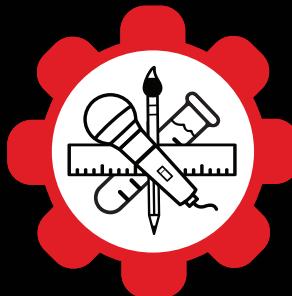


2018

GRADUATE
STUDENT



EXPO



Dr. Marshall “Chip” Montrose

Vice Provost and Dean of the Graduate School

Dr. James Mack

Associate Dean of the Graduate School

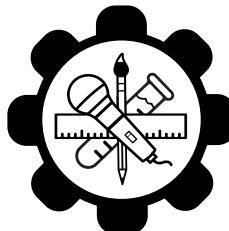
Dr. Yonatan Eyal

Director of Graduate Studies

Megan Tischner

Coordinator, Graduate Student Expo

GRADUATE STUDENT EXPO



THURSDAY, FEBRUARY 15, 2018

Participant Check-In	8 a.m.—9 a.m.
Creative Arts Gallery	9 a.m.—1 p.m.
Poster Session 1	9 a.m.—10:30 a.m.
Poster Session 2	10:30 a.m.—12 p.m.
Pizza Lunch	12 p.m.
Three Minute Thesis Competition	12:15 p.m.—1:30 p.m.



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| | | 15 | Creative Arts Gallery Artist Statements |
| | | 23 | Poster Forum Abstracts |
| | | 59 | Three Minute Thesis Contestants |

PARTICIPANT	PARTICIPANT #	PARTICIPANT	PARTICIPANT #
Iraj Abbasian Shojaei Physics, PhD	29-P	Matthew Branham Fine Arts, MFA	9-C
Wael Abdelraheem Environmental Engineering, PhD	49-P	Josephine Brown Toxicology (Environmental Health), MS	21-P
Bina Ajay Business Administration, PhD	3-P	Diana Casteel Communication, MA	22-T
Maryam Alsameen Physics, PhD	59-P	Kelsey Conrad Pathobiology and Molecular Medicine, PhD	14-T
John Arnaud	2-C	Allison Cooke Pathobiology and Molecular Medicine, PhD	10-T
Ben Romero Architecture, MArch		Shima Dalirirad Physics, PhD	8-P
Shraddha Barawkar Mechanical Engineering, PhD	13-T	Shima Dalirirad Physics, PhD	5-T
John Betz Biostatistics, MPH	19-P	Trenton Davis Applied Economics, MS	8-T
Kalyani Bhide Mechanical Engineering, MS	4-T	Smruti Deoghare Biomedical Informatics, PhD	8-C
Rachel Bosch Geology, PhD	30-P		
Matthew Branham Fine Arts, MFA	9-C		

PARTICIPANT**PARTICIPANT #****PARTICIPANT****PARTICIPANT #****Joseph Deye**

Chelsea Guest

Kelly Maloney

Communication, MA

9-P**Donald Gaffney**

Business Administration, PhD

44-P**Victoria Dickman**

Educational Studies, PhD

2-P**Andrew Gangidine**

Geology, PhD

41-P**Carrie Doyle**

Physics, PhD

46-P**Samuel Garvey**

Biological Sciences, MS

38-P**Jayanth Naik Dungavath**

Computer Science, MS

6-P**Emrah Gecili**

Mathematical Sciences, PhD

26-P**Jayanth Dungavath**

Computer Science, MS

6-T**Deeptha Girish**

Electrical Engineering, PhD

4-P**Alexandra Eicher**

Molecular & Developmental Biology, PhD

32-P**Deeptha Girish**

Electrical Engineering, PhD

21-T**Andrew Eisenhart**

Chemistry, PhD

33-P**Chelsea Guest****Kelly Maloney****Joseph Deye**

Communication, MA

9-P**Jacob Ryan Enriquez**

Molecular & Developmental Biology, PhD

35-P**Ivayla Gyurova**

Pathobiology & Molecular Medicine, PhD

18-P**Carrie Farrell**

Communication, MA

14-P**Stephanie Heath**

Geology, PhD

34-P

PARTICIPANT	PARTICIPANT #	PARTICIPANT	PARTICIPANT #
Loryn Holokai Molecular Genetics, Biochemistry, and Microbiology, PhD	12-T	Jose Joseph Computer Science, MS	50-P
Jing Wen Hong Fine Arts, MFA	3-C	Jose Joseph Computer Science, MS	19-T
Shu-Tzu Huang Health Education, PhD	27-P	Safa Khodabakhsh Materials Science and Engineering, PhD	2-T
Shaimaa Ibrahim Molecular, Cellular & Biochemical Pharmacology, PhD	1-P	Charles Kronk Biomedical Informatics-in College of Medicine, PhD	16-P
Courtney Jackson Immunology, PhD	39-P	Dung Le Business Administration (Finance), MS	5-C
Rajeswari Jayavaradhan Pathobiology and Molecular Medicine, PhD	7-T	Sean Leavell Fine Arts, MFA	7-C
April Johnson Adult-Gero Primary Care Nurse Practitioner, MSN	65-P	Miaoqi Li Mathematical Sciences, PhD	43-P
Brittany Johnson Epidemiology, MPH	42-P	Karen Lynch Anthropology, MA	53-P
Robert Johnson Community Planning, MCP	13-P	Pulong Ma Mathematical Sciences, PhD	15-P
Staci Jones Communication, MA	16-T		

PARTICIPANT	PARTICIPANT #	PARTICIPANT	PARTICIPANT #
Kelly Maloney Joseph Deye Chelsea Guest Communication, MA	9-P	Gaurav Patil Mechanical Engineering, PhD	57-P
Melanie McKell Immunology, PhD	56-P	Daniel Peat Business Administration, Management, PhD	11-T
Fatemesadat Mohammadi Physics, PhD	23-P	April Poteet Health Education, MS	45-P
Lina Motlagh Zadeh Communication Sciences and Disorders, PhD	12-P	Christina Psihountas Chemistry, PhD	22-P
Arunkumar Muthusamy Biological Sciences, PhD	18-T	David Rea Business Administration, PhD	52-P
Shannon Neale Geology, MS	36-P	Seth Reighard Immunology, PhD	61-P
Yoontaek Oh Environmental Engineering, PhD	63-P	Abigail Richard Mathematical Sciences, PhD	37-P
Alvaro Ortiz Lugo Mathematical Sciences, PhD	40-P	Katelyn Ritchie Communication, MA	20-T
Wesley Parker Geology, PhD	47-P	Ben Romero John Arnaud Architecture, MArch	2-C

PARTICIPANT	PARTICIPANT #	PARTICIPANT	PARTICIPANT #
Mohammad Sarim Mechanical Engineering, PhD	60-P	Nirmalya Thakur Computer Science, MS	9-T
Connor Sears Biological Sciences, PhD	64-P	Jonathan Thompson Physics, PhD	58-P
Christopher Sheehan Geology, PhD	62-P	Natalie Thompson Environmental Engineering, MS	5-P
Aparna Singh Women's, Gender, and Sexuality Studies, MA	4-C	Natalie Thompson Environmental Engineering, MS	17-T
Vineeta Singh Electrical Engineering, PhD	23-T	Mia Varner Environmental Engineering, MS	17-P
Arvind Sundararajan Fine Arts, MFA	1-C	Andrew Vonhandorf Toxicology (Environmental Health), PhD	48-P
Felicia Swafford Psychology, PhD	55-P	Sisan Walker Angel Communication Sciences and Disorders, PhD	3-T
Mary Talley Molecular & Developmental Biology, PhD	31-P	Tiaoling Wang Design, MDES	11-P
Rigwed Tatu Biomedical Engineering, PhD	20-P	Cassie Wardlaw Nursing Research, PhD	10-P
Rigwed Tatu Biomedical Engineering, PhD	15-T	Jennifer Watson Fine Arts, MFA	6-C

PARTICIPANT**PARTICIPANT #****Huibin Weng**

Business Administration, PhD

25-P**Crystal Whetstone**

Political Science, PhD

1-T**Sarah Willis**

Communication, MA

7-P**Andrew Winter**

Neuroscience/Medical Science Scholars Interdisciplinary, PhD

66-P**Kelsi Wood**

Health Education, PhD

54-P**Tzu-Chun Wu**

Mathematical Sciences, PhD

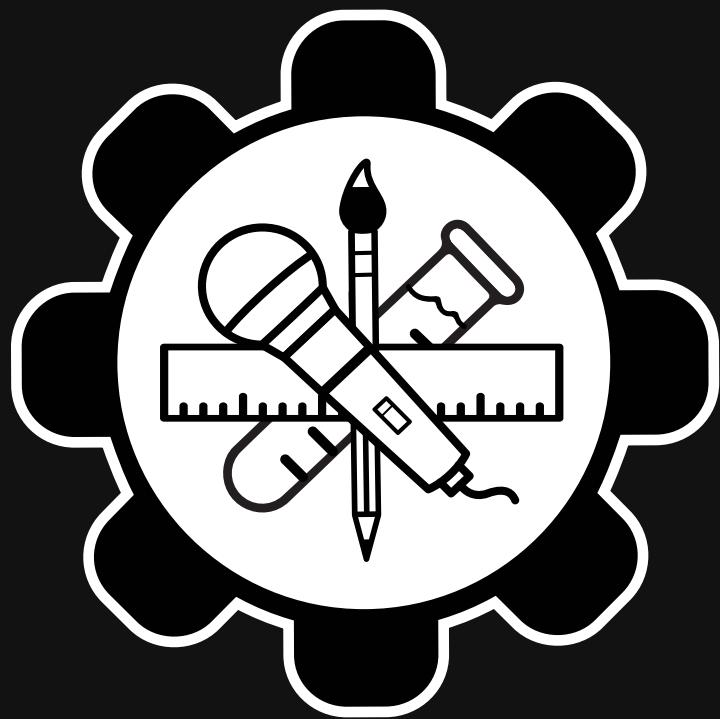
28-P**Fang Yu**

Environmental Engineering, PhD

51-P**Xinghao Zhang**

Molecular & Developmental Biology, PhD

24-P

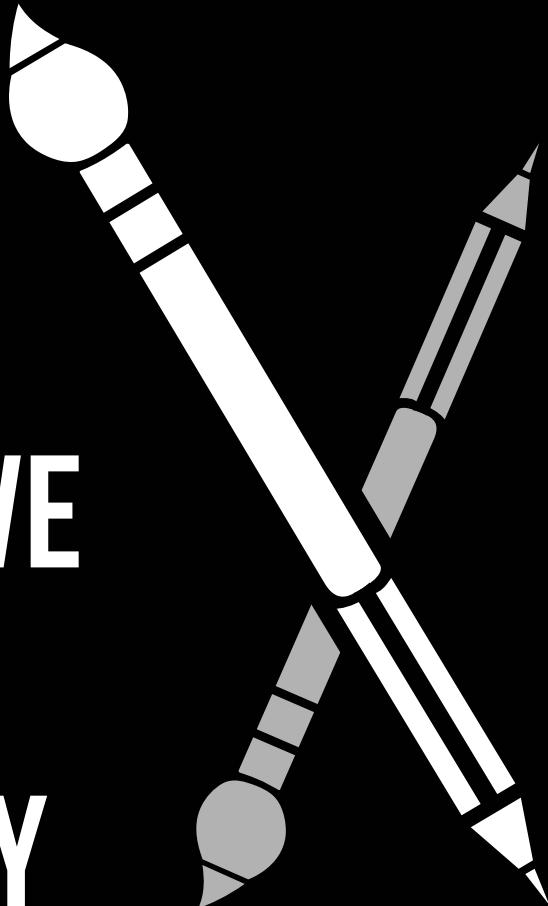


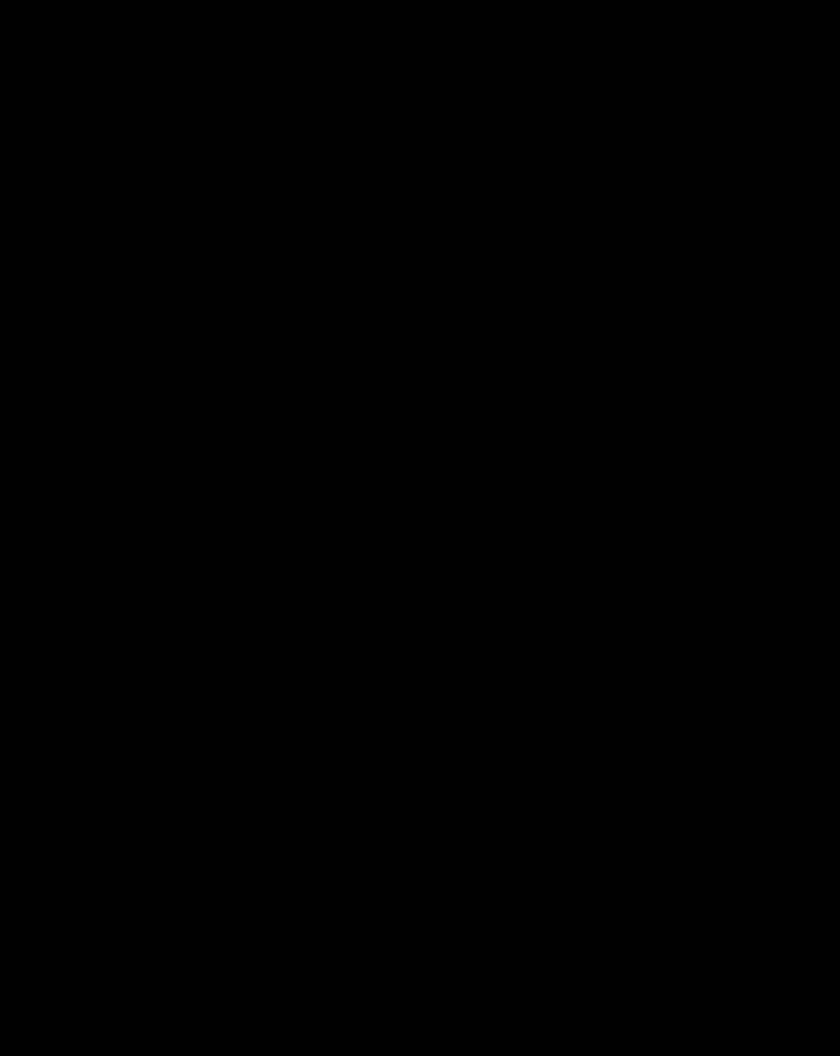
ACKNOWLEDGEMENTS

The Graduate School would like to thank all judges for your time and thoughtful evaluations. The students you judge will use your feedback to craft improved artwork, posters and research presentations in the future. We truly appreciate your service and hope that you take pride in the impact you've had on graduate student research here at UC.

