussa**  
Faculty mentor: Dr. Christine S. Chow  
**“Applications of DNAzymes on Studies of 23S rRNA”**

A qualitative/quantitative look at the positives and negatives of hosting the World Cup, with a focus on the 2014 World Cup in Brazil. This project also looks at past examples of hosting the world’s largest event and asks the question, “Is the beautiful game really worth it?”

**Jihad Fahs**  
Faculty mentor: Dr. Elena Past  
**“The World Cup Runneth Over”**

Dr. Matthew Allen  
Faculty mentor: Dr. Matthew Allen  
**“Adaptation of Water-Tolerant Asymmetric Precatalysts to the Michael Reaction”**

Many biological processes are sensitive to the three-dimensional arrangement of molecules and their constituents. This sensitivity can cause bioactive molecules composed of the same constituents in the same order (but in a different three-dimensional arrangement) to perform less effectively, if at all. Therefore, when synthesizing bioactive molecules (such as pharmaceuticals), control over the arrangement of the products is imperative. This control can be achieved with the use of a catalyst. I report the adaptation of a previously successful lanthanide-based precatalyst to a water-tolerant Michael addition, a powerful method used to form the carbon-carbon bonds necessary for the fabrication of complex bioactive molecules.

**Joshua Fischer**  
Faculty mentor: Dr. Matthew Allen  
**“Adaptation of Water-Tolerant Asymmetric Precatalysts to the Michael Reaction”**

I was trying to find the reasoning behind the variability in neutron stars. What I was testing was the theory that inner accretion disk radius is the thing that drives the changes in state of the neutron stars.

**Bridget Franz**  
Faculty mentor: Dr. Mary Margaret Weir  
**“From Detroit to San Francisco: A Cultural Link with the Diego Rivera Frescoes”**

This research project is a chronicle of my journey to San Francisco to visit the Diego Rivera mural, “The Building of a City from the Ground Up,” in order to make a cultural link with the Diego Rivera “Detroit Industry” mural at the Detroit Institute of Arts. Detroit is no longer the industrial titan depicted in the “Detroit Industry” mural, but a city being built from the ground up as portrayed in his mural, which resides on the opposite coast of the Rust Belt. It was my hope to act as a bridge, a connector, between these two informative pieces of art history.

**Shaun Frey**  
Faculty mentor: Dr. Annmarie Cano  
**“Moderators of a Gratitude Meditation Exercise on Student Undergraduate Well-Being”**

My research involved examining whether baseline gratitude plays a moderating role in undergraduate students’ positive and negative affect after a brief 10-minute meditation exercise. This was compared to a control group in which the meditation did not emphasize gratitude. Participant baseline levels of life satisfaction, psychological mindedness and compassionate love for humanity were also examined as potential moderators.

**Alexander Gagliardi**  
Faculty mentor: Dr. Howard Matthew  
**“Development of Chitosan-GAG Fibers as a Modular Tissue Engineering Platform”**

Helix 69 (H69) of 23S rRNA plays a central role in ribosome structure and function. Our main interest lies in post-transcriptional modification of H69, which leads to more efficient growth of bacterial culture. Chemical modifications of H69 are expensive and difficult to perform, and there are currently no known proteins capable of isolating H69 from 23S rRNA to perform model studies. In this project, we designed a specific DNAzyme that will be applied to cleave the 5' terminus of H69 from 23S rRNA. Selectively developing a DNAzyme to obtain H69 from natural sources would potentially disrupt bacterial protein synthesis, thus creating a novel antibiotic.

**Donovan Garmo**  
Faculty mentor: Dr. Shane Perrine  
**“Modeling Post-Traumatic Stress Disorder and its Treatments”**

Our lab conducted a set of experiments in mice to study the disruptive effects of trauma on recognition memory and to determine how Paroxetine reduces the effects of traumatic stress exposure on cognition.
Fariha Ghazi  
Faculty mentor: Dr. James Granneman  
“Functional Significance of Lipid Droplet and Organelle Interactions in Brown Adipose Tissue”  
Growing data indicates that dysregulation of fatty acid (FA) metabolism is a key event that links excessive adipose tissue with disease to other organs. In this regard, lipid droplets (LD) in brown adipose tissue (BAT) sequester excess toxic FA in the form of neutral lipids such as triacylglycerols, and may manage FA combustion within the abundant mitochondria surrounding the LDs that are the sites of FA storage. The mobilization of stored lipids within and outside the adipose tissue requires precise regulation. BAT has multiple intracellular LDs, which dramatically increases the LD surface area and allows efficient supply of FA for mitochondrial thermogenesis. Hence, we hypothesize that there are structural and molecular mechanisms for efficient distribution and channeling of FAs for oxidation.

Sadia Ghazi  
Faculty mentor: Dr. Noa Ofen  
“Socioeconomic Status and Hippocampal Volume”  
Environmental factors, as assessed by socioeconomic status (SES), have been shown to impact brain development. In particular, childhood SES has been linked to hippocampal volume (HCV) in adulthood. Both SES and HCV have been shown to relate to learning and memory, but the extent of SES impact on HCV during development is largely unknown. Here, we investigated the relationship between SES and HCV during child development. Higher SES correlated with larger HCV in children and adolescents, but SES was unrelated to HCV in adults. These findings suggest that during childhood, SES is related to hippocampal volume and this relationship may be minimized in adulthood. Additionally, that SES can affect memory development through its impact on hippocampal volume.

Felicia Christ  
Faculty mentor: Dr. Ann Stacks  
“Evaluating PICCOLO Scores Against the Crowell: Is the PICCOLO Valid with Parents of Maltreated Children in the Child Welfare System?”  
Judges presiding over child welfare cases want objective measures when making a decision about whether or not it is safe to send a child home. Currently, there is no objective and practical measure used for community intervention programs or in the courtrooms. We investigated if a brief measure of parenting (PICCOLO) is a valid assessment for parents whose children are under court jurisdiction as a result of maltreatment by comparing it to a gold-standard research measure (Crowell). From data obtained from the Wayne County Baby Court Initiative, we observed a positive correlation in scores between hypothesized subscales. The PICCOLO may assist social workers in understanding their clients’ strengths and limitations in order to target interventions and to report changes in parent-child interactions to the court.

