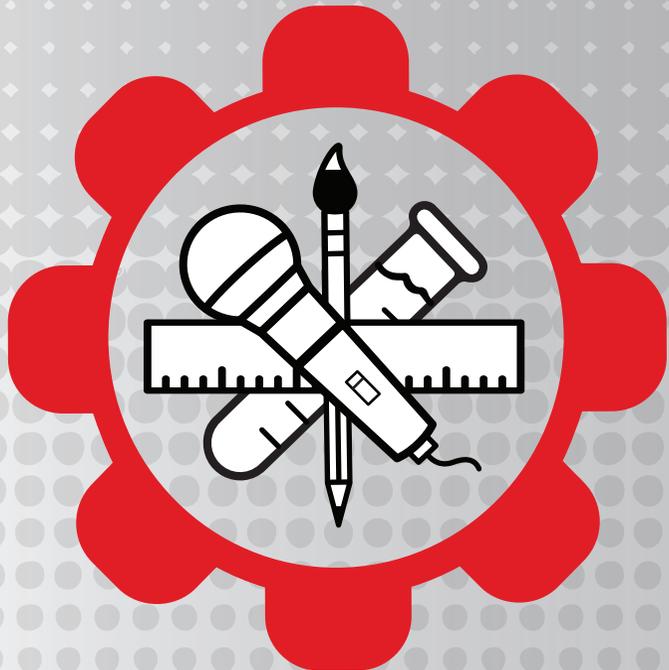


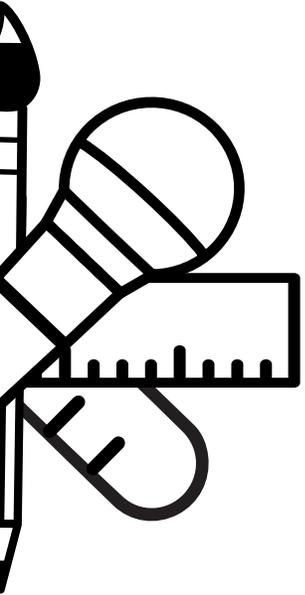
2016



**GRADUATE STUDENT
EXPO & POSTER FORUM**

THE GRADUATE SCHOOL
2016





DR. MARSHALL "CHIP" MONTROSE

Vice Provost and Dean of the Graduate School

DR. MARGARET HANSON

Associate Dean of the Graduate School

DR. YONATAN EYAL

Director of Graduate Studies

MEGAN TISCHNER

Coordinator, Graduate Student Expo & Poster Forum



GRADUATE STUDENT EXPO & POSTER FORUM

FRIDAY, FEBRUARY 26, 2016

Participant Check-In	8 a.m.—9 a.m.
Poster Session 1	9 a.m.—10:30 p.m.
Poster Session 2	10:30 a.m.—12 p.m.
Fine Arts Gallery	9 a.m.—2 p.m.
Main Stage & Three-Minute Thesis Competition	12 p.m.—2 p.m.
Award Ceremony	2 p.m.—Close

2016

POSTER
NUMBER

PRESENTER

12 **Elizabeth Adams**
Educational Studies, PhD

33 **Nathaniel Barker**
Chemistry, PhD

25 **Alicia Boards**
Educational Studies, PhD

38 **Michelle Burbage**
Health Education, PhD

**FINE ARTS
GALLERY** **Jenni Cattran**
Social Work, MSW

45 **Mark Chrisman**
Chemistry, PhD

10 **Kyle Cox**
Educational Studies, PhD

44 **Shima Dalirirad**
Physics, PhD

29 **Anushree Das**
Chemistry, PhD

40 **Kathryn Davidson**
Communication Sciences and Disorders, PhD
Cassie Ragland
Communication Sciences and Disorders, PhD

19 **Victoria Dickman**
Educational Studies, PhD

56 **Michelle Dietz**
Germanic Languages & Literature, PhD

01 **Pankaj Dwivedi**
Cancer and Cell Biology, PhD

35 **Joshua Eby**
Physics, PhD

14 **Masoud Edalati Ahmadsaraei**
Physics, PhD

52 **Ahmed Elshewy**
Chemistry, PhD

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47	<p>Joseph Hart Educational Studies, PhD</p>		

POSTER
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PRESENTER

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FINE ARTS GALLERY	Christine Kern Fine Arts, MFA
54	Aaron Koenig Physiology, MS
FINE ARTS GALLERY	Sean Leavell Fine Arts, MFA
04	Feng Liang Educational Studies, PhD
50	Matteo Lotito Physics, PhD
07	Michael Lukaszuk Composition, DMA
17	Pulong Ma Mathematics (Statistics), PhD

36	Parvaneh Maleki Design, MDes Branden Trauth Design, MDes
16	Louis Mora Romance Languages & Literatures, PhD
31	Lina Motlagh Zadeh Communication Sciences & Disorders, PhD
55	Nadeesha Nambukara Wellala Chemistry, PhD
49	Vitor Nogueira Design, MDes Yun He Design, MDes
32	Lakshmi Palaparambil Dinesh Business Administration, PhD
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Chemistry, PhD

Alisa Strauss
Design, MDes

Zhuting Sun
Physics, PhD

Ivy Thompson
Communication Sciences and Disorders, PhD

Johnson Thompson
Physics, PhD

Branden Trauth
Design, MDes
Parvaneh Maleki
Design, MDes

Mia Varner
Environmental Science, MS

POSTER
NUMBER

PRESENTER

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Ashley Vaughn

Educational Studies, PhD

Sarai Hedges

Educational Studies, PhD

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Jennifer Vernia

Chemistry, PhD

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Nadeeka Wickramasuriya

Physics, PhD

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Shane Winslow

Geography, MA

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Elizabeth Wurtzler

Environmental Engineering, PhD

05

Na Yang

Educational Studies, PhD

FINE ARTS
GALLERY

Sunni Zemblowski

Fine Arts, MFA

06

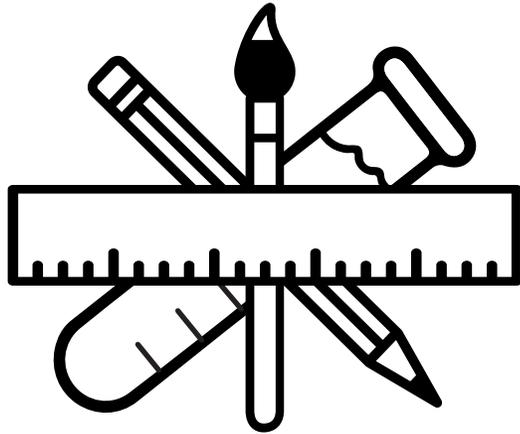
Wen Zeng

Educational Studies, PhD

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 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.



ARTS & HUMANITIES
LIFE SCIENCES & MEDICINE
PHYSICAL SCIENCES & ENGINEERING
SOCIAL & BEHAVIORAL SCIENCES

All students who present research posters at the Graduate Student Expo & Poster Forum 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.

01

Pankaj Dwivedi

Cancer and Cell Biology, PhD

Advisor: Kenneth D. Greis, PhD

Phosphoproteomic Analysis of Colony-Stimulating Factor 3 Receptor (CSF3R) in Normal and Mutated Conditions

Colony-stimulating factor 3 receptor (CSF3R) signaling plays a seminal role in neutrophil production through activation by its ligand, granulocyte-colony stimulating factor (G-CSF). A series of CSF3R mutations have been reported to cause neutropenia and leukemia. A proximal point CSF3R mutation, T618I, has been reported in over 80% of chronic neutrophilic leukemia (CNL) patients. Several distal truncation mutations of CSF3R have been recorded in acute myeloid leukemia (AML) and myelodysplastic syndrome (MDS) patients progressed from the neutropenic condition. It is unclear how these two types of mutated receptor signal differently from the normal receptor and lead to the leukemic condition. Previous work has demonstrated that downstream kinase signaling may differ in the mutated CSF3R receptors; however, a differential phosphoproteomic profile of CSF3R in the mutated condition has not been conducted. Here, we report the findings of a phosphoproteomic analysis comparing the mutated CSF3R receptor with the wild type (WT) using an *in vitro* model system: virally transduced BaF3 cells expressing the WT, proximal mutation T618I and distal truncation mutation Q741x. Phospho-flow analyses for pSTAT3 and pSTAT5 (the targets of CSF3R signaling) were executed to check the receptor response to G-CSF induction. Furthermore, the findings of phospho-flow analysis were verified using immunoblot analyses. To check receptor

activation kinetics, a time course study was conducted using G-CSF to observe the differential activation patterns for pSTAT3 and pSTAT5 in WT and mutant cells. We also performed SILAC-based quantitative phosphoproteomic analysis to better understand CSF3R biology.

02

John Shahan

Germanic Languages & Literature, PhD

Advisor: Harlod R. Herzog, PhD

Heroism and Villainy as Seen Through a Kantian Lens

In my project, I examine German detective and spy fiction through a philosophical lens. I employ two main literary sources in my dissertation. My detective novels are written by Friedrich Dürrenmatt, a Swiss author who wrote in German. His novels normally feature detectives who are flawed and obsessed with the abstract concept of justice. They are willing to destroy, or at least sacrifice, themselves to see that their concept of justice is implemented. I view these novels through a Kantian lens to enhance their discussion of justice. Immanuel Kant was very much concerned with justice: his view of the concept was based on the capacity for human reason, which in turn enables human beings to form a collective, called the Kingdom of Ends, based on mutually acceptable moral imperatives. Building on these discussions of justice, I examine Cold War spy fiction set in Germany, written by authors such as John Le Carré. Overall, Kant's moral arguments, especially those concerned with justice, are based in an understanding of duty. I consider two questions: first, does a Kantian hero differ from a conventional hero, or even an antihero, in terms of duty and justice? Second,

if we value Kant's argument that human beings are ends in themselves and not simply means to an end, how can we evaluate what happened during the Cold War in Germany as seen in spy fiction?