We would also like to thank the faculty, librarians, departmental staff, fellow students and other persons who directly support the graduate students presenting today. Your continuing efforts make such wonderful graduate research possible.

CREATIVE ARTS GALLERY





The Graduate Student Expo's ode to creativity and purely artistic endeavors, the Creative Arts Gallery displays graduate students' art, consisting of any media form. All artwork will be assessed by a single judge, and the judge's decision is final.

1

Arvind Sundararajan

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Space Configuration Drawings

These drawings are results of constant experimentation. I see collage as a lyrical statement as it converges the gap between two realities. These drawings are collages made from several drawings. They converge as one entity and creates a new kind of space. Here, the grid is being used as a gauge to map the spaces in the drawing. I am interested in following a system that would create a space that has room to defy the same system upon which it was created.

2

John Arnaud

Ben Romero

Architecture, MArch

Advisor: John Dixon

JABR

A collection of work built as an exploration of joints and detail in furniture.

br.06 - Sidebar

ja.09 - Stool

ja.11 - Coffee Table

3

Jing Wen Hong

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Colorful Stage

Your stage is beautiful and colorful

My world is dirty and gloomy

We have accomplished your stage

But you use this stage to accomplish your greed

4

Aparna Singh

Women's, Gender, and Sexuality Studies, MA

Advisor: Carolette Norwood, PhD

How I survived: Healing Through Poetry at the Time of the Earthquake

On April 25, 2015, I survived a massive earthquake in Nepal. The devastating earthquake, with a magnitude of 7.8 on the Richter scale, killed thousands and left many homeless. Deeply affected by the event, I decided to write my MA project on Nepalese women's experiences during the earthquake. This is a creative piece of work that supplements my project. My piece consists of poetry and writing that I composed during the earthquake. It was a therapeutic outlet for me to, to get it all out, and to process the mental and emotional trauma that I was going through at the time.



5

Dung Le

Business Administration (Finance), MS
Advisor: Michael Neugent, MA

The Little Beauties from Nowhere

There are beautiful things and people everywhere but nowhere specifically. They are just simple beautiful as they are at some moments. Seeing those moments just makes my small and normal life becomes more interesting. Just wanna share what I see.

6

Jennifer Watson

Fine Arts, MFA
Advisor: Katie Parker, MFA

[sparkle emoji]

For the new season:
Things for people
who live in an unceasing
fog of ennui
because it looks good
on Instagram

Sean Leavell

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Mother's Milk

36" by 60" painting on panel

What does the nostalgic American Dream mean during a time of social and political divisiveness in the aftermath of The American Century.

Smruti Deoghare

Biomedical Informatics, PhD

Advisor: Nathan Salomonis, PhD

Maps

Maps are fascinating! They are visual representations, informing us and guiding us or at least imparting a sense of direction. This composition is a collection of maps; a spec of a line in the largest map that interconnects everything—map of the Universe, of existence.



Matthew Branham

Fine Arts, MFA

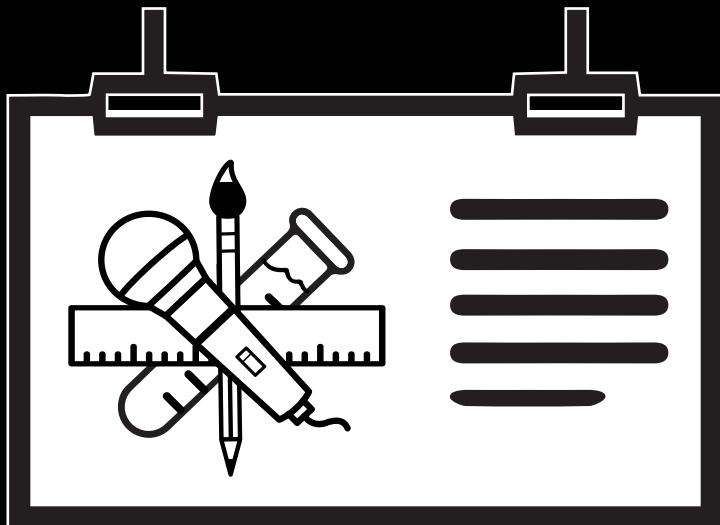
Advisor: Joseph Girandola, MFA

Self Portrait

3D printed ceramic, 2017.



POSTER FORUM



ARTS & HUMANITIES

LIFE SCIENCES & MEDICINE

PHYSICAL SCIENCES & ENGINEERING

SOCIAL & BEHAVIORAL SCIENCES

All students who present research posters at the Graduate Student Expo are evaluated by two judges from the student's field or a related field. The judges' score sheets with comments and suggestions for improvement will be distributed to the participants following the event.

Shaimaa Ibrahim

Molecular, Cellular & Biochemical Pharmacology, PhD
Advisor: Jun-Ming Zhang, MD

Unexpected Interactions between the Mineralocorticoid and Glucocorticoid Receptors in a Rat Model of Inflammatory Low Back Pain

Low back pain is a major health problem. Inflammation of lumbar intervertebral discs and compression of nerve roots cause low back pain. Epidural steroid injections (ESI) are widely used in these conditions, but they are ineffective in many cases. Mineralocorticoid receptor (MR) activation has a critical role in the initiation of immune and inflammatory responses in the dorsal root ganglia (DRG). Steroids used clinically for ESI activate not only the target glucocorticoid receptor (GR) but also the MR with significant potency. We hypothesized that this reduces the effectiveness of currently used ESI. In this study, we used the local inflammation of the DRG (LID) model of inflammatory low back pain. The immune activator zymosan was applied in the vicinity of the L5 DRG, evoking mechanical and cold allodynia in the hind paw. We examined the effectiveness of a clinically used steroid, dexamethasone (Dexa), with and without the MR antagonist Eplerenone (EPL), applied locally to the DRG. Although Dexa alone reduced pain behaviors, the effectiveness was improved when combined with EPL. The overall ineffectiveness of the ESI may be due not only to activation of the pro-inflammatory MR, but also to the reduced signal level of GR in the inflamed sensory ganglia. This suggests that the combination therapy of EPL with Dexa may be more beneficial than Dexa alone in the management of low back pain.

Victoria Dickman

Educational Studies, PhD
Advisor: Jacinda Dariotis, PhD

Comprehensive Sexual Assault Prevention through Young Adult Literature: A Participatory Mixed Methods Study

Overview: This study examines a sexual assault prevention program that was developed as part of an action research partnership between the researcher and a high school English teacher. The study takes place in an English classroom and seeks to teach students about sexual violence with the aim of changing attitudes, and ultimately change behaviors.

Research question: How does a critical educational approach to sexual assault prevention education that uses young adult literature and Youth Participatory Action Research (YPAR) change how students think about sexual assault?

Methodology and Analysis: This is a Participatory Social Justice Mixed Methods Study that uses quantitative attitude and knowledge data, qualitative interview data, and participatory data from the YPAR activities, including photographs and artwork. This study will use ANOVA and regression to analyze quantitative data, critical theory-driven analysis to analyze qualitative data, participatory analysis to use participatory data, and mixed methods integrative analysis to analyze all of the findings together.

Results/Conclusion: This study is a dissertation in progress. At the time of the poster presentation, preliminary findings will be presented.

Bina Ajay

Business Administration, PhD
Advisor: Joanna Campbell, PhD

I Am and I Am Not: Ambivalence in Entrepreneur Identification

Research on entrepreneur identity has focused on understanding how and when individuals see themselves as an entrepreneur and scholars have argued that individuals either clearly identify with the term “entrepreneur” or they disidentify with it. However, the literature hints at instances of ambivalent identification, i.e., when individuals may identify with certain facets of the term and disidentify with others. Using qualitative data from 29 founders of businesses across the United States, Canada, and Australia, we delve deeper into this phenomenon and find that individuals are ambivalent not only with reference to their identity as an entrepreneur but also as to how they want others to perceive them, i.e., their image. We develop a two-stage model of entrepreneur ambivalence that captures these findings and illustrates the reasons why individuals may identify, disidentify, or ambivalently identify with the term “entrepreneur” and what leads them to project an image that is either in sync with or misaligned with their identity as an entrepreneur. Our findings have important theoretical and practical implications for entrepreneurs and agencies focused on supporting and encouraging them.

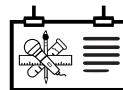
Deeptha Girish

Electrical Engineering, PhD
Advisor: Anca L. Ralescu, PhD

Image Segmentation Using Fuzzy C-Means Algorithm

Fuzzy c-means is a popular clustering algorithm which allows a single data point to belong to more than one class at any given point. Fuzzy c-means clustering first introduced by Bezdek is an efficient and commonly used clustering algorithm that uses fuzzy ideas to perform clustering. It has been used for a variety of applications especially when the applications are subjective and ambiguous. Image segmentation is one such application in which the decision of a certain pixel belonging to a particular cluster is very fuzzy. A lot of work has been done in improving the fuzzy c-means by experimenting with different membership functions, objective functions, features and weights.

The weight associated with every data point is very important as it controls the decision of assigning the data point to a particular cluster. In this study, two novel methods of updating weights that take into account the goodness of clustering and spatial relationships are proposed in order to improve the results of clustering. Fuzzy c-means with our proposed method of updating weights is applied to different kinds of images to perform image segmentation.



Natalie Thompson

Environmental Engineering, MS

Advisor: Dionysios D. Dionysiou, PhD

Comparative Study of Calcium Carbonate, Lanthanum Carbonate, and Strontium Carbonate Based Adsorbents Recovering Phosphate from Water

Phosphorus is an essential nutrient for all living organisms. Fertilizers used in agriculture are created from the mined mineral and, when used in excess, can result in excess level of phosphorus in water bodies. Eutrophic lakes can become harmful with algal blooms and a danger to human health if the water body is a drinking water source. The need for phosphorus removal and recovery in water bodies is paramount. Calcium carbonate, lanthanum carbonate, and strontium carbonate mixed with a cellulose binder to form pellets are compared to determine which metal carbonate removes the most phosphate. Each metal carbonate will be compared at varying pH levels in batch studies to investigate kinetics and isotherms for a holistic approach to determine removal efficiency of phosphate. Speed of reaction, cost of material, and toxicity of each material will be considered to determine feasibility of reusing phosphate recovered on pellet as a slow releasing fertilizer for agriculture.

Jayanth Naik Dungavath

Computer Science, MS

Advisor: Fred Annexstein, PhD

Batmobile: Stuck in Traffic; Batman, "I'm Running Late!"

UC's Night Ride program—like our Dark Knight—decided to come to the rescue of stranded UC students. However, Batman is running late because the Batmobile's navigation and underlying algorithm isn't well optimized such that the Batmobile reaches the student's location on time and takes him to his safe house in the shortest time and distance possible.

Being the Lucius Fox that I am, I work with Batman to find the bugs in existing application's underlying algorithm design and help him upgrade the application to achieve the mentioned goals of optimizing the route to minimize wait time and travel distance there, thus saving money while providing safety services to the UC students.

Sarah Willis

Communication, MA

Advisor: Eric Jenkins, PhD

Timeless or Timeliness? Examining Ideology in NBC's "Timeless"

In this study, the researcher examines ideology in NBC's time travel television drama, "Timeless," by performing a close textual analysis of the series. The researcher focuses on the portrayal of gender and race, and contextualizes the findings based on historical fiction media representation literature. In addition to helping update this body of literature, this study also makes a methodological contribution. To examine ideology, the researcher uses an updated model of Stuart Hall's (1973) encoding/decoding model, where the three decoding positions are also applied to the encoding side of the model (Ross, 2011). A methodological approach that uses this updated model has not been described. This study proposes a methodological approach and provides an example application.

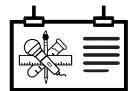
Shima Dalirirad

Physics, PhD

Advisor: Andrew Steckl, PhD

DNA-Nanoparticle Biosensor Device for Sensitive Detection of Stress Hormones in Body Fluids

Long term effects of stress due to stressful jobs and situations (soldiers, pilots, medical professionals, etc.) have a major influence on both physical and physiological health. Therefore, monitoring stress biomarkers in vivo levels could be helpful to assess human's physiological state. It is not convenient for individuals frequently to do a blood test in clinics to measure their stress biomarkers level. We know that the blood is the gold standard in monitoring the physiological state, but as an invasive method, using a needle may induce stress to some individuals and may lead to inaccurate test results for stress biomarkers detection. Developing a robust, easy to use and quick point of care (POC) diagnostic device to detect the stress and depression biomarker is the goal of my project.



Joseph Deye

Communication, MA

Advisor: Gail Fairhurst, PhD

Kelly Maloney

Communication, MA

Advisor: Gail Fairhurst, PhD

Chelsea Guest

Communication, MA

Advisor: Pamara Chang, PhD

Exploration in LMX, Gender, and the Classroom Experience

This project explores how issues of gender, teacher-student relationships (TSRs), and Leader-Member Exchange Theory (LMX) in- or out-group status affect student expected final course performance. By employing a mixed-methods survey instrument to measure gender, TSR strength, LMX in- or out-group status, and expected final course performance, this exploratory study helps to advance findings useful to pedagogy and teacher interactions with students. The project also tested a new LMX measurement scale specific to classroom settings and resource allocation, which helps to connect organizational theories to the classroom experience. The qualitative findings from the open-response questions also provided useful insight into how students make sense of their relationships with teachers. The presenters would like to thank Dr. Stephen Haas for overseeing this research project.

Cassie Wardlaw

Nursing Research, PhD

Advisor: Donna Z. Shambley-Ebron, PhD

Co-Cultural Communication Strategies of African-American Women during the Clinical Encounter for Depression Care

Purpose and Background: The prevalence rate of a major depressive episode for African-Americans has been reported as lower than Whites. However, symptom severity and chronicity have been found to be higher. African-American women encounter a healthcare system which has a history of discrimination and power differentials based on race, class, and gender. In response to experiences of discrimination, African-American women make decisions regarding how to communicate in an effort to deliver health related messages that are considered acceptable by the healthcare system. An examination of the communication strategies African-American women use when interacting with the healthcare system was necessary to identify common cultural practices that may impact the treatment of depression. The purpose of this study is to explore the co-cultural communication strategies African-American women use when seeking care for depression. Methods: The method used for this study was Focused Ethnography. Semi-structured interviews, observations, and field notes were used to collect data. The data were analyzed within the context of Co-Cultural Theory of Communication (Orbe, 1998) and Black Feminist Thought (Collins, 2000), using Leininger's four phases of qualitative data analysis. Rigor was assessed using Leininger's (2006) criteria for evaluating qualitative research.

