SRS 2020

Annual SUNY New Paltz Student Research Symposium

Abstract Book

New Paltz
STATE UNIVERSITY OF NEW YORK

26th ANNUAL
SUNY NEW PALTZ
STUDENT RESEARCH SYMPOSIUM

Sponsored by:
The Research, Scholarship, and Creative Activities Program

Friday, May 1, 2020
Via ForagerOne Virtual Symposium

Table of Contents

Acknowledgments……..……...…2

Welcome Statements……..…….……...3-5

Mentor Award……..6

RSCA Opportunities.……..…..……..…...…..7

Abstracts ……..…..……..…8-31

Award Recipients

2019 SURE Award Recipients……..….....32-33
Fall 2019 AYURE Award Recipients..…….....34-35
Spring 2020 AYURE Award Recipients…….....…….36
Student Conference Travel Award Recipients…….....…..……37

Publication Opportunities for Undergraduates……..…….…...38-40

Editor: Kate McCoy, RSCA Director
Assistant to the Editor: Amy Witkus, RSCA Secretary
Cover Photograph: Rami Abouemira '16
Cover Design: Kaitlin Hair

The 2020 Student Research Symposium

Once again, as the academic year comes to a close, we have this opportunity for scholarly exchange between our faculty and students. The 2020 Student Research Symposium includes 46 poster presentations of work performed by 90 students representing 14 majors, sponsored by 24 faculty mentors representing 12 departments. This is an occasion for us to share our accomplishments in a spirit of camaraderie.

The Student Research Symposium is sponsored by the Research, Scholarship and Creative Activities (RSCA) Program. The mission of the RSCA program is to encourage and support student-faculty collaboration in the active participation of scholarly and artistic activities that generate new knowledge or works.

Such activities enable students to gain knowledge, skills and confidence to contribute as productive members of their professions and contribute to a learning environment that is challenging, student-centered and personalized.

Acknowledgments

The following people have provided generous support of this event:
Aram Agajanian (Computer Services) for support of the web-based abstract submissions; **Amy Witkus** (RSCA Secretary) for abstract book preparation and additional support.

The RSCA Advisory Board

Welcome to the Student Research Symposium

As we recognize our research scholars, I want to commend both our students and faculty for being persistent, productive and inspiring during these extraordinary times. While this semester looks much different than we expected, I am heartened by the commitment to original research across all fields of interest from biology, chemistry and engineering; to psychology and sociology; to music and theatre; and to languages, literatures, & cultures. Each project represents a high-impact learning experience, proof of a student's ability to think creatively, work alongside more experienced mentors and stake out new ground for the benefit of a larger community of learners.

Student research participation is one of several educational practices known to produce especially deep and meaningful learning. A key ingredient to a successful program like ours is a faculty who are willing to guide and support students, and who value this work as one of the most important forms of teaching we can undertake. This is a labor of love, but it still takes time, energy and effort above and beyond everything else that we ask you to do, especially this spring. So many of our New Paltz faculty demonstrate enthusiasm and commitment to mentoring undergraduates, regardless of the circumstances.

Student research and scholarly endeavors are not just for students heading to graduate school. Employers see the successful completion of a research project as one of the most useful indicators of student learning and capability that they seek in new employees. More than 80% of employers responding to recent national surveys value completion of a research project or similar endeavor that demonstrates knowledge in the major, and the ability to solve problems, communicate and make evidence-based decisions.

Such findings highlight why we value the Research, Scholarship, and Creative Activities (RSCA) program and other New Paltz programs that encourage student research engagement. Successful undergraduate research programs depend on the dedication, knowledge, and scholarly expertise of faculty. I also want to take this opportunity to express my deep gratitude for them, our campus-wide RSCA Coordinator Dr. Kate McCoy, and the advisory committee for their dedication.

I congratulate students and faculty both for your hard work and your success in projects this past year, and wish you continuing success and fulfillment in the future.

Donald P. Christian
President

No area of the human experience nor of the material world has been untouched by the coronavirus crisis. As it unfolds, the COVID-19 pandemic reinforces the case for undergraduate research and scholarly/creative activities within and across disciplines. This global crisis represents multiple interdependent sets of dynamics which to address successfully will require higher order critical thinking and problem solving, effective teamwork and project management, and strong communication skills and strategies. Undergraduate research experiences develop all of these crucial capacities.

I would like to acknowledge and congratulate all who play key roles in putting our students' great minds to work as evident in the Student Research Symposium. First, congratulations to the students themselves for their curiosity and quest to deepen their knowledge and understanding. You have done impressive work! Without the faculty who expertly mentor students in scholarly inquiry, the depth and quality of undergraduate research and scholarly inquiry achieved at New Paltz would not be possible. Thank you to the faculty for modeling excellence in research and scholarly/creative activities within your disciplines and through interdisciplinary inquiry.

Students' preparation for scholarly inquiry begins long before they carry out the kinds of projects featured in the symposium. Students' capacity to think critically and creatively is developed across all programs from the day they first join us. The impressive scholarly inquiry represented here is scaffolded on the strong general education foundation of the liberal arts and sciences, all of which prepares and positions students to make the most of their undergraduate research opportunities. Thus, all faculty deserve appreciation for their respective contributions to the excellence on display through this symposium. Many staff support the undergraduate research enterprise and deserve acknowledgement and thanks as well.

Again, congratulations to the students who will emerge from the College better prepared as a result of their research experiences to contribute significantly to their families and communities around issues from local to global.

Barbara Lyman
Interim Provost & Vice President for Academic Affairs

On behalf of the Research, Scholarship, and Creative Activities Program Advisory Board, I would like to welcome you to the 2020 Student Research Symposium. Today's event is the 26th consecutive celebration of student-faculty scholarship at SUNY New Paltz. Due to the extraordinary situation in which we find ourselves due to the COVID-19 pandemic, the celebration is virtual this year. Many thanks to the folks at ForagerOne, who have made this possible at no charge to our institution.

In the best of times, producing scholarship through research and/or creative activities is challenging and exciting for faculty and students. These experiences foster vital skills such as critical thinking, problem-solving, and communication. We are grateful to the faculty who provide these opportunities. We especially commend faculty and students who continued to persevere with their work during this difficult time.

Please know that these types of interactions are a particularly fulfilling part of a college professor's job. Do stay in touch after you have graduated. It brings us all great joy and inspiration to hear of your post-New Paltz adventures and successes. I hope this event brings you fulfillment in presenting the results of your work and inspiration from your fellow students' accomplishments.

Kate McCoy
RSCA Director and Associate Professor of Educational Foundations

2020 RSCA Faculty Mentor Award
Lauren Bone Noble

This award recognizes extraordinary efforts in mentoring undergraduate students in the production of new works or knowledge.

Lauren Bone Noble (Theatre Arts) is the 2020 Faculty Mentor Awardee. According to Jack Wade, who nominated her for this award, Ms. Bone Noble spends numerous hours inside and outside the classroom mentoring students in acting, improvisation and stage movement for SUNY New Paltz main-stage productions. She has a long and successful record of individual mentorship of Theatre Arts majors. She has directed a gender reversed *Julius Caesar*, *A Midsummer Night's Dream*, sections 1, 2 and 3 of the *Every 28 Hours Plays* and *The Servant of Two Masters*. Over the past summer, she mentored Natalie Houle, a senior Theatre Arts sound design major in the creation of a new, original sound design for her own play *Fury*, premiering Ms. Houle's design at the Phoenicia Fringe Festival and then again at Denizen in the fall where Ms. Noble's play received enthusiastic audiences. Lauren Bone Noble has become a trusted and highly valued member of the New Paltz Theatre Arts acting program. Beyond her work in the Department of Theatre Arts, Ms. Bone Noble has also served as Adjunct Lecturer in The Department of Digital Media and Journalism with her *Acting for the Camera* course. Her stature as one of the university's top lecturers was recently acknowledged with the SUNY Chancellor's Award in adjunct teaching. Her vast professional experience as an actor in theater on and Off Broadway, and in television and commercials has paid great dividends to students in Digital Media as well as Theatre Arts Performance. Wade notes that the department has been extremely fortunate to have an actress of her accomplishment as part of the teaching, coaching and directing team.

Research, Scholarship & Creative Activities Program

Faculty-student collaborators may propose projects for support funds through the Summer Undergraduate Research Experience (SURE) and Academic Year Undergraduate Research Experience (AYURE) programs. Both of these programs are competitive and are selected for support by a faculty committee. Students whose work is accepted for presentation at a professional conference are eligible for the RSCA travel awards. Congratulations to all award recipients (see pages 33-38).

SURE

The focus of the SURE program is to encoura
ge intensive student participation in an aspect of faculty research. Each student participant is supported with a stipend for the 8-week summer project and is expected to devote 37.5 hours per week to the project. Faculty mentors direct and provide guidance to participating students as they work on a particular aspect of the faculty's research program. A goal of this program is to encourage ongoing faculty student collaboration, and thus students are encouraged to continue working on the project during subsequent semesters.