André Gilford II  
Faculty mentor: Dr. David Goldberg  
“For the Betterment of the Race: The Efforts of the Detroit Urban League in Assimilating Black Families During the Early Great Migration, 1916-17”  
This paper attempts to understand the role that the Detroit Urban League (DUL) played in the migration of African American families during its first year, 1916-17. African American families came to Detroit looking for a better life and the promise of higher-wage jobs. Often they came without a place to stay or a sustainable job. The DUL assumed the role of helping families with these and other issues. However, often the DUL took the role of police to discredit the black rural tendencies of these individuals, while using the rhetoric of improving image for White benefactors. In this way, the DUL perpetuated a notion of race betterment that was narrowly focused in whiteness and middle-class values.

Taania Girgla  
Faculty mentor: Dr. Jean Peduzzi-Nelson  
“Human Olfactory Mucosal Stem Cells Delivered into The Nose Home to Regions of Damage in the Spinal Cord-Injured Rats”  
This project investigates a novel stem cell delivery method using human stem cells obtained from the olfactory mucosa located in the upper nasal cavity in an animal model of contusive spinal cord injury. The 30 nude RNU male rats were injured at the T9 spinal cord level and received intranasal saline or stem cells with and without exercise and enrichment. The stem cell treatment combined with an exercise and enrichment program showed the most improvement. I worked primarily with the sectioning tissue and immunohistochemistry of the spinal cord sections to determine if the cells migrated to the injury site of the spinal cord. The human stem cells reached the spinal cord injury site after intranasal delivery that may be contributed to the functional recovery.

Michael Golfetto  
Faculty mentor: Dr. Stephanie L. Brock  
“Aerogel Synthesis via Template Sublimation”  
I tested new methods of aerogel synthesis that utilize cost-effective strategies and can improve production time.

Aamina Hafeez  
Faculty mentor: Dr. Qing-Sheng Mi  
“DMBA/TPA Induced Skin Carcinogenesis in Mice With Over-Expression of MicroRNA-150”  
In recent years, a substantial number of reports on individual microRNA (miRNA) have been published, providing strong evidence that miRNAs play an important role in cancer development and progression. This project investigates the role of miRNA-150 genes in tumor growth in mice. The effects of treating knock in (KI) and knock out (KO) miR-150 mice with a chemical carcinogen in order to induce skin tumors were investigated in vivo. MiRNA-150KO mice showed a significant increase in tumor incidence and number compared to wild-type (WT) mice, while miRNA-150KI mice demonstrated a decrease in tumor incidence and mimicked WT mice in average tumor number. Based on these results, it is hypothesized that miRNA-150 target genes regulate oncogenes that play a predominant role in DMBA-initiated skin carcinogenesis.
Nathaniel Hardin
Faculty mentor: Dr. Christine Chow
“Platinum(II) Complexes with Sulfur-Containing Peptide Building Blocks For Use in RNA Binding Studies”
With the help of my advisor, I am synthesizing Pt(II) complexes with sulfur containing amino acids. These complexes are going to be used with DNA and RNA binding studies. The hope is to use these complexes in RNA probes.

Douglas Harriman
Faculty mentor: Dr. Marcis Jansons
“Investigation of the Ignition Delay of Surrogate Fuels in a Constant Volume Ignition Quality Tester”
A Scheffé polynomial is used to predict an outcome when more than one independent variable determines the output. This research was developed to determine a Scheffé polynomial that can be used to determine the percentage of compounds from a given palette to make fuel surrogates. Fuel surrogates mimic the properties of the fuel they represent, such as JP8.

Danielle Hicks
Faculty mentor: Dr. Annmarie Cano
“Meditation and Well-Being: Religion and Spirituality as Moderators”
This study examined the Positive-Activity Model of religious and spiritual variables of meditation within 100 Wayne State University undergraduate students. The participants completed an in-lab session consisting of multiple measures, a seven-minute meditation and further measures upon completion of the meditation. Results indicated that negative affect decreased from pre-meditation to post-meditation (F [1, 97] = 1.493, p = .225). Results also indicated that both high and low levels of daily spiritual experiences were associated with the decrease in negative affect (p=.042), but this decrease was more significant for those with low daily spiritual experiences (t = 7.817) rather than those with high daily spiritual experiences (t = 5.226). These results suggest that religious or spiritual variables have a significant effect on meditation outcomes.

Thin Hoang
Faculty mentor: Dr. Jin K. Cha
“Titanium-Mediated Cyclopropanation of N-Acyl Sulfonamides”
Herein, we report the use of N-acyl sulfonamides in the synthesis of cyclopropanols. The N-acyl sulfonamides were subjected to two different reactions to yield cyclopropanols. One reaction implements Kulinkovich’s method of cyclopropanation. The other method takes advantage of ligand-exchange between the reaction intermediate and a terminal alkene. A variety of N-acyl sulfonamides, olefins and Grignard reagents were investigated for their respective yield of cyclopropanols.

Jason Huyghe
Faculty mentor: Dr. Saeed Khan
“Exploring Turkey: A Secular Society in Transition”
This project is a study of the Hizmet Movement, a religious movement rooted in Turkey. I looked at the idea of citizenship and how the development of the movement fits within that construct. I traveled to Turkey three times within 13 months. Two of the times, I was part of a trip partially funded by the Hizmet movement. The third time, I traveled alone, with the intention of gaining an outsider’s perspective. This paper consists of my experiences both with and without the group, as well as an academic approach intended to answer the question of citizenship.

Ahmedul Islam
Faculty mentor: Dr. Mark Cheng
“An Improvement to the Standard Micro Pillar Design to Quantify Contraction Forces Produced by Cardiac Myocytes”
This project’s aim was to build a device that can measure the force produced by heart muscle cells as they contracted. The device itself was made from a transparent, flexible material called polydimethylsiloxane (PDMS) that made it ideal for the application. The device composed of two PDMS layers. The bottom layer had pillars and the top layer was a very thin layer that was permanently bonded to the pillars. The muscle cells were placed on the top layer of the device and once the cells contracted, the top sheet and the pillars would deform. By measuring this deflection of the pillars using white light interferometry, I will be able to know the force produced.