Results/Conclusions: The findings from this study will be compared to extant literature. It will be used to develop culturally appropriate theory regarding depression care with African-American women.

11

Tiaoling Wang

Design, MDes

Advisor: Vicki Daiello, PhD

Prepare for Alzheimer's: Stories to Bind Together

Population aging brings serious health issues worldwide, and Alzheimer's disease (AD) is an immediate and accelerating concern in China. Pervasive misconceptions about the causes of AD, combined with a lack of understanding about its progression and management, creates a devastating image of AD and builds a gap between people affected by AD and non-sufferers. This thesis takes a two-pronged approach to the Alzheimer's concern in China: 1) Investigation of the public perception of AD in China, specifically current publicities that distort the realities of the disease, manipulate emotions about AD, and promulgate fears that result in public avoidance of preventative strategies. 2) Intervention in the cultural and sociological elements of public attitudes about AD in China with educational material for the Chinese millennial generation that is designed to build a greater understanding of the disease and, ultimately, improve the quality of life for current and future Alzheimer's sufferers and their families. The higher-level goal of this project is "preventative action through education" directed at the millennial generation whose perceptions of AD will ultimately influence the quality of life for elder loved ones as well as their own future health and well-being.

12

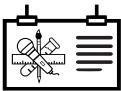
Lina Motlagh Zadeh

Communication Sciences and Disorders, PhD

Advisor: Noah Silbert, PhD

Developing a Remotely Deliverable Digit Triplets Screening Test with Higher Sensitivity to High-Frequency Hearing Loss

The prevalence of late-diagnosed or often unrecognized hearing loss (HL) is higher in developing countries due to the lack of access to hearing health care services. Due to the importance of hearing screening tests in early diagnosis of HL, development of remotely deliverable screening tests that can detect HL reliably, quickly, and easily provides significant benefits, specifically for underserved population. The purpose of this research is to refine the established English digit triplet test (DTT) to improve detection of high-frequency HL. The sensitivity and specificity of the DTT for detecting high frequency HL will be analyzed for low-pass filtered speech-shaped noise with three different cut-off frequencies (2 kHz, 4 kHz, 8 kHz). The current study will also replicate previous work showing that speech reception thresholds estimated from the DTT correlate highly with listeners' pure tone average audiometry. This research should improve the accuracy of convenient, efficient tools for diagnosing HL for millions of people who have limited access to hearing health care.



13

Robert Johnson

Community Planning, MCP

Advisor: Johanna W. Looye, PhD

The Waste Powered Kiln: A Creative Solution for Morocco's Environmental Issues

Processes for alleviating environmental issues through waste-to-energy design in artisan communities: A case study of traditional pottery kilns in Tameslouht, Morocco. An artisan community in Tameslouht, Morocco is rife with traditional pottery kilns powered by burning tires, wastewater from the olive oil mills, and open burning landfills. Our proposed kiln will be powered by the combustion of solid waste and methane gas captured from the decomposition of organic matter.

14

Carrie Farrell

Communication, MA

Advisor: Stephen M. Haas, PhD

Improving the Quality of After-Visit Summary to Enhance Patient-Centered Care

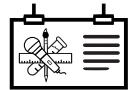
Since 2015, a clinic at a local hospital has implemented an after-visit summary (AVS). Currently, the clinic would like to transition from the method of using a checkbox AVS to automatically generating the AVS while still providing a physical copy for the family. The goals of this study are to 1) improve the quality of our current AVS before it is moved to Epic by quantifying how many patient's charts contain the checklist AVS, and 2) assess usefulness of the AVS and areas for improvement by performing parent and clinician interviews.

Pulong Ma

Mathematical Sciences, PhD
Advisor: Emily L. Kang, PhD

Fused Gaussian Process for Very Large Spatial Data

With the development of new remote sensing technology, large or even massive spatial datasets covering the globe becomes available. Statistical analysis of such data is challenging. This article proposes a semiparametric approach to model large or massive spatial datasets. In particular, a Gaussian process with additive components is proposed, with its covariance structure consisting of two components: one component is flexible without assuming a specific parametric covariance function, but is able to achieve dimension reduction; the other is parametric and simultaneously induces sparsity. The inference algorithm for parameter estimation and spatial prediction is devised. The resulting spatial prediction method that we call fused Gaussian process (FGP) is applied to simulated data and a massive satellite dataset. The results demonstrate the computational and inferential benefits of the FGP over competing methods and show that the FGP is more flexible and robust against model misspecification.



Charles Kronk

Biomedical Informatics, PhD
Advisor: Anil Jegga, DVM, MRes

GNOMICS: A One-Stop Shop for Biomedical and Genomic Data

The World Wide Web is an indispensable tool for biomedical researchers who are striving to understand the molecular basis of phenotype. However, it presents challenges in the form of proliferation of data resources, with heterogeneity ranging from their content to functionality to interfaces. This often frustrates researchers who must visit multiple sites, become familiar with their interfaces, and learn how to use them to extract knowledge. Even then, one may never feel sure that they have tracked down all needed information. We envision addressing this challenge with GNOMICS (Genomic Nomenclature Omnibus and Multi-faceted Informatics and Computational Suite), a suite with both a programmatic interface and a GUI. GNOMICS allows for extensible biomedical functionality, including identifier conversion, pathway enrichment, sequence alignment, and reference gathering, among others. It combines usage of other biological and chemical database application programming interfaces (APIs) to deliver uniform data which can be further manipulated and parsed.

Mia Varner

Environmental Engineering, MS

Advisor: Dionysios D. Dionysiou, PhD

Using High Frequency Monitoring of Environmental Factors to Predict the Microcystin Concentrations in a Multi-use Island Reservoir

Cyanobacteria, known as blue-green algae, are photosynthetic bacteria found naturally in marine, freshwater, and estuarine ecosystems. An increase in nutrient input and changes in the climate have contributed to the proliferation of cyanobacteria, forming harmful algal blooms (HABs). Beyond the ecosystem effects, loss of recreational use and economic impact, a serious issue associated with these blooms is the production and release of cyanotoxins. While some factors that influence the proliferation of HABs have been identified, how these factors affect blooms and the resulting production of toxins are still unknown. In order to investigate the environmental factors and nutrient concentrations that results in an increase of total microcystin, high frequency water quality data and discrete grab sampling were compared for 2015 sampling at William H. Harsha Lake, Ohio in order to determine significant correlations between chlorophyll-a, phycocyanin, temperature, nitrogen, phosphorus, and resulting total microcystin concentrations at four sites, on Harsha Lake. A time series approach was then used to first determine significant correlations and investigate useful lag-times for management decisions, such as drinking water treatment options, beach closures, and do not drink or consume warnings, to be enacted.

Ivayla Gyurova

Pathobiology & Molecular Medicine, PhD

Advisor: Stephen Waggoner, PhD

Dynamics of Adaptive Natural Killer Cells in Longitudinal Analysis of CMV Vaccine Recipients

Classical vaccine efforts focusing on the induction of B- and T-cell memory have proven ineffective in the protection against pathogens such as cytomegalovirus (CMV). Thus, CMV remains a significant public health threat. There is clear evidence that patients lacking natural killer (NK) cells suffer recurrent, severe infections with multiple herpesviruses, including CMV, highlighting the importance of NK cells in controlling this pathogen. In addition, several studies describe the expansion and persistence of phenotypically and functionally distinct murine ($\text{Ly}49\text{H}^+$) and human (NKG2C^+ , FcRIII neg, EAT-2 neg, SYK neg) NK-cell subsets with putatively enhanced antiviral effector function upon CMV infection. Therefore, one potentially pioneering approach to creating an efficacious CMV vaccine would include the induction of such NK cell adaptations. To test this, we used longitudinal PBMC samples collected during a vaccine trial with HCMV gB in MF59 adjuvant administered to CMV negative adolescent females. We observed several patterns of transient and sustained elevations in the frequency of FcRIII neg, EAT-2 neg, and SYK neg subsets at various time points despite absence of detectable CMV infection in any trial participants. Surprisingly, these patterns were apparent in participants regardless of administration of vaccine or placebo. In contrast to previous cross-sectional studies, we present evidence that these CMV-reactive adaptive NK cells exhibit continuous oscillations in the blood of CMV negative individuals, suggesting that they may react to unknown environmental or inflammatory cues.

19

John Betz

Biostatistics, MPH

Advisor: Marepalli B. Rao, PhD

Longitudinal Coping and Resiliency of Hospice Workers

Research in coping, resiliency, and religiosity among hospice workers is quite limited and typically does not include clinical (i.e., medical, psychosocial, and spiritual) and office staff. This study measured the coping, religiosity, and resilience of office and clinical hospice workers in a rural setting. This was a self-report survey administered through SurveyMonkey at two time periods: October 2015 and October 2016. Both surveys included all Caucasian/White participants. Both Year 1 and Year 2 measures for depression (CES-D) significantly correlated with spiritual struggle (Brief-RCOPE-negative subscale) and inversely with self esteem (RSES). Data were further analyzed for evidence of mediation effects using Model 4 in the PROCESS macro (Hayes, 2013) for SPSS, with follow-up bootstrapping to obtain bias-corrected 95% confidence intervals. The emotional cost of working with death, dying, and bereavement has not been studied much from a longitudinal perspective. Pargament, Koenig, and Perez (2000) found poorer coping was related to spiritual cognitive dissonance between beliefs and experience as well as a picture of the Divine as punisher. These results accord with the connection that negative religious coping has with depression and self-blame and its role in exacerbating the effects of depression on resiliency. Those workers who serve in rural settings have less accessibility to mental health resources, and the small hospice organizations typically have limited budgets for staff-care.

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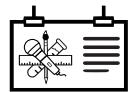
Rigwed Tatu

Biomedical Engineering, PhD

Advisor: Chia-Ying Lin, PhD

Developing a Self-Expanding Patch for Prenatal Neural Defect Repair

Myelomeningocele is a neural tube defect occurring before birth, characterized by protrusion of spinal elements from the infant's back. This defect, if not treated prior to birth, can lead to complications after birth, such as paralysis and other dysfunctions. The current minimally-invasive surgery conducted for repair utilizes surgical patches to cover the defect, which have flaws that can pose risks to surgical outcome. We have developed a polymeric patch that concurrently addresses the existing flaws and acts as a standalone system to benefit the efficacy of surgery. We have successfully tested the patch for self-expansion, watertight membrane, biodegradability and cytotoxicity. Our designed patch can be a potential alternative to the incumbent technology employed for defect site coverage.



21

Josephine Brown

Toxicology (Environmental Health), MS

Advisor: Mary Beth Genter, PhD

Intranasal Nilotinib in the Thy1-aSyn Mouse Model of Parkinson's Disease

Parkinson's disease (PD) is a common and debilitating motor disorder. Early symptoms of PD include motor dysfunction and decreased olfaction and gastrointestinal motility. Aggregation of α-synuclein (αSyn) is a key component of PD pathology. αSyn aggregation in the brain correlates with motor and non-motor impairments in PD patients. Thy1-αSyn transgenic mice exhibit these and other features of PD observed in humans, making this a suitable model for studying drug intervention in PD. Nilotinib is an inhibitor of the tyrosine kinase c-Abl and is approved for treatment of Philadelphia chromosome-positive chronic myelogenous leukemia. A phase 1 clinical trial found motor improvement in PD patients treated with oral nilotinib, but some serious side effects were reported. With the goal of decreasing drug-induced systemic toxicity and delivering nilotinib directly to the brain, we are investigating the novel use of the intranasal (IN) route of administration for nilotinib in the Thy1-αSyn model of PD. Dose-finding studies with 1.0 mg/d IN nilotinib (n=3) resulted in acute toxicity indicated by weight loss, anosmia, and olfactory epithelial damage, while 0.5 mg/d showed no histological damage. After baseline neurobehavioral assessments, wild-type and Thy1-αSyn mice received vehicle, 0.5 or 0.25 mg/d nilotinib treatment for 8 wk. After 8 wk dosing, behavioral assessments were repeated, and brains, nasal cavities, and lungs were collected for histological analysis. Behavioral results found the Thy1-αSyn mice treated with 0.5 mg/d nilotinib have less net increase in errors/step (p -value=0.038) compared with the controls, suggesting that IN nilotinib decreases the progression of motor dysfunction in the Thy1-αSyn PD mouse model.

22

Christina Psihountas

Chemistry, PhD

Advisor: Patrick A. Limbach, PhD

tRNA Modification Changes during Growth Phase Transitions in *Bacillus subtilis*

Transfer Ribonucleic Acids (tRNAs) have more modified bases than the other species of RNA. Temperature, culture media, stress, and cell development are suspected to influence tRNA nucleoside modifications in a qualitative and/or quantitative nature. Current databases do not reflect modification changes or detail the culturing conditions of obtained data. Changes in tRNA modifications are being studied in the gram positive and spore forming bacteria, *Bacillus subtilis*. Here we show that there is a change in the tRNA profile as the bacteria progresses through its life cycle. This method will also be used to monitor tRNA profiles during sporulation. We hypothesize that we will see a change in nucleoside abundance when vegetative cell and spore tRNA profiles are compared. Using liquid chromatography tandem mass spectrometry (LC-MS/MS), we can detect and characterize modifications from total tRNA samples obtained at different phases of growth and during sporulation.

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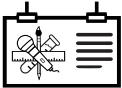
Fatemesadat Mohammadi

Physics, PhD

Advisor: Hans Wagner, PhD

Metal-Enhanced Lasing from Zinc-Doped GaAs Nanowires

Excitation power and temperature dependent lasing from Zinc-doped GaAs nanowires on glass and on metal films was investigated. NWs with an average diameter of 250 nm and 8 nm Al₂O₃ as top coating, were laid on glass, showed photonic lasing of the TM10 mode when the excited pulsed laser intensity exceeded 53 $\mu\text{J}/\text{cm}^2$. Similar NWs on a metal film showed enhanced lasing and reduced excitation threshold that is attributed to the contribution hybrid photonic/plasmonic lasing modes. We suggest that the stronger light field confinement in the vicinity of the metal as well as the energy transfer from the NW emission to surface plasmons in the metal film leads to enhanced gain and reduced laser threshold. Observed blue shift of the NW lasing emission as a function of excitation intensity up to 200 $\mu\text{J}/\text{cm}^2$ is attributed to band filling. The subsequent red-shift at higher intensities is caused by band-gap renormalization. At higher temperature, we observe both a red-shift and weakening of the emission that is attributed to band gap shrinkage and increasing non-radiative losses. While NWs on metal show lasing up to room temperature, NWs on glass stop emitting at ~200 K. The enhanced robustness of lasing from NWs on metal is again attributed to light confinement and coupling with metal plasmons.