ACADEMIC YEAR FUNDS

This program (AYURE) supports student faculty collaborations on projects that span the Disciplines. Projects that generate new knowledge or works are eligible for support. Funds for supplies and support of the research, scholarship or creative activities are provided through this program.

STUDENT CONFERENCE TRAVEL AWARD

The RSCA program supports students to present the results of the collaborative work at professional conferences.

WE ARE ON FACEBOOK

SUNY New Paltz Undergraduate Research, Scholarship and Creative Activities Group https://www.facebook.com/group.php?gid=44644830786#!/pages/SUNY -New-Paltz-Research- Scholarship-and-Creative-Activities/43858825348

Facebook® is a registered trademark of Facebook, Inc.

Abstracts

Biology

The Effect of Phosphate Group Manipulation on Adhesion in Gram Negative Bacterial Cells

Jared Rifkind (Biology), Zach Rausch (Psychology)
Faculty Mentor: Megan Ferguson (Chemistry)

Bacterial interactions are closely tied to how cells adhere to one another on a molecular level. Some cellular adhesion depends on lipopolysaccharides (LPS), molecules on the outer membrane of gram negative cells. The part of the LPS that anchors into the outer membrane of the cell typically includes two glucoseamine units with attached fatty acids, each bonded to a phosphate group. The gram negative cells we studied are strains of K12 E. coli, which is found in the human gut. The K12 parent strain (control) had both phosphate groups on each of its LPS molecules, whereas the K12 monophosphate and K12 no phosphate strains contained 1 and 0 phosphate groups per LPS molecule, respectively. The purpose of our study was to examine how removing phosphate groups from the LPS molecules would affect the K12's adhesive properties. The method used to collect the data was atomic force microscopy (AFM). Cells were first fixed, live, to glass slides using Cell-tak. Force curves were then taken in order to measure levels of adhesion. It was observed that the K12 parent strain actually showed less adhesion affinity for the AFM cantilever than the glass slide it was mounted on. The K12 monophosphate cells showed a similar negative adhesion correlation. K12 no phosphate was different, showing little to no difference in adhesion between on cell and off cell, suggesting that the adhesion of the cell may be increased by removing all of the phosphate groups in the outer membrane LPS molecules.

Growth Patterns of Paramecium in Lakes Recovering from Acid Deposition

Mario Cortes-Mendoza (Biology)
Faculty Mentor: Lydia Bright (Biology)

In the early 1970s, acid deposition became a serious issue in New York's waters and forests. The primary sources of acid rain were sulfur dioxide (SO2) and oxides of nitrogen (NOx) from the combustion of fossil fuels that would result in deposition downwind from the source. Ecosystems such as the Adirondack Mountains, Catskills, and the Hudson highlands were very susceptible to the effects of acid deposition. The US Federal legislature passed the Clean Air Act Amendment(CAAA) of 1990 and, in 1995, implemented limitations of sulfur dioxide emissions from coal-fired power plants upwind of northeastern North America. Since then, lakes in New York have started seeing some recovery in their ecosystems such as viable conditions for fish survival. However, we know less about the recovery or shifts in community structure of small organisms such as *Paramecium*. In this project, we looked at growth rates of *Paramecium* cells isolated from Lake Awosting in New Paltz, a previously acidic lake that is in the recovery process and has a simplified fishless food web. We compared those with growth rates of cells from Mohonk Lake, a lake with neutral pH and we have found, via preliminary statistical and genetic analysis, that the cells from Mohonk Lake

grew as expected in all three water sources but the Awosting cells did not grow and when they did it was not as expected. With preliminary results, the experiment continues with more trials and modifications.

Investigating Paramecium caudatum Response to Infection by Holospora undulata

Jared Weiler (Biology & Biochemistry), Winiffer Conce (Biology), Nicole Lee (Biology)
Faculty Mentor: Lydia Bright (Biology)

Paramecium caudatum is a single-celled ciliate that sweeps food into its oral groove to acquire nutrients. The cells become infected through this feeding apparatus by Holospora undulata, an obligate endosymbiont that occupies the micronucleus of Paramecia in two morphologically distinct forms, the infectious and reproductive form. Once the Paramecium cells begin to starve, the reproductive forms of the parasitic bacteria consume most of the food in the micronuclei and differentiate into infectious forms. The bacteria eventually break out of the cell and seek other hosts to infect. It was found that Paramecia strains differ in susceptibility to infection and different proteins are found to be significantly up-regulated upon uptake of the Holospora. In order to better understand the mechanism by which Holospora successfully infiltrate their host's defense systems, we have been performing infections on Paramecium strains with varying levels of infectability and collecting mRNA at specific time points to eventually determine the difference in upregulated genes between susceptible and resistance strains. Once these genes have been identified, we hope to clone the significantly up-regulated ones into E. coli and feed this silencing media to naïve strains of Paramecia. By carrying out gene knockdowns, we will hopefully be able to determine which proteins function to induce infection resistance. After finding which genes are capable of preventing susceptibility, we plan to characterize the associated proteins and track the gene's evolutionary divergence in Paramecium strains with varying infectability.

Phyto Chemical Studies on Sausurea Lappa

Sery Pak (Biology), Aabir Aslam (Biology)
Faculty Mentor: Preeti Dhar (Chemistry)
Faculty Mentor: Aaron Haselton (Biology)

Sausurea lappa (S.lappa) is a herb that grows in the Himalayan region (China, India and Pakistan) at an altitude of 2500-3500m. The root of this plant has been used in Indian traditional folklore medicine for the treatment of over forty diseases without any known adverse effects. The plant is also used in agricultural fields and with stored woolen clothing due to its insecticidal properties. The purpose of this research was to obtain crude extracts of S. lappa using various solvents (water and ethanol), in addition to sequentially extracting S. lappa with solvents of increasing polarity (hexane, ether, ethyl acetate and ethanol). The six extracts thus obtained were concentrated and then evaluated using standard tests for the presence of saponins, tannins, flavonoids, alkaloids, carbohydrates, and terpenoids. Literature studies have shown that two terpene derivatives found in this plant (costunolide and dehydrocostus lactone) are known to exhibit insecticidal activity. The results of the phytochemical tests on all six plant extracts showed the presence of terpenoids. Future studies will focus on the insecticidal effects of these extracts on Drosophila suzukii, a major pest species in America as in contrast to the other Drosophila species that infest only rotting fruit, this species infests fruits in their early ripening stage.

T-Cell Signaling in Response to Atrazine

Hanaa Ahmed (Biology), Sarah Taborda (Biology)
Faculty Mentor: Maureen Morrow (Biology)

Atrazine (ATR), the second most used herbicide in the US, is known to negatively affect developmental, hormonal, and reproductive systems in vivo. Previous experimentation has indicated that in vitro ATR exposure may cause T-cell activation, as indicated by an increase in the amount of cell aggregation, a characteristic of activated Jurkat cells. It is known that cAMP and estrogen participate in T-lymphocyte activation. ATR is a phosphodiesterase inhibitor which can lead to increased levels of cAMP, and it is also known to be an EDC (Endocrine Disrupting Compound) due to its ability to cause an increase in estrogen levels. It is possible that ATR is able to alter the immune response by increasing cAMP and estrogen, thus resulting in inhibition of T cells. In this work, we defined cell activation as aggregated masses of ≥4 cells. Jurkat T-cells were treated with: ATR of varying concentrations dissolved in either ethanol or DMSO. The treated cells were incubated for 2 hours and then samples were systematically photographed. Cells within each sample were counted and categorized into clumps of 1-3 cells, 4-8 cells, and 9+ cells which yielded the "Clumping Percentage". Results demonstrated that ATR does not trigger T-cell activation; there is no significant difference in cell clumping percentage in the treated versus the untreated cells. Results also indicate inhibition of T cell activation with atrazine. Another possible explanation for the data presented is that the ethanol and DMSO solvents alter T-cell activity.

Tree Age & Growth Across the Lost Ski Slopes of Minnewaska

Patrick Salaway (Biology)
Faculty Mentor: Eric Keeling (Biology)

Tree communities in the Shawangunks are affected by topography, soils and human disturbance. This is especially true in the Peterskill area, where areas clear-cut for a ski area that closed in the 1970s are now mostly regrown and interspersed with adjacent, presumably uncut areas. Some of the presumed-uncut areas are on naturally open slabs of rock. Thus, the exact locations of former clear-cuts is uncertain. SUNY New Paltz biology students have used this area to study tree community composition, ecophysiology and succession. Focusing on two pine species, we used tree-ring techniques to a) determine tree ages to attempt to locate formerly clear-cut areas, and b) compare tree growth rates between the presumed-cut vs. uncut areas. We hypothesized that the presumed-cut areas, which are dominated by white pine, a likely early-succession species, would have young, fast-growing trees. In contrast, we hypothesized that pitch pine growing in the presumed-uncut areas would be older, and slow-growing. Mean tree age in the presumed-cut areas was 20 years, compared to 76 years in the presumed- uncut areas (p < .001). Mean growth rate of trees in the presumed-cut areas was 30.3 cm 2/year, compared to 9.8 cm 2/year in the presumed-uncut areas (p< .001). In addition, within the presumed-cut areas alone, white pine grew faster than pitch pine (p = .001). This suggests that high growth rates may be intrinsic to white pine, rather than simply a response to low-competition in clear-cut sites.

Chemistry

Analysis of Trace Lead and Arsenic Concentrations in Urban Vegetable Gardens in Brooklyn, NY

Morgan Slater (Environmental Geochemical Science)
Faculty Mentor: Megan Ferguson (Chemistry)

Some residents of the East New York neighborhood in Brooklyn, New York who cultivate land for vegetables expressed concerns about trace element contamination in their gardens. Vegetables grown in soil that is contaminated with trace elements such as lead (Pb) and arsenic (As) can absorb these elements, which are harmful when ingested due to their toxicity. These elements are introduced over time and can come from multiple sources. Arsenic has been used in pesticides and lead was once used in gasoline and paint. Once an area experiences Pb or As contamination, it is difficult to remediate. The purpose of this study was to determine the concentration of As and Pb in the gardens of the East New York residents. Soil sample collection occurred from August 2019 until October 2019 in seven gardens in the East New York neighborhood. Ground soil and imported soil were collected. Coordinates of each sample were recorded to aid in determining possible contamination sources for soil containing high concentrations of the contaminants. A chemical digestion method based upon, but simplified from, the Environmental Protection Agency's Method 3050B for the acid digestion of sediments, sludges, and soils was used to extract any Pb or As adsorbed to the soil. ICP-OES was used as the determinative technique for the trace element concentrations. After analyzing the results the ICP-OES gave, it was determined that there was interference for all As wavelengths due to a complicated matrix. Consequently, As results were reported with limited significant figures and the data was loosely interpreted. The Pb results were much more reliable and experienced little to no matrix interference. Results showed that ground and imported soil can both contain high concentrations of Pb, which suggests using imported soil does not guarantee the absence of trace elements. It was determined that lead paint used on the surrounding structures and atmospheric Pb deposition were likely sources of Pb contamination.

Gas Chromatography/Mass Spectroscopy Analysis of Extractions from Planaria Exposed to BPA

Scott Kienzle (Physics and Chemistry), Brianna Flood (Biochemistry)
Faculty Mentor: Pamela St. John (Chemistry)
Faculty Mentor: Spencer Mass (Biology)

Bisphenol-A (BPA) is commonly found in various plastics, epoxies, and other products and has been recognized as a probable endocrine disruptor. Planaria, a type of flatworm, was used to determine the effects of BPA on the worm's regeneration cycle. The planaria were incubated in solutions containing micromolar concentrations of BPA. The amount absorbed by the planaria was quantified through gas chromatography/mass spectroscopy or GC/MS. To enhance the signals, BPA was derivatized with N,O-Bis(trimethylsilyl)trifluoroacetamide (BSTFA) to form a more volatile compound that gives a larger signal strength and a more symmetric peak in the gas chromatogram. An internal standard, 2-phenylphenol (2PP), was added to each solution to quantify the amount of derivatized BPA in each sample. Additional experiments used deuterated BPA to differentiate the amount of BPA that was absorbed and the amount that was already present in the environment as a contaminant. Experiments performed with deuterated BPA have shown almost twice the signal to noise (background signal from BPA in the environment) ratio than those that were performed with BPA.

Isotopic Separation of Bisphenol A Using High Performance Liquid Chromatography

Brianna Flood (Biochemistry), Scott Kienzle (Chemistry), James Conklin (Chemistry)
Faculty Mentor: Pamela St. John (Chemistry)
Faculty Mentor: Spencer Mass (Biology)

Bisphenol-A (BPA) is a xenoestrogenic environmental pollutant produced in large quantities by human industry, including plastic manufacturing and packaging for consumer goods, in health and beauty products and in the thermal printing industry. Due to its common use, ecological exposure is nearly unavoidable. Prior work in our lab has demonstrated that exposure to bisphenol compounds severely affects planarian behavior and regenerative capacity. We have developed protocols using high performance liquid chromatography (HPLC) and gas chromatography/mass spectrometry (GC/MS) to quantify BPA extracted from freshwater planaria (G. tigrina) exposed to media containing known quantities of BPA and deuterated (D-8) BPA. Using differences in GC column affinity between deuterated and non-deuterated BPA, we have been successful at separating these two compounds at sub-micromolar concentrations. We would like to apply these concepts to HPLC in order to distinguish the D-8 BPA and BPA chromatogram signals by varying solvent flow rate and gradients so that we may lower the limit of detection. Continuing refinement of these chromatography methods will permit us to measure BPA and D-8 BPA in picomolar quantities in planarian tissue using HPLC with fluorescence detection, as well as correlate phenotypic abnormalities with specific quantities of BPA and D8 BPA retained by the worms.

Predation Patterns of Bdellovibrio Bacteriovorus

Rebecca Mitrani (ACS Chemistry)
Faculty Mentor: Megan Ferguson (Chemistry)

Host-dependent Bdellovibrio bacteriovorus is a predatory bacterium with an unknown prey detection mechanism. The predation patterns of this bacterium were analyzed using prey lysates, double layer plates, as well as atomic force microscope imaging. Novosphingobium capsulatem ATCC 14666, Escherichia coli: ZK 1056, K12 W3170 (parent strain), K12 BN1 pE (monophosphorylated strain), and K12 BN2 pEF (no phosphate strain) were all examined as bacterial prey to see if B. bacteriovorus would prey upon them and at what relative rates. B.bacteriovorus was determined to not readily prey upon the Gram-negative bacterium containing glycosphingolipids instead of lipopolysaccharides (LPS) composing its outer membrane, Novosphingobium capsulatem, but does prey upon all strains of E. coli listed. B. bacteriovorus preys upon E. coli with more “typical” LPS at a faster rate than those with modified LPS, zero or one phosphate group.

The Purification of Riboflavin Binding Protein for Ligand Complexation Studies

Elena Toscano (Chemistry)
Faculty Mentor: Pamela St. John (Chemistry)

Riboflavin binding protein (RBP) from chicken eggs was extracted and purified to study the binding of the protein to the ligand, riboflavin. The extraction/purification yield was quantified using UV-Vis spectrophotometry, since the ligand absorbs at 447 nm. In addition, riboflavin fluoresces over the range of 470 to 650 nm. Subsequently the protein was diluted and titrated in 10-20 microliter aliquots into a riboflavin-containing solution to study binding. For each aliquot added, an emission spectrum was taken using a spectrofluorometer to measure the intensity of fluorescence at 447 nm. Analysis was performed to determine an association constant using the fluorescence intensities obtained as increasing amounts of protein was added to a riboflavin solution. The association constant obtained experimentally was compared to the literature value. In efforts to improve the percent difference between the two, purification methods were attempted, including crudely purifying the protein by the addition of ammonia sulfate. In following this precipitation, the protein was separated using ion chromatography.

Synthesis of Bromo-Alcohols Using Sodium Borohydride/Bromine

Kaitlyn Baudille (Chemistry)
Faculty Mentor: Preeti Dhar (Chemistry)

Bromo-alcohols are commonly used as starting materials in organic synthesis. These alcohols are not readily available and custom ordered due to the unstable nature of these compounds. The process to purchase and obtain one of these compounds can be time consuming and expensive. Sodium Borohydride (NaBH4) is used in the reduction of carbonyl groups of aldehydes and ketones, and its reactivity can be enhanced by carrying out the reaction in the presence of certain additives, including Br2. This work is an extension of the work done previously in our lab wherein various cyclic ethers were opened to their corresponding iodo-alcohols using NaBH4 and I2. The synthesis of the bromo-alcohols from cyclic ethers using sodium borohydride/ bromine reagent system was monitored with TLC and the products were characterized using 13C NMR and 1H NMR. The reaction conditions were altered to see what set of conditions gave the maximum yield of the products. The cyclic ethers used throughout the semester included tetrahydrofuran (THF) and 2-methyltetrahydrofuran (2-MeTHF). Further research focus will be on investigating the opening of a few more cyclic ethers, including tetrahydropyran (THP), 2,3-dihydrobenzofuran, and 3,4-dihydro-2H-pyran (DHP).

Communication Disorders

Aphasia Treatment: Supported Conversation vs. Constraint-Induced Language Therapy

Alyssa Finuoli, Erin Rifkin, Kate Purcell
Faculty Mentor: Ange Inema (Communication Disorders)

Our research focused on two language approaches for treating aphasia: communication partner training in supported conversation (SCA) and constraint-induced language therapy (CILT).

Counseling

Maturity and Identity: Counselors and Community-Building Intervention for Adolescents

Devon Brady (Mental Health Counseling)
Faculty Mentor: David Bright (Counseling Professor)

Raising adolescents to achieve mature adulthood is a complex task. Research indicates that achievements of adulthood tasks and psychosocial maturity are impaired when a sense of belonging, identity and meaning fail to be instilled. Improving adolescents' sense of identity and sense of belonging increases psychosocial maturity and achievement of adulthood tasks. Research has shown the importance of stable family life and connections to community in fostering a sense of identity and belonging in adolescents. Declines in indicators of psychosocial maturity and mental health for adolescents are affected by current social issues including, the growing instability in family structures, loss of connection to community, and the use of social media technology as it affects socioemotional and relational development. The effects of these social issues can be counteracted by calling on the perspective of counselors with their focus on wellness and strengths based approaches to tailor a new intervention strategy. We will consider the use of community-based prevention in an intervention strategy that draws on the use of traditional ways of marking transition to adulthood used by indigenous peoples called rites of passage. Rites of Passage interventions are considered as an alternative to typical modalities due to the value they place on community and the focus on developing an adult identity. The application of these interventions to the suburban and urban counseling context is suggested.

Economics

Are the Bottom Billion Converging? Measuring Economic Growth in the World's Poorest Countries from Outer Space

Jacob Bayer (Economics)
Faculty Mentor: Patricia Jones (Economics)

The rate of income convergence between rich and poor countries has been estimated by a series of papers starting with Barro and Sala-i-Martin (1992). This paper adds to that body of literature by empirically testing the rate of cross-country income convergence using night lights data as a proxy for GDP per capita. Night lights data are collected by satellites and measure the amount of light reflected into space by increased economic activity. In this study, I use night lights data to measure cross-country convergence in a panel of 98 countries using an empirical specification similar to Barro (2015). To do this, I estimate several growth models using both OLS and fixed-effects estimators. My study finds a very strong log-log correlation between lights per capita and GDP per capita (R-squared = 0.808) and, more importantly, finds that lights significantly predict a rate of convergence of 3.4% in a panel of 66 low income countries whereas traditional measures of GDP do not predict any convergence. This suggests that GDP in the developing world is understated by national statistical offices.

Examining the Effect of Minimum Wage on Employment

Madison Brine (Economics)
Faculty Mentor: Patricia Jones (Economics)

Minimum wage policies aim to raise the incomes of low-skilled workers, but there is conflicting evidence on whether or not such policies are effective. In this paper, I employ a difference-in-difference identification strategy to estimate the effect that minimum wages have on the number of hours worked by employees in the United States. This involves comparing the change in hours worked for a treatment group (workers living in states where the minimum wage increased) to the change in hours worked for the control group (workers living in states where the minimum wage remained the same). In addition, I examined whether workers in states with larger minimum wage changes had larger changes in working hours compared to workers in states with smaller minimum wage changes. My results indicate that increases in the minimum wage between 2015 and 2017 had a negative (and statistically significant effect) on workers' hours worked. In states with large changes in the minimum wage, workers worked 36 minutes less per week compared to workers in states where the minimum wage stayed the same. While this effect may seem small, it amounts to about 30 fewer hours work during a typical (50 week) year. Surprisingly, the effect of higher minimum wages on workers in states with smaller minimum wage change was positive, increasing hours work by about 20 minutes per week.

Leadership Transition and Foreign Direct Investment

Thomas Roy (Economics)
Faculty Mentor: Patricia Jones (Economics)

This paper looks at the effect of leadership transition caused by natural or accidental death on foreign direct investment. Using natural deaths as a measure of leadership transitions—as opposed to transitions caused by leaders who are overthrown by political opponents or lose in elections—deals with the potential endogeneity of leadership transitions in developing countries (see Jones and Olken, 2005). Building from prior research on the topic of leadership transitions, I adopt a difference in difference analysis using World Bank open data as well as biographical leadership data from 1970 until 2003. The results suggest that there is not a significant effect of leadership death within three years of a leaders natural or accidental death.

Engineering

A Comparison and Review of Surface Treatments & Their Affects on Natural Fiber Composites

Jose Alarcon (Engineering)
Faculty Mentor: Jared Nelson (Engineering Programs)
Faculty Mentor: Jennifer Jenkins (Engineering)

The objective of this research is to understand how certain processes and treatments affect the surface of natural fibers & in turn the material properties. Natural fibers could be a suitable replacement to synthetic fibers used in reinforced composites. Unfortunately, most untreated natural fibers cannot compete with the strength of synthetic fibers. However, there are numerous treatments that can be performed on the natural fiber that could yield positive effects making them more alluring for their use in composites. Some of these treatments include but are not limited to: plasma treatment, surface etching, silane treatment, alkali treatment, & hydrophobic treatment. These treatments directly affect the surface of the fibers. They are either chemical or physical alterations. Treating the surface can result in a change in the wettability, moisture absorption, fiber-matrix adhesion, and mechanical properties of the fibers. All traits that if altered, may result in improved results. A comparison between treated and untreated fibers is performed in order to understand the exact effect of the various treatments.

Design of Drag Experiment for SUNY New Paltz Engineering: Determining Drag Coefficient from a Water Flow Tank

Christopher Rodi (Mechanical Engineering), Seth Pearl (Mechanical Engineering)
Faculty Mentor: Rachmadian Wulandana (Mechanical Engineering)

The following presentation summarizes the experimental analysis of the effect of drag on various different objects. Drag is a force, acting in the opposite direction of a fluid around it, in this case water. A water flow tank was utilized in order to simulate and contain the direction of flow. This experiment was noted to have a high Reynolds number; therefore, it can be deemed as turbulent. The main goal of this procedure was to create a laboratory experiment to be utilized for future SUNY New Paltz Engineering Thermo-Fluids sections. In order to study the effects of a drag, various differing rods were constructed out of steel tubing. Each cylindrical rod would have a different diameter and cross-sectional area, as well as a different shape. The measurement of flow rate was obtained through the use of a propeller, outputting flow velocity in meters per second. From there, a force sensor was used to determine the force acting upon the specified rod. This would allow students to compute the drag coefficient of each cylindrical rod and compare with published values. For ease of manipulation, rods were threaded and inserted into a fabricated test stand within the flow tanks "area of study". It was found that as pump power increases, so does the flow rate within the tank, in turn producing a larger force on the rod. This larger force resulted in a larger drag coefficient for each rod. Experimentally obtained values for drag coefficient deviated only slightly from published values, resulting in a six to twelve percent error.

The Effect of Dew and Water Retting on the Material Properties and Composition of Bast Fibers

Ryan Martinez (Mechanical Engineering)
Faculty Mentor: Jared Nelson (Mechanical Engineering)
Faculty Mentor: Jennifer Gilbert-Jenkins (Agricultural Science)

Retting, or the process that degrades the pectinous and non-cellulosic material that bind together bast fibers, has substantial effects on both the composition and material properties of bast fibers. Although a wide range of processes are used in order to facilitate the extraction of fibers from the stem, the two retting processes that will be discussed are dew and water retting. These are the two major processes used in industrial fiber extraction, which involve the utilization of different microbiological organisms. Both methods produce fibers of varying qualities, where the application of each is affected by factors such as fiber strength, fiber uniformity, time, cost, and environmental effects. The large variability in the mechanical properties of natural fibers due to varying conditions during the retting process is a major issue which inhibits them from being used in high-grade composite materials. For this reason, it is necessary to analyze the key factors for each process that allow for optimal fiber production. In dew retting, the environmental factors, the duration of retting, and the use of different filamentous fungi will be analyzed. In water retting, the effect of different bacterial strains, the duration of retting, and the physio-chemical properties of the water will be analyzed. The factors for each retting process will be examined in order to view its effect on the material properties, as well as, the composition of different bast fibers.

Effects of Soil Composition and Various Pretreatments on Tensile Properties of Natural Fibers

Louis Pate (Mechanical Engineering)
Faculty Mentor: Jared Nelson (Mechanical Engineering)
Faculty Mentor: Jennifer Gilbert Jenkins (Mechanical Engineering)

This paper will summarize the studies performed in order to understand the effects of soil make-up on natural fibers. This is evident in single fiber pull tests, where IRS and IPS are measured. The effects of soil on fiber mechanical properties are evident within single fiber pull tests (similar to our research). This method of testing is effective for obtaining the interfacial peak strength (IPS) and interfacial residual strength (IRS) of fibers and soil. IRS and IPS both share a negative correlation with hydrated soil. That is, IRS and IPS are higher in fibers grown in dry soil. Other variables of growing soil directly affect the mechanical strength of natural fibers. These effects are present both in mechanical testing, and under observation via SEM. Additionally, nitrogen levels can directly affect crop growth, which has been explored. Alternatives to soil-engineering exist and will also be expanded upon.

Effect of Soil Nitrogen on Hemp Fiber Mechanical Properties

Hadi Rabadi (Mechanical Engineering), Jackie Taylor (Mechanical Engineering)
Faculty Mentor: Jared Nelson (Engineering)
Faculty Mentor: Jennifer Gilbert Jenkins (Division of Animal & Plant Sciences & Agricultural Business. School of Agriculture, Business & Technology)

With the use of sustainable biomaterials such as hemp, synthetic material in composites may be replaced in targeted applications. However, this switch is complicated by the material property variation of natural fiber replacements. In order to gain an understanding of how different material properties are impacted by different agricultural processes and harvesting techniques, hemp samples grown in the years 2018 and 2019 with different levels of manure or inorganic nitrogen were tested. Single, defect-free fiber strands were placed on clear mounting tabs and then measured to determine the average cross sectional area of the fiber. Each fiber sample was loaded to failure in tension to determine the break load. After each fiber was tested the stress and strain values were calculated and modulus of elasticity and tensile strength were determined. Analysis shows a higher amount of nitrogen has a positive effect on the fiber tensile strength. The 50 lb (18') and 100 lb (18') samples showed related values for tensile strength. The 100 lb (18') sample shows a 5% larger value than that of the 50 lb (18') sample. Consequently, stronger fibers were associated with the larger the amount of nitrogen added to the soil. Additionally, the fibers fertilized with the 150 lbs (18') of nitrogen show the best mechanical advantage when comparing the modulus of elasticity and average tensile strength to the samples of less nitrogen content. The 50 lb (18') and 100 lb (18') samples broke at a similar load, however the variation in the 50 lb(18') data set was roughly 10% larger than the 100 lb (18') set indicating that the results may be less reliable. In conclusion, fibers grown with higher nitrogen levels offer improved performance in technical applications, such as composites. The 2019 crops were fertilized with 75 lbs, 125 lbs and 150 lbs of inorganic nitrogen as well as, ferimon and altair manures. These samples will undergo the same

analysis as the 2018 samples, focusing on material properties such as tensile strength and modulus of elasticity.

Exploring the Potential of 3D-Printed Metal Heat Sinks

Michele Lederer (Mechanical Engineering)
Faculty Mentor: Rachmadian Wulandana (Mechanical Engineering)

Metal additive manufacturing (AM) promises a plethora of possible industrial applications. Its capability of producing complex geometrical shapes is particularly attractive for applications in electronic reliability where heat dissipation is crucial. This research project examines the performance of metal AM micro heat sinks reported in publications. The various heat sink models that were manufactured using selective laser melting (SLM) method were re-created in SolidWorks CAD software. The geometry was then imported into ANSYS and COMSOL Multiphysics software for thermal fluid simulations. As metal additive manufacturing produces porous products and imperfect surface finish, the effects of thermal conductivity of the metal and surface roughness on the effectiveness of the heat sink were studied.

Finite Element Modeling of High Frequency Vibration in Metal Structures

Terence Costigan (Mechanical Engineering)
Faculty Mentor: Ping Chuan-Wang (Mechanical Engineering)

The vibrational resonant frequency in a solid object is a critical state of energy storage and transfer. The resonant frequency of an object is its natural response to an oscillating vibration force that is imparted on it. At the resonant frequency, the response from the object is amplified as the force is synchronous with its natural vibrating motion frequency. When the resonant frequency is attained, the object becomes an ideal energy storage and transfer system. Resonance can be expressed in many “modes” or patterns of motion, such as longitudinal, torsional, bending, and other complex forms. Certain factors affect achieving a resonant response, and the mode of that response. These factors include geometrical ones like length and cross section configuration, as well as material properties like modulus of elasticity, Poisson’s ratio and the density. Therefore, the resonance response provides a non-destructive process to obtain information about the object under analysis. A research project is currently ongoing to develop a non-destructive methodology to test 3D-printed metal structures. To prove concept, finite element modeling (FEM) is utilized to simulate resonance response of various cylindrical geometries under identical vibrational force, in an ideal situation. In this talk, the nature of vibrating solids will be introduced and investigated; results of simulations will be summarized, and the feasibility of our proposed non-destructive test will be discussed.

Impact of Cellulosic Content on Tensile Properties of Natural Bast Fibers

Michael Bianco (Mechanical Engineering)
Faculty Mentor: Jared Nelson (Mechanical Engineering)
Faculty Mentor: Jennifer Jenkins (Mechanical Engineering)

Utilizing naturally produced fibers as reinforcement within composite structures is an engineering technique which has been investigated with more frequency recently. Engineers prefer to make use of natural bast fibers whose mechanical properties are very high. Various aspects like chemical content dictate mechanical properties of fibers; this research dives into cellulose chemical content in bast fibers, its link to elevated tensile properties, and potential reasoning as to why this link exists. Additional research into extraction methods of bast fibers selected for tensile testing is conducted to determine how this process impacts mechanical properties. Cellulose is a linear hydrophilic glucon polymer consisting of repeating D-glucopyranose units. Collected data details the trend associated between cellulose and tensile properties; as the level of cellulose content increases, as does the strength of natural fibers. Cellulose has significantly larger stiffness associated with it when compared to other chemical constituents; hence when selecting plant fibers as reinforcement in structural composites, high cellulose content is very desirable among engineers. The large stiffness value, which leads to the elevated material properties, is due to the existence of hydrogen bonds within cellulose. These bonds are very strong attractive forces that allow for the chemical to be so desirable to engineers when determining how to reinforce structural, load-bearing composites. Fiber aspects are difficult to control, meaning that focus on the harvest and the extraction procedures associated with natural bast fibers selected for tensile testing is essential in producing the most high quality, and accurate results. There exist various types of fiber extraction techniques including mechanical and chemical methods; these methods are to be examined in hopes of determining a trend which shows increased mechanical properties.

Optimum Disk and Casing Design of 3D Printed Mini Tesla Turbines

Rogan Delisio (Mechanical Engineering)
Faculty Mentor: Rachmadian Wulandana (Mechanical Engineering)

Tesla turbines promise possible utilization for 2-phase flow suitable for application involving supercritical fluid. In this project, the focus is given on the design and manufacturing of 3D-printed mini Tesla turbines operated by compressed air. Various Tesla turbine casing and disk prototypes are developed and tested in the pursuit of optimal designs. Experimentation was performed using compressed air that was pressurized starting at 90 psi then was released to measure a maximum voltage until the pressure tank was empty. This was done in increments of 10 psi until 30 psi was reached for each prototype. All the maximum voltage points were collected by the tachometer in the turbine to determine the efficacy of the newly developed 3D printed prototype. Five different mini Tesla turbine casing designs were printed to be tested with a standardized disk. While the five disk prototypes were printed to be tested with a standardized casing. The casing testing focused on the flow of the inlet nozzle and the outlet of the turbine. While the disks had different support pillar patterns for each prototype. Out of the five casing and disk prototypes, the second casing prototype along with the third disk design resulted in the most efficient, having a maximum output voltage and current of 16V and 1.8A; with an overall efficiency of 41% based on the differential flow rates of the turbine. Lastly the steady state voltage and current of the optimized prototype was measured to be 5.3V and 0.5A at 30 psi.

Processing and Characterization of 3D-Printed Copper

Leo Santala (Engineering), Schuyler Mann (Engineering)
Faculty Mentor: Ping-Chuan Wang (Engineering)

Metal 3D-printing is a revolutionary technique for manufacturing with much to still be tested in terms of the limitations of the process. In this presentation, the challenges and steps taken when printing copper (Cu) structures will be displayed, as well as the characterization of the resulting specimens. Cu specimens were prepared by traditional 3D-printing with injection molding method, where the filament consists of 95% Cu powder and 5% polyactic acid (PLA) as the binding material. Heat treatment is a necessary next step in order to remove PLA from the specimen as well as sinter the loosely packed Cu particles for densification. A main concern for this project is to create an inert environment in which the Cu specimen will be heat treated because oxidation occurs at a higher rate in elevated temperatures. For mechanical properties, qualitative observations were made due to limited success in sample preparation for testing. For material characterization, x-ray powder diffraction (XRD) was employed to identify material composition and phase. Lastly, for microstructure analysis, optical microscopy and scanning electron microscopy (SEM) were used to examine the general morphology. This presentation will summarize the results of four specimens to illustrate the process-structure-property interrelation unique to 3D-printed Cu structures. Also, feasibility of using traditional 3D-printing system to create metal structures will be discussed, followed by plans for future research.

Renewable Energy Harvesting of Vortex-Induced Rotational Turbines

Seth Pearl (Mechanical Engineering)
Faculty Mentor: Rachmadian Wulandana (Mechanical Engineering)

Hydrokinetic energy harvesting promises renewable power generation with minimal environmental impact. Unlike hydropower plants that demand large footprints within aquatic environments and massive infrastructure, hydrokinetic harvesting relies on natural currents and condenses the overall form factor significantly. Our project investigates the feasibility of turbine designs that lack identifiable blades. The absence of blades reduces harm to its surrounding biological marine life. The vortex-induced rotation and oscillation of such symmetric blunt objects exposed to fluid flow are ubiquitous in nature. Nevertheless, efforts on harnessing its energy are still lacking. Experiments using a closed-loop water tank on various designs of symmetric objects showed potential rotation and periodic oscillation that lead to energy generation. The useful power production, in terms of electric current and voltage, seem to be enhanced when upstream obstacles that mimic natural streams are present. In recent tests using a custom air tunnel, it was discovered that 3D-printed bladeless cross model turbines with low infill density (10%) yields encouraging autorotation phenomena after reaching a critical flow speed. This cross model resembles a merging of two short cylinders arranged orthogonally. On the other hand, models of triangular and rectangular prisms showed better potentials than polygonal prisms with many sides.

Designs and Assembly of 3D-Printed Water Wheel Models

Sona Sharan (Mechanical Engineering)
Rachmadian Wulandana (Mechanical Engineering)

The long-forgotten waterwheel technology has regained interest due to its low environmental impact. Unlike hydropower technologies that require large footprints, waterwheels can satisfy local demands with its minimal infrastructure. In this project, an early investigation on the performance of undershot waterwheel has been conducted using mini scale 3D-printed models. A custom-made closed-loop flow tank capable of delivering a maximum of 60 cm/sec water stream is used as the source of energy in this experiment. Various flow speed and Reynolds numbers can be studied by means of the controllable centrifugal pump that drives the water. The blades and wheel of the turbine were designed and 3D-printed as separate entities so that multiple blade configuration can be assembled and experimented. In particular, we are interested in the effects of the variation of angle of attacks, number of blades, and the depth of waterwheels into the water stream of the power generation. Past research studies revealed that the wheel is most effective when the wheel blades are submerged halfway into the water. Results may be used for further full-scale testing and for the designs of effective waterwheels. Future iterations and improvements may be made to the blades for improvement in power generation.

Geography

Don't Drink the Water: Widespread Contamination of the Environment with PFAS Chemicals

Liam Salisbury (Geography)
Faculty Mentor: Melissa Rock (Geography)

Since the 1940s corporations like 3M and Dupont Chemical have been producing per- and poly-fluoroalkyl substances (PFAS) chemicals for use in household products like teflon and fire retardants. In 2005 it was made public that the Washington Works plant in Parkersburg, WV had been producing teflon using a PFAS chemical known as Perfluorooctanoic acid (PFOA) and had contaminated the surrounding community. After this revelation, the ensuing legal battles, and a subsequent large-scale epidemiological study, a definitive causal link was scientifically confirmed between human exposure to PFOA and kidney cancer, increased cholesterol, and immunotoxicity. In 2016 the city of Newburgh, NY was notified that its drinking water was contaminated by Perfluorooctanesulfonic acid (PFOS), a chemical closely related to PFOA. This was caused by a spill of firefighting foam at Stewart Air National Guard Base in the 1990s, the danger of which was not disclosed to the public at the time. Through archival research of public records, newspapers and legal filings as well as through the use of mapping tools this paper attempts to make clear the extent of damage that has been done to the community of Newburg's health and environment. Further, this research will examine the underlying reasons state and federal governments have thus far failed to remedy this issue. Lastly, this work will connect to the larger issue of widespread PFAS environmental contamination.

Fighting for Clean Water: Newburgh Residents Respond to Environmental Contamination

Hollie Burton (Geography)
Faculty Mentor: Melissa Rock (Geography)

In May 2016 the city of Newburgh, NY declared a State of Emergency for the city's drinking water. That month, Newburgh's main source of water, Lake Washington, was found to exceed the Environmental Protection Agency's Maximum Contaminant Level Goals (MCLG) for PFOS or Perfluorooctanesulfonic acid. The PFOS contamination stemmed from a 1990 Aqueous Film-Forming Foam spill at the Stewart Air National Guard base. PFOS has been a largely unregulated chemical that is considered an "emerging contaminant" by the EPA. The MCLG for PFOS was lowered to 70 parts per trillion (ppt) from 200 ppt in May 2016, which immediately triggered the State of Emergency. This project investigates how Newburgh residents have responded to this environmental and public health emergency within their community. This study utilizes archival research related to Newburgh's water contamination, interviews with advocacy groups, and community meeting minutes, as well as geospatial data to explore the ways in which residents are working to demand just remediation for an environmental problem that has a significant impact on their daily lives and potential long-term health outcomes. Many Newburgh residents have been active in establishing local organizations aimed at advocating for safe and affordable access to clean water. This project highlights the various stakeholders involved in the city of Newburgh's water contamination crisis with a special focus on the role community activism plays in holding numerous levels of government, and corporate polluters, accountable for the health and environmental harms inflicted upon their local community.

History

John Chinaman Must Go: Racism Against Chinese Workers in the Colorado Mining Community

Shayna Murphy (History/Anthropology)
Faculty Mentor: Kate McCoy (Education)

During research on a Colorado mining site from the 1800s, several by-laws from a miner's protective union were discovered, most of them surrounding workers' rights. Article 6 of the by-laws, however, excludes any Chinese workers from mining or from working in the area. Such by-laws demonstrate the intense racism experienced by Chinese workers and how this was accomplished through political power, state ideology, and language in newspapers. Throughout the 1800s and 1900s, workers feared the competition of foreign workers and focused this hatred on those who were not white. The influence of social Darwinism and manifest destiny gave scientific and moral justification for these acts and influenced the ways in which groups thought of Chinese workers. Articles show how these ideals operated locally, how Chinese workers were kicked out of towns, discriminated against, and physically harassed by competitive workers. The by-laws created by the Miner's Protective Union in Mosquito Gulch represent only a taste of the larger picture of competition, exclusion, and racism. Examination of primary documents, including newspapers and accounts of mining in Colorado, and analysis through scholarly articles allowed us to interpret the actions and accounts of past individuals. The literature on the racism experienced by Chinese workers in this time period and place is scarce and lacking; this research will shed light on the experience of immigrant workers and the difficulties they faced. In the future, we plan to publish an article documenting this under- researched topic.

Linguistics

Ersewhile: An Evaluation of the Vitality of Scottish Gaelic and Welsh

William Gallagher (Linguistics)
Faculty Mentor: Oksana Laleko (Linguistics)

Welsh and Scottish Gaelic, languages of the Celtic language family, share the same island and the same major linguistic competitor in English. However, as Scottish Gaelic continues a protracted decline, Welsh has gained speakers in recent years. With official estimates of the percentage of Welsh speakers as high as 29.9%, the national average of Scottish Gaelic speakers rests at around 1.7%. Applying LoBianco's (2013) Capacity, Opportunity, and Desire (COD) framework, initially proposed for indigenous North American languages, this study provides a comparative analysis of the sociolinguistic factors contributing to the disparity in the respective speech communities and outlines some possible steps forward if Scottish Gaelic is to survive beyond the coming decades. Based on analysis of available census data, government funded surveys, and published scholarship, this study concludes that greater cultural and political autonomy in Wales, relative to Scotland, and earlier intervention at the state level have helped to maintain a relatively stable Welsh bilingual population. While the symbolic importance of Scottish Gaelic and Welsh is comparable in both regions, a decades-long disparity in policy implementation has hindered that symbolic support from translating into a statistically relevant increase in Scottish Gaelic speakers. Despite modest increases in urban centers, if Scottish Gaelic is to survive as a community language, language planning efforts should focus on the Western Isles and Highland communities, where the language remains a part of everyday life.

Mathematics

Determinants of All 2-Bridge Knots of Crossing Number up to 22

Keith Grover (Mathematics)
Faculty Mentor: Moshe Cohen (Mathematics)

A knot is a 4-valent planely-embedded graph whose vertices are decorated with under/overcrossing information. We choose a specific graph and assign crossing information at each vertex. We encode this crossing information as a binary string and use this string to generate an Alexander matrix whose determinant is the determinant of the original knot; a positive integer value. We tabulate the determinants of all 2-bridge knots with crossing numbers up to 22 using computer calculation. This calculation takes advantage of our chosen graphs to produce the data in exponential time rather than factorial. This talk is based on joint work with Moshe Cohen.

Physics

Effects of Local Mutations in Quadratic Iterations

Abraham Longbotham (Physics)
Faculty Mentor: Anca Radulescu (Mathematics)

The study of copying mechanisms is of great importance to genetics. We study in a theoretical system how a mutation (replication error) affects the temporal evolution of the system, on both a local and global scale (from tumor formation to overall systemic unsustainability). We introduce a new mathematical framework for studying replication mechanisms, in the form of discrete iterations of complex quadratic maps. This approach builds upon a century of existing knowledge of iterated maps towards obtaining results with potential impact on applications. More specifically, our modeling framework considers a "correct" function acting on the complex plane (representing the space of genes to be copied) and a "mutation," acting at a specific focal point, of a given size r, and moves radially toward an outer radius R. We use the Julia set of the system to quantify simultaneously the long-term behavior of the entire space under such transformations. We analyze how the position, timing and size of the mutation can alter the topology of the Julia set, hence the system's long-term evolution, its progression into disease, but also its ability to recover or heal. In the context of genetics, such results may help shed some light on aspects such as the importance of location, size and type of mutation when evaluating a system's prognosis, and of customizing timing of treatment to address each specific situation. Our current work is a proof of principle. Once these aspects are understood theoretically, they can be further applied to empirically driven genetic models, validated with data and used for predictions.

Psychology

Betrayal, Outrage, Guilt, and Forgiveness: The Four Horsemen of the Human Social-Emotional Experience

Baylee Spackman (Psychology), Nickoleta Alijaj (Psychology), Sydney Huppert (Psychology), Miriana Ruel (Psychology), Ann Marie DeBonis (Psychology), Edward Maurer (Psychology), Kelly Nolan (Psychology), Danielle Kruchowy (Psychology), Nicole Elyukin (Psychology), Michele Cristo (Psychology), Kerri Widrick (Psychology), Aliza Santos (Psychology), Cody Wojszynski (Psychology), Victoria Zuela (Psychology), Amelia De Jesus (Psychology), Adrianna Villegas (Psychology)
Faculty Mentor: Glenn Geher (Psychology)

The current work proposes an evolution-based model regarding how genuine forgiveness might emerge on the heels of a betrayal in a relationship between two individuals who co-exist in some broader community. Ancestral human societies were small-scale in nature, usually consisting of no more than 150 individuals. Reciprocal altruism (see Trivers, 1971) evolved as a strong feature of our evolved social psychology in such small-scale contexts. People evolved to develop bonds of trust with others whom they could expect to help them in the future. Under these conditions,

breaking trust via betrayal would have had devastating consequences. The current work presents a model for understanding how individuals can get past betrayals given our evolved psychology. The model proposed here includes the four horsemen of the human social-emotional experience, which we construe as betrayal by the offender, outrage expressed by the victim, guilt expressed by the offender, and, possibly, forgiveness felt and demonstrated by the victim. Based on this model, other responses to the outrage experienced by the victim, such as spite or shame demonstrated by the offender, are unlikely to lead to forgiveness. Thus, this model conceptualizes guilt as fundamental in the process of forgiveness. Implications for modern living and for future research directions are discussed.

College Students' Experience with Play

Ann Marie DeBonis, Ash Moquin, Theresa Paras, Kanjira Rodriguez

Faculty Mentor: Doug Maynard (Psychology)

Prior to this study, this lab had created a four-item scale known as the Adult Play Fulfillment Index (APFI), for the purpose of measuring play fulfillment in adults. In two previous studies, the scale had been shown to positively correlate with life satisfaction and negatively correlate with perceived stress, demonstrating a beneficial relationship between play and mental health. The purpose of this current study was to continue psychometric evaluation of the APFI, which measures the extent to which the respondent feels that their need to engage in preferred play activities during the past two weeks has been met. In particular, we aimed to investigate the criterion-related validity of our scale by testing whether participants' scores on the APFI will be related to behavioral outcomes, such as how long a participant chooses to play when given the opportunity, and whether they report an increase in positive emotions and benefitting from or having needed that play session. Specifically, it was hypothesized that those low in play fulfillment will engage in play longer and experience greater benefits in positive emotion compared to those who score high in play fulfillment. Participants were college students (N = 115) who took two surveys and engaged in self-directed play activities. Their responses to both quantitative and qualitative measures were used to assess behavioral outcomes based on their play experiences.

Darwin, Jesus, and GMOs: An Empirical Assessment of Attitude Change in the Face of Scientific Evidence

Amanda Baroni (Psychology), Julie Planke, Jacqueline Di Santo (Psychology), Alec Goldstein (Psychology), Olivia Jewell (Psychology), Alexander Mackiel (Psychology), Kelsey Newhook (Psychology), Nicholas Primavera (Psychology), Michele Cristo (Psychology), Mariah Griffin (Psychology), Kaelyn Marks (Psychology), Jenny Patel (Psychology)
Faculty Mentor: Glenn Geher (Psychology)

Many academics are highly skeptical of evolutionary psychology (see Geher & Gambacorta, 2010). The current experiment sought to determine if people's attitudes about evolutionary psychology might change in light of evidence regarding its utility. For comparison, attitudinal change regarding the safety of GMOs and the existence of Jesus Christ as an actual person were also examined. Over

490 participants were randomly assigned to one of six conditions, which included one of the three topics mentioned here along with either pro or anti scientific statements speaking to the topic. Roughly half of our participants were academics. Data analysis is in progress. We are predicting that academics have a hard time developing positive attitudes toward evolutionary psychology in spite of evidence.

Does Hand Placement Affect Semantrocessing?

Elizabeth Jacoby (Psychology, Biology), Adina Gutierrez (Psychology)
Faculty Mentor: Giordana Grossi (Psychology)

Recent research suggests that, when we analyze visual information, our attention is altered in the space around the hands. In this study, we attempt to replicate findings by Davoli et al. (2010) that suggest an effect of hand proximity on performance on a Stroop Task. Specifically, Davoli and colleagues found that the magnitude of the effect was reduced when participants were in the proximal, compared to distal, condition (Davoli et al., 2010). In order to test the hypothesis that this effect reflects better cognitive control near the hands, we manipulated hand position and the proportion of incongruent (e.g., "red" in green) and congruent ("red" in red) trials in a Stroop task. Based on previous literature, if cognitive control is enhanced when the hands are placed near the stimuli, the Stroop effect should decrease in size when the proportion of congruent trials is high compared to small.

Flow and Productivity

Allisen Casey (Psychology)
Faculty Mentor: Glenn Geher (Psychology)

Flow Theory (Csikszentmihalyi, 1975) describes the phenomenon of the 'optimal experience'; the experience in which individuals report feeling 'in the zone', or completely absorbed by the task at hand. When it was found that flow occurred more at work than in leisure (Csikszentmihalyi & LeFevre, 1989), advocates for positive organizational-behavior encouraged organizations to consider restructuring jobs to be more flow-inducing for employees. Although, individual differences play a large role in one's likelihood of experiencing flow during a task (Csikszentmihalyi, 1975, Fullagar & Kalloway, 2009, Ullen, 2012). Creating a work-setting that successfully leads to flow for the majority of employees can prove to be complicated and this is perhaps why many organizations are not moving toward such implementations. Using a between-groups design, the current study investigated whether a flow-related cue would have an impact on an individual experiencing a flow-like state as opposed to an individual who did not experience a flow-related cue but a neutral cue. Further, if their experience with flow had any effect on their productivity, measured by number of sentences in response to a neutral essay topic. Flow-like symptoms were measured through the short FSS-2 (Jackson, 2008) and their written responses were analyzed using an online readability analyzer (Taylor, 2013). Participants also received the Autotelic Personality Questionnaire (Tse, 2018) and the Ten Item Personality Measure (TIPI) (Gosling, 2003). The manipulation did not result in any significant findings, although this study generally found that there were significant correlations between flow and extraversion and conscientiousness, and autotelic personalities with all Big Five components.

The Near-Hand Superiority Effect: A Failed Replication

Lucinda Judson (Psychology), Emilia Lisiecki (Psychology)
Faculty Mentor: Giordana Grossi (Psychology)

In a letter identification task, Adam et al. (2012) found a near-hand superiority effect that facilitated the processing of visual information presented near the hands: letters were identified more accurately when presented near, compared to away from, the hands. The purpose of the present study was to replicate Adam et al.'s (2012) findings. In a within-subjects, 2x4x3 factorial design, participants viewed randomized strings of consonants on a computer screen. The letters were presented in groups of three for a duration of either 33, 50, 67, or 83 milliseconds under two different hand conditions (proximal and distal). Three main effects were predicted (hand position, presentation time, and letter position). It was hypothesized that higher letter identification accuracy would be achieved in a proximal compared to a distal hand position. It was also hypothesized that identification accuracy would be higher for longer, compared to shorter, presentation times, and that accuracy would be higher for identifying letters in the first position compared to letters in the other two positions. Although main effects of presentation time and letter position were found, the present experiment did not replicate the near-hand superiority effect found by Adam et al. (2012).

Speech and Social Evaluations

Michele Cristo (Psychology), Jen Link (Psychology), Allisen Casey (Psychology), Aliza Santos (Psychology), Jenny Patel (Psychology), Alexander Mackiel (Psychology), Kaelyn Marks (Psychology)
Faculty Mentor: Glenn Geher (Psychology)

We are an intensely social species and spoken language is a uniquely human trait; speech and sociality may have co-evolved. Adopting evolutionary psychology as a framework, the current study aims to investigate the first impressions speech has on listeners. Specifically, we will examine evaluations of physical prowess, social prestige, and attractiveness in mating contexts as a function of speech clarity. We will also examine whether perceived similarity to oneself, based on speech, influences attractiveness-evaluations in mating contexts. These kinds of studies will help us understand how we navigate social relationships and networks in terms of vocal and verbal aspects. Doing so will also help us compare our speech-reliant behavioral and perceptual tendencies with vocal communication in other primates.

Sociology

Why There Are No Black Dominicans: How Anti-Haitian Sentiment in the Era of Trujillo and the Deeply Rooted Black History of the Island of Hispaniola Affects How Dominicans Racially Identify in New York Today

Melissa Frasco (Sociology and Spanish)
Faculty Mentor: Judith Halasz (Sociology)

Within the island of Hispaniola are two countries: the Dominican Republic and Haiti, which remain segregated geographically and culturally. In the twenty-first century, Haiti is often associated with poverty, corrupt governments, and blackness, while the Dominican Republic is associated with tropical vacations, baseball, and the Caribbean. By considering the role of socio-political, historical, and ethno-cultural factors in Dominicans' racial self-identification, this study examines why some Dominicans do not identify as "black" despite the history of the African slave trade across the island. Using a snowball sampling method to identify study participants, I interviewed Dominican individuals about their racial self-identification and the extent to which it differs within their family. My research provides insights into how Dominicans in New York identify ethnically, racially, and culturally. Dominicans have a complicated relationship with race, partially due to the thirty-year reign of General Rafael Trujillo, promotion of a racial ideology that associates blackness with Haitians rather than Dominicans, and historical colonization, post-coloniality, and migration. Dominican racial identity and its relationship with the country of Haiti cannot be explained by the simplicity of the United States racial binary. In New York, Dominicans straddle racial imaginaries spanning from Latin America and the Caribbean to the United States.

Social Media Influencers as Agents of Capitalism

Amanda Drucker (Sociology)
Faculty Mentor: Judith Halasz (Sociology)

The rapidly growing world of social media has created a new type of celebrity, the social media influencer. These influencers, particularly on Instagram and YouTube, have accumulated millions of followers, millions of dollars, and have created a brand for themselves that thrives on the capitalization of their adolescent audiences. This area of study is extremely under-researched because no other study has investigated social media influencers as a new type of branded celebrity. Using an original online survey of SUNY New Paltz undergraduates, this study measures the link between spending habits and college-aged students, as well as the link between the idolization of social media influencers and self-esteem. Through survey research, race, class, and gender are found to play a role in contemporary capitalism.

Theatre Arts

Costume Design: She Kills Monsters

Stella Katz
Faculty Mentor: Andrea Varga (Theatre Arts)

For my research for She Kills Monsters, I utilized the SUNY New Paltz library, online databases, and other books to explore armour, masks, puppetry, as well as mystical illustration. I began with initial sketches based on my primary research and met with Dungeons and Dragons players to learn about their emotional connection to the online community. Next, I created both hand drawn and digital sketches as I explored new mediums and softwares.

Silent Band

Miguel Vasquez (Contract- Audio Engineering)
Faculty Mentor: Sun Hee Kil (Theatre Arts)

Similar to Silent Disco, Silent Band is a way to listen to live performances via headphones with no audible electrical sound sources like speakers, filling the room with acoustic energy. This gives private and DIY venues the opportunity to host shows with the comfort of knowing that they can avoid noise ordinance in their location. There are people in this world that love to host live performances in their very own home. Many times they are told to keep the noise down, but they do not listen; then the police would have to stop by when they just wanted to host a little show for their close friends and fellow musicians. Instead of stopping these live shows completely, the idea of "Silent Band" has emerged. This is a concept not only to get rid of those negatives of having live performances in your venue, but also it also creates a whole new world to experiment with new sounds. Having learned the basic ideas from Silent Disco, we had further research on how to implement Silent Band creation using electronic musical instruments to the Silent system. My own live "Silent" form of music is only audible via headphones to the audience as well as to the musicians. This whole concept is to still give that live show feel when people attend Silent Band shows. With this method, we can manipulate the effects of each instrument to give the audience the best experience. The goal is to make this project come to life in the hope that musicians with noise ordinance issues are able to do this on their own and add their own ideas to this project to make it even bigger. If this project comes out how we intend it to be, the possibilities are endless.

Theatre and Dramaturgy in a Time of Crisis

Mara Einson (Theatre Arts)
Faculty Mentor: Lauren Bone-Noble (Theatre Arts)

We know that humans long to be in communion. The recent pandemic and ongoing quarantine have thrown that need into stark relief. For thousands of years, the theatre has been a place for people to gather and see themselves reflected back. In this project, we have endeavored to tell the story of women and the vote in the United States. We have focused on the early days of woman suffrage and, by creating a historical fantasy, blown up the archetypes associated with that movement and any movement in which marginalized people struggle to make their voices heard. The concept of the

play merges high Commedia dell'arte style with Brechtian Epic Theatre. In it, we present a serious topic first through humor and then turn the tables in order to confront the audience with uncomfortable questions about the enduring nature of the suppression of certain voices. In the process of my work as dramaturg, I aided in research throughout the writing process, providing examples of imagery and both primary and secondary source documents that served as inspiration to the playwright. Additionally, I aided throughout the writing process by reading early drafts and making notes on story structure and artistic elements. During our first reading of the play before the pandemic, I again took notes and offered feedback and additional ideas, which helped in moving forward with the Brechtian elements. Throughout this process, I have had an unparalleled experience in learning how to work professionally as a dramaturg and begun to develop my personal skill set in dramatic research and critical analysis. This project has allowed me to explore, make mistakes, and get comfortable working as a dramaturg beyond the scope of a traditional classroom setting. The funding provided by the AYURE award allowed us to bring students and faculty together in the development process and to offer up to our community the value not only of every voice being heard on the stage but on voting day. Our intention is for this play to be professionally produced when social restrictions are lifted. We still believe in the importance of theatre and the power of human connection.

Utilizing OSC for Lighting and Sound in the Theatre

Natalie Houle (Theatre Arts: Design and Technology), Conor Thiele (Theatre Arts: Design and Technology)
Faculty Mentor: Sun Hee Kil (Theatre Arts)

Bringing an audience the spectacle that they have come to expect from live theatrical performances is an increasingly challenging task. It often requires the creative integration of aural and visual technologies communicating with one another through a specific protocol. In order to properly synchronize lights, sound, video, special effects, and more, a method called show control is used. Show control over a network gives users the power to manipulate many parameters of a device from a single trigger source. In order to further understand the process of creating a show control network and utilizing its potential, we will explore how to implement this synchronization through the industry-standard program Qlab. QLab provides the interfacing between various devices on the network; it is capable of sending control messages to desired devices. Using QLab with OSC not only allows for practical remote control over projectors, consoles, and other technology, but for different devices across departments to be seamlessly cued in-time with one another. Show control over a network affords designers the ability to create spectacle with a minimal amount of additional equipment. The creative and technical applications of OSC are being continually stretched by the entertainment industry.

2019 SURE Award Recipients

Felicita E. Chipak, Communication Disorders, ‘20
Mentor: Dana Arthur, Communication Disorders
Effects of Infant-Caregiver Interaction Training on Early Communication Development

Sophie Cooke, Art History (Linguistics), ‘20
Mentor: Keely Heuer, Art History
Private Inscriptions and Formulation of Public Identity in Ancient Greece

Robby Cusack, Printmaking, ’20
Mentor: Jill Parisi-Phillips, Art Studio
Greater Sustainability in Printmaking

Dan Dannor, Geology, ‘20
Mentor: Kaustubh Patwardhan
Analog Experimental Models of Multiple Magma Injections in the Palisades Sill, NY

Claire Dawkins, English/History, ’20
Mentor: Cyrus Mulready, English
Storied Objects: A Material History of New Paltz

Tyler Gopee, Biology, ’21
Mentor: Aaron T. Haselton, Biology
Neuromodulation of Aggression Behavior by Neuropeptide-F and Octopamine in the Fruit Fly, *Drosophila Melanogaster*

Alyson Hummer, Psychology (Music), ‘19Mentor: Alex Peh, Music
Burmese Sandaya Piano Style: Creating the First American-Burmese Piano and Percussion Ensemble

Anthony Ibanez, Chemistry, ’20
Mentor: Frantz Folmer-Andersen, Chemistry
New Preparative Methods for the Purification of Single Enantiomer Compounds

Schuyler Mann, Mechanical Engineering, ‘21
Mentor: Ping-Chuan Wang, Mechanical Engineering
Microstructures and Mechanical Properties of Additive Manufactured (3D Printed) Metals

David Meer, Physics & Astronomy (History & Geography), ’21 and **Mia Naglieri**, Physics, ‘22
Mentor: Catherine Herne, Physics and Astronomy
Enhancing Rotation of Optically Trapped Particles with Programmable Pulsed Light

Joel Olzak, Sculpture, ