THE HONORS SCHOOL RESEARCH CONFERENCE

MONMOUTH
UNIVERSITY
The Honors School

It is with great pleasure that the Honors School presents its Fall 2018 Research Conference.

Student presenters include research in the following fields:

Biology (BY)

Chemistry (CE)

Education (ED)

English (EN)

Health Studies (HE)

Mathematics (MA)

Social Work (SW)

FALL 2018
HONORS SCHOOL
RESEARCH CONFERENCE SCHEDULE
Friday, December 7, 2018

SESSION 1: 8:30 a.m. - 9:40 a.m.

Opening Remarks: Dr. Walter D. Greason

Dean of the Honors School

Grace Roeder, Biology & Secondary Education

Nicole Sivetz, Biology & Chemistry

Sneha Bupathi, Health Studies

Jane Lai, English

Meghan Brown, English & Elementary Education

Miranda Halpern, Mathematics

SESSION 2: 10:00 a.m. - 11:00 a.m.

Brenna Sadowski, Social Work

Bryanna Roos, Mathematics & Elementary Education

Matthew Vazzana, Mathematics & Secondary Education

Tyler Soobryan   Chemistry

Arbaz Khan, Biology

Closing Remarks: Dr. Walter D. Greason

Completed but not presenting

JUSTIN DRITSCHEL (PS)

AMBER STRATZ   (HE)

Opening Remarks

DR. WALTER D. GREASON, *Dean of The Honors School*

In Order of Presentation:

GRACE ELIZABETH ROEDER (BY EDS) | *The Impacts of Fire Suppression on Pitch Pine Populations of a Maritime Forest in New Jersey*

Chief Advisor: Dr. Pedram Daneshgar

Since the mid-1900s, the New Jersey Forest Fire Service has utilized prescribed burns in the Pinelands as methods of preemptive wildfire control and a source of regulation for the ecosystem. The Pinelands experience frequent forest fires which prevent the succession of a hardwood climax forest. Pitch pine (*Pinus rigida)* is a dominant species throughout the Pinelands that benefits from the disturbance of forest fires. The pitch pines require extreme heat and fire to successfully release seeds from serrotinous cones and reproduce. The intentional prescribed fires clear away competing species and provide pitch pines with suitable conditions for growth. The Pinelands National Reserve not only includes the Franklin Parker Preserve, but also the maritime forest of Island Beach State Park, where controlled burns are not implemented. To determine the differences in pitch pine populations as a result of fire suppression, the two populations were sampled using radius plots and quadrat sampling. The number of juvenile pitch pines were counted within a 10 meter radius of a mature tree sampled along with descriptive statistics of the populations such as height, age, and trunk diameter. Additional data was collected on the soil composition, litter depth, canopy cover and species diversity directly beneath the adult tree and 10 meters away from the tree. The results indicated that Franklin Parker Preserve had a greater population of juvenile pitch pines in comparison to Island Beach State Park. There was, on average, 7 juvenile trees found per tree sampled in the Pinelands versus only 2 juvenile trees found per tree sampled in the maritime forest site. The results also included taller trees, larger diameters and older trees in the Pinelands, justifying the difference in the ecosystems due to fire suppression. This study suggests that overtime, fire suppression in a maritime forest reduces the pitch pine population and alters the natural environment of the maritime forest.

NICOLE SIVETZ (BY CE) | *Fast and Efficient Synthesis of Quinazoline Derivatives*