03

Julianne Fernandez

Geology, MS

Advisor: Amy Townsend-Small, PhD

Hypoxia and Natural Gas Production's Respective Contributions to Lake Erie's Methane Emissions

The central basin of Lake Erie exhibits seasonally hypoxic bottom waters, which contribute to biological methane (CH_4) production. Leaks from Canadian natural gas wells in the rocks underlying Lake Erie are a potential contributor to CH_4 emissions. Previous work has shown that Lake Erie is a positive source of CH_4 to the atmosphere in the late summer, with some evidence for enhanced CH_4 emissions from regions with natural gas wells. This study updates past CH_4 emission studies of Lake Erie, utilizing stable isotopic composition to determine the distribution of CH_4 sources. $\delta^{13}\text{C}-\text{CH}_4$ ratios were measured using the University of Cincinnati's isotope ratio mass spectrometer. Samples collected in the late summer of 2013, during the period of widespread hypoxia in the central basin, indicated $\delta^{13}\text{C}-\text{CH}_4$ enrichment in locations near gas wells. This result is consistent with previous studies showing that thermogenic CH_4 is enriched in ^{13}C relative to biological CH_4 . The $\delta^{13}\text{C}-\text{CH}_4$ ratio in water at hypoxic sites was -58.6‰, while for locations near gas wells, the average $\delta^{13}\text{C}$ was -42.5 ‰. Concentrations of CH_4 in the bottom waters were similar in both

hypoxic and natural gas extraction regions. These preliminary data will be supplemented by isotopic data obtained during the spring and summer of 2014. Additionally, samples gathered during the early summer of 2015 are currently under analysis, and fieldwork scheduled for the late summer and fall of 2015 will further build on this data set. Ongoing work includes additional measurements of the hydrogen isotopic composition of methane and CH_4 efflux throughout the year.

04

Feng Liang

Educational Studies, PhD

Advisor: Dong-shin Shin, PhD

Issues in Parental Attitudes and Practices toward Heritage Language Maintenance: A Review of the Literature

The problem of heritage language shift and loss among immigrant children negatively impacts children, families and society. Although many literature reviews have suggested the importance of heritage language maintenance (HLM), no systematic review has examined the empirical studies specifically addressing family attitudinal and practical factors in relation to children's HLM. The present literature review explores research on North American immigrant families' attitudes and practices with respect to their children's HLM. The majority of parents participating in these studies share positive attitudes toward children's HLM for various reasons, but their attitudes are not static. Many issues and challenges regarding parental efforts to promote children's HLM are worthy of investigation. Further theoretical and practical implications are also discussed.

05

Na Yang

Educational Studies, PhD

Advisor: Haiyang Ai, PhD

IESL Reading Rate Strategies

The author conducted a systematic review examining the efficacy of four ESL reading rate strategies: Extensive Reading (ER), Pleasure Reading (PR), Timed Reading (TR) and Repeated Reading (RR). Fifteen studies were examined, and the results indicate that TR is the most effective ESL reading rate strategy. Further research must be conducted to examine the transfer and retention of reading rates and reading comprehension for the other three strategies and to determine if they are as effective as TR. Implications on pedagogy and self-learning are also offered.

06

Wen Zeng

Educational Studies, PhD

Advisor: Song Ju, PhD

Effectiveness of Learning Disability Interventions for College Students

Students with learning disabilities (LD) are becoming the largest and

fastest-growing subgroup of students with disabilities at the postsecondary level. Therefore, it is important to explore the effects of LD interventions and programs on college academic success. To examine the trends and effectiveness of those interventions and programs for college students with LD, the author reviewed the relevant literature from 2000 to 2015. From the 17 articles found, five primary types of interventions and programs were identified and discussed: assistive technology, direct assistance, strategy instruction, strengths training and support programs. The findings indicate that the independence-oriented approach and individualization are current trends for improving the effectiveness of interventions and programs. Furthermore, interventions and programs could create long-term benefits for academic success and encourage students to use disability support to achieve that success. Finally, the author provides suggestions for improving the effectiveness of learning disability interventions and programs in postsecondary education.

07

Michael Lukaszuk

Composition, DMA

Advisor: Margaret M. Helmuth, DMA

Approaches to Composition, Improvisation and Performance used by the Cincinnati Composers Laptop Orchestra Project

Computers have been used for generating sound since the 1950s, but their use as legitimate musical instruments intended for performance is relatively new. The Cincinnati Composers Laptop Orchestra Project (CiCLOP) is an ensemble and research project in which students

experiment with writing and performing music that confronts many new challenges for computer music composers. How do laptop performers communicate with each other and a conductor without a musical score? How do performers foster a connection between computer-generated sounds and their physical movements? How can a piece of software function as a musical instrument? The ensemble has explored a variety of approaches to answer these questions, including sound synthesis, networked performance, sensor use, gestural controllers and live coding. The ensemble's work promotes a new and interesting approach to making music.

08

Benjamin Hearn

Counseling, Mental Health, MA

Advisor: George B. Richardson, PhD

Disclosing an Invisible Identity: The LGBTQ Counselor's Unique Challenge

Coming to identify as LGBTQ may play a significant role in the development of a counselor's personality and motivation for choosing the profession. Individuals who identify as LGBTQ exist cross-culturally and lack general acceptance and/or legal protection in much of the world. This situation poses a challenge in a field that encourages the authenticity and congruency of its practitioners, as LGBTQ counselors may feel isolated and frustrated as they try to reconcile their personal and professional identities. Such feelings may discourage them from drawing from and aligning with this identity, both in their work environment and practice with clients.

When LGBTQ counselors choose to disclose this identity to their clients, the course of therapy is often profoundly impacted, generating questions as to when such disclosure is appropriate. The presenter first experienced the impact of disclosing his sexual orientation during his practicum, in which a women's group would only allow a male to cofacilitate if he was gay. The present work proposes an ethical decision model to understand how LGBTQ counselors may choose to disclose their identity, as well as how this identity may affect their practice. Additionally, suggestions are provided for educators, supervisors and researchers. This poster is based off a recently published article by the presenter and will also be presented in a poster session at the American Counseling Association conference in Montreal in April.

09

Batsheva Guy

Educational Studies, PhD

Advisor: Mary L. Brydon-Miller, PhD

Minority Women in STEM: The Role of Undergraduate Research

This literature review examines the following three research questions: (1) What are the benefits of undergraduate research for undergraduate students in terms of academic, social and career outcomes? (2) What undergraduate research programs exist for minority women, and what are their outcomes for undergraduate students? (3) What barriers do minority women face in STEM study, and how can this knowledge be incorporated into undergraduate research programs? The author provides suggestions for integrating the barriers and success factors of minority women in STEM

into undergraduate research programs, thereby positively contributing to the persistence of this subgroup in STEM graduate study.

10

Kyle Cox

Educational Studies, PhD

Advisor: Benjamin M. Kelcey, PhD

Empirically Estimated Design Parameters for Cluster Randomized Trials with Educational Outcomes: A Review of the Current Collection

When empirically estimated design parameters are included in the planning of cluster randomized trials (CRTs), they improve study efficiency and precision. A literature review was conducted of research articles from 2002 through 2014 that focused on the collection of empirically estimated design parameters for CRTs with educational outcomes. These studies involved a range of students in grades PreK–12, from a variety of school locations and demographic groups, and focused on outcomes of student achievement in math, reading and science. The review generated a comprehensive collection of design parameters for CRTs of student achievement outcomes in math and reading but very limited collections for CRTs of other outcomes. The literature indicated that considerations of location, demographics, grade, outcome and study design are important during the planning of a CRT. The inclusion of key covariates, the best being a student-level pretest score on the outcome subject, is crucial to planning an efficient and effective study. Researchers should continue to collect design parameters for CRTs with outcomes beyond student achievement in

math and reading.

11

Jennifer Keelor

Communication Sciences and Disorders, PhD

Advisor: Nancy Creaghead, PhD

Text-to-Speech Technology: Impact on Reading Fluency and Comprehension for Students with Dyslexia

Text-to-Speech (TTS) technology can be useful as a compensatory reading strategy; however, the most effective array of TTS presentational features for certain disabilities is uncertain. The present study investigates the impact of TTS on the reading fluency and comprehension of students with dyslexia.

12

Elizabeth Adams

Educational Studies, PhD

Advisor: Hye Pae, PhD

Early Writing Instruction for Young Bilingual Children: A Review of the Research Literature

The researchers conducted a comprehensive review of the research literature on writing in young bilingual children to identify previously investigated aspects of writing development and document the effectiveness of various instructional approaches and writing environments. The data corpus included 38 empirical studies. The researchers examined research problems, populations and settings, theoretical frameworks, methodologies and major findings. A systematic content analysis across those six components yielded several major themes: Young bilingual children are able to acquire oral language and writing skills in a second language simultaneously. Oral language supports the composition process. Young bilinguals often use linguistic knowledge from their native language when writing in the target language. Elements of effective instructional approaches and writing environments include access to materials, writing for authentic purposes, allowing choice of topic and language, providing explicit writing instruction and encouraging children to talk about their writing. The literature was primarily grounded in bilingual, cognitive and sociocultural theories, and case study designs were used most often.