Chelsea Jaskot
Faculty mentor: Dr. Judy Westrick
“Examination of the Removal of Cyanotoxins by Drinking Water Plants”
The basis of my project was to study water samples from across the country and examine them for traces of algal toxins. From there, the most effective methods of toxin deactivation were deduced.

Albert Jose
Faculty Mentor: Dr. Lubna Alazzawi
“Hardware Design of Smart Irrigation Techniques Based on Wireless Sensor Network to Manage pH Level Systems”
Due to the continuing development in technology, irrigation systems must continue to grow in efficiency and productivity. Monitoring soil pH level is important to receive maximum crop yield. The use of the wireless DF Robot sensors in coalition with the open source Arduino will lower expenditure and generate capability compared to the previous system used. A variety of wireless sensor network testing in multiple weather conditions will be performed to ensure these sensors are accurate and durable. Testing will be done between four types of soil: sand, silt, loam and clay to provide validity in any condition. In this project, the Arduino microcontroller is utilized to develop the system maintaining crops at the ideal pH level from 6 to 7.5.
Kayla Jordan  
Faculty mentor: Dr. Umer Khalid  
“Arduino Banking System”  
A banking system was designed using a software known as Arduino. It involved building a circuit on a breadboard and sensor components. Sounds, light and touch were all used in the system to engage it to go into certain modes.

Nikita Khetarpal  
Faculty mentor: Dr. Bruce Berkowitz  
“Oxidative Stress and Light-Evoked Responses of the Posterior Segment in a Mouse Model of Diabetic Retinopathy”  
Diabetic retinopathy is the leading cause of vision loss and blindness in people under the age of 45. How diabetic retinopathy develops remains unclear, although there is now evidence that oxidative stress generated from dysfunctional rod photoreceptor cells is a major contributor to this disease. In this study, we develop and apply a new MRI method for measuring the impact of oxidative stress on both rod cells and their main circulation, the choroid, in an experimental model of diabetic retinopathy. Because our new MRI method exploits an endogenous contrast mechanism, its translational potential to people is promising. Our data supports a link between diabetes-related oxidative stress and rod, but not choroidal, pathophysiology.

Trevor Kirsch  
Faculty mentor: Dr. Peter Savolainen  
“Longitudinal Analysis of Traffic Fatalities Considering Socioeconomic and Demographic Factors”  
This project involved searching the existing transportation research literature to find useful information about traffic crashes and fatalities, as well as supportive data on factors that are expected to be related to recent safety trends (e.g., travel patterns, economic factors, demographic characteristics, etc.). Ultimately, this analysis aims to examine how demographic and socioeconomic characteristics relate to traffic safety as determined by an analysis of annual statewide traffic fatalities. Given the plethora of important factors that are expected to influence traffic crashes and resultant injuries/fatalities, this comprehensive study includes a multivariate analysis of population factors.

Gaia Klotz  
Faculty mentor: Dr. Kelly M. Young  
“Perceptions of Gender’s Influence in Chinese Senior Secondary Education”  
This qualitative investigation seeks to understand Chinese perceptions of gender in Chinese high school or senior secondary education. In order to conduct a series of three hour-long interviews, the primary investigator, Gaia Klotz, traveled to China with the Wayne State University Confucius Institute from July 1 to July 29. Intensive cross-cultural training, basic language training, and a week of fieldwork of ancient Chinese civilizations and modern Chinese history helped develop the cultural relativism necessary to conduct successful interviews. Data was amassed from interviews transcribed by hand and relevant research articles. This is the first undergraduate research project the PI has had the opportunity to participate in.

Sanjana Kulkarni  
Faculty mentor: Dr. Bhanu Jena  
“Glucose-Stimulated Insulin Secretion in Cells Reconstituted With the Insulin-Secreting Porosome Complex”  
The Porosome structure is known to help with transient intravesicular secretion in cells. Therefore, the porosome is involved in many vital regulatory processes in our body such as insulin secretion, neurotransmitter release etc. Throughout the years, many studies have been conducted to determine the composition and the role of other proteins on the Porosome structure. Now, the reconstitution of the porosome structure in live MIN-6 is being studied. Ultimately, we will be able to determine the potency and efficiency of the porosome structure after being reconstituted into MIN-6 cells. This can further help us understand the functional role of the porosome structure. In addition, it would help us gain more knowledge on diseases associated with cell secretion.

Han Soul Lee  
Faculty mentor: Dr. David Cinabro  
“Guide, Focus and Alignment System for DESI”  
The conducted research was for calibration of the Dark Energy Spectroscopic Instrument. The instrument will be mounted on the Mayall Telescope in Kitt Peak Observatory.

Alexandra Lemieux  
Faculty mentor: Dr. Judy Westrick  
“Investigation of the Occurrence of Cyanotoxins in Source Water From Drinking Water Plants Across the United States”  
Cyanobacteria are microscopic organisms that live in aquatic environments and sometimes produce harmful metabolites, known as cyanotoxins. They can be detrimental to human life, as seen in the recent cyanobacterial bloom that caused many in Ohio and Southeast Michigan to lose ready access to drinkable water. My research project focused on perfecting a method that would allow us to analyze water samples for cyanotoxins, and analyzing water samples from source waters across the United States.

Veronica Lewalski  
Faculty mentor: Dr. Jeremy Kodanko  
“Synthesis of TQA(NO2)3 Caging Ligand and Ruthenium Caging Complex for the Light Activation of Enzyme Inhibitors”  
Metal caging complexes are growing in popularity in their use as potential anticancer treatments with their ability to render bioactive chemicals inert until activated with light. The organic molecules, ligands, attached to these complexes determine at what wavelength of light they are activated. My project focuses on the development of a modified version of a known ligand that should shift the activation of Ruthenium-centered complexes out of the ultraviolet light region into the visible light region.
Tayson Lin
Faculty mentor: Dr. Lawrence Lum
“Immunohistochemistry of Breast Cancer Microenvironment Immunology as a Prognostic Tool”
The immune system plays a critical role in cancer protection. However, tumors still develop despite the body’s defenses. Recent research has suggested that the tumor microenvironment facilitates cancer progression through suppressing anti-tumor immune response. Here, we examined the immunology behind the tumor microenvironment of breast cancer as a prognostic tool. Tissue sections from breast cancer biopsies, along with auxiliary lymph nodes, were stained for cancer-infiltrating lymphocytes as well as IFN-γ and IL-10, which can stimulate or suppress anti-tumor immune mechanisms, respectively. The objective is to determine if there is a measurable immune response in the tumors and lymph nodes of patients with lymph node positive or negative breast cancer. This information is then used to predict patient prognosis by comparing T cell infiltration and activation.