Chief Advisor: Dr. Massimilano Lamberto

Epidermal growth factor receptor (EGFR) deregulation is associated with tumor metastasis and poor patient prognosis in a variety of malignancies. This widely-expressed tyrosine kinase receptor activates critical signaling pathways to promote cell survival and proliferation, thus EGFR is an attractive therapeutic target. The development of EGFR inhibitors, such as erlotinib and gefitinib, has resulted in agents that exhibit anti-cancer activity in several cancer models, yet drug toxicity and mutation-mediated resistance remain major obstacles. To address these issues, the protein structure of tumor-specific EGFR isoforms can be exploited during inhibitor development to increase drug efficacy and selectively differentiate tumor cells from normal cells expressing wild-type EGFR. A number of substituted quinazolines have been previously demonstrated to be potent EGFR inhibitors but their synthetic schemes are lengthy and complex. Here, we developed an optimized procedure to access a variety of quinazoline derivatives with previously demonstrated efficacy against EGFR activity, among other applications, using microwave-assisted synthesis. This strategy not only synthesized compounds in comparable or even increased yields compared to conventional synthesis techniques, but microwave-assisted chemistry enables more facile adjustment of these inhibitor structures to subsequently alter their biological activities.

SNEHA BUPATHI (HE) | *Water Quality And Public Health: A Case for India and the United States*

Chief Advisor: Dr. Tsanangurayi Tongesayi
Second Reader: Professor John Tiedemann

While there are strides being made towards making water a right, it remains a privilege for much of the world. Specifically, access to safe drinking water is considered a basic human right that is currently inaccessible to about 844 million people even though it is essential for survival, as a basic need of life. In various parts of the world, there are differing levels of consumption and safety of drinking water. The proposed research will provide a comprehensive comparison of global drinking water contamination and toxicity, along with the respective health impacts to the affected populations, specifically in India and the United States. The main objective of this research will be to determine the various aspects contributing to the differences in water contamination in developed countries like the United States versus developing countries like India. These differences can be used to understand the policies related to water contamination regulation and allow the general public to see how understanding socioeconomic and cultural aspects serves a purpose in combating these issues.

JANE LAI (EN) | *On Metaphors and Martyrdom in Hanya Yanagihara's A Little Life*

Chief Advisor: Dr. Mihaela Moscaliuc
Second Reader: Professor Alena Graedon

I will argue on the craft of the third person omniscient narrator (alongside the point of view of Willem and Harold) in *A Little Life* by Hanya Yanagihara with a focus on exploring how trauma informs as well as deforms the protagonist Jude and his sense of self-worth as he attempts to rebuild his subjectivity through relationships with others. Further, I will unpack the reader's access to Jude's voice and how that consciousness is mediated in ways that enhance the understanding of his emotional and physical turmoil and trauma. The research I have undertaken is interdisciplinary, drawing from literary criticism, clinical psychology, and trauma studies. I will examine metaphors and how they function in relation to narrative and point of view in order to grapple with an understanding of how Jude navigates his potential for healing as he confronts both past and present societal experiences. By parsing Yanagihara's use of metaphors through systems such as Jude's axiom, his relationship to food, memory, and enthymemes, these parts will begin to thread together and recreate one version of his process for coping with his trauma.

MEGHAN BROWN (EN EDE) | *Flashbulb*

Chief Advisor: Professor Alena Graedon

Inspired by the works of Ernest Hemingway, Lydia Davis, and Jamaica Kincaid, *Flashbulb* is a collection of flash fiction; the longest story is a page and a half, and the shortest is just a sentence. The title, *Flashbulb*, derives from the psychological term flashbulb memory, which is a phenomenon that states that a person can remember a specific moment with incredible vividness due to high levels of emotional arousal. The collection covers an array of themes including abusive relationships, sexual harassment, self harm, eating disorders, and unhealthy friendships. These themes explore the relationship between traumatic events and the individual's emotional response to pain and stressful situations.

MIRANDA HALPERN (MA) │ *Two–Phase Flow in a Hydrothermal Vent System*

Chief Advisor: Dr. Kayla Lewis
Second Reader: Dr. Dmytro Kosenkov

Using six major assumptions from Lewis et al. (2018), the two-phase flow along a vertical wall in salt water is studied. With the use of Darcy's Law, the volumetric flux and temperature in relation to a dike are able to be calculated. The thickness of the layer as a function of height is sought. To solve this problem, the partial differential equations describing salt, mass, and heat transport are averaged across the thickness of the layer, converting them into ordinary differential equations that can then be solved to find the thickness. A formula for the rate at which heat is lost from the magma is derived, along with the length of time that the two-phase flow is able to persist as the magma cools. The conclusions found are that the width of the two-phase layer increases as height to 1/2 power. Liquid volume saturation and bulk salinity both increase with increasing depth. The bulk salinity reaches 10 wt% NaCl at the lowest height in the model. Phase separation at the top of the system persists for 21 days. The heat required to sustain the layer is derived primarily from the latent heat of magma crystallization.