24

Xinghao Zhang

Molecular & Developmental Biology, PhD

Advisor: James Wells, PhD

Modeling Neurogenin3 Mutations for Endocrine Cell Development in Human Pluripotent Stem Cell Derived Pancreas and Intestinal Organoids

Gastrointestinal hormones secreted by endocrine cells are important in regulating functions such as glycemia, satiety, secretion, and absorption. Neurogenin3 (NEUROG3) is a basic helix-loop-helix transcription factor required for all endocrine lineages of pancreas and intestine. Patients with homozygous or compound NEUROG3 mutations are born with congenital malabsorptive diarrhea due to the loss of enteroendocrine cells. In contrast, the effects on the endocrine pancreas are variable, ranging from neonatal diabetes to diabetes onset later in life. This suggests a context dependent difference in pancreas versus intestinal requirement for NEUROG3. NEUROG3^{-/-} PSCs failed to form any pancreatic or intestinal endocrine cells, demonstrating its requirement for human endocrine development. Endocrine specification was fully rescued by physiologic expression of wild type NEUROG3, and we used endocrine cell rescue to test the activity of mutants' effect on pancreatic and intestinal endocrine development. R93L, R107S and S171fsX68 model the human phenotype with development of some pancreatic endocrine cells, but no intestinal endocrine cells. In contrast, E123X and L135P were devoid of any functional activity regardless of expression levels. Biochemical analysis determined that R107S and E123X have reduced protein stability, whereas S171fsX68 is more stable than wild type NEUROG3. All NEUROG3 mutations have impaired DNA binding activity. These results suggest that intestinal endocrine cell development is more acutely impacted by NEUROG3 activity loss and demonstrate the utility of *in vitro*-derived human pancreatic and intestinal tissue to identify the molecular causes of human birth defects.

Huibin Weng

Business Administration, PhD
Advisor: Olivier Parent, PhD

Estimation of a Social Interaction Model with Endogenous Network Formation

A large and growing literature examines the role that peer effects in the networks play in economic phenomena. Properly identifying the peer effects in social network is of real importance for policy makers in order to implement policies efficiently. Compared to classical Manski-typed linear-in-means model, spatial models release the restrictive assumptions and have recently become popular in the study of social interaction. However, if we just simply plug in data and run this procedure, too often it leads to a misspecification problem because of two main potential causes: the endogenous social network and mis-measured social network.

To solve the endogeneity issue, Goldsmith-Pinkham and Imbens (2013) and Hsieh and Lee (2014) treat the network matrix as an endogenous choice variable and propose a parametric model of network formation to correct this endogeneity issue by Bayesian estimation method. Consequently, the big challenges faced becomes proper modelling of the formation of social network. This paper will extend their work and apply another class of higher order dependence formation models, exponential random graph model (ERGM), to correct the endogeneity issue.

Moreover, the introduction of hidden structure could correct the bias caused by measurement errors. By exploring more efficiently the parameter space, it will also increase convergence of the algorithm. This paper will provide new tools to estimate the ERGM, making this model more reliable to evaluate the impact of peer effects in the social interaction literature dealing with endogenous network formation.

Emrah Gecili

Mathematical Sciences, PhD
Advisor: Siva Sivaganesan, PhD

Objective Bayesian Multiple Testing for Binary Data

We consider objective Bayesian multiple testing of several null hypotheses concerning two proportions under different experimental settings. We find an intrinsic prior with different choices of priors for the training sample size and a mode-based beta prior permit desirable flexibility under the alternative. We use simulated and real data sets to compare the results obtained by using these priors. Later, we consider empirical Bayes procedures for both the intrinsic and beta priors and compared the results with fully Bayesian approaches. Additionally, the results from the Bayesian approaches are compared with those of certain commonly used frequentist procedures using simulations and real data sets.

27

Shu-Tzu Huang

Health Education, PhD

Advisor: Rebecca A. Vidourek, PhD

Substance Use, Mental Health, and Recent Alcohol Use among College Students

Alcohol use among college students continues to be a prevalent public health issue in the United States. However, the associations between substance use, mental health, and recent alcohol use in this population remain unclear. Therefore, the aim of the current study is to investigate potential risk factors including mental health problems and other drug use related to drinking alcohol in the past 30 days among college students. Study participants were 707 students at one Midwestern, metropolitan university and were recruited by the university wellness center. Participants completed the American College Health Association National College Health Assessment, a survey including items on health behaviors and demographics, in their classrooms. Logistic regression method was used to analyze the data. Findings indicated 76.0% of participants reported using alcohol in the past 30 days. Recent alcohol use was associated with multiple factors including grade level, sorority/fraternity status, ever been emotionally abused, ever felt overwhelmed, felt very sad, felt anxiety, felt overwhelming anger, and other substance use including cigarette, marijuana, non-medical prescription drug, binge drinking, and drinking and driving. In the final logistic model, grade level, sorority/fraternity status, recent marijuana use, recent binge drinking, and recent drinking and driving remain significantly related to recent alcohol use. College health professionals may use study findings to identify high-risk groups and develop harm reduction programming for students. Future studies may examine additional risk factors related to recent alcohol use.

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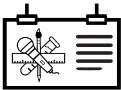
Tzu-Chun Wu

Mathematical Sciences, PhD

Advisor: Emily L. Kang, PhD

Dynamic Transelliptical Graphical Models for Sparse Precision Matrix Estimation

We propose a new method for estimating high dimensional precision matrices from dynamic transelliptical graphical (DTG) models. Also, we assume in the DTG model that the precision matrix is sparse and varies. This method combines not only the flexibility of kernel estimation to characterize the changing precision matrix but also the extra robustness due to the transelliptical modeling. An efficient algorithm via linear programming is developed. The performance of DTG models is demonstrated through extensive simulation studies and applications to real data sets.



Iraj Abbasian Shojaei

Physics, PhD

Advisor: Leigh M. Smith, PhD

Study of Carriers Dynamics and Band Alignments in GaAs0.7Sb0.3 /InP Nanowires for Enhanced IR Optoelectronic Devices

We explore the carriers dynamics and energy band structure of single GaAs0.7Sb0.3 core-only and GaAs0.7Sb0.3 / InP core-shell semiconductor zinc blende nanowires by using pump-probe measurements at both 10 K and 300 K. The fitting of the data based on transient Rayleigh scattering (TRS) theory exhibit 70 nm and 130 nm average diameter for core-only and core-shell nanowires respectively. As another result, core-shell nanowires show a remarkable long carriers lifetime (~1800 ps) at 10 K compared to the core-only nanowires (~5 ps). In contrast, core-shell nanowires don't show that much long carriers lifetime at 300 K (~150 ps), while core-only nanowires exhibit the same carriers lifetime (~5 ps). These results suggest that band alignment of the core-shell nanowire may be Type II with less than 30meV off-set energy. Also, the modeling of the data shows that carriers thermalization in core-shell nanowires at 10 K is much slower than core-only nanowires

Rachel Bosch

Geology, PhD

Advisor: Dylan Ward, PhD

Modeling Coupled Physical and Chemical Erosional Processes Using Structure from Motion Reconstruction and Multiphysics Simulation: Applications to Knickpoints in Bedrock Streams in Limestone Caves

In cave passages, there is evidence for mechanical and chemical erosion, however the different hydraulic regimes, coupled with an important role for the dissolution process, affect the relative roles and coupled interactions between these processes, and distinguish them from processes at surface stream knickpoints. Using a novel approach of imaging cave passages using structure from motion (SFM), we create 3D geometry meshes to explore these systems using multiphysics simulation. Here we focus on two field sites in Mammoth Cave, Kentucky: Upper River Acheron contains an actively eroding streambed with a knickpoint; Boone Avenue has a prominently scalloped wall surface indicative of paleohydraulic conditions. We demonstrate that SFM is a viable imaging approach for reconstructing cave passages with complex morphologies. We then use these reconstructions to create meshes upon which to run multiphase free-surface computational fluid dynamics simulations in STAR-CCM+. Physical and chemical properties of the water, bedrock, and sediment will enable computation of shear stress, sediment impact forces, and chemical conditions at the bed surface. Preliminary results prove the efficacy of commercially available multiphysics simulation software for modeling various flow conditions. In future work, we will incorporate physically realistic simulations of sediment transport and chemical kinetics into this flow model, and thus elucidate the nature of their complex coupled interactions in cave passages and in surface stream channels to expand knowledge and understanding of overall cave system development and river profile evolution.

Mary Talley

Molecular & Developmental Biology, PhD
Advisor: Ronald Waclaw, PhD

A Role for the E Proteins Tcf3/12 in Oligodendrocyte Progenitor Cell Generation in the Mouse Telencephalon

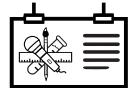
The mouse telencephalon is a progenitor region involved in generating postnatal brain structures necessary for the highest levels of neural function. Progenitor cells in this region generate diverse neurons and also glia (oligodendrocytes and astrocytes) at temporally distinct stages of development. At mid-gestation stages (E13.5), oligodendrocyte progenitor cells (OPCs) are generated in the ventral most regions of the forebrain (medial ganglionic eminence [MGE] and pre-optic area [POA]) but not in the intermediate (lateral ganglionic eminence [LGE]) or dorsal (pallium-cortex) regions. We are interested in transcriptions factors that are involved in regional generation of these diverse cell types. Previous work has found that Tcf12, a member of the bHLH E-protein family of transcription factors, shows regional expression early in development. Using *in situ* hybridization and immunofluorescence, we found a dynamic expression pattern with a high ventral to low dorsal gradient in the ventral telencephalon from E13.5-E15.5 and more uniform expression at later stages of development (E18.5). Tcf12 positive cells were also detected in oligodendrocyte enriched regions of the postnatal brain (corpus callosum/white matter). Loss of Tcf12 protein in the Olig2 lineage (Tcf12 cKO generated with Olig2cre/+) did not result in dramatic changes in OPC generation. However, combined loss of Tcf12 with its closely related family member Tcf3 results in severe reductions of OPC markers. Our findings indicate an early role for Tcf3/12 in embryonic OPC Generation. Future experiments are focused on determining the mechanism underlying the OPC defects in Tcf3/12 cKOs.

Alexandra Eicher

Molecular & Developmental Biology, PhD
Advisor: James Wells, PhD

Engineering a Human Model System to Study the Development and Physiology of the Gastric Enteric Nervous System

The enteric nervous system (ENS) is a peripheral network of neuronal and glial cells that regulates key digestive functions. It arises from neural crest cells (NCCs) that colonize the gut tube between 4 and 7 weeks of human gestation. Despite the prevalence of known gastric enteric neuropathies, little is known about the development of the gastric ENS. However, we hypothesize that the human ENS encourages the growth, patterning, and maturation of human gastric epithelium and mesenchyme. We developed a human-specific, *in vitro* approach using human pluripotent stem cells (hPSCs) to examine the specific roles the ENS plays during gastric development. To do this, we incorporated hPSC-derived NCCs into developing human gastric organoids (HGOs) to recapitulate normal gastric ENS development and examine ENS impact on gastric growth, patterning, and maturation. hPSC-derived NCCs recombined with HGOs arranged in a mesh-like network close to the developing HGO epithelium, differentiated into neuronal and glial subtypes, and seemed to play a role in regulating not only gastric mesenchymal patterning but overall HGO growth. Neuronal and glial lineages made up about 25% of the cells within innervated HGOs and differentiated into specific subtypes, such as inhibitory (nNOS), dopaminergic (TH), and sensory (CALB1) neurons. In addition, innervated HGOs seemed to have an expanded mesenchyme and upregulated specific mesenchymal transcription factors. Finally, the addition of NCCs to HGOs seemed to aid in their *in vivo* growth under murine kidney capsule. In the future, we will use this human organoid system to interrogate molecular pathways that are involved in ENS-mesenchyme-epithelial cross talk and to model congenital ENS defects.



Andrew Eisenhart

Chemistry, PhD

Advisor: Thomas L. Beck, PhD

A Novel “Bowl in a Bowl” Formation with Differently Sized Calixarenes

Engineered synthetic nanocarriers with defined cavity size and shape are indispensable candidates in nanomedicine and nanotechnology. In this context, supramolecularly built materials are of prime importance because of the ease of modification based on structure-function correlation. So far, supramolecular organization of cavitands to build a well-defined nanoporous framework primarily relied on self-organization in the presence of particular substrates in the form of metal, solvent, or guest species. Lack of interaction between two cavitands of the same or different kinds limits building an extended geometry in space. We hypothesized the organization of two differently sized calixarene units, C-methylresorcin[4]arene (RsC1) and either Calix[6]arene (Calix6) or Calix[8]arene (Calix8), in crown/bowl conformations, to form a composite system where the lower rim of the smaller RsC1 partially overlaps with the upper rim of the larger Calix6 or Calix8. Theoretical analysis using free energy calculations not only justifies the feasibility of such a process, but also indicates the above mode of organization as the most favored among several combinations with two macrocycles. NMR studies in solution of macrocyclic mixtures obtained at 400 K show clear evidence of partial overlaps between RsC1/Calix6 and RsC1/Calix8. This solution state phenomenon is well supported by a small angle neutron scattering study. Finally, the theoretical analysis demonstrates a favorable condition for formation of such an assembly at a higher temperature compared to room temperature.

Stephanie Heath

Geology, PhD

Advisor: Thomas V. Lowell, PhD

Preliminary Chronology of the James Lobe, South Dakota

During the last glacial period, the southern lobes of the southern Laurentide Ice Sheet exhibited vastly different behavior, with early (>20 ka) advance and retreat in the eastern sector (Wisconsin to New England), and relatively late (<18 ka) advance and retreat in the western sector (Iowa and westward). At present, the chronology of the western sector is relatively sparse, consisting of radiocarbon ages from the Des Moines Lobe in Iowa. We seek to bolster this data set to further test this apparent pattern of asynchrony across the southern Laurentide margin. The James Lobe was the westernmost lobe of the southern Laurentide Ice Sheet and occupied much of eastern South Dakota. We focus on the Pierre Sublobe, the largest of several sublobes that formed along the James Lobe's western flank, which terminated at the Missouri River near Pierre, SD. We collected boulder samples from moraine surfaces for ¹⁰Be exposure age dating. We present here new exposure ages from four sites across the Pierre Sublobe that fall on either Tazewell, Cary, or Mankato drift as identified in previous studies (i.e., Flint 1955). These new ages agree with existing ¹⁴C ages from sediment cores across the James Lobe and are used to reconstruct the lobe's behavior during the last glacial period. Taken together, this updated chronology suggests the James Lobe exhibited similar behavior to the nearby Des Moines Lobe. We find that our new chronology challenges the traditional view of Tazewell, Cary, and Mankato phases of advance as all three drifts appear to be very close in age. Further, our new chronology supports the apparent asynchronous behavior of the terrestrial margin of the largest ice sheet of the last glacial period.

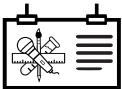
Jacob Ryan Enriquez

Molecular & Developmental Biology, PhD

Advisor: James Wells, PhD

Enterendoctrine Cell Differentiation and Dynamics during Homeostatic and Altered Nutrient Conditions

Enterendoctrine cells (EECs) are nutrient-sensing cells found throughout the intestinal tract that secrete more than 20 hormones that regulate many physiologic processes related to nutrient homeostasis. EECs are implicated in many metabolic diseases, including diabetes and obesity. The bHLH transcription factor Neurogenin 3 (Neurog3) is required for EEC formation and both mice and humans lacking EECs display impaired nutrient absorption. Despite the many essential functions of EECs, little is known about the lifespan and dynamic changes of EEC differentiation under normal and diet-induced metabolic disease. For example, the intestinal epithelium turns over every 5-7 days in mouse and humans, yet the lifespan of EECs is not known. We hypothesize that EECs and individual EEC hormone populations may have unique life spans whereby changes in dietary inputs may directly alter EEC lifespan and subsequent overall homeostasis of EECs. We have used a mouse inducible lineage-tracing approach based on transgenic Neurog3CreERT2 and Neurog3Cre to perform thorough and quantitative studies to study EEC differentiation and homeostasis in the context of normal and altered nutrient conditions. We have developed flow cytometry-based quantitative approaches to study the lifespan of individual EEC subtypes under normal and varied dietary conditions. We find that EECs remain present through 7 days and that the lifespans of various EECs expressing hormones can vary. Given the critical role of EECs in metabolic disease, basic knowledge regarding the dynamics of EECs is essential for future studies of how dietary excess or deprivation impact EEC homeostasis and function.



Shannon Neale

Geology, MS

Advisor: Craig Dietsch, PhD

Analysis of a Mill Creek Valley, Ohio Core Utilizing XRF and XRD Technology

The Mill Creek River Valley is located in southwestern Ohio just north of the center of the Ohio River Valley. This study investigated a core from the southern end of the valley with the intention to compare the core with the well documented glacial, fluvial and human occupation history of the northern portion of the Ohio River Valley. This study utilized macroscopic observation, X-ray fluorescence (XRF), X-ray diffraction (XRD), and energy dispersive scanning electron spectroscopy to analyze grain size, chemical composition, and mineralogy with depth. The study identified five distinct intervals of deposition, which correlated with the established history of the region. The study also identified an anthropogenic influence on the sediment of the Mill Creek Valley, which used to be a heavily industrialized area.

The XRF data was the most useful in being able to delineate between the five layers. Layer 1 (0-16.5') was labeled fill, and it was the easiest to separate due to the large amount of heavy metal deposits found in this section of the core. Layer 2 (16.5'-26.5') was labeled clay and silt, and it is believed this layer is from glaciation episodes associated with this area. Layer 3 (26.5'- 36.5') was labeled clay and is separated from the previous layer by a marked increase in SiO₂, Yttrium, and Th/Fe. Layer 4 (36.5'- 75') was labeled lake clay/lean clay, and Layer 5 (75'+) was labeled alluvial silt and has a marked increase in Potassium Oxide (K2O) and Strontium (Sr).

37

Abigail Richard

Mathematical Sciences, PhD
Advisor: David A. Herron, PhD

Types of Convergence: Hausdorff, Gromov-Hausdorff, and Pointed Gromov-Hausdorff

We explain various forms of convergence and metrics with the intention of determining relationships among different types of convergence.

38

Samuel Garvey

Biological Sciences, MS
Advisor: Takuya Konishi, PhD

The Northernmost Occurrence of a Large Tylosaurine Mosasaur (Squamata: Mosasauridae)

Mosasurs (Squamata: Mosasauridae) were large-bodied (up to 13 m long) swimming lizards that existed during the Late Cretaceous (c. 100–66 million years ago). Of six subfamilies we recognize today, four are known to have been hydropedal, or flipper-bearing, either predominantly (Mosasaurinae) or exclusively (Tylosaurinae, Plioplatecarpinae, and Halisaurinae). These hydropedal mosasaurs exhibited a bifurcate vertical tailfin and many attained a body length of 5 m or more. Due most likely to their large and fish-shaped body being well adapted to life in water, hydropedal mosasaurs colonized Late Cretaceous seas across the globe, with their fossils found in all the continents including Antarctica. At the same time, in the Northern Hemisphere, a majority of mosasaur fossils are found within 0°–60°N paleolatitudes, and plioplatecarpine mosasaurs are the only mosasaurs yet confirmed to have existed in paleolatitudes higher than 60°N. Herein, we report on the northernmost occurrence of a tylosaurine mosasaur from near Grande Prairie in Alberta, Canada (c. 80 million years ago). Recovered from 65°N paleolatitude, this material (TMP2014.011.0001) is assignable to Tylosaurinae by exhibiting the following main characters: cylindrical rostrum; broadly parallel-sided premaxillo-maxillary sutures; and homodonty. We further refer this material to *Tylosaurus* based on the premaxilla without a dorsal midsagittal ridge. Unexpectedly, TMP2014.011.0001 exhibits widely spaced teeth, a juvenile condition, despite its sub-adult or adult age based on the estimated body length of 6 m. Regardless, this study suggests the presence of a rich Cretaceous boreal marine community that sustained apex predators as large as tylosaurines.

Courtney Jackson

Immunology, PhD

Advisor: Claire Chouquet, PhD

In Utero Exposure to Inflammation Modifies Fetal Regulatory T Cells, Inducing the Accrual of Poorly Suppressive Inflammatory Regulatory T Cells

Chorioamnionitis (chorio) is one of the largest contributors to premature birth, and associated with several complications post-birth, mainly pulmonary and cerebral. However, a full understanding of the fetal responses to the inflammatory milieu created by chorio remains limited. To address this question, we developed an experimental model of chorio in which intra-amniotic injection of LPS in pregnant Rhesus macaques lead to placental inflammation similar to what is described in human chorio. In this model, fetal splenic regulatory T-cells (Treg) frequency decreased, but CD4+IL-17⁺ cells increased. IL-17 and other pro-inflammatory cytokines were mainly expressed by a subset of FoxP3⁺ T-cells that also had a low expression of Helios. These FoxP3+RORC⁺ cells also displayed increased expression of chemokine receptor CCR6. Several cytokines, notably IL-6, TNFa and IL-1 are elevated in cord blood and amniotic fluid of LPS-exposed neonates. Treatment of LPS-exposed animals by IL-1 receptor antagonist, anti-TNFa and anti-IL-6 decreased the frequency of splenic FoxP3+IL-17⁺ Treg; however, they did not normalize overall Treg frequency. Furthermore, CCR6⁺ fetal Treg in both control and LPS-exposed fetuses had a diminished ability to suppress autologous non-Treg CD4⁺ cell proliferation compared to CCR6⁻ Treg. Collectively, our results show that *in utero* exposure to inflammation triggers a rapid pro-inflammatory response in the fetus, particularly affecting Treg, and cytokines IL-6, IL-1 and TNFa are important for many of these pathways. Due to the role of Treg in maintaining immune homeostasis, altered Treg frequency and/or function may contribute to the detrimental outcomes in neonates exposed to *in utero* inflammation.

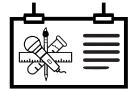
Alvaro Ortiz Lugo

Mathematical Sciences, PhD

Advisor: Benjamin L. Vaughan, PhD

A Mathematical Model of Pathogen Dynamics in Water Distribution Networks with Bounded Flux Functions

A water distribution network is a system that aims to provide a safe water supply. Biological contamination of the system can occur by breach on pipes and several other factors, impacting the water quality. Frequently, microorganisms form biofilms on the interior surface of pipes, which are aggregates of microorganisms that adhere to solid surfaces through self-secreted extracellular polymeric substances. The presence of typically harmless drinking water biofilms can allow harmful bacteria to persist within the distribution network, possibly degrading water quality. In this talk, we analyze a mathematical model of the dynamics of non-native bacteria with the native drinking water biofilm within a large network of pipes, for a time constant, periodic and aperiodic flows. We analyze the dynamics of models using linear stability analysis with Floquet theory. For realistic water distribution systems, there exists a number of connections in the network making Floquet multipliers inefficient. To address this, we develop an efficient algorithm for predicting the long-time behavior of the pathogen population within the network and prove mathematically these predictions are equivalent to results from Lyapunov and Floquet theory. The analytical results are validated using numerical simulations of the full non-linear system on a range of water distribution network sizes.



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Andrew Gangidine

Geology, PhD

Advisor: Andrew D. Czaja, PhD

Life on Mars? Developing a Trace Element Biosignature for Early Earth and Mars

Impending missions focusing on the search for life outside of our planet require the development of robust and conclusive biosignatures. Due to metamorphism and diagenesis, determining the biogenicity of ancient fossils on Earth is difficult and often contentious. Some of the oldest evidence for life on Earth comes from hydrothermal silica deposits, which may also exist on the surface of Mars in at least one of the candidate landing sites for the Mars 2020 mission. I report here my initial results and plan to further develop a novel biosignature for ancient terrestrial and extraterrestrial life based on trace elements sequestered by life and preserved in the rock record. Preliminary data from modern organisms preserved in terrestrial hydrothermal silica-depositing environments indicate that enrichments of certain trace elements are spatially associated with biological material relative to the surrounding mineral matrix. Using biological secondary ion mass spectrometry, we can determine the concentration and spatial location of trace elements in each sample on a micron scale across biological structures and into the surrounding silica matrix. Most of the measured trace elements (Fe, As, Al, Cr, and Mn) are found to be co-localized with preserved organics, while Ga is found to be co-localized with siliceous coatings that surrounded the microbes during life and were subsequently preserved. By developing this novel biosignature and combining it with multiple techniques for establishing biogenicity, we can find more robust evidence of life, which may prove to be a valuable tool for the search for extraterrestrial life in precious samples, particularly those collected by the upcoming Mars 2020 mission.

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Brittany Johnson

Epidemiology, MPH

Advisor: Aimin Chen, MD, PhD

Listening to Their Story: Use of PhotoVoice and Interviews to Develop an Individual and Advocacy-Based Health Behavior Intervention among Urban-Dwelling, Low-Income African Americans

Rationale: Many Americans live in environments promoting access to unhealthy foods, excessive eating, and physical inactivity, contributing to the nationwide rise in obesity, especially in minority and low-income populations (F as in Fat, 2012). This is especially true in Ohio where 34% of African-American adults are obese compared to 29% of White adults (F as in Fat, 2012). The Center for Closing the Health Gap (The Center) developed the “Do Right!” campaign—a 12-week neighborhood resident-led, household focused program designed to improve diet and physical activity levels through didactic and experiential learning opportunities, and to increase resident’s self-efficacy to advocate for changes in the built environment supporting healthy behavior. The program employs the “Neighborhood Watch” block model and recruited Health Captains from the neighborhood to serve as group facilitators.

Objective: To display how a community needs assessment, including PhotoVoice and focus groups, was used to train Health Captains and inform program content and delivery.

Review of Literature: PhotoVoice is a community-based participatory research (CBPR) methodological tool, based on the premise that people are experts of their own lives (Garziano, 2004). This method has been used to: identify needs in a community (needs assessment) so as to develop interventions and create facilities; persuade policymaking within local communities; and influence people, including community members and the people leading interventions.

Miaoqi Li

Mathematical Sciences, PhD
Advisor: Emily L. Kang, PhD

Randomized Algorithms of Maximum Likelihood Estimation with Spatial Autoregressive Models for Large-Scale Networks

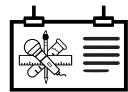
Spatial autoregressive (SAR) models have been widely used in analyses of economic, environmental data and recently social network data. Maximum likelihood estimation with the SAR models has been extensively studied and utilized. However, when dealing with large amount of data, direct evaluation of the log-likelihood function from the SAR models becomes computationally infeasible. To alleviate this challenge, we propose a randomized algorithm that provides an efficient way to obtain the maximum likelihood estimator, denoted as the randomized maximum likelihood estimator (RMLE). Numerical studies with simulated and real data are carried out to investigate the performance of the proposed algorithm. It is shown that the RMLE performs favorably in comparison with existing methods.

Donald Gaffney

Business Administration, PhD
Advisor: Frank Kardes, PhD

You Are What You Buy: An Investigation into How Moral Purity Affects Purchasing Behavior

The consumer decision making process is complex. This research investigates the effect of metaphorical purity on choices and judgments of products as a function of consumers' distinct purity beliefs. Consumers have higher judgments of products featuring one rather than a multitude of (dissimilar or similar) materials, ingredients or sources. This is because one component (material, ingredient or source) is metaphorically associated with higher perceived purity. Purity is generally believed to be important, but purity belief can still vary across individuals and contexts. In a practical sense, consumers' lay beliefs regarding purity (either measured or manipulated) impact how they view products, such that consumers who value (devalue) purity are more (less) likely to choose products with one component over those with a number of components.



April Poteet

Health Education, MS

Advisor: Laura Nabors, PhD

Peer Attitudes towards Children with Intellectual Disabilities

Background: Policies on inclusion-based education have resulted in increased interaction among typically developing students and students with disabilities. Students most likely included in mainstream classrooms are those with learning disabilities, such as an intellectual disability (ID), with recent research indicating that the number of youth receiving special education services was 6.6 million (35% having specific learning disabilities). ID refers to significant limitations in intellectual functioning, poor social interaction skills, and limited practical skills. Research supports the idea that children may hold more negative attitudes towards peers with IDs. Research indicates that females may be more accepting of peers with IDs; older children may hold more negative attitudes; and contact significantly affects positive attitudes. Empathy of the perceiver has not been evaluated as a factor. Authors of this study hope to determine if empathy of the perceiver influences attitudes and contribute to existing literature regarding the correlations among attitudes, gender, and contact.

Methods: This study is currently in progress. The goal for this study is 240 students. Children are randomly assigned a vignette describing a same gender child with an ID or one who is typically developing. Children will provide answers to the CATCH scale, the index of empathy for children and adolescents, and the modified short-form of the children's social desirability questionnaire.

Plan for analyses: Data will be analyzed using descriptive statistics and t-tests. Results will offer new information on the effects of empathy of the perceiver and peer acceptance and contribute to existing literature regarding gender and contact.

Carrie Doyle

Physics, PhD

Advisor: Thomas L. Beck, PhD

Ion Solvation and Interfacial Potentials: A Multipolar Breakdown

Free energies and entropies are key to understanding the ion-specific effects that are ubiquitous in many natural processes and are necessary for improving technology. Key components to the determination of these values are a clear definition of the thermodynamic process of ion solvation and measurement of the interfacial potentials. Using classical molecular dynamics computer simulations of cavities inside of small liquid water droplets, the interfacial potentials and their multipole decomposition are calculated. This includes two interfaces: one separating the cavity from the droplet and a second separating the droplet from vapor. By simulating various system sizes and cavity sizes, the bulk behavior can be extrapolated. The dominant multipolar potential contribution is shown to be the quadrupole potential from the cavity-droplet boundary.

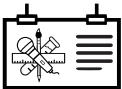
Wesley Parker

Geology, PhD

Advisor: Yurena Yanes, PhD

High-Resolution Paleotemperature Inferences in Tenerife, Canary Islands from Archaeological *Phorcus atratus* Shells

Shells of *Phorcus atratus* (Gastropoda; Trochidae) were collected from modern and archaeological sites on the island of Tenerife in the Canary Islands, Spain. The oxygen isotope composition of these shells ($d_{18}\text{O}$) was examined along the direction of growth to determine the variability of the season of shellfish harvest, mean annual sea surface temperature (SST), and magnitude of seasonality over the most recent 800 years in the Canary Islands. The shell carbonate material of two modern and three archaeological shells was analyzed at 1mm intervals from the shell margin to the apex. Previous study of *Phorcus atratus* in the Canary Islands determined the $d_{18}\text{O}$ values of live-collected individuals to be reliable repositories of paleoclimatic data. Preliminary results from this study indicate that SSTs in the Canary Islands have risen 1-2 °C over the past 800 years. Additionally, the magnitude of seasonality has widened by 3 °C, reaching 8 °C in the modern archipelago, compared to 5-7 °C recorded in the shells from ~800 years ago. Lastly, season of shellfish collection is clearly discernable in all archaeological shells, and was determined to be late summer/early autumn. This finding is consistent with the ongoing archaeological interpretation of archaeological sites in the archipelago, which found that shells of other gastropod genera were predominantly collected in the warm months. Combined with ongoing research, these preliminary conclusions support that the marine resource exploitation patterns remained consistent throughout pre-Hispanic times in the Canary Islands.



Andrew Vonhandorf

Toxicology (Environmental Health), PhD

Advisor: Alvaro Puga, PhD

Chromium Disrupts Chromatin Organization and CTCF Access to Its Cognate Sites in Promoters of Differentially Expressed Genes

Hexavalent chromium compounds are well-established respiratory carcinogens used in industrial processes, and environmental exposure from chromium-contaminated drinking water is a widespread gastrointestinal cancer risk, affecting millions of people throughout the world. Cr(VI) is genotoxic, forming protein-Cr-DNA adducts and silencing tumor suppressor genes, but its mechanism of action is poorly understood. Here, we used two complementary approaches to test the hypothesis that chromium perturbs chromatin organization and dynamics. DANPOS2 analyses of MNase-seq data identified several chromatin alterations induced by Cr(VI) affecting nucleosome architecture, including occupancy changes at specific genome locations; position shifts of 10 nucleotides or more; and changes in position amplitude or fuzziness. ATAC-seq revealed that Cr(VI) disrupted the accessibility of chromatin enriched for CTCF and AP-1 binding motifs, with a significant co-occurrence of binding sites for both factors in the same region. Cr(VI)-enriched CTCF sites were confirmed by ChIP-seq and found to correlate with evolutionarily conserved sites occupied by CTCF *in vivo*, as determined by comparison with ENCODE-validated CTCF datasets from mouse liver. In addition, more than 30% of the Cr(VI)-enriched CTCF sites were located in promoters of genes differentially expressed from chromium treatment. Our results support the conclusion that Cr(VI) exposure promotes broad changes in chromatin accessibility and suggest that the subsequent effects on transcription regulation may result from disruption of CTCF binding and nucleosome spacing, implicating transcription regulatory mechanisms as primary Cr(VI) targets.

Wael Abdelraheem

Environmental Engineering, PhD

Advisor: Dionysios D. Dionysiou, PhD

Facile Synthesis of Nitrogen- and Boron-Codoped TiO² with Enhanced Photocatalytic Properties for Wastewater Treatment/Reuse Applications

Water scarcity nowadays has become a persistent challenge to many societies, especially in areas with lack of sustainable water resources. Thus, reclaiming domestic wastewater emerged as an effective solution that could secure a viable way of producing clean water for potable and non-potable reuse. Advanced oxidation technologies were identified as important and efficient treatment methods for various contaminants in wastewater. In this study, we are investigating the use of homemade synthesized nitrogen- and boron- codoped TiO² (NBT) nanoparticles with improved solar light photocatalytic properties for the degradation of contaminants of emerging concern—including Bisphenol A (BPA), Diclofenac (DCF), Estrone (E1), Tricosan (TCS), and Ibuprofen (IBP)—in clean water and water matrices from GWRS water purification system in Orange County. The spiked chemicals were chosen to represent different categories of pollutants (i.e., pharmaceuticals, personal care products, hormones, and pesticides) typically found in wastewater. Several physicochemical techniques were used for catalyst characterization including XRD, BET, SEM, EDX, TEM, and HR-TEM. The highest pollutant removals were achieved at initial catalyst dose and pH of 0.8 g/L and 7, respectively. All studied contaminants were completely degraded by solar light/NBT system in clean water in 2 hours; however, the same system showed a lower degradation efficiency for the target contaminants spiked in GWRS waters. Among all the contaminants used, degradation of IBP was highly diminished in GWRS water. The synthesized photocatalyst showed a superior reactivity towards the removal of certain contaminants in water matrices.

Jose Joseph

Computer Science, MS

Advisor: Rui Dai, PhD

A Survey on Simulator Platforms for Mobile Wireless Multimedia Sensor Networks (MWMSN) and Aptness Evaluation for the QoE Modelling for the Video Transmission Scenarios of a UAV FANET-WMSN

Mobile wireless multimedia sensor networks (MWMSN) have gained a lot of interest among researchers recently due to their forecasted huge deployment demands for IoT based systems enabling smart cities in the near future. Mobility and multimedia aspects by themselves make the mobile wireless multimedia sensor networks very complicated and challenging in design, testing, deployment, and ensuring quality of experience to the end users. Due to the cost associated with real deployment testing and the limited opportunities in onsite testing, it is very essential to simulate and test the system before actual deployment for various network performance parameters to meet the strict quality assurance requirements.

Currently, most of the simulations for MWMSNs are performed with the help of extensions, which were developed on top of traditional network simulators where most of the extensions do not cover mobility, multimedia and QoE aspects together. The development of more integrated simulators (or simulator extensions) and standardization efforts are required, which will help to simulate the system in a more holistic way to better represent the real system and to reduce the configuration efforts. Thus an efficient simulator platform will help to achieve cost-effective faster deployments of the network.

In our study, an extensive evaluation of various wireless sensor simulator platforms and their extensions performed with a special focus on their support for mobility, multimedia, QoE aspects. As part of the study, a specific case of MWMSN simulation, the QoE modelling for the video transmission scenarios of a UAV FANET-WMSN, has been considered and evaluated.



Fang Yu

Environmental Engineering, PhD

Advisor: Dionysios D. Dionysiou, PhD

A Geometrical Model for Diffusion of Hydrophilic Compounds in Human Stratum Corneum

The routes by which hydrophilic compounds enter the skin, and the associated question of whether these routes can be safely altered to increase topical or transdermal delivery, have been the subject of much research. A three-dimensional diffusion model with either hexagonal or cylindrical symmetry has been constructed to simulate desorption profiles of hydrophilic chemicals from the top-most layer of human skin (the stratum corneum) as measured in *ex vivo* studies. The tissue is pierced by skin appendages (sweat glands and hair follicles), which in this particular scenario are considered to be perfect sinks. Desorption profiles of nine test permeants covering a wide range of lipophilicity were analyzed. By optimizing transverse and lateral diffusion coefficients to match these profiles, it was found that the lateral diffusivity values exceeded the transverse values by average factors ranging from 45 (hexagon model) to 71 (cylinder model). However, transverse clearance exceeded lateral clearance by factors ranging from 8 to 27 (cylinder model); these values were strongly influenced by the thickness of the individual tissue samples, as expected. The results confirm the validity of earlier estimates of transverse diffusivity of hydrophilic compounds in human stratum corneum based on purely one-dimensional models. They furthermore confirm that transcellular transport is an important component of the stratum corneum's polar pathway, in addition to the already-recognized appendageal transport mechanism.

David Rea

Business Administration, PhD

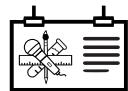
Advisor: Craig M. Froehle, PhD

Allocating Clinical Capacity across Multiple Hospital Locations to Maximize Staff Satisfaction

Staff scheduling tends to allocate capacity while minimizing total costs, with staff satisfaction rarely being incorporated in any systematic way. In this research, we develop a novel approach for allocating physician clinical hours to Emergency Department (ED) locations that maximizes staff satisfaction.

Using a novel, two-stage survey approach, we gathered data in order to estimate physicians' location preferences and how they would weight various factors, such as seniority, educational engagement, etc., to reflect departmental priorities. The research process produced a comprehensive slate of metrics by which faculty's contributions to the department's mission were measured. Using those data, we then formulate a mixed integer non-linear optimization model to assign clinical hours so that all staffing requirements are met, and the weighted satisfaction of the faculty cohort is maximized. By systematically incorporating physician preferences, we increase the overall satisfaction of the group while ensuring no physician receives an unfair allocation.

The model's recommended staffing allocation assigned faculty to significantly more hours at their preferred facilities and fewer hours at their non-preferred facilities than the subjective, manual approach it replaced. The presented methodology can be generalized to many situations where faculty effort needs to be allocated across multiple locations (or responsibilities) in an equitable and effective manner.



Karen Lynch

Anthropology, MA

Advisor: Leila Rodriguez Soto, PhD

Ethnography in Senegal

Conducting ethnographic research in Senegal is never predictable. I intended to interview respondents over meals and tea, but I was taken into a market that is very difficult to see unless you know what to look for. I was taken to a tailor to have clothing made. Sitting through an hour's long religious program is not an uncommon request made of visitors. This is a chance to see the respect and courtesy shown to each other, especially anyone older than yourself, in public places. People were very happy to answer my questions and tell me stories, but watching friends greet each other and visit showed me new questions to ask. A lesson in tea-making, Senegalese style, also taught more than tea pouring skills. Traveling by car can be a chance for a three hour interview with your driver, but also the opportunity to observe the care taken by drivers to avoid hitting goats, cows, dogs, and any of the many pedestrians along the road. When I thought the day was over, my host would say to me, "Binta, I have a question." He would ask me a question about how I feel about one of their customs, and I learned to grab my notebook. Ethnography happens constantly, and is constantly worth the work.

Kelsi Wood

Health Education, PhD

Advisor: Rebecca A. Vidourek, PhD

Friend Influence on Electronic Cigarette Use: A Nationwide Study of Hispanic Adolescents

Background: Electronic cigarette (e-cigarette) use is rapidly increasing among Hispanic adolescents. A better understanding of social factors associated with e-cigarette use may provide information to tailor interventions that can be implemented to decrease rates. The purpose of the present study was to review the influence friends have on lifetime, past year, and potential use of e-cigarettes.

Methods: A secondary analysis was conducted of the 2014 National Youth Tobacco Survey which included 6,044 Hispanic adolescents. While controlling for sex and grade level, logistic regressions were performed to determine whether e-cigarette use differed based on friend factors. Follow-up regressions were done to examine differences by grade level while controlling for sex.

Results: Results revealed students who reported that young people who use e-cigarettes have more friends were 3-4 times more likely to report lifetime use (95% CI = 2.52, 3.34, $p < .001$), recent use (95% CI = 3.16, 4.47, $p < .001$), and think they will try e-cigarettes soon (95% CI = 3.60, 4.76, $p < .001$). Students who reported if one of their best friends offered an e-cigarette that they would use were 27 times more likely to report lifetime use (95% CI = 22.71, 31.42, $p < .001$), 38 times more likely to report recent use (95% CI = 29.31, 49.51, $p < .001$), and 77 times more likely to try e-cigarettes soon (95% CI = 62.90, 95.53, $p < .001$).

Discussion: Results supported the idea that friend use of e-cigarettes strongly influenced use among Hispanic adolescents.

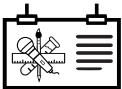
Felicia Swafford

Psychology, PhD

Advisor: Stacie Furst-Holloway, PhD

The Unmasking of a Chameleon: The Role of Race Discrepancy on Multiracial Employees Professional Image

The population of the United States is fundamentally shifting, with a dramatic increase in the number of people identifying as multiracial. A multiracial individual is one whose identity consists of two or more cultural influences. We are proposing and exploring a new phenomenon on how society tends to social categorize multiracial individuals into one racial group due to outwardly monoracial appearance even though the individual may internally identify with more than two or more races. We are suggesting that when a multiracial's perceived racial identity is not consistent with the employees' internal self-identity, this can lead to a phenomenon we are proposing called race discrepancy. We are examining frame switching strategies that multiracial employees may use to bring their socially perceived identity into agreement with their self-identity.



Melanie McKell

Immunology, PhD

Advisor: Joseph Qualls, PhD

L-Arginine Drives Anti-Mycobacterial Acid Production by Macrophages

One third of the world's population is currently plagued by mycobacterium tuberculosis (Mtb), which is becoming increasingly resistant to antibiotics. Therefore, a host-directed therapy, aimed at boosting the host immune system, is necessary. A better understanding of how host defense to Mtb is regulated is critical to designing an optimal host-directed therapy. A sufficient supply of the amino acid L-arginine is necessary for macrophage-mediated host defense against Mtb. L-arginine-driven antimicrobial activity has previously been attributed to mycobactericidal nitric oxide (NO) production by macrophages, but due to its controversial role in humans, investigation into NO-independent mechanisms of L-arginine-mediated host defense is necessary. We observe that NO-deficient macrophages can still facilitate mycobacterial killing in an L-arginine-dependent fashion, illuminating a critical NO-independent killing mechanism regulated by L-arginine. Amongst known antimycobacterial defense pathways, our data identify lactic acid production as an alternative L-arginine-dependent mechanism capable of inhibiting mycobacterial growth. Additionally, we find this lactate production is due to a large spike in glycolytic activity, linking for the first time L-arginine metabolism to glycolysis-associated mycobacterial defense. We have further parsed out the regulatory pathways involved, which can assist in the discovery of an optimal host-directed therapy. In conclusion, we find that L-arginine assists in macrophage antimicrobial activity independent of NO generation via lactic acid production.

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Gaurav Patil

Mechanical Engineering, PhD

Advisor: Manish Kumar, PhD

Planning Sit-to-Stand (STS) Transition Trajectories for a Lower-Limb Exoskeleton Using a Momentum-Based Model

The ability to move one's body from sitting to standing is a crucial ability for independent living. Especially for seniors with decreasing muscular strength, sit-to-stand (STS) transitions are exceptionally risky and often call for assistance. In general, a STS transition is a complex full-body activity that requires the synergistic coordination of the upper and lower limbs and trunk. An exoskeleton can support this multiple degrees-of-freedom problem by controlling the trajectory of the center of mass of the resulting human-robot system. However, while human movement is highly variable, exoskeletons usually only support one of multiple possible solutions. In this poster, we present an analysis of factors that affect human center of mass trajectory and show that different human movement velocity profiles during STS transitions require different control strategies of the center of mass. Therefore, we propose a model based on horizontal and vertical momentums that enables efficient planning of the center of mass trajectory for any STS transition velocity. Finally, we validate this model by presenting an inverse kinematics solution for the CoM to joint angle problem using a deep long short-term memory (LSTM) network.

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Jonathan Thompson

Physics, PhD

Advisor: Hans Wagner, PhD

Temperature Dependent Quenching of Trapped Singlet Excitons in Alq₃ Films

We investigate temperature dependent light emission from optically excited tris(8-hydroxyquinolinato) aluminum (Alq₃) films using time-resolved photoluminescence (PL) for varying laser pulse repetitions and energy fluences. Understanding Alq₃'s fluorescence through singlet exciton dynamics and decay processes is necessary to create more efficient organic light emitting diodes (OLED). We model these singlet decay lifetimes using coupled rate equations that include singlet-triplet intersystem crossing and bimolecular quenching. Due to Alq₃'s quasi-amorphous nature, grains of varying polymorphs and isomers form, introducing compressive strain at grain boundaries. Hence, we also add trapped radiative and non-radiative states in our model that can be thermally excited. Our measurements show that high laser energy fluences create many singlet excitons that undergo singlet-singlet annihilation (SSA) and decrease the overall PL efficiency. Due to long triplet lifetimes, high laser pulse repetitions lead to large accumulations of triplets that can also annihilate singlets via singlet-triplet annihilation (STA), further decreasing PL efficiency. However, this effect is only observable for low temperatures, where triplet-triplet annihilation (TTA) is negligible. Consequently, the PL efficiency increases as the temperature rises because increasing TTA decreases STA. Though, a max PL efficiency of 45% is reached at about 180 K, where singlets are thermally activated from their traps and fall into non-radiative centers.

Maryam Alsameen

Physics, PhD

Advisor: Mark DiFrancesco, PhD

Functional Activation Associated with Adolescent Chronic Sleep Restriction in Working Memory

The overall goal of this multidisciplinary research project is to advance science and sleep health in adolescents by clarifying the impact of experimental chronic sleep restriction (CSR) on healthy adolescent's neural functioning. This study uses functional magnetic resonance imaging to investigate brain circuits associated with working memory and attention and their dependence on adolescent sleep regime. 36 healthy adolescents underwent 5 consecutive nights of short duration sleep (SD; 6.5 hours in bed) versus 5 nights of healthy duration (HD; 9 hours in bed), in randomly counterbalanced order, separated by a 2-nights wash-out. Imaging was performed the morning after each sleep condition during working memory (*n*-back) task. After preprocessing of the imaging data, group level voxel by voxel analysis was performed over all subjects for summed response in two brain networks of interest. The first network corresponds to task positive (TP) regions that are commonly activated in response to attention and working memory tasks, and the second corresponds to task negative (TN) regions that reduce activation in response to attention demands. Analysis of variance (Anova) was performed to find out the effects of sleep condition and difficulty level of the *n*-back task, and the interaction between sleep state and task's difficulty. The finding from these results show that TP and TN responses varied according to level of difficulty of the working memory task. Sleep state affected activation only for the most difficult level of working memory, which may be implied to TN network breakdown due to CSR in adolescents.

Mohammad Sarim

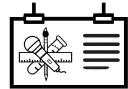
Mechanical Engineering, PhD

Advisor: Manish Kumar, PhD

Memristive Device-Based Bio-Inspired Learning for Robots

The aim of this research is to develop a bio-inspired approach towards unsupervised learning for robots. We recently developed a hardware-based learning scheme that can impart unsupervised learning capabilities in a highly scalable and computationally efficient manner. The motivation comes from the fact that we learn very intuitively from the environment around us and make rational decisions. However, the human brain contains billions of neurons and trillions of connections between them. This makes it very difficult to replicate this functionality on conventional computers employing traditional neural networks due to the limited bandwidth between processing and memory storage. The memristive devices mitigate this problem due to their capability of parallel processing and memory storage. They can replicate the synaptic behavior and are also energy efficient and highly scalable to large networks.

We implemented this approach on a ground robot coupled with a crossbar array of such devices. We showed that this robot can learn the associations between the environmental features and its response to them to reach a given target, thus very effectively navigating in an unknown environment while avoiding the obstacles. To explore the scalability of this approach, we are now working to solve the simultaneous localization and mapping (SLAM) problem using a large network of these memristive devices with inspiration from biological place cells.



Seth Reighard

Immunology, PhD

Advisor: Stephen Waggoner, PhD

Taking CARs Down a Road Less Traveled: Engineering a Natural Killer Cell for the Treatment of Systemic Autoimmune Disease.

Chimeric antigen receptor (CAR) T-cell therapy has become a powerful new weapon in the fight against cancer. Yet treatment with CAR T-cells has limitations and risks, such that CAR-equipped natural killer (NK) cells are emerging as a potentially safer and more effective therapeutic option. We hypothesize that the success of CARs in the cancer clinic can be extended to autoimmune diseases, such as systemic lupus erythematosus (SLE). Specifically, we engineered a CAR that contains the extracellular domain of programmed death-ligand 1 (PD-L1). PD-L1 binds to programmed cell death protein 1 (PD-1), a receptor that is highly expressed on the cells responsible for disease pathogenesis in SLE. We aim to express this CAR on functional human NK cells isolated from SLE patients or generated from patient-derived induced pluripotent stem cells (iPSC). We propose that CAR-expressing NK cells will kill PD-1-expressing target cells, resulting in reduced autoantibody production and alleviation of disease in patients. We are using multiple techniques (e.g. lentiviral vectors, transposable elements) to express our CAR in primary NK cells, NK-cell lines, and iPSC-derived NK cells to explore different therapeutic options for SLE patients. Additionally, we are testing the function and specificity of CAR-expressing NK cells in both *in vitro* assays and in humanized mouse models of SLE-like disease. We aim to demonstrate that CAR NK cells can revolutionize the treatment of autoimmune disease.

Christopher Sheehan

Geology, PhD

Advisor: Dylan Ward, PhD

A New Mechanism of Escarpment Retreat: Quantifying the Processes of Laterally Propagating "Waves of Erosion"

Earth scientists endeavor to understand how the planet's coupled physical and chemical systems will respond to human-induced climate and land-use changes over the next century. One method of predicting future changes to Earth's surface is to measure the landscape response to past climate forcing. A recently discovered variety of landform, which we call "waves of erosion" (WEs), offers such an opportunity. WEs are small escarpments beveled into shale bedrock; conceptual models indicate they are created by climatically induced base level lowering and subsequently erode via escarpment retreat, causing them to migrate across the landscape like kinematic waves. Erosion rates in the shale are large enough to measure over several months; however, no data regarding WE age, rate of migration, or governing geomorphic processes have been collected.

We seek to constrain long and short-term migration rates at a single WE in central Utah and evaluate the sensitivity of its governing processes to changes in precipitation. This will be accomplished by completing four goals: 1) Constrain the time of WE creation, 2) Measure regolith flux over several years, 3) Quantify the amount of regolith moisture required to initiate mass wasting, and 4) Create field-calibrated, process-driven numerical models. A minimum WE age will be obtained by dating relatively younger deposits using radiocarbon (¹⁴C) and optically-stimulated luminescence (OSL) techniques. *In situ* erosion gages will measure mass wasting at several locations, and regolith moisture will be monitored and correlated with mass wasting events. These data will be used to calibrate numerical simulations that subject the WE to variable amounts of precipitation over various time scales.

Yoontaek Oh

Environmental Engineering, PhD
Advisor: Soryong Chae, PhD

Effect of Divalent Cations on Power Generation in Reverse Electrodialysis

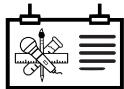
Reverse electrodialysis (RED) is an emerging technology that can generate clean energy from the mixing of two water resources with different ionic strength. According to literature, most RED studies have been conducted using only NaCl in synthetic water, which does not reflect the characteristics of natural water sources containing multivalent ions. Therefore, there is a critical need to determine the effect of multivalent ions on performance of RED. In this study, we have investigated the effects of environmentally abundant alkaline earth ions such as Mg²⁺, Ca²⁺, Sr²⁺, and Ba²⁺ on electrical resistance of IEMs and energy production of the RED process. In batch experiments, we found that the electrical resistance of a cation exchange membrane (CEM) with Mg²⁺ or Ca²⁺ ions in an NaCl solution was increased by 145% or 172%, respectively compared to that of a CEM with NaCl only. Also, a linear relationship between the electrical resistance of the CEM and the hydration number of various cations was found. As the hydration number of divalent cations decreased (i.e., Mg²⁺ > Ca²⁺ > Sr²⁺ > Ba²⁺), the electrical resistance of the CEM increased. During the continuous operation of a bench-scale RED process, when a divalent cation (i.e., Mg²⁺ or Ca²⁺) was added into an NaCl solution, the electrical resistance of the bench-scale RED process increased by 110% or 117%, respectively, compared to that of the RED stack with NaCl only. The increased electrical resistance of the RED stack adversely affected power generation from the RED process.

Connor Sears

Biological Sciences, PhD
Advisor: Joshua Gross, PhD

Life in the Dark: A Transcriptomic Assessment of Varying Photic Rearing in the Mexican Cavefish

The blind Mexican cavefish, *Astyanax mexicanus*, has evolved for millions of years in the extreme cave environment. Previous studies have characterized phenotypic changes that evolve in response to these pressures (such as complete darkness), however, little is known of the complex genetic changes underlying these phenotypes. Across 29 cave localities in NE Mexico, *A. mexicanus* cavefish have evolved eye loss, pigmentation loss, cranial asymmetry and expanded non-visual senses. Lighting condition can play a key role in gene expression. However, previous transcriptomic analyses have not accounted for photic rearing differences between cavefish and closely related surface fish. This project investigates gene expression changes as influenced by lighting condition. Both cave and surface fish were reared under either a 12-hour-light/12-hour-dark cycle (LD) or constant darkness (DD) for >5 years. Total RNA was isolated from head tissue (n=4, each treatment) and aligned to the draft *Astyanax* genome to evaluate expression of >25,000 genes. We assessed patterns of global gene expression, the functional repertoire of differentially expressed genes, and specific genes of interest across the transcriptome. GO term enrichment analysis revealed gene expression differences in neural and behavioral system processing. Single genes, such as *iер2* and *hbz*, responded very differently to photic rearing condition in cavefish. In sum, dark rearing better replicates the extreme cave environment and reveals considerable gene expression differences between cave and surface fish. Many of these changes may explain why the blind Mexican cavefish has recurrently adapted to the unforgiving and extreme cave environment.



April Johnson

Adult-Gero Primary Care Nurse Practitioner, MSN
Advisor: Christine Colella, DNP

Depression among African American Women with Diabetes

Diabetes Mellitus (DM) is the seventh leading cause of death. It affects 18.7% of the African American community, particularly affecting its women who have a greater proportion of DM risk factors and incidence than men. The same is true for depression, which has a lower incidence of diagnosis and treatment. Among African American women, having comorbid stress and depression with DM puts them at high risk for cardiovascular events. Complex regimens and associated distress also correlates with elevated HgbA1C levels. Furthermore, depression contributes to non-adherence with diabetes self-care and medication regimens. There is also a higher risk of physical-psychiatric comorbidity in this population which is complicated by socioeconomic factors.

Health outcomes and DM control are improved in primary care when interventions are targeted at risk factors such as depression. African American women do tend to seek treatment for depression in primary care, but few of them receive guideline-concordant depression treatment. Integrating nurse practitioners into primary care teams improve Hgb A1C benchmarks, lower blood pressure and LDL, increase self-efficacy, and decrease depression.

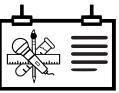
The incorporation of depression diagnosis and treatment into the plan of care for DM maintenance will enhance patient outcomes. The nurse practitioner can employ strategies to recognize and treat depression thus enhancing regimen adherence. Depressed patients could also be given extra assistance to comply with treatment regimens.

Andrew Winter

Neuroscience/Medical Science Scholars Interdisciplinary, PhD
Advisor: Renu Sah, PhD

Delineating Mechanisms Underlying Panic Pathophysiology

Panic disorder (PD) is a prevalent, complex anxiety disorder afflicting 4% of U.S. adults. The hallmark of PD is recurring panic attacks: episodes of debilitating fear concurrent with intense physical symptoms. Existing treatments for PD are limited, and many patients are unresponsive, highlighting the need for improved understanding of the biological triggers of panic attacks to identify novel targets of intervention. Panic attacks can occur spontaneously without external threats, suggesting internal homeostatic disturbances as likely triggers. Accordingly, PD patients are very sensitive to challenges producing pH imbalances, specifically acidosis. Carbon dioxide (CO_2) inhalation induces acidosis and reliably elicits panic attacks in PD patients. Thus, analysis of acid-sensing mechanisms and downstream effectors are crucial to understanding panic pathophysiology. Our lab employs CO_2 inhalation in mice to simulate an acute, interoceptive threat producing defensive behaviors representative of fear. Recently, we reported contributions of microglial acid-sensing to CO_2 -evoked fear (Vollmer, 2016), but specific sites and neuronal effector mechanisms remain unclear. The current study a) confirms the brain site orchestrating acidosis-evoked behavior and b) identifies a potential neuronal coupling system in CO_2 responses: the renin angiotensin system (RAS). Site directed infusion of acidified aCSF into a homeostatic regulatory region, the subfornical organ (SFO), evoked significant fear behavior in mice dependent on the presence of the acid sensor. The SFO is also a known modulator of systemic homeostasis via RAS. By intracerebroventricularly delivering Angiotensin II-type I receptor antagonist, losartan, near the SFO, a significant attenuation of CO_2 -evoked freezing was observed in losartan treated mice, identifying RAS as a potential neuronal effector downstream of microglial acid sensing. Our studies help delineate mechanisms by which homeostatic triggers may lead to panic attacks.



THREE MINUTE THESIS



First developed by The University of Queensland, Australia in 2008, the international Three Minute Thesis competition challenges students to summarize their research or scholarship for a nonspecialist audience using only three minutes of speech and a single PowerPoint slide.

1

Crystal Whetstone

Political Science, PhD
Advisor: Rina V. Williams, PhD

A Comparative Study of Political Motherhood

In this presentation, I will describe the concept of political motherhood and its implications for women's political participation in the context of my comparative study of two maternal groups, the Madres of the Plaza de Mayo and the Mothers' Front.

2

Safa Khodabakhsh

Materials Science and Engineering, PhD
Advisor: Ashley Paz Y Puente, PhD

Alloying and Sintering of 3D Printed Ni-based Super Alloy Scaffolds

I am going to explain: Why 3D printing? Why Ni-based super alloys? And interesting facts about my thesis.

3

Sisan Walker Angel

Communication Sciences and Disorders, PhD

Advisor: Amy Hobek, PhD

Digital Dual Language Books for English Language Learners

The study looks to investigate the use of video recorded books on iPads (narrated bilingually in English and Spanish) vs. monolingually (English only) to provide Hispanic ELL children an opportunity to demonstrate their language abilities when working with their monolingual teachers by hearing a book in both their home language and their school language. The project takes place in Head Start facilities with approximately 30 Hispanic ELL children.

4

Kalyani Bhide

Mechanical Engineering, MS

Advisor: Shaaban Abdallah, PhD

Supersonic Rectangular Nozzles

Multiphysics modeling of rectangular supersonic nozzle geometries with varying aspect ratios and wall curvatures.



Shima Dalirirad

Physics, PhD

Advisor: Andrew Steckl, PhD

Stress and Depression Biomarkers Detection by Paper-based Biosensor

Long term effects of stress due to stressful jobs and situations (soldiers, pilots, medical professionals, etc.) have a major influence on both physical and physiological health. Therefore, monitoring stress biomarkers *in vivo* levels could be helpful to assess human's physiological state. It is not convenient for individuals frequently to do a blood test in clinics to measure their stress biomarkers level. We know that the blood is the gold standard in monitoring the physiological state, but as an invasive method, using a needle may induce stress to some individuals and may lead to inaccurate test results for stress biomarkers detection. Developing a robust, easy to use and quick point of care (POC) diagnostic device to detect the stress and depression biomarker is the goal of my project.

Jayanth Dungavath

Computer Science, MS

Advisor: Fred Annexstein, PhD

Batmobile: Stuck in Traffic; Batman, "I'm Running Late!"

UC's Night Ride program—like our Dark Knight—decided to come to the rescue of stranded UC students. However, Batman is running late because the Batmobile's navigation and underlying algorithm isn't well optimized such that the Batmobile reaches the student's location on time and takes him to his safe house in the shortest time and distance possible.

Being the Lucius Fox that I am, I work with Batman to find the bugs in existing application's underlying algorithm design and help him upgrade the application to achieve the mentioned goals of optimizing the route to minimize wait time and travel distance there, thus saving money while providing safety services to the UC students.

Rajeswari Jayavaradhan

Pathobiology and Molecular Medicine, PhD
Advisor: Punam Malik, MD

A Precise Tool to Edit Human Hematopoietic Stem Cells and Quantify and/or Alter Different DSB Repair Outcomes

Hemoglobinopathies affects millions worldwide, with nearly 400,000 births per year, and the disease has devastating morbidity and mortality. Newer therapies that cure hemoglobinopathies are much needed. Gene-editing of hematopoietic stem cells (HSC) to correct the disease mutation using CRISPR/Cas9 system has vast therapeutic potential. However, to achieve therapeutic levels of gene-editing efficiency in HSC is currently challenging.

Herein, we developed a hematopoietic gene-editing reporter system to rapidly and precisely quantify different DNA double-strand break (DSB) repair outcomes in hematopoietic stem and progenitor cells (HSPC)/HSC at a single cell level by flow cytometry and molecular assays. This system allowed us to optimize conditions and achieve efficient gene-editing in HSC. More importantly, we identified high susceptibility of adult, but not fetal “edited-HSC” to apoptosis. Our studies open a new paradigm of the occurrence of microhomology-mediated end joining (MMEJ)-based DSB repair in HSPC and not in lymphocytes. Our system lays the foundation for the development of strategies to achieve editing efficiency in the mobilized peripheral blood (MPB) derived HSC, similar to cord blood-derived HSC.

Trenton Davis

Applied Economics, MS
Advisor: Melinda Butsch-Kovacic, PhD

The Neighborhood Economic Vitality Index

When we research human subjects, we ask questions. Often times, those questions lead to solutions or “fixes” that are simply a product of the question that we asked. The reason we keep trying to “fix” those that live in poverty is because we are creating a narrative about them from the questions we ask. The Neighborhood Vitality Index (NEVI), is the first step in identifying a new narrative and empowering communities to band together in support of one another.



Nirmalya Thakur

Computer Science, MS
Advisor: Chia Yung Han, PhD

A Complex Activity-based Emotion Recognition Algorithm for Affect Aware Systems

The usefulness of affect aware systems can be summarized as optimizing the system's services to improve the user experience. A means to achieve this objective is to make the system aware of the real-world situations and enable intelligent emotion analysis of its users. The ability of smart systems to automatically recognize human affective behavior through their movements and to respond are the key challenges in this area of study. This presentation thus discusses an algorithm that can effectively categorize the underlining emotion of an activity as positive or negative and then classify it amongst the six basic emotions: sadness, fear, happiness, anger, disgust, and surprise [Coulson 2004]. To portray the efficacy of this proposed model, typical scenes in the context of a smart home have been analyzed and the results have been studied. The results that would be presented and discussed shall show that the proposed model would help developers to understand user experiences in the form of user's emotions in any scenario, which would help them to improve or modify the existing technologies or interfaces to enhance computer-human interaction.

Allison Cooke

Pathobiology and Molecular Medicine, PhD
Advisor: W. Sean Davidson, PhD

LCAT Activation Requires the Cooperation of ApoA-I Molecules on HDL

High density lipoprotein (HDL) cholesterol levels are inversely correlated with coronary artery disease (CAD). Delineating the molecular interactions of HDL and plasma proteins could lead to new therapies for CAD. To do this, we chose a model plasma protein known to interact with HDL called lecithincholesterol acyl trasferase, LCAT. The primary protein component of HDL, apolipoprotein (apo) A-I, is thought to mediate activation of LCAT. With the use of techniques to measure LCAT binding, activation, and interaction with apoA-I on HDL, we found that a specific molecular orientation of two apoA-I molecules interact cooperatively on HDL to activate LCAT.

11

Daniel Peat

Business Administration, Management, PhD

Advisor: Joanna Campbell, PhD

Interaction of HR Systems and Dynamic Capabilities

Firms that leverage the interaction of HR systems with their dynamic capabilities are better able to respond to increasing globalization and the inherent complexities and dynamism of operating in these environments. We theorize how firms leverage this interaction to influence organizational level outcomes, specifically firm financial performance and organizational learning. In doing so, we both examine how human capital is viewed and answer calls within the literature on how resources are combined to influence firm outcomes.

12

Loryn Holokai

Molecular Genetics, Biochemistry, and Microbiology, PhD

Advisor: Yana Zavros, PhD

Pancreatic Cancer: A War Zone

My project deals with discovering new ways to aid the immune system in its fight with pancreatic cancer. Pancreatic cancer currently has about an 8% 5-year survival rate. Chemotherapy and radiation are not effective for most patients. My research focuses on helping the patient's own immune system recognize and kill the cancer.



13

Shraddha Barawkar

Mechanical Engineering, PhD

Advisor: Manish Kumar, PhD

Adaptive Control for Hawk

Hawk is an autonomous aerial car consisting of multiple UAVs/drones lifting a payload of people collaboratively. This will serve as a new mode of transportation and will benefit the entire human society. I will be discussing one control aspect known as “adaptive control” for this system.

14

Kelsey Conrad

Pathobiology and Molecular Medicine, PhD

Advisor: Phil Owens, PhD

The Role of Dietary Choline and Gut Microbiota in Abdominal Aortic Aneurysm

Abdominal aortic aneurysm (AAA) is a vascular disease characterized by a localized dilation of the abdominal aorta to a diameter 50% greater than normal (>3 cm in human patients). AAA affects 5-10% of men and 1% of women over the age of 65 and ranks as the 13th leading cause of death among this population. Currently, surgical intervention is the only treatment option for these patients; there are no pharmaceutical therapies available for the prevention or treatment of this disease. Thus, the pathophysiology of disease must be further explored to identify new therapeutic targets and develop novel pharmaceutical treatments for these patients.

Over the years, the gut microbiota and associated metabolites have been associated with a variety of cardiovascular and metabolic diseases, including atherosclerosis, chronic kidney disease, heart failure, and insulin resistance. Specifically, trimethylamine N-oxide (TMAO), a microbial metabolite derived from dietary choline, has been causally linked to the atherosclerosis. However, the effects of the gut microbiota and TMAO have never been evaluated in the context of AAA. The first aim of this research is to elucidate the role of gut microbiota-dependent TMAO on AAA development. As our preliminary data has identified a relationship between dietary choline supplementation, plasma TMAO, and AAA incidence in a mouse model of the disease, the second aim of this work is to assess the mechanism by which TMAO contributes to AAA disease. This knowledge will significantly advance our understanding of the diet and gut microbe-generated metabolites as risk factors for AAA and may help contribute to more personalized therapeutic strategies to decrease CVD risk and improve survival and quality of life for AAA patients.

Rigwed Tatu

Biomedical Engineering, PhD
Advisor: Chia-Ying Lin, PhD

Development of a Self-Expanding, Biodegradable Surgical Patch for Pre-Birth Neural Defect Repair

Myelomeningocele is a neural tube defect occurring before birth, characterized by protrusion of spinal elements from the infant's back. This defect, if not treated prior to birth, can lead to complications after birth, such as paralysis and other dysfunctions. The current minimally-invasive surgery conducted for repair utilizes surgical patches to cover the defect, which have flaws that can pose risks to surgical outcome. We have developed a polymeric patch that concurrently addresses the existing flaws and acts as a standalone system to benefit the efficacy of surgery. Our designed patch can be a potential alternative to the incumbent technology employed for defect site coverage.

Staci Jones

Communication, MA
Advisor: Ronald Jackson II, PhD

Not Everywhere We Go: A Critical-Interpretive Study of Affirmation and Identity Negotiation among Black College Students

In this study, I sought to understand the parallel of Black identity and experiences in the context of a Predominately White Institutions (PWIs) and Historically Black Colleges and Universities (HBCUs). In utilizing Cultural Contracts Theory and Identity Negotiation, the study takes a grounded theory approach that explores whether one institutional space provides greater opportunities for enhancing self-efficacy for Black students than the other. The findings provide insights into higher education in America and reflect an initial exploration of the concepts of minority identity affirming spaces and identity fulfillment.



17

Natalie Thompson

Environmental Engineering, MS

Advisor: Dionysios Dionysiou, PhD

Importance of Phosphorus Recycling

Phosphorus is an essential nutrient for plants and used as fertilizer to support food production across the world. However, phosphorus is a limited nutrient that must be mined and over application of fertilizers depletes the mineral's reserves. Excess nutrients in water bodies causes overgrowth of aquatic plants which can create toxins causing a danger to humans and animals. By removing phosphorus from water bodies and reusing as a fertilizer, this will decrease the demand on production and create cleaner water bodies.

18

Arunkumar Muthusamy

Biological Sciences, PhD

Advisor: Elke Buschbeck, PhD

Peering into the Weird Bifocal Eyes of *Thermonectus marmoratus*

I'm looking to unravel the genetic basis of how the bifocal eyes of a beetle, *Thermonectus marmoratus*, came into being. It is the only known extant animal possessing a bifocal eye.

19

Jose Joseph

Computer Science, MS
Advisor: Rui Dai, PhD

Quality of Experience (QoE) Modelling for UAV Video Streaming

Video capture using drones is becoming one of the latest trend for live event broadcasting. Currently no efficient QoE evaluation model exist for this scenario. The aim of my research is to propose an efficient model for Quality of Experience evaluation for UAV (drone) based sensor network video streaming.

20

Katelyn Ritchie

Communication, MA
Advisor: Nancy Jennings, PhD

To Post, or Not to Post: Exploring Adjunct Faculty and Staff Social Media Use Among Mixed Audiences

I will be presenting about my master's thesis work, which is in-progress. I am studying adjunct faculty and staff self-presentation behavior on social media among converged social spheres.



21

Deeptha Girish

Electrical Engineering, PhD
Advisor: Anca Ralescu, PhD

Action Recognition in Images

The goal of my thesis is to perform activity recognition in still images. The basic idea is to look at an image and recognize what activity is being performed by a human. I also aim to build a model that has an understanding of what properties of an object enable a person to perform certain activities. This research has various interesting applications, like searching a particular frame in a video, searching the web through action words and also security applications.

22

Diana Casteel

Communication, MA
Advisor: Eric Jenkins, PhD

Will Click for Change: How Social Media Platforms Affect the Message of Social Movements

This thesis explores how the unique features and affordances of Twitter and Facebook impact the message of the Women's March. This research provides specific evidence in the efficacy debate of cyber-activism by comparing the function of posts and the calls to action that are being made.



Vineeta Singh

Electrical Engineering, PhD

Advisor: Anca Ralescu, PhD

Segmenting Complex Structures

We try to segment the complex structure of the lung.

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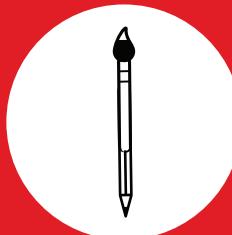
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Poster Forum



Creative Arts Gallery



Three Minute Thesis