Genan Ling
Faculty mentor: Dr. Marcis Jansons
“Validation of Soot Emissivity Models in Flames”
Combustion devices are one of the most widely used ways to produce power for everyday transportation and industrial applications. Current combustion devices, including internal combustion engines and external combustion devices, need to be optimized for more efficiency and less emissions, and are regulated by the U.S. Environmental Protection Agency. This project is validating soot emissivity models by measuring the temperature field over a standardized flat-flame burner using the classic two-color method.

Renee Ludlam
Faculty mentor: Dr. Edward Cackett
“Reapproaching the Spin Estimate GX 339-4”
We systematically reanalyze two previous observations of the stellar mass black hole within GX 339-4 in the very high and intermediate state. We utilize the recently developed model for X-ray reflection and relativistic ray tracing to properly fit the disk’s reflection spectrum. We find GX 339-4 to be consistent with a near maximally spinning black hole with a spin parameter that is greater than 0.91. Constraining the spin of black holes has consequences on other areas of research in astronomy and physics. It offers insight into the mechanisms for jet production and the intrinsic properties of supernovae and/or gamma-ray bursts that created the black hole. The extreme warping of space near a spinning black hole itself provides an environment to test theories of general relativity.

Mia Ma
Faculty mentor: Dr. Nitin Chouthai
“Early Caffeine Therapy is Not Associated with Mortality Within 48 Hours of Life in Very-Low-Birth-Weight Newborns”
The objective of this study was to describe the caffeine usage in very-low-birth-weight (VLBW) newborns that did not survive. 145 VLBW newborns were divided into three groups based on timing of caffeine therapy. Early caffeine therapy was within first 48 hours of life. Late caffeine therapy was after 48 hours of life. No caffeine group did not receive any caffeine. Higher of percentage of newborns in no caffeine group [n (%)] [86 (69.9)] died within first 48 hours of life as compared to early group [7 (46.7)], while none of the newborns in the Late group (p<0.0001). In conclusion, early caffeine therapy is not associated with a higher percentage of deaths in VLBW newborns within 48 hours of life.

Ahila Manivannan
Faculty mentor: Dr. Jian-Ping Jin
“Combined Technological Improvements for High-Efficiency Genotyping of Genetically Modified Mouse”
Although PCR (polymerase chain reaction) is a mature technology, methodological improvements can be made to significantly increase the effectiveness of PCR in the genotyping of genetically modified mice, a time-and material-consuming procedure, especially when being carried out in large scales. The contents of my research training are demonstrations of a combination of advanced molecular biological techniques to facilitate large-scale mouse genotyping applicable in a standard research laboratory. The methodology modifications discussed in my proposal have significant advantages in raising work efficiency and the reliability of results, as well as lowering the cost. My proposed research training will take place in Dr. J.P. Jin’s laboratory at Wayne State University’s School of Medicine, where I am gaining hands-on laboratory experiences.

Harjot Mann
Faculty mentor: Dr. Christine S. Chow
“Studies on Reaction Mechanism and Product Characterization of Oplatin and Cytidine”
Cisplatin and its derivatives form inter-strand and intra-strand adducts with DNA and is believed to contribute to the anti-cancer activity of the compounds. Adenosine and guanosine are shown to be the preferred targets for platination, but adducts with pyrimidines were also observed. To explore the reaction mechanism between cisplatin derivatives and pyrimidines, we investigated the reaction between platinum ornithine (Oplatin), a derivative of cisplatin, and cytidine by nuclear magnetic resonance and high performance liquid chromatography. The reaction kinetics were monitored by NMR and the products were purified and characterized with HPLC and mass spectrometry.
Aniruddh Mannari  
Faculty mentor: Dr. Howard Matthew  
“Potential for Enhanced Differentiation of Bone Marrow Mesenchymal Stem Cells via Controlled Release of Rh-BMP2 from Heparin-Modified Collagen Microspheres In Vitro”  
Bone defects and injuries affect nearly 500,000 patients annually in the United States. The traditional “gold standard” approach of bone grafts (replacements bone tissue), although effective, presents many undesirable effects including chronic pain and low graft availability in the body. This presents the tissue engineering discipline with an exciting opportunity to design regenerative models of bone repair. This study investigates the ability and efficacy of collagen microspheres to deliver BMP2 (a growth factor protein) to bone stem cells, while maintaining tissue integrity and allowing for controlled release. Through modification, these microcarriers can also demonstrate enhanced drug delivery in a variety of biomedical applications.

Shobi Mathew  
Faculty mentor: Dr. Brian J. O’Neil  
“Comparison of Quantitative EEG With Current Clinical Decision Rules for Head CT Utilization in Acute Mild Traumatic Brain Injury in the Emergency Department”  
We compared the performance of a hand-held Quantitative Electroencephalogram (QEEG) acquisition device to New Orleans Criteria (NOC), Canadian CT Head Rule (CCHR) and National Emergency X-Radiography Utilization Study II (NEXUS II) Rule in predicting intracranial lesions on Head CT in acute mild TBI in the ED. Adult patients who presented to the ED with acute blunt head trauma were enrolled in this study. QEEG discriminant score of > 31 was found to be a good cut-off (AUC=0.84, 95% CI 0.76-0.93) to classify patients with positive head CT. At a sensitivity of greater than 90 percent, QEEG discriminant score had better specificity than NOC and NEXUS II. Only CCHR had better specificity than QEEG discriminant score but at the cost of low (<50%) sensitivity.

Tyler May  
Faculty mentor: Dr. Louis J. Romano  
“Errors in Single Nucleotide Incorporations Using a Y-Family DNA Polymerase”  
After DNA replication has been initiated, DNA polymerases will bind and incorporate new nucleotides across from the templating strand. Multiple DNA polymerases can be used to replicate DNA sequences, but there are important differences between them. For instance, higher fidelity polymerases can replicate a relatively large number of bases in a single binding event, making very few replication errors. Y-family polymerases have the ability to bypass DNA damage sites. Because these enzymes have a less constrained active site they are much more prone to making replication errors. The experiments described in this report were performed with a Y-family polymerase, DNA polymerase IV (Dpo4) isolated from the thermophylic bacteria Sulfolobus solfataricus.

Samia Mazumder  
Faculty mentor: Dr. Bonnie Sloane  
“3D In Vitro Evaluation of BPD as a Treatment for Breast Cancer Cells”  
Breast cancer is one of the most common and lethal cancers among American women, second only to lung cancer. Inflammatory breast cancer (IBC) is the most aggressive form of breast cancer, with a five-year survival rate of only 34 percent. The conventional methods of treatment, including surgery, radiation therapy or chemotherapy, are not highly effective due to the complex structures IBC makes in the human body. Photodynamic Therapy (PDT) is an alternative treatment that can be used to treat cancer cells. This study examines the efficiency of BPD, a PDT drug, on IBC cells grown in 3D culture and evaluates the advantages of BPD over other, commonly used PDT drugs.

Rebecca Meerschaert  
Faculty mentor: Dr. Christopher V. Kelly  
“Novel Experimental Methods to Resolve Nanoscale Membrane Organization and Curvature”  
The structures and functions of cell membranes are regulated by their diverse compositions, distinctive intermolecular interactions and dynamic organization. The complexity of membrane organization leads to their higher-level functions. Hypotheses concerning the redistribution of membrane components in response to curvature are unanswered due to the limitations of current optical imaging techniques. We aim to resolve this curvature and the redistribution by inducing curvature on vesicles and through novel microcopy methods. When a vesicle is pressed against a curved surface, distinctive components respond differently to curvature. Having the capability to resolve these previously irrevocable details allows us to better understand membrane dynamics and molecular sorting, in addition to exploring vital biological and disease related processes that are sensitive to membrane curvature.

Devin Mills  
Faculty mentor: Dr. Matthew Allen  
“Physical Variation in lanthanide-Containing N-[1-(2, 3-dioleloyloxy)propyl]-N,N,N-Trimethylammonium Chloride Complexes Across the Series and Their Impact on Chemical Exchange Saturation Transfer”  
Magnetic Resonance Imaging using specialized contrast agents has been an expanding field in recent years, as higher strength magnets are becoming more readily available. The contrast agent I am synthesizing is to provide contrast enhancement that will help to identify the specific chemicals that are perfusing the tissues being studied. The ability to determine the reduction status of tissue may help us devise more specialized treatment.
Mukund Mohan  
Faculty mentor: Dr. Brian J. O’Neil  
“Physician Perception in Predicting Good Neurological Outcomes in Patients Resuscitated from Cardiac Arrest”  
Optimizing outcomes in cardiac arrest patients remains one of the principal goals at the forefront of emergency medicine (EM). Currently, EM physicians make decisions regarding care of these patients using unstandardized bedside perception. This study looks at whether this unstructured perception can be a reliable ultra-early predictor of neurological outcomes in patients resuscitated from cardiac arrest. Subjects included were non-traumatic cardiac arrest patients who were successfully resuscitated. The EM physician managing the patient’s care rated their probability of leaving the hospital in good neurological condition from 0-100. Good neurological outcome was a Cerebral Performance Category score of 1 or 2 at discharge, and linear regression modeling analyzed the results. The results showed that EM physician perception is indeed a reliable ultra-early predictor of neurological outcomes.

Erica Montgomery  
Faculty mentor: Dr. Steven Ondersma  
“Optimizing Computer-Delivered Brief Interventions for Alcohol Use Among University Students”  
Brief motivational interventions for alcohol use have demonstrated efficacy in multiple studies, but several recent studies have been negative. Thus, it’s important to examine brief intervention components to optimize efficacy and examine differences in intervention content as a possible factor of above-noted inconsistency. The FOTI (Factorial Optimization for Technology Interventions) study uses a factorial design, testing most efficacious intervention components, using Multiphase Optimization Strategy (MOST) to identify key active component combinations within the computer-delivered brief alcohol intervention for university students. This study randomly assigns participants to different groups including empathy (yes/no) and talking narrator (yes/no), evaluating which elements or combinations are most associated with motivation change. Results are expected to determine which factors influence participant motivation and readiness to decrease drinking most.

Michael Moore  
Faculty mentor: Dr. Song Jiang  
“A Three-Dimensional Approach to Cache Replacement”  
This study will look to improve performance time of computer systems by reducing the time it takes to retrieve certain types of data. Specifically, data that is hard to reproduce, frequently accessed and/or small in size should be stored in a location that can be accessed almost instantaneously. Since this location will have a finite size, research must be done to determine the most optimal data to keep in this location, improving overall computing performance as a result.

Zeinab Moussa  
Faculty mentor: Dr. Carolyn Joy Dayton  
“Behavioral Reactions of Detroit Mothers and Fathers Participating in the Baby Cry Protocol: Preliminary Findings”  
In early infancy, parents spend a great deal of time soothing and calming their infant to help them maintain, or return to, a regulated biobehavioral state. This process is crucial due to the significant developmental need for entraining the infant’s capacity for self-regulation. Using an innovative protocol, the “Baby Cry Protocol” (BCP), parents expecting a baby (third trimester) were observed independently interacting with a crying life-like baby doll and their soothing behaviors were recorded. Preliminary examination of the behavioral data suggests that there may be both similarities and differences in the way in which mothers and fathers approach soothing a crying infant.

Maricruz Moya  
Faculty mentor: Dr. Carmen Giurgescu  
“Relationship between Psychological Distress and Inflammation in Pregnant African American Women”  
African American women are more likely to have preterm birth compared with white women. Preterm birth is a major risk for neonatal mortality and child health problems, including developmental delays and chronic illness. Psychological distress may increase systemic inflammation and, ultimately, risk for preterm birth. The purpose of this study was to examine the relationships among psychological distress, inflammation and gestational age at birth in a sample of 114 pregnant African American women. Higher levels of psychological distress were related to higher levels of pro-inflammatory cytokines of IL-6 and IL-8. Knowledge of the social context of African American women’s lives will generate new perspectives for future research and contribute to the development of interventions to improve birth outcomes.

Kenneth Nash  
Faculty mentor: Dr. Mark Baskaran  
“Sorption Characteristics of Radium Isotopes (224Ra, 226Ra, 228Ra) In a Freshwater System: Implications to Groundwater-Surface Water Exchange Studies”  
Radium isotopes are extensively utilized as tracers to determine nutrient fluctuation in groundwater-surface water exchange in saltwater systems; however, few studies have been carried out in freshwater systems utilizing radium. In order to fill this knowledge gap, lake sediments were subjected to two different experiments. One experiment takes the lake sediments and adds a known amount of excess radium (224Ra, 226Ra, 228Ra) and mixed within an amount of water at 0 to 35 parts per thousand salinity. The other method mixes lake sediments in various saline water without addition of (224Ra, 226Ra, 228Ra). The solids and solutions of both experiments were separated and analyzed using radioactive counting techniques to assess if radium remains in the solution phase or solid phase at varying salinity.
Rohan Patel  
Faculty mentor: Dr. Carolyn Dayton  
“Understanding the Intergenerational Transmission of Music in a Sample of Detroit Families”

Music can have powerful effects in the everyday lives of people. Understanding the process of transmission of music across generations may help in understanding elements of the family, such as a parent’s engagement and involvement with music, expectations of their child’s music engagement, association with family activities, and preference of using music with their child. Little is known about the ways in which parents make decisions about how to use music and what music to use with their infants and young children. Therefore, the study investigates the ways in which a group of expectant parents in Detroit makes these musical preference decisions. This study sheds light on how the intergenerational transmission of music may have an effect on the well-being of the entire family.

Vincent Perrone  
Faculty mentor: Dr. Caroline Maun  
“A Poetic Investigation of the Modernists in Paris”

“A Poetic Investigation of the Modernists in Paris” involved reaching an understanding of modernist authors such as Pound, Eliot and Hemingway through their biography, creative work, and the experience of seeing and visiting the Paris that they called their home. The research culminates in a collections of poems that are both reflective and reflexive in content and process.

Damiris Pop  
Faculty mentor: Dr. Shane Perrine  
“Changes in Brain Norepinephrine and Serotonin Levels in an Animal Model of Posttraumatic Stress Disorder”

Posttraumatic Stress Disorder (PTSD) is a debilitating psychiatric disorder that occurs in an individual who has experienced a traumatic event, and continues to experience the heightened emotions in the absence of the stimulus. Although preclinical and clinical research studies have implicated neurochemical changes in certain brain regions affected by PTSD, these changes are not fully understood. This study used single prolonged stress (SPS), an animal model of PTSD, to study the neurochemical levels changes that occur in brain regions involved in regulating emotional states in response to environmental stimuli.

David Prince  
Faculty mentor: Dr. Andrew Newman  
“Freemasonry and Urban Resilience in Detroit”

This research explores the role that the 300-year-old Freemasonic fraternity plays in the urban environment of Detroit. The presence and public knowledge of Freemasonry is often shrouded in misunderstanding and this research aims to demystify Freemasonry and present Detroit Freemasonry as a previously unknown influence in the lives of not only those that belong to the order, but in the lives of the citizens of Detroit. This research studies 15 Freemasons from three different affiliated Freemasonic bodies. Interviews were conducted with them to construct a broader understanding of what influence Freemasonry has in the members’ lives and communities, as well as discover what the members and their lodges do to address urban issues that Detroit faces.

Alexandra Ranski  
Faculty mentor: Dr. Ryan Thummel  
“Characterization of the Müller Glial Response During Adult Retinal Regeneration”

We use zebrafish to study human diseases that result in loss of vision. The zebrafish retina is similar to the human retina, yet zebrafish maintain a remarkable ability to regenerate their retina following damage. This is accomplished by resident stem cells, the Müller glia. Human retinas also possess Müller glia. However, following retinal damage, these cells fail to act as stem cells and instead exhibit a gliotic, scar-like response. The conventional view is that zebrafish Müller glia do not exhibit a gliotic response, but here we provide evidence that they have the potential to become gliotic and act as stem cells. We are ultimately interested in revealing what regulates the switch between these two fates in order to induce regeneration response in human retinas.

Samantha Russell  
Faculty mentor: Dr. John Richardson  
“Neo-plastic: The Re-envisioning of Materials Past”

My project is a sculptural exploration of silk and resin that will be displayed in a fine art fashion at the McGregor Memorial Conference Center. I will answer questions personally as the present themselves.

Priya Sam  
Faculty mentor: Dr. Noa Ofen  
“Age-Related Differences in Free Recall and Mnemonic Strategy Use”

Memory is important in everyday activities, such as recalling a grocery list. Recall can benefit from a mnemonic strategy such as grouping similar items together. While both mnemonic strategy use and recall increase with age, it is unclear how they interact across development and whether children and adults similarly benefit from mnemonic strategy use. This study looked at age-related differences in recall and mnemonic strategy use. Participants (N=105, ages 5-25) studied a list of words from three semantic categories, repeated five times with a recall phase after each repetition. Semantic strategy use and recall were correlated and improved with age. Moreover, semantic strategy use mediated age-related increase in recall, but children benefit from increased strategy use through repetition similarly to adults.

Madhumeeta Sanam  
Faculty mentor: Dr. Sandeep Mittal  
“Determination of Ideal Meningioma Cell Lines for Invasion/Migration Studies”

Meningiomas are the most common primary brain tumors and are categorized into three main categories: grade I, grade II and grade III. A strong relationship is beginning to emerge between cancers and microRNAs. MicroRNAs are small, noncoding RNA molecules, involved in post-transcriptional gene regulation. In this study, we examined the role of a couple of microRNAs on multiple meningiomas. We selected miR-155 and miR-221 because of their documented behavior in other cancers. Our results showcase grade 2 and 3 meningiomas, producing significant differential expression for further invasion/migration studies. The microRNAs studied suggest the immunosuppressive nature of these high-grade meningiomas. Through this project, we laid down a foundation for meningiomas microRNA research and obtained the most suitable meningioma samples for future studies.
In the present study, the proteome of the porosome in mouse insulinoma Min6 was determined and results suggest the involvement of Hsp90 in the supramolecular secretory portals at the cell plasma membrane called porosomes. Of precisely regulated transient vesicle docking, fusion and fractional release via in vitro and in vivo bone binding assays. The targeting potential of the nanocarrier can be a candidate delivery system of anticancer therapeutics against bone metastasis from prostate cancer.

**Archanna Radakrishnan**  
Faculty mentor: Dr. Lori Pile  
“Investigating the Role of SIN3 in Tolerance to Acute Oxidative Stress”

To understand development and aging during adulthood, it is important to study genes related to stress resistance. One particular gene of great importance is SIN3. Although it has been shown that SIN3 is essential for mitochondrial activity, which includes tolerance to oxidative stress, little is known about the role of SIN3 during adulthood, where a majority of cell development has taken place. In this study, the fruit fly, drosophila melanogaster, was used to understand the biology of genes that influence the aging process and aging related diseases in humans. By knocking down SIN3 and studying its effect, we were able to show that SIN3 is very important for the maintenance of a healthy adulthood as well as the aging process.

**Tahsin Rahman**  
Faculty mentor: Dr. Phillip Levy and Dr. Aaron Brody  
“Safety and Efficacy of Emergency Department Antihypertensive Prescription”

The study explores the effects of starting antihypertensive therapy for at-risk patients that present in the emergency department (ED) with elevated blood pressure readings. The goal was to set standards for the ED in treating hypertensive patients by taking a retrospective look at two studies. The data suggested that antihypertensive therapy is both safe and effaceable to start in the ED.

**Amulya Rajagopal**  
Faculty mentor: Dr. Bhanu Jena  
“Proteome of the Insulin-Secreting Min6 Cell Porosome Complex: Involvement of Hsp90 in its Assembly and Function”

Secretion is a cellular process that occurs in all organisms. Following a meal, secretion of digestive enzymes from the pancreas helps digest food. Consequent elevation of blood glucose following digestion triggers secretion of insulin from \( \beta \)-cells of the endocrine pancreas. While secretion may occur by the complete collapse of secretory vesicles at the cell plasma membrane, the release of portions of the contents from within secretory vesicles requires an alternate mechanism of precisely regulated transient vesicle docking, fusion and fractional release via supramolecular secretory portals at the cell plasma membrane called porosomes. In the present study, the proteome of the porosome in mouse insulinoma Min6 cells was determined and results suggest the involvement of Hsp90 in the assembly and function of the Min6 porosome complex.
Serotonin in the Dorsal Raphe

This study was completed to understand the effects and mechanism of a medical procedure performed on patients with depression. In order to mimic this procedure, stimulation was applied to the same region of the brain as is applied to humans. Resulting serotonin concentration was then measured in a region that is home to a majority of serotonin cell bodies. As a result of this treatment, serotonin was cleared from the brain at a faster rate and back into storage.

Preethi Sriranga
Faculty mentor: Dr. Prahlad Parajuli
"Effect of Inflammatory Cytokines on the Growth and Stem Cell Properties of Primary Gliomas"
Glioma stem cells play a role in the progression of gliomas, cancers that originate from glial cells in the brain/spine. Our investigation studies the role that inflammatory cytokines (specifically IL-17 and IL-6) play on the growth and development of glioma stem cells. We hypothesized that IL-17 receptor was co-expressed with stem cell markers on glioma cells, and that this interaction works via several cell signaling pathways, such as the STAT-3 pathway. From this study, we can better understand the role of the immune system in tumor progression.

Ellen Strawsine
Faculty mentor: Dr. Parastoo Hashemi
"Probing Neurochemical Effects of High Frequency-Deep Brain Stimulation on Serotonin in the Dorsal Raphe"
This study was completed to understand the effects and mechanism of a medical procedure performed on patients with depression. In order to mimic this procedure, stimulation was applied to the same region of the brain as is applied to humans. Resulting serotonin concentration was then measured in a region that is home to a majority of serotonin cell bodies. As a result of this treatment, serotonin was cleared from the brain at a faster rate and back into storage.
Mrunalini Tankasala  
Faculty mentor: Dr. David Merolla  
"Evaluation of Peer Mentor Educational Programs For Transplant Patients In Hospital Setting: Transplant Living Community (TLC) at Henry Ford Hospital"  
Organ transplant is a common surgical process for patients with chronic diseases. Patients who have been through organ transplant have to learn to live a new normal life adhering to specific after-care regimen. While the organ transplant care team at the hospital is able to help patients understand the medical aspect of transplant life, they are not able to provide information on lifestyle beyond the hospital. One such program that addresses transplant lifestyle is the Transplant Living Community (TLC) affiliated with Henry Ford Hospital, which is created by patients for patients. This research evaluates the TLC program to determine the level of patient satisfaction among TLC program participants and whether there are any differences on the level of satisfaction based on demographic factors.

Bhavana Tetali  
Faculty mentor: Dr. Rod D. Braun  
"Determination of Tumor Manganese Content Using a Ratiometric and Colorimetric Method"  
Calcium channels play a key role in the progression of many types of cancer, making these channels potential therapeutic targets. Mn2+ is a surrogate for Ca2+ and enters cells via many of the same pathways. We are currently investigating the use of Mn2+ uptake in tumor cells as a biomarker of the presence of Ca2+ channels. Since Mn2+ is paramagnetic, its presence can be detected in vivo following MnCl2 injection using a technique called manganese-enhanced magnetic resonance imaging (MEMRI). To correlate MEMRI signals with actual Mn2+ content, we need an assay to quantify Mn2+ concentration in tumors. The purpose of this project is to develop a ratiometric and colorimetric method using standard laboratory equipment for detecting Mn2+ levels in tumor tissue samples using absorption spectrophotometry.

Garrett VanHecke  
Faculty mentor: Dr. Young-Hoon Ahn  
"Synthesis of Clickable Glutathione"  
All cells must regulate the various processes occurring within them, and when these processes become unregulated anything from diseases such as cancer or death may take hold. Cells regulate their processes by signaling certain functions to stop, start, accelerate or slow down. Some of these signaling pathways have been extensively studied and others have not. Redox signaling has recently been recognized as an important signaling pathway, although there is still a need for approaches which will allow for elucidation of proteins involved in this pathway. This project aims to provide an approach to study this signaling pathway.

Kaushik Varadarajan  
Faculty mentor: Dr. Sandeep Mittal  
"Tryptophan Metabolic Enzymes in Meningiomas and Gliomas"  
Investigated the expression of tryptophan metabolic enzymes in different grades of brain cancer. Examined tissue-level expression to determine appropriate treatment targets.

Gautham Vellaichamy  
Faculty mentor: Dr. Qing-Sheng Mi  
"STZ Induced Diabetes in Mice With Loss of MicroRNA"  
Type I diabetes is an autoimmune disease characterized by lack of efficient glucose uptake. Recent studies have linked miRNAs, non-coding RNA sequences with post-transcriptional functions, with the regulation of immunological pathways. We developed a method to determine the regulatory role of two miRNAs in question, miR-146a and the miR-17-92 cluster, in the onset and progression of Type I diabetes. Using Multiple Low Dose Streptozotocin (MLDS), we induced diabetes in all mice and observe the results. Our analysis reveals little to no significance in the results for miR-17-92. However, our data indicates a slightly accelerated rate of diabetes incidence in mice with miR-146a ablated, suggesting a possible regulatory function of the RNA sequence in beta cell apoptosis.

Nathan Vengalil  
Faculty mentor: Dr. Derek Wildman  
"Sequencing Lactate Dehydrogenase A (LDHA) and Analyzing its Adaptive Evolution Among Primates"  
We looked to compare the evolution of the sequence of Lactate Dehydrogenase A (LDHA) gene in hibernating and non-hibernating primates.

Jasmine Vickery  
Faculty mentor: Dr. Robert Akins  
"Investigation of Mechanisms of Antifungal Resistance in Candida Albicans"  
Pathogenic fungi are the cause of many life-threatening infections. The resistance of these fungi to antifungal drugs is becoming a major problem in the management of several diseases. By up-regulating genes of C. albicans, we observed changes in its resistance to many antifungal drugs. A fragment of DNA that caused this antifungal resistance was copied and inserted into C. albicans cells. The cell then selected for a terminal deletion in the amino acid sequence, which caused a different resistance profile. By reinserter the same gene at a high copy number, we can compare the original C. albicans with the deletion to the new C. albicans cells and make conclusions about each resistance profile and the cause of deletion.

Kashmira Wani  
Faculty mentor: Dr. Nitin Chouthai  
"Effects of Recreational Substances and Prescription Medications on the Caloric Content and Fat Levels in Human Breast Milk"  
There are many factors that affect the content of human breast milk, including stress, dietary habits, medication and recreational substances. Over a six-month period, mothers were consented to provide breast milk and were given a questionnaire that allowed us to collect information on her medications and substance use during pregnancy. Results showed the average calories/oz. was significantly lower in the breast milk from mothers who had consumed alcohol during pregnancy than from mothers who did not consume alcohol. Other parameters tested included mothers who had taken prenatal vitamins, other medications and no medications during pregnancy, but results were not statistically significant. This study forms preliminary data for a larger study exploring effects of recreational drugs on cytokine levels and caloric content of human breast milk.
Alyssa Wilkins  
Faculty mentor: **Dr. Sorin Draghici**  
“Comparison of R Implemented Topology-based Pathway Analysis Tools using Target Pathways”

Seven pathway analysis methods were compared with 24 data sets to evaluate how well each ranked the target pathway by p-value and ranking. Evaluating these methods was to start the step of evaluating how efficient each method was. This is a crucial step to have a benchmark to really test efficiency. The methods were evaluated and the results indicated that there was a lot of variance between the methods and there is room for improvement for pathway analysis.

Camille Williams  
Faculty mentor: **Dr. Mark Cheng**  
“Enhancing Liquid Lens Using Electrowetting and Graphene Material”

Liquid lens uses two properties of liquids within a confined space to provide magnification. This device became important for new technology such as cell phone cameras, and other small digital cameras. Liquid lenses make digital cameras appear crystal clear. In order to create a functional liquid lens, the two properties of liquids cannot mix upon introduction. This research focuses on how to change the variable focus length of the contact angle of a liquid lens. This would open new doors for liquid lenses. If the focus length of the contact angle changes, liquid lenses could maybe be used for laptop webcams.

Jacob Wilson  
Faculty mentor: **Dr. Talia Weltman-Cisneros**  
“Investigating Social and Cultural Frameworks that Contribute to Educational Barriers for Chinese Students with Disabilities”

Research has shown a lack of opportunity for Chinese students with disabilities to access education. This study aims to discover what social and cultural frameworks lead to this gap in education and success. Specifically, the study attempts to find a better understanding of Chinese cultural viewpoints of disabilities, and how they influence the opportunities available in life for disabled students in China. Over the past few months, the researcher has conducted on-site interviews with college students in China to gain firsthand knowledge surrounding this issue.

Jolin Yamin  
Faculty mentor: **Dr. Mark Lumley**  
“Cognitive Behavioral Therapy and Emotional Exposure Therapy for Fibromyalgia: Do They Differ in Their Processes?”

Fibromyalgia is a chronic disorder with physical, psychological, and emotional implications. This study examines two psychobehavioral treatments for fibromyalgia to understand how they differ in their processes and in how therapists and patients experience them.

Jerold Young  
Faculty mentor: **Dr. Gil Paz**  
“Model Independent Extraction of the Axial Mass Parameter in CCQE Anti Neutrino-Nucleon Scattering”

The study of neutrino oscillations depends on a consistent value for the axial mass. In order to facilitate this, a model-independent extraction of the axial mass parameter from quasielastic (anti)neutrino-nucleon scattering is needed. This poster demonstrates a model-independent description using the z-expansion of the axial form factor. Using this method on the reported mineral oil results from Fermilab’s MiniBooNe experiment could lead to a consistent value for the axial mass. This poster also proposes a statistical model to be used to combine cross sections of carbon and hydrogen for future analysis of mineral oil data from MiniBooNe.

Ao Yu  
Faculty mentor: **Dr. Chin-An Tan**  
“An Innovative Exercise Adherence Monitoring (EXAM) Device to Improve Therapeutic Gains in Home Exercise Programs”

We have developed a prototype sensor and software for monitoring physical therapy patients.
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