BREAK

NOTES

BRENNA SADOWSKI (SW) | *College Students' Perceptions on the Effectiveness of Art Therapy for Major Depression*

Chief Advisor: Dr. Michelle Scott

Art therapy has been utilized across various treatment settings as an intervention for major depression, with the exception of college campuses. The purpose of this study is to fill a gap in the literature regarding college students' perceptions of art therapy as treatment for major depression. Students of Monmouth University's Honors School participated in this study via an electronic survey. Results comparing major, knowing someone with major depression, and gender were compared to perceptions of art therapy using an independent sample t-test. Participants felt neutral about art therapy as a treatment, but mainly agreed that art-making has benefits for people experiencing major depression. There was only a significant relationship between gender and believing that are therapy has emotional benefits.

BRYANNA ROOS (MA EDE) | *A Checklist for Implementing Technology in Elementary Mathematics Classrooms*

Chief Advisor: Dr. Laura Turner

This paper reviews the effects of technology in elementary mathematics classrooms. Technology has changed the way teachers can educate their students through a variety of interactive learning opportunities. A two-part checklist has been created for teachers to stay accountable when implementing technological resources in the classroom. Planning and reflection are two critical elements of effective teaching. Therefore, the checklist consists of questions to be addressed both before and after instruction where each component is supported by peer-reviewed research. A future project will be considered to implement the checklist in a real classroom setting to gain evidence of the outcomes for teachers.

MATTHEW VAZZANA (MA EDS) | *Exploration of Lebesgue Integral*

Chief Advisor: Dr. Sandra Zak

Elementary level calculus introduces the idea of the definite integral as the area under a function $f(x)$ over a closed interval $[a,b]$. This presentation will look at two different approaches to finding this area, known as the Riemann Integral and the Lebesgue Integral. The rough idea used by both approaches is to approximate the area using geometric rectangles. The key difference is in the construction of the rectangles used in the successive approximations. For the Riemann Integral, the domain of the function (the x-axis), is partitioned into smaller intervals, which will give the width of each rectangle to be used. Next the length of each rectangle will be given by either the supremum or the infimum on each interval. The choice will either give an "over" approximation, or a "lower" approximation. The basic idea may be seen in the definition of the upper sum below.

$$U(f,\pi) = \sum_{i=1}^{n} M_i \Delta x_i,$$

Where M_i is the supremum of $f(x)$ over the subinterval and Δx_i is the width of the subinterval.

The approach taken by the Lebesgue Integral, is to partition the range of the function $f(x)$ (the y-axis), and then to use the measure, λ, of the inverse image over each these partitions to find the width of each rectangle. We can see the idea in looking at upper sum given by the definition

$$U(f,\pi) = \sum_{i=1}^{n} y_i \lambda \left(f^{-1}\left([y_{i-1}, y_i] \right) \right).$$

To help us understand the differences in these two approaches, we will consider the following example: Define $f:[0,1] \to \mathbb{R}$

This example will not only show the different methods of choosing a partition, but will also highlight the key idea that the Lebesgue Integral is a more general approach to solving the question of finding a definite integral.