13

Shane Winslow

Geography, MA

Advisor: Changjoo Kim, PhD

Retracing our Steps: Reassessing Urban Environmental Interventions and Crime Prevention through GIS and Spatial Analytics

Environmental criminology is a powerful and provocative theory within

the positivist and Chicago schools of criminology. This theory focuses on understanding criminal patterns within a built environment and how these spaces affect the behavior of both victims and criminals. Additionally, the theory inherently advises the practical application of crime prevention through environmental design (CPTED). While CPTED is typically effective at crime prevention, the present study highlights certain cases of its ineffectiveness. In these cases, public pedestrian infrastructure was closed for crime prevention. The present research observes stairways and walkways as points of accessibility to important facilities on the city landscape of Cincinnati, Ohio. Using ArcGIS and SPSS, this study illustrates the relationships between these and their surrounding environments through both quantitative and qualitative analysis. The results indicate no clear relationship between the closure of pedestrian infrastructures and crime reduction. While the alteration of the physical environment may improve crime prevention in many cases, this study advocates that more rigorous analysis protocols be established and implemented prior to the closure of public walkways.

14

Masoud Edalati Ahmadsaraei

Physics, PhD

Advisor: Michael D. Taylor, MD

Feasibility of Free-Breathing Cardiac Diffusion Tensor Imaging (DTI)

A novel magnetic resonance imaging (MRI) approach was developed to noninvasively characterize the heart muscle (myocardium) microstructure.

This approach employs diffusion tensor imaging (DTI) to measure the mean diffusivity (MD), fractional anisotropy (FA) and myofiber orientation of the myocardium in normal and cardiovascular-diseased hearts. These parametric maps are very sensitive to pathological changes in living organs.

15

Ivy Thompson

Communication Sciences and Disorders, PhD

Advisor: Brian Earl, PhD

“Excuse me, I’m with the Band”: Neural Activation Patterns Reveal Robust Auditory Nerve Synchrony Evoked with Octave-Band Chirps

The amplitude values of compound action potentials (CAPs) have been used to predict auditory nerve damage. Recent research has suggested that the amplitudes of high-level CAPs can detect auditory nerve damage that is missed by traditional threshold measurements. Octave-band chirp stimuli evoke larger CAP responses than do tonebursts at corresponding frequencies. Therefore, the use of octave-band chirps may enhance neural synchrony and provide clinicians and researchers a precise tool for identifying changes in auditory nerve integrity. The present study compared the neural activation patterns generated by octave-band chirps to those generated by tonebursts using a high-pass masking paradigm. Neural activation patterns were derived from octave-band chirp and toneburst responses using a high-pass masking paradigm to determine which stimulus caused greater neural synchrony. Cumulative amplitude functions were constructed for both stimulus types at 80, 60 and 40 dB SPL by tracking CAP amplitude

during the presentation of simultaneous masking noise high-passed in 1/3 octave intervals between 0.4 and 62 kHz. The results showed that octave-band chirps elicited higher CAP amplitudes than did tonebursts. Neural activation patterns indicated greater neural firing density at the peak location for octave-band chirps than for tonebursts across all frequencies. However, these patterns also showed a broader bandwidth of activation for the octave-band chirp stimuli than for tonebursts, opposite of what was hypothesized. This finding suggests that octave-band chirps could be the most optimal stimuli for assessing regional auditory nerve integrity.

16

Luis Mora

Romance Languages & Literatures, PhD

Advisor: Nicasio Urbina, PhD

The “Cartonera” Phenomenon, a Nonprofit Publishing Movement

The “Cartonera” phenomenon is an independent literary publishing movement that originated in Latin America in 2002 and quickly propagated to different regions worldwide. These publishers created books with reused materials collected in the streets for “cartoneros,” or people who gather cardboard (“cartón” in Spanish). Due to the growing monopolization of corporate publishing houses, publishing possibilities had previously been restricted to certain topics and bestsellers. Within this panorama, the initiative of cartoneras spread between different groups of new writers and publishers, mostly born in the 1970s and 1980s. These groups decided to form their own self-managed, nonprofit publishing projects to distribute

their work without relying on any publishing house, allowing them to focus directly on the public. Such groups have included important authors from Latin America, with an emphasis on the antiestablishment social movement.

17

Pulong Ma

Mathematics (Statistics), PhD

Advisor: Emily Lei Kang, PhD

Semiparametric Inference via Sparsity-Induced Kriging for Massive Spatial Datasets

With the development of new remote sensing technology, large or even massive spatial datasets covering the globe have become available. Statistical analysis of such data is challenging. We propose a semiparametric approach to modeling and inference for massive spatial datasets. In particular, a Gaussian process with additive components is considered, with its covariance structure coming from two components. The first part is flexible and does not assume a specific parametric covariance function but is able to achieve dimension reduction; the second part is parametric and simultaneously induces sparsity. An inference algorithm for parameter estimation and spatial prediction is devised. The resulting spatial prediction method, which we call sparsity-induced kriging (SIK), is applied to simulated data and a massive satellite dataset. The results demonstrate the computational and inferential benefits of SIK over competing methods and show that SIK is more flexible and more robust against model misspecification.

18

Casey Keck

Communication Sciences and Disorders, PhD

Advisor: Nancy Creaghead, PhD

Children's Pragmatic Skills after Traumatic Brain Injury: Parents' Perspectives

This qualitative research poster presents preliminary data from a study characterizing pragmatic communication between children with traumatic brain injury (TBI) and their primary caregiver/parent. This poster answers two research questions: (1) What home environment social contexts do parents report as difficult for effective communication? (2) What pragmatic deficits do parents report as potential causes of communication breakdowns in these social contexts? A phenomenological qualitative approach with purposive sampling was used. Eight participants were sampled from ten parents that had participated in a larger study. The parents identified themselves as the primary caregiver (all were mothers) for a child who had sustained a TBI. Parents completed individual, in-depth semi-structured phone interviews lasting 60–90 minutes, which were recorded and transcribed verbatim for analysis. The parent interview transcripts were analyzed using a deductive analysis framework. Preliminary results suggest that the parents primarily perceived their child as exhibiting adequate pragmatic skills during day-to-day casual conversations in the home environment. Pragmatic deficits were commonly reported in situations where the child was sharing new information, such as retelling a story the parent had not read or describing an event that happened at school. The next phase of this research is to observe the ten parents communicating with

their child in a context that the parent has identified as difficult.

19

Victoria Dickman

Educational Studies, PhD

Advisor: Miriam Raider-Roth, PhD

Measuring the Effectiveness of Sexual Assault Prevention Programs in Light of the White House Task Force Recommendations: A Literature Review

This systemic review of literature is an exploration of the body of studies conducted to measure the effectiveness of programs designed to educate college students about sexual assault. Using the recommendations for program content provided by the White House Task Force to Protect Students from Sexual Assault as an organizing principle, the review provides a framework for examining sexual assault prevention programs. While most programs were found to be significant on some level, this review specifically looks at the educational content of sexual assault prevention programs to examine trends of effectiveness. This review also offers recommendations for how best to proceed with further program design and future research in this area.

20

Lucas Powers

Chemistry, PhD

Advisor: David B. Smithrud, PhD

Synthesis of a Targeted Contrast Agent Based on Rotaxane Architecture

Crown ether host rotaxanes have been shown to be effective cellular transport agents for metal cations. An azacrown ether binding pocket will be used to house a gadolinium(III) atom which will act as a positive contrast agent for MRI. The rotaxane architecture takes advantage of the compound's cell transport agent and molecular switch properties in order to make the contrast agent both effective and highly selective to only the targeted cells. Mass spectrometric and ¹H NMR spectra analysis of the target components show that the correct molecules were synthesized.

21

Mellie June Paulines

Chemistry, PhD

Advisor: Patrick A. Limbach, PhD

Spectral Matching: A Tool to Detect tRNA Sequence

Transfer ribonucleic acid (tRNA) harbors a diverse set of modified nucleosides as compared to other RNA species. Post transcriptional modifications can range from simple methylations to a multi-step involving two or more enzymes like queosine. tRNAs are abundantly represented in the human genome with over 450 genes that have been annotated. More than 270 unique sequences exist, encompassing 51 possible anticodons for 21 amino acids. These genes are further subdivided into tRNA isodecoders, which have the same anticodon but sequence differently elsewhere. The high level of sequence similarity is challenging to analyze with standard RNA mass mapping approach. Here we show a new method to simplify the detection of digestion products using spectral matching.

22

Angelica Hardee

Health Education, PhD

Advisor: Ashley Merianos, PhD

Caroline Hensley

Public Health — Health Education/Health Promotion, MPH

Advisor: Jun Ying, PhD

Addressing the Need for Essential Resources in Underserved Communities

Cincinnati is the third-largest city in Ohio and the 65th largest in the United States, with a population of nearly 300,000 according to the U.S. Census Bureau. From 2009 to 2013, the Cincinnati poverty rate was nearly

double (30.4%) than the overall U.S. poverty rate (15.9%). Cincinnati contains abundant clinical and non-clinical resources designed to serve those living in poverty. Resources include primary care services, mental health services, dental services, housing, food aid and transportation assistance. Unfortunately, collaboration and communication between these resources and individuals residing in Cincinnati is significantly lacking. Crossroad Health Center (CHC), a federally qualified health center in Cincinnati, sees approximately 10,000 patients annually. Over 90% of CHC patients live at or below 200% of the federal poverty line and consequently are more likely to be negatively impacted by social determinants of health. The purpose of the project is to establish paths of collaboration amongst community resources in order to create an efficient and sustainable system for addressing social determinants of health. The project will consist of a collaboration of community resources and healthcare partners. This collaboration will allow for the communication necessary to maintain the relationship needed to connect individuals to existing resources. CHC will serve as a beta-testing site for implementation of a screening system. Once the screening process is established at CHC, it will serve as an opportunity to share the methodology with others within the community. Implementation of this project will impact thousands of families experiencing poverty in Cincinnati.

23

Jennifer Vernia

Chemistry, PhD

Advisor: Michael J. Baldwin, PhD

Bioinspired A-Hydroxy Acid Containing Tripodal Amine Chelates, New Derivatives and Their Metal Complexes

The a-hydroxy acid moiety found in photoactive siderophores can be incorporated into organic compounds that mimic the strong binding affinity and photoactive properties of an iron-siderophore complex. A series of compounds that contain the a-hydroxy acid (AHA) in the tripodal amine structural motif has been synthesized. Varying the functional groups attached to the non-AHA arms of the tripodal amine allows for studies of metal complex structure, stability and photochemistry. New derivatizations of the AHA ligands are currently being synthesized, including a-hydroxy amides and a-thiol acids. The iron complexes of natural siderophores that contain a-hydroxy amides have photoactive properties. Using previously made AHA chelates, new a-hydroxy amide chelates have also been synthesized. The metal complexes of chelates are being studied, with focus on Fe(III) complexes and studying their photochemical activity by circular dichromism spectrometry.

24

Alisa Strauss

Design, MDes

Advisor: Paul M. Zender, MFA

Design by Consensus: Designing Effective Icons Using Quantitative Ethnography

An icon is useless if the people viewing it cannot correctly decipher its meaning. Current design practice for icon creation involves a designer creating an icon that they think represents the intended concept and then showing it to people to see if they can determine its meaning. If they cannot, revisions will be made to try to enhance comprehension. This study tests a

different technique for icon design that eliminates guesswork on the part of the designer composing an icon. Using consensus analysis techniques, it can be determined what symbols users expect to see in an icon that conveys a certain meaning—before even a rough draft of the icon is created. Once data analyses determine what symbols should be included in an icon, user comprehension testing is used to determine if this method of icon creation is truly successful.

25

Alicia Boards

Educational Studies, PhD

Advisor: Helen Meyer, PhD

African American Women and Tenure in Higher Education

This literature review addresses the following: What is most important for African American women faculty members to experience when in a tenure-track position? What barriers do African American women face when pursuing tenure? How can higher education support services enhance the experience for African American women faculty members, specifically, when they are striving to attain tenure?

26

Bradley Fevrier

Health Education, PhD

Advisor: Laura Nabors, PhD

Hookah Use among College Students and the Risks Associated with Being “Hooked”

Tobacco use remains the primary cause of avoidable death. According to the U.S. Department of Health and Human Services, tobacco smoking is responsible for approximately 440,000 deaths in the United States each year. Despite these figures, hookah smoking remains a growing public health concern, especially among college-age students throughout the United States. During past decade, there has been mounting public health concerns over hookah tobacco smoking. According to the Centers for Disease Control and Prevention, hookah smokers believe they face lower risks for smoking-related health concerns than other tobacco users. However, the literature reveals that hookah users are exposed to nicotine, carbon monoxide and significant amounts of toxicants and carcinogens in the smoke. As a result, this presentation will review current literature and present findings on the effects of the charcoal used to heat tobacco in the hookah and how it increases health risks by producing smoke that contains high levels of carbon monoxide, metals and cancer-causing chemicals. Even with these known risks, there is still limited research available concerning use and perceptions of risks of using hookah among college students. Thus, future research in the area is needed, and studies to develop health communications to inform college students of the potential health risks involved with hookah use will be important.

27

Elizabeth Wurtzler

Environmental Engineering, PhD

Advisor: David Wendell, PhD

Targeted Biological Photodisinfection

Over the past century, chlorination has significantly reduced the spread of waterborne disease worldwide, thereby eliminating a major source of human mortality in developed and developing countries. Unfortunately, the health benefits of chlorination are not without a cost: the formation of toxic disinfection by-products. To increase disinfection efficiency and limit downstream by-product formation, advanced oxidation processes have been explored and expanded. Despite the demonstrated efficacy of oxidative disinfection, residual oxidant and reactant stability in treated water remains a concern. An ideal oxidant would act on a wide range of target organisms, potentially with a targeting capability; produce few or no harmful by-products, possibly through the generation of reactive oxygen; and be harmless when consumed by the end user. The present research seeks to develop a selective, photocatalytic, biological disinfection system based on the fusion protein StrepMiniSOG (SMS), which we recently developed, and will pursue two main goals: 1) the characterization of a new biological disinfection system through methods including RO species, production rates and quantum efficiency, and 2) completing disinfection studies of several microbial targets to determine the disinfection kinetics and ability of the system to target specific microorganisms within a mixed population. The proteinaceous SMS photodisinfection system proposed in this work will reduce the negative impacts of traditional disinfection methods, while the

demonstration of selective removal will encourage its application in a broad range of disinfection situations.

28

Zohre Gorunmez

Physics, PhD

Advisor: Thomas L. Beck, PhD

Finite-Difference Time-Domain (FDTD) Modeling of Gold Core-Shell Structures with Different Shell Morphology for Surface-Enhanced Raman Spectroscopy (SERS)

Core-shell nanostructures have received substantial attention in recent years due to their usefulness in applications ranging from catalysis to cancer treatment. SERS is among the most sensitive techniques for molecular detection, achieving single-molecule detection due to the large enhancements afforded by plasmonic substrates. Two mechanisms for this enhancement have been proposed: charge transfer (CT), in which greater polarizability is induced upon the molecule, and the electromagnetic mechanism (EM), in which large electromagnetic fields increase the observed signal. In recent years, the EM mechanism has been established as the main contributor to SERS enhancement due to the normal Raman spectroscopy arising from the coupling of both the incident and reemitted fields. The FDTD technique has been developed to provide numerical solutions to Maxwell's time-dependent curl equations, which promise modeling capabilities for the EM enhancement of SERS. Herein, we apply this method to the study of morphologically different gold core-shell nanoparticles to investigate their contributions to SERS. In these structures,

the dye or probe molecule resides between the shell and the core, and only the shell morphology is altered. The experimental and calculated data are in agreement and show that the surface plasmon resonances (PRs) influencing the SERS of the probe molecules, due to the coupling of the core and shell, are tunable by changing the morphology of the shells. Additionally, core-shell structures with sharp features on their outer surfaces highlight larger enhancements in the region between the core and shell, where dye molecules reside, due to stronger localized surface PRs.

29

Anushree Das

Chemistry, PhD

Advisor: Anna D. Gudmundsdottir, PhD

Photo-Michael Synthesis of Natural Products from Chalcone Derivatives

Natural product synthesis is attracting dynamic research interest around the globe for the development of new synthetic strategies, as well as of large-scale syntheses that facilitate extensive biological investigations, drug discovery, medicinal applications etc. Additionally, a constant need exists to find economical ways of synthesizing natural products as alternatives to extraction. We are developing a greener approach for the synthesis of natural products through the photosynthesis of natural compounds.

The Michael reaction is commonly used for new sigma bond formation involving the addition of a carbon nucleophile or of any electron-rich species (Michael donor) to an electron-deficient double bond (Michael acceptor). We are currently studying the photochemistry of several

chalcone derivatives using product studies, laser flash photolysis and density functional theory calculations. Product studies in visible light result in the formation of isoflavanone derivatives, which are found as secondary metabolites in plants and can be used as antioxidants.

30

Will Garde

Environmental Engineering, MS

Advisor: Margaret J. Kupferle, PhD

Application of *Moringa oleifera* Seed Extract to Treat Coffee Fermentation Wastewater

Coffee is grown in 70 countries across the globe and is worth about \$100 billion annually. Approximately 40% of all coffee around the world is wet processed. Pollution from this processing wastewater is a primary source of stream water degradation and is hazardous to human health. *Moringa oleifera* seed extract (MOSE) offers promise as a sustainable, natural and affordable local option for treating coffee processing wastewater. To date, its ability to reduce turbidity in coffee pulping wastewater has been established, but its ability to reduce total suspended solids (TSS), chemical oxygen demand (COD) and biochemical oxygen demand in fermentation effluent has not been studied. Field research was conducted at the Kauai Coffee Company in Hawaii to investigate the potential of MOSE as a viable treatment option for coffee fermentation wastewater. Coagulation tests were conducted in the field at five pH effluent levels (3, 4, 5, 6 and 7) and MOSE doses (0, 1, 2, 3 and 4 g/L) using pre-cleaned, 1-quart glass canning jars with metal lids. After settling, TSS, COD, total nitrogen, nitrate, nitrite,

total dissolved solids and pH of supernatant from each jar were measured. MOSE was found to be effective at reducing TSS, COD, nitrate and nitrite in fermentation wastewater. TSS removal ranged from 8% to 86%. COD removal ranged from 1% to 16%. Nitrate and nitrite reduction ranged from 20% to 100%. Given the popularity of wet-processed coffees and their environmental impact, sustainable treatment options are necessary for preserving water resources; MOSE shows promise as one of those options.

31

Lina Motlagh Zadeh

Communication Sciences and Disorders, PhD

Advisor: Noah Silbert, PhD

Listener Characteristics and the Perception of Speech in Noise

Speech communication is often made difficult by the presence of background noise. Much research on the perception of noise-masked speech has focused on the masking of phonetic information by different types of noise (e.g., white noise, speech-shaped noise, temporally modulated noise, multi-talker babble). This research focuses on the relationships between some cognitive characteristics of listeners and accuracy in the identification of noise-masked consonants. Thirty-seven listeners identified numerous tokens of four consonants (p, b, f, v) each in CV syllables produced by eight talkers (four male, four female), masked by ten-talker babble. Listeners also completed a number of tasks designed to measure selective attention: two dichotic listening tasks and two non-speech discrimination tasks. On each trial of the dichotic listening tasks, one ear was cued visually (i.e., “right ear” or “left ear”), after which the listener indicated the talker sex or the

consonant in the target ear, depending on task. In the two non-speech tasks, listeners discriminated either the frequency or the duration of broadband target noise bursts embedded in temporally modulated background noise. Analyses indicate a positive relationship between noise-masked speech accuracy and performance on the dichotic consonant identification and complex non-speech discrimination tasks.

32

Lakshmi Palaparambil Dinesh

Business Administration, PhD

Advisor: Uday S. Rao, PhD

Design and Cost-Benefit analysis of Power Interruption Contracts

Power interruption contracts are used by power suppliers, such as Duke Energy, to meet peak demand without resorting to more expensive sources of power such as older power plants and the spot market. Residential customers are interrupted for small amounts of time and paid incentives in return. The present study seeks to understand the profit contribution from these contracts, as well as how to improve their current design.

33

Nathaniel Barker

Chemistry, PhD

Advisor: William B. Connick, PhD

A Study of Two $[\text{Pt}(\text{tpy})\text{Cl}]\text{BF}_4$ Polymorphs: Red vs. Green

Vapochromic materials undergo a color change when exposed to the vapors of organic compounds. Such materials have potential practical importance in a wide range of environmental sensing applications. In this presentation, we explore the differences of two $[\text{Pt}(\text{tpy})\text{Cl}]\text{BF}_4$ polymorphs in their responses to different vapors.

34

Zhuting Sun

Physics, PhD

Advisor: Andrei B. Kogan, PhD

Electron Transport in Doped GaAs Nanowires Contacted by Evaporated Metal Films

We present electron transport measurements in doped GaAs nanowire samples contacted by metal interfaces as a function of temperature (T). We

show that the contact resistance is strongly dependent on T ($5\text{ K} < T < 300\text{ K}$), even though the resistance of moderately doped nanowires ($ND \sim 10^{18}\text{ cm}^{-3}$), as expected, displays little or no variation with T . We further show that the classical treatment of the Schottky barriers fails to adequately describe the temperature dependence of the metal-nanowire interface, and we present a corrected model that considers charge distribution in the contact region and the effect of surface states on the nanowire. The nanowires, 100 nm in diameter, were grown using metalorganic chemical vapor deposition. The metal contacts, 20 nm Ti/300 nm Al films, were deposited via e-beam and thermal evaporation. We performed a detailed comparison between data on nine nominally identical samples and the modified theory, finding a good agreement. We also showed how the measurement can be used to estimate the effective doping density and the mobility of the nanowire.

35

Joshua Eby

Physics, PhD

Advisor: L. C. R. Wijewardhana, PhD

Stability of Axion Stars in Dark Matter Halos

The axion is a very light, hypothetical particle that was originally proposed to solve a fine-tuning problem in the Standard Model of particle physics. Separately, the axion is a good candidate for dark matter, which is known to comprise the majority of mass in the universe but whose other properties are unknown. Cold and copiously produced in the early universe, axions can form large, gravitationally bound structures called axion stars. We show that the masses of these starlike objects are restricted by both

gravitational instability and the decay of axions through self-interactions. Our analysis has significant consequences for the presence of axions and axion stars as dominant components of the dark matter of the universe.

36

Parvaneh Maleki

Design, MDes

Advisor: Brigid O’Kane, MFA

Branden Trauth

Design, MDes

Advisor: Craig M. Vogel, MA

Tesla, Mobility & Sustainable Systems

Systems thinking gives designers the ability to understand the impact they are having on the world with the products they are designing. This approach helps quantify the diverse interconnections a product’s development, use and disposal have on society and the planet. The present project, focused on Tesla Automobiles, was geared towards the use of systems thinking to understand mobility within the urban environment. However, to quantify Tesla’s true impact on sustainable development, a wider net was cast to examine its CEO’s intentions and investments.

The project was created by MDes students with multidisciplinary backgrounds, which came together to inform this comprehensive story. Tesla has been revolutionizing the automobile industry in many ways since its start in 2003. While the company’s most visible effect has been on the

electric vehicle (EV) market, the work of CEO Elon Musk and his varied investments goes beyond that impact. Musk is one of the few pioneers focused on developing a green technology for the future using a mostly free market, as illustrated by his investments and interests.

37

Masoud Kaveh Baghbadorani

Physics, PhD

Advisor: Hans Wagner, PhD

GaAs-AlGaAs-GaAs Core-Shell Nanowire Plasmon Lasing

We investigated the amplified spontaneous emission and plasmonic nanowire lasing from hybrid plasmonic GaAs-AlGaAs-GaAs core-shell nanowire (NW) heterostructures using temperature- and intensity-dependent time-integrated (TI) photoluminescence (PL) measurements. Vertically aligned zincblende NWs, 130 nm in diameter, were grown on a GaAs substrate using the Au-catalyzed vapor-liquid-solid method. The plasmonic heterostructures were composed of either bare NWs on an Au-coated glass substrate or Au-coated NWs on a bare glass substrate. Au deposition was performed by organic molecular beam deposition. Intensity-dependent PL spectra on a reference sample of bare NWs showed strong and weak emission bands at 1.515 and 1.47 eV at 15 K, which were attributed to the exciton transition and an impurity-related luminescence, respectively. Intensity-dependent PL on the plasmonic NW samples revealed a superlinear increase of the PL intensities and an amplified spontaneous emission at a threshold energy fluence of $\sim 1 \times 10^{-2}$ J/cm². Measurements above the threshold power revealed sharp emission lines around the exciton

emission. The laser emission was attributed to the Au plasmonic film because photonic emission from such narrow GaAs NWs is impossible.

38

Michelle Burbage

Health Education, PhD

Advisor: Rebecca A. Vidourek, PhD

Effective Strategies for Drug Use Interventions Targeting Inmates

Drug abuse among adults is a major health concern. This is especially true among the inmate population. The present study aimed to identify effective drug use intervention strategies for the adult inmate population. Intervention programs that met the inclusion criteria were assessed for effectiveness. For each intervention, frequently used prison-based drug treatment components were examined. Thus, effective strategies that decreased the probability of drug use among this population were identified and discussed. Two main themes were discovered: the therapeutic community approach and group counseling. Recommendations for future intervention programs targeting inmates are offered.

39

Sheng Ren

Mathematics (Statistics), PhD

Advisor: Emily L. Kang, PhD

Periconception Exposure to Air Pollution and Risk of Congenital Malformations

Congenital anomalies (CA) are among the most common complications of pregnancy. We aimed to describe the association between exposure to high levels of airborne fine particulate matter ($PM_{2.5}$) during the periconception period with risk of CA. We used data from two sources: birth certificate data obtained from the Ohio Department of Health (2006–2010) and $PM_{2.5}$ data obtained from the U.S. Environmental Protection Agency's 57 monitoring stations located throughout Ohio. Geographic coordinates of the mother's residence for each birth were linked to the nearest $PM_{2.5}$ monitoring station, and monthly exposure averages were calculated. The association between CA and increased $PM_{2.5}$ levels was estimated, with adjustment for coexistent risk factors. Sensitivity analyses were performed to identify the optimal cutoffs regarding the geographic distance from monitor stations and method of definition for high exposure levels. Based on our statistical analysis, we conclude that exposure to high levels of fine particulate air pollution in the periconception period is associated with increased risk of CA. The most susceptible time of exposure appears to be the one month prior to conception. Although the increased risk with high $PM_{2.5}$ exposure is modest, the potential impact on a population basis is noteworthy because all pregnant women experience some degree of exposure.

40

Kathryn Davidson

Communication Sciences and Disorders, PhD

Advisor: Lisa N. Kelchner, PhD

Cassie Ragland

Communication Sciences and Disorders, PhD

Advisor: Lisa N. Kelchner, PhD

An Analysis of the Three Domains of the Pediatric Vocal Handicap Index in Treatment-Seeking Adolescent Vocalists

Vocal pathologies can be detrimental to the plans of adolescent vocalists, potentially limiting their future performance and career options. As a part of clinical evaluation, the Pediatric Voice Handicap Index (pVHI), a self-reported quality of life index, uses three domains (physical, functional and emotional) to assess how the patient or a parent of the patient perceives the voice disorder. A retrospective chart review was completed to investigate the results of the pVHI among treatment-seeking adolescent vocalists. Participants included nine adolescents (ages 13–18) who underwent clinical evaluation at the Center for Pediatric Voice Disorders at Cincinnati Children's Hospital. The results indicate that the voice issues had mild to moderate impacts on the students' lives, with the physical subscale demonstrating the highest average score. The three domains were found to be positively correlated. Future research is needed to explore the need for a Pediatric Singing Voice Handicap quality of life index.