TYLER SOOBRYAN (CE) | *Synthesis of Quinazoline Derivatives and their Roles as Anticancer Drugs*

Chief Advisor: Dr. Massimilano Lamberto

Quinazoline derivatives were synthesized to test the inhibition efficacy of these compounds for human telomerase enzymes. Recent studies have shown that certain secondary metabolites from Actinomycetes and other small microorganisms can act as telomerase inhibitors. These compounds are classified as quinazolines which have the shape and size of potential inhibitors of telomerase enzymes. Quinazolines also show a high affinity for G-quadruplex structures. The compounds synthesized in this study were also aimed to possess high selectivity towards G-quadruplexes over normal DNA double helices. This characteristic allows quinazolines to avoid targeting normal cells since G-quadruplexes are primarily found in cancer cells. If effective quinazolines can be synthesized and proven to stop telomerase activity and selectively bond to G-quadruplexes then these compounds have the potential to serve as anti-cancer drugs. The substituents on a base quinazoline were modified to identify if any elements added or removed from the compound increase inhibition efficacy and G-quadruplexes.

ARBAZ M. KHAN (BY) | *Acidolysis Products of Rhenium (I) Alkyl Carbonato Complexes To Treat And Inhibit Inflammation in Cancers of the Oral Cavity*

Chief Advisors: Dr. Gregory Moehring and Dr. Jeffery Weisburg
Second Reader: Dr. Datta Naik

Studies have examined various organometallic compounds with their cytotoxic properties due to the cytotoxic resistance and significant side effects of current therapies. This research focuses on Rhenium (I) centered organometallic compounds supported by one α-diimine ligand, three carbonyl ligands, and a sixth ligand. In this research there is an emphasis on a rhenium complex with a sixth alkyl carbonate ligand. This ligand arises from the reflux of dirheniumdecacarbonyl in pentanol under an atmosphere of carbon dioxide. The alkyl carbonate ligand in the rhenium complex can be substituted in acidolysis reactions with the anions of a variety of acids such as difluoroacetic acid, chloroacetic acid, and a pyridinium salt. Acidolysis reaction products are characterized by IR and NMR spectroscopy to verify the compound's structure.The association between inflammation and cancer has been studied widely, so we want to determine if alkyl carbonates could inhibit vital signaling of the inflammatory process. The transcription factor NF-kB has been a key element in inflammation, and its activation has been shown to upregulate gene expression of other pro-inflammatory cytokines. Employing carboxylate-supported Rhenium(I) centers on the human squamous carcinoma (HSC-2) cells and human normal gingival fibroblast (HF-1) cells, we want to observe if these organometallic compounds could inhibit or slow down the activation of NF-kB and prevent the inflammatory process. Evidence of cytotoxicity will lead to studies in the mechanism of action for these cytotoxic properties.

HONORS SCHOOL

ENHANCING LEARNING OPPORTUNITIES

MONMOUTH
UNIVERSITY

Recent Graduate Schools Accepting MU Honors Students

BU School of Law

WASHINGTON STATE UNIVERSITY

GEORGE MASON UNIVERSITY

UMDNJ
UNIVERSITY OF MEDICINE & DENTISTRY OF NEW JERSEY

UNIVERSITY of HAWAI'I
MĀNOA

Georgetown University

PURDUE UNIVERSITY

MONMOUTH UNIVERSITY

LSE
THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

NC STATE UNIVERSITY

UNIVERSITY of VIRGINIA

College of Veterinary Medicine
UNIVERSITY of MISSOURI

UNIVERSITY OF NOTRE DAME

THE UNIVERSITY OF MEMPHIS.

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

THE UNIVERSITY OF TOLEDO
1872

AMERICAN UNIVERSITY
WASHINGTON, DC

DREXEL UNIVERSITY College of Medicine

AMERICAN UNIVERSITY
WASHINGTON COLLEGE OF LAW

RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

Thomas Jefferson University

VILLANOVA UNIVERSITY SCHOOL OF LAW

SCHOOL of INTERNATIONAL SERVICE

COLUMBIA UNIVERSITY

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

UNIVERSITY OF CENTRAL FLORIDA
UCF

VILLANOVA UNIVERSITY

UNIVERSITY AT ALBANY
State University of New York

Yale SCHOOL OF NURSING

UB University at Buffalo
The State University of New York

JOHNS HOPKINS UNIVERSITY

NEW YORK UNIVERSITY