41

Nadeeka Wickramasuriyav

Physics, PhD

Advisor: Leigh M. Smith, PhD

Raman and Transient Rayleigh Scattering Spectroscopy of Single InGaAs/InP Strained Core-Shell Nanowires

We used Raman spectroscopy and transient Rayleigh scattering (TRS) spectroscopy to characterize the energy structure and strain of individual wurtzite (WZ) $\text{In}_{0.65}\text{Ga}_{0.35}\text{As}$ nanowires (NW) and $\text{In}_{0.65}\text{Ga}_{0.35}\text{As}/\text{InP}$ strained core-shell NWs. The cores of these wires were ~ 30 nm in diameter and ~ 2 μm in length and were synthesized by metalorganic chemical vapor deposition. Micro-Raman scattering from $\text{In}_{0.65}\text{Ga}_{0.35}\text{As}$ NWs showed InAs-like and GaAs-like TO modes with frequencies consistent with the 35% Ga concentration determined from the growth parameters. Raman scattering of $\text{In}_{0.65}\text{Ga}_{0.35}\text{As}/\text{InP}$ NWs revealed that both the InAs-like and GaAs-like TO modes from the core had energies ~ 2 cm^{-1} greater than those measured in the unstrained NWs, indicating that they were under compression. The Raman response from the InP shell revealed TO and LO modes shifted to frequencies $5\text{--}6$ cm^{-1} lower than those of unstrained WZ InP NWs, indicating that the shell was under tensile stress. We found that the $\text{In}_{0.65}\text{Ga}_{0.35}\text{As}$ core was under a compressive strain of 0.26%, while the InP shell was under a tensile strain of 0.42%. The strain is expected to shift the band structure of both the core and shell. Our TRS measurements of single NWs at 300 K showed clear evidence for a strong band resonance in the InGaAs NW at 1514 nm. This resonance moved up in energy in the core-shell NW to 1433 nm, as is consistent with compressive strain. The time

decays of this resonance are quite long (~ 125 ps) when compared to those of bare InGaAs (~ 31 ps).

42

Anastasia Fries

Geology, MS

Advisor: Amy Townsend-Small, PhD

Methane Emissions from Aging and Abandoned Oil and Gas Infrastructure in Appalachian Ohio

The United States currently depends on the burning of coal and oil as its primary source of energy, but this process creates greater carbon dioxide (CO_2) emissions than does the burning of natural gas. Therefore, switching to natural gas as a primary energy source has become more attractive as the atmospheric temperature continues to rise. The mining and distribution of natural gas leads to fugitive emissions of methane (CH_4), and recent research suggests that national CH_4 emissions from oil and gas infrastructure are commonly underestimated. Ohio has drilled approximately 265,446 conventional wells since 1860, and many of these wells have been abandoned without proper sealing and closure. However, previous studies have not included aging and abandoned oil and gas infrastructure, which may be the cause of these excess emissions, as CH_4 sources. Here, I present preliminary data from direct measurements of CH_4 emissions from various oil and gas infrastructure in Wayne National Forest in eastern Ohio. These results indicate the presence CH_4 leakage and provide evidence that a reduction in CH_4 emissions is crucial to better accommodate a future energy switch from coal and oil to natural gas in the United States.

43

Katelin Schneider

Biological Sciences, MS

Advisor: Daniel R. Buchholz, PhD

Characterization of a CORT-Specific Gene during Development

The mechanisms underlying the developmental origins of chronic adult diseases have yet to be determined. Importantly, previous research has shown that stress experienced during early life causes higher basal stress hormone levels, leading to later behavioral, neural and metabolic changes. To elucidate how stress hormones impart the lasting effects of stress, we use frog metamorphosis as a model. Tadpoles are used as sentinels for endocrine-disrupting chemicals. Amphibian metamorphosis is mediated by thyroid hormone (TH), and the stress hormone CORT synergizes with TH to accelerate metamorphosis. The effects of CORT on development and subsequent altered stress hormone levels are conserved in tadpoles and humans. Towards the overall goal of understanding the mechanisms of permanent stress effects on development, I am characterizing Str. 34945, the only known CORT-responsive gene not also regulated by TH. The Str. 34945 sequence maps onto the *Xenopus tropicalis* genome between the genes *ush1g* (Usher syndrome 1G) and *fads6* (fatty acid desaturase 6), but it remains unclear if the sequence represents part of one of these genes or a noncoding RNA sequence. Based on preliminary data, this gene is *ush1g*. The tissue distribution, developmental profile and hormonal regulation of the gene are currently being analyzed.

44

Shima Dalirirad

Physics, PhD

Advisor: Andrew Steckl, PhD

Quantitative Detection of Multiple Biomarkers in Biofluids Using a Circular Paper-Based Device

Identifying biomarkers in biofluids can be a powerful tool for diagnosing many diseases. However, identification is often complicated by the very low levels of biomarkers among other proteins in body fluids. Therefore, an applicable and robust biomarker identification device can be a powerful medical tool in the diagnostic or prognostic support of targeted medicines. Paper-based microfluidic systems, due to their low cost, portability and ease of use as analytical platforms for assays, represent a rising technology of particular relevance to improving healthcare and disease screening, especially for areas with no or low infrastructure and limited medical and health professionals. In the present work, blood samples were dispensed into a device laminated with self-adhesive plastic lamination sheets. Sealing the membrane minimizes fluid loss from evaporation, while placing vent openings to prevent pressure buildup optimizes the blood-membrane interaction by controlling the transport rate. Citrated rabbit blood was used for the experiments. The coagulant factor Ca^{2+} was added to the citrated blood in the form of CaCl_2 solutions at different concentrations to mimic coagulation abilities *in vitro*. The red blood cell (RBC) travel distance decreased linearly with increasing CaCl_2 concentration due to changes in blood viscosity during coagulation. This result demonstrates the effect of Ca^{2+} ions from the added CaCl_2 solution on the blood coagulation process

in radial flow assay devices.

45

Mark Chrisman

Chemistry, PhD

Advisor: Michael J. Baldwin, PhD

Photoactive Uranyl Complexes of Salicylidene- α -Hydroxy Acid Chelates

Iron uptake is limited in marine environments because it is primarily present as Fe^{III} . To make iron bioavailable, marine bacteria produce siderophores, which are capable of photoreducing Fe^{III} to Fe^{II} . This photoreduction only occurs in marine siderophores that contain an α -hydroxy acid (AHA) moiety. This α -hydroxy acid moiety was used to develop a series of mixed-donor salicylidene-containing chelates. These Sal-AHA chelates form photoactive trimeric clusters when complexed with Fe^{III} . To further expand this interesting coordination and photochemistry to other metals, a uranyl complex was formed due to its reported photoactivity with the AHA-containing chelate citrate. In forming a uranyl complex with the 3,5-diCl-Sal-AHA and 3,5-di-*t*-butyl-Sal-AHA ligands, it was found that both formed photoactive dimers with similar structures in which the α -hydroxy groups bridged the uranyl ions. Quantum yields for each derivative have been calculated. Irradiation produces U^{IV} and organic photoproducts, which indicate that the reaction is more similar to that of the Fe^{III} Sal-AHA complexes than that of the uranyl ion in solution.

46

Skyler Smith

Chemistry, PhD

Advisor: Julio Landero Figueroa, PhD

Selenium Supplementation of Nile Tilapia Reared in an Aquaponic System

Aquaponics is an integrated technique that combines fish and plant production simultaneously. The premise of this system is that water recirculates from a fish-rearing tank to a grow bed containing plants, which absorb excess nutrients from the fish waste and ultimately return clean water back to the tank. However, this system only functions efficiently when nitrifying bacteria are present as a biofilter between the fish and plant components. *Nitrosomonas* and *Nitrobacter* species are pivotal in the conversion of ammonia, a harmful waste product of fish digestion, to nitrates, which are the preferred nitrogen source in plant metabolism. The lack of nitrogen buildup allows water to be reused without the need for constant water exchange, making aquaponics more environmentally sustainable than typical aquaculture techniques in terms of freshwater conservation. However, high fish densities are still needed to make fish farming profitable, which can lead to accumulations of total organic matter and toxic metals that cause oxidative stress for fish. Selenium (Se) is a known antioxidant, and many studies have supported its role in mediating oxidative stress, but its use as an additive in fish feed is currently unregulated in the U.S. The aim of this research was to supplement aquaponic systems with various concentrations of selenium, using selenized yeast incorporated into the fish feed, then evaluate distribution and speciation within the compartments of each system using mass spectrometry (ICP-MS) and

liquid chromatography. The results of a 10-week study with Nile tilapia and basil plants will be presented.

47

Joseph Hart

Educational Studies, PhD

Advisor: Christopher Swoboda, PhD

Exploring the Effects of Manipulating Auxiliary Variable Attributes on Multiple Imputation Efficiency under Realistic Conditions

Multiple imputation (MI) is a modern technique for addressing missing data and is appropriate when data are assumed missing at random (MAR) or missing completely at random (MCAR). Researchers often employ auxiliary variables to improve the efficiency of MI, although the literature contains discordant and incomplete guidelines for auxiliary variable selection. The present study sought to clarify guidelines for auxiliary variable selection by evaluating the predominantly inclusive selection strategies under more realistic conditions than those previously investigated. We performed a simulation to examine the bias and efficiency of MI performance in response to the manipulation of auxiliary variables in the imputation model. Auxiliary variables in the present study varied along four primary dimensions: strength of correlation (.7, .4, .1) with missingness indicators and outcome, the underlying missingness mechanism (MAR, missing not at random (MNAR)), normally and nonnormally distributed data and the proportion of missingness (20%, 30%, 50%). Preliminary results suggest that including certain auxiliary variables can improve MI performance in terms

of bias and imputation efficiency in MAR and MNAR situations; however, additional auxiliary variables provide diminishing returns when other strongly correlated auxiliary variables are included in the MI model. This scenario may complicate the use of MI on smaller datasets. These results suggest that fully inclusive auxiliary variable selection strategies may be unnecessary when MI performance is assessed under realistic conditions.

48

Jonathan Thompson

Physics, PhD

Advisor: Hans Wagner

Real-Time Depth-Resolved Holographic Imaging using Photorefractive Quantum Wells

Coherence-gated optical imaging techniques that enable wide-field time- and depth-resolved imaging through turbid media such as atmosphere, plastic or biological tissue have attracted much attention in recent years. When equipped with our recently discovered all-optical phase coherent photorefractive (PCP) ZnSe quantum wells (QWs), optical coherence imaging (OCI) and a modified novel technique that we named contrast-enhanced holographic imaging (CEHI) have the potential to become powerful methods for high-speed three-dimensional (3D) imaging through turbid media or for highly sensitive particle tracking in a solution.

Our central objective is to optimize these PCP QWs. In particular, we wish to shift their resonance energies into the near-infrared spectral region for medical applications, where skin or tissue is less absorptive. We also want to increase their diffraction efficiencies (currently ~0.1%).

49

Vitor Nogueira

Design, MDes

Advisor: Brigid Okane, MFA

Yun He

Design, MDes

Advisor: Brigid Okane, MFA

Access: Where are We Going and How are We Going to Get There?

This exploratory study of systems thinking synthesizes the techniques of storytelling to gradually pinpoint the core features of 21st century mobility and highlight future trends and scenarios. By analyzing the concept of access throughout history, from the industrialization of the Model T in America to the experience of using Zipcar, our group gathered information on the relationship between sharing and crisis. These data served as raw material to develop a vision of the future.

50

Matteo Lotito

Physics, PhD

Advisor: Philip C. Argyres, PhD

Classification of 4d Rank-1 N=2 SCFTs

We present a classification of 4d rank-1 N=2 superconformal field theories (CFTs). We characterize these theories by analyzing the structure of their moduli spaces of vacua. We begin by listing the possible scale-invariant geometries of an N=2 Coulomb branch. Subsequently, we introduce deformations consistent with N=2 supersymmetry and the residual gauge symmetry of the low energy theory. This approach allows us to argue the existence of a CFT and determine its flavor symmetry structure.

51

Leena Shewade

Biological Sciences, PhD

Advisor: Daniel R. Buchholz, PhD

Endogenous Regulation of Kruppel-Like Factor 9 by Corticosteroids Occurs via Type-II Nuclear Receptor

Studies in humans and lab animals have shown that perinatal stress can lead to a wide range of later abnormalities, such as prolonged and elevated stress responses, learning and memory deficits and an increased risk of schizophrenia, as well as metabolic and cardiovascular disorders. Perinatal stress is associated with permanent changes in brain structure and the neural control of the stress hormone axis. One transcription factor active during brain development, Kruppel-like factor 9 (klf9), is believed to be a key regulator of the neuronal maturation underlying brain developmental plasticity to stress. Our lab and others have shown that klf9 can be induced by exogenous thyroid hormone (TH) and glucocorticoid hormones (GC,

the primary vertebrate stress hormone) during neuronal maturation in the *Xenopus* frog model. The hormonal basis of *klf9* regulation is significant because environmental influences and endocrine disruption act via altered hormone physiology, which can affect *klf9* expression and thus brain development. However, the contribution of endogenous hormone signaling for *klf9* induction during the adaptive response to stress is less clear. Here, we investigated the role of the nuclear receptors used by GCs to regulate *klf9* endogenously using a series of hormone and receptor antagonist treatments. Our results suggest that GCs act through the glucocorticoid receptor to regulate *klf9* levels during development. We are currently pursuing further studies using a frog knockout model to determine how GCs act on brain maturation via *klf9* regulation.

52

Ahmed Elshewy

Chemistry, PhD

Advisor: Michael J. Baldwin, PhD

Formation of New Bimetallic Complexes Containing Two α -Hydroxy Acid Moieties

To sequester iron, bacteria biosynthesize molecules called siderophores that bind Fe(III) very strongly. Some siderophores are photochemically active; all such molecules have an α -hydroxy acid-related functional group. A series of new two α -hydroxy acid-containing chelates inspired by photoactive marine siderophores, along with their transition metal complexes, are being synthesized and characterized structurally and photochemically. These new chelate structures are being designed to

accommodate two different metal sites, including one photoactive iron site and a second variable metal site.

53

Sue Schlembach

Educational Studies, PhD

Advisor: Victoria Carr, EdD

Play and Child Homelessness

Over 1 million homeless children in the United States—51% of total homeless children—were under the age of 6 in 2014. Adversities associated with homelessness are considered risks to early developmental trajectories. Play is a primary medium for early learning and also acts as a protective mechanism for children facing the cumulative risk factors associated with adversities linked to homelessness. Homeless shelters often lack supportive environments critical to eliciting stimulating play interactions. This qualitative exploratory case study examined mothers' perceptions of young children's play in a Midwestern urban core homeless shelter. Data collection methods consisted of interview, observation and photo elicitation. The research question to be answered was as follows: How do mothers perceive children's play in the context of a homeless shelter for women and children experiencing homelessness? The findings indicated that mothers perceived play as an important activity in the lives of their children. Mothers also reported that play opportunities were restricted by the contextual nature of the shelter, thereby compounding the existing high levels of stress in their lives. Implications of the study findings for policy and practice related to service delivery models are discussed.

54

Aaron Koenig

Physiology, MS

Advisor: Steven J. Kleene, PhD

The Trafficking of Polycystins 1 and 2 to the Primary Cilium in Kidney Tubules

Autosomal dominant polycystic kidney disease (ADPKD), the most common cause of inherited cystic kidney disorders, is caused by mutations in polycystin (PC) 1 or 2. PC-1 and 2 form a heterodimeric complex that is expressed on the primary cilium (PrC) of kidney tubule cells and mediates the mechanosensation of urine flow. Defects in the PrC localization of PC-1 and 2 have been identified in the cysts of ADPKD patients with normal PC1/2 protein abundance. Both entry and exit to the PrC for membrane proteins such as polycystins are dynamic, regulated processes that establish the PrC as a distinct signaling entity. In this review, we summarize the current models of ciliary trafficking for PC-1 and 2. We address long-standing questions such as whether the interaction between PC-1 and 2 is a prerequisite for PrC localization and the identity of the trafficking proteins capable of crossing the PrC diffusion barrier that recognize motifs on PC1 and 2. Understanding the destinations for PC-1 and 2 in the cell may help determine therapeutic targets to increase functional polycystin delivery to the PrC in ADPKD kidneys.

55

Nadeesha Nambukara Wellala

Chemistry, PhD

Advisor: Hairong Guan, PhD

A Diphenyl Ether–Derived Bidentate Secondary Phosphine Oxide as a Preligand for Nickel-Catalyzed Carbon-Sulfur Cross-Coupling Reactions

A new bidentate secondary phosphine oxide (SPO) was synthesized from diphenyl ether via ortho-lithiation, phosphorylation with $\text{PhP}(\text{Cl})\text{NEt}_2$ and hydrolysis in an acidic medium. The nickel(0) species ligated with this new SPO was established as a more effective catalyst than $\text{Ni}(0)\text{-Ph}_2\text{P}(\text{O})\text{H}$ for the cross-coupling of aryl iodides with aryl thiols.

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Michelle Dietz

Germanic Languages & Literature, PhD

Advisor: Tanja Nusser, Dr Habil

“He in His Black Uniform with Its Death-Heads, Me the Black Grandchild:” Race, History and Identity in Jennifer Teege’s “Amon: Mein Großvater hätte mich erschossen” (“My Grandfather Would Have Shot Me”)

Jennifer Teege discovers by chance that she, a Black German put up for adoption shortly after birth, is the granddaughter of war criminal and concentration camp commandant Amon Göth. Her 2013 autobiography, “Amon: Mein Großvater hätte mich erschossen,” assembles her family’s history and details her personal struggle with the information that she is the descendant of a brutal murderer. Throughout her work, she employs structural, narratological and cultural elements that contribute to its complexity and depth. Analyzing all three will reveal the murky situation of a black woman in a “white” country whose grandfather was a memorable part of its darkest hour.

Due to the current atmosphere in Germany, Teege’s Germanness is not usually assumed in the interactions she describes, which creates both negative and positive results. As she deals with depression, reignited by the stress of her situation, she can hide her true identity and visit locations central to her grandfather’s crimes at will. She fully admits that her skin color allows her to ask invasive questions about Göth and his family without the suspicion that white Germans in the same position would have received. Conversely, her looks also precipitate her need to grapple with the fact that she descends from a perpetrator while living in a country where others perpetrate against her. This analysis will explore the complexities of Teege’s identity, expressed through events in the past and the racial climate of the present, to investigate the dynamic nature of proclamation and reclamation of German identity.

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Ashley Vaughn

Educational Studies, PhD

Advisor: Marcus Johnson, PhD

Sarai Hedges

Educational Studies, PhD

Advisor: Marshella L. Harkness, PhD

School’s Out for Summer? Providing Summer Experiences for Preservice Teachers

Preservice teachers beginning their program during the summer session have difficulty obtaining first-semester field experience. The subjects of this study are career-changer preservice teachers (PSTs) seeking science or mathematics secondary certification and a master’s degree. The PSTs participated in a new, innovative field experience. During this experience, the PSTs (including math and science PSTs) participated in a three-week IT workshop with students from their future student-teaching sites (located in a large, urban Midwestern school district). This research is part of a larger study of high school student participants in the three-week intensive IT program. The goal of this workshop was to push the PSTs to interact with urban youth in a more informal setting, thereby allowing the PSTs to develop relationships with the students, become comfortable with working with diverse student populations and better facilitate group work in this setting. We present the results of a series of interviews with the participants on the effectiveness of the field experience, their experiences working with diverse groups and urban populations and if/how the workshop prepared them for starting student teaching in the fall.

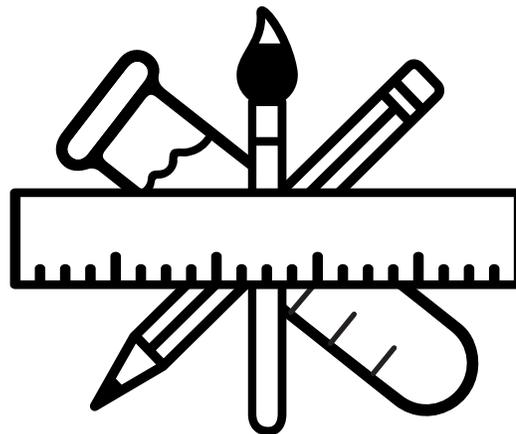
Mia Varner

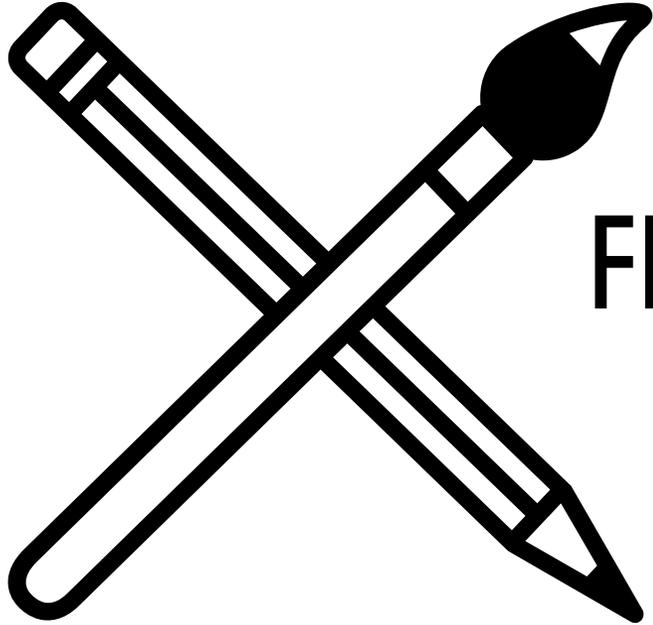
Environmental Science, MS

Advisor: Dionysios D. Dionysiou, PhD

Correlation of Variations in Chlorophyll-a and Concentrations of Microcystin in William H. Harsha Lake, Ohio

Cyanobacteria, also known as blue-green algae, are photosynthetic bacteria found in freshwater and marine environments. Cyanobacteria are naturally occurring, but increasing nutrient inputs and rising water temperatures have contributed to their proliferation, resulting in harmful algal blooms, or HABs. HABs are able to produce toxic secondary metabolites such as microcystin, anatoxin-a and cylindrospermopsin. These potentially toxic HABs are sources of contamination for drinking water utilities, pose a public health risk and may disrupt the ecosystem dynamics of lakes and rivers. At this time, the environmental factors that influence the formation of HABs and the release of toxins such as microcystin are not well understood. As HABs start to occur more frequently and expand in location, additional monitoring techniques and improved predictive tools must be implemented. Chlorophyll-a, the primary pigment of photosynthetic organisms, can be used as an indicator of total biomass for cyanobacteria. In this study, we look at the correlation of variations in chlorophyll-a and microcystin concentrations at William H. Harsha Lake as a potential indicator of toxic HABs.





FINE ARTS GALLERY





Jenni Cattran

Social Work, MSW

Advisor: James Canfield, PhD

Serenity

Jenni Cattran is a graduate student in the administrative/macro track of the master's of social work program at UC. She also holds a bachelor of arts in philosophy from Northern Kentucky University. Her social work interests include issues impacting women and children, forgiveness and reconciliation, peace building and violence reduction efforts, and large scale social change. To relax, Jenni enjoys painting, sculpting, drawing and minimalist architecture. Although Jenni's painting style usually skews toward abstraction, Serenity is a good example of the artist's love of nature and was inspired by a backyard bird feeder.



Christine Kern

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Untitled

This piece of handmade paper was created to invite the viewer to take a moment to think about the importance of energy investment in one of the simplest material processes. The amount of time and energy that goes into creating a single sheet of paper is overlooked and underestimated. Paper undergoes various transformations. It transforms from a tree to pulp and then into paper and often from information to overlooked trash. The energy used deserves attention. To ignore the beauty of the processes acted out in the making of paper would be to waste time and energy. We should not cast aside paper with unwanted and imperfect imposed impressions. The paper can be reused and repurposed. Beauty can be found in these cast aside pieces. Jewelers do not discard diamonds because of one wrong cut. With today's technology, it takes a lot longer to grow a tree than cut a diamond. The difference in value between a piece of paper and a diamond is shocking. My work invites the viewer to take a moment of time to search, see and breathe and to understand that unwanted information is not unwanted by me.



Sean Leavell

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Systemized

My work addresses the American cultural relationship to the land, more specifically the suburban landscape and how its history can be used as a tool to illuminate an often overlooked contributor to the current state of inequity in our society.



Teal Porrini

Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Watermelon Rhizomes

Paint is a curious substance. I seek to seduce my audience by employing a sensory presentation of paint with focus on materiality. I am interested in presence – the presence of the artist both in and out of their studio – and perspective – the ways in which the artist comes to terms with themselves and their surrounding environment. I search for answers to the question “What is painting?” It’s the painted line on the street I scurried over this morning, the hat dropped on the concrete last winter and the color of the sky after a brief rain. Perhaps painting is everything. It’s ubiquitous. It’s an individualized way of seeing. Do you see what I see?

Momentary intense impulses of pigment in binder thrust onto an empty surface; my paintings are materially honest extensions of my being and I am an extension of them. My work is my poetic response to atmosphere and the poems I write about the same atmospheres are also in turn paintings. These paintings display my interest in the manners in which paint or painting exists.

I submit myself to the process of painting as I explore the various ways in which paint pulls, sweeps, bends, folds, twists, separates and comes together effortlessly. The paintings share my interest in the piece of peeling paint I strolled past last Tuesday and the bubbled beige latex that distracts me as I try to fall asleep. I employ the use of the circular frame within my paintings to place emphasis on fleeting time and the objecthood of moments, moments

that are often only remembered by a photograph, diary entry, smell, etc. The work is a plea for the viewer to join in my enthusiasm for the material and gain insight to my individual perspective of the world. The framed moments are monads that offer infinite perceptions of the world meant to connect and disconnect.



Sunni Zemblowski

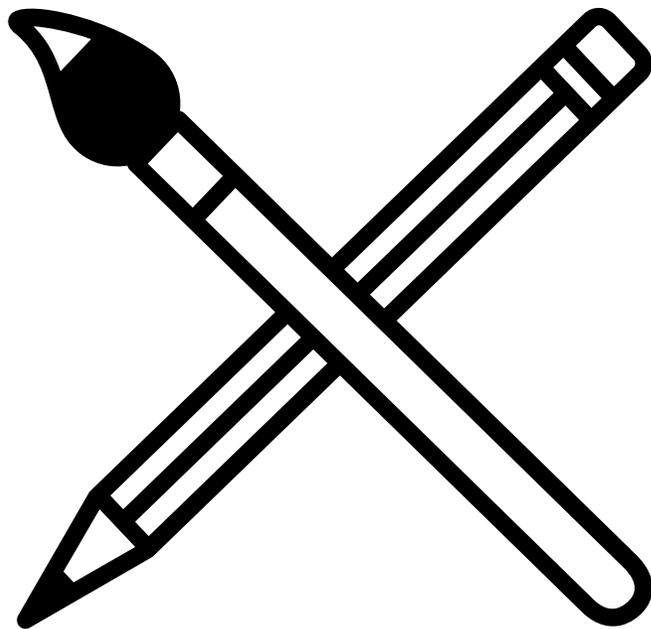
Fine Arts, MFA

Advisor: Joseph Girandola, MFA

Self Portrait / Portrait of Jeanette

Oil on canvas, 18" x 24". Rabbit on green ground.

Oil on canvas, 18" x 24". Gold valve on blue ground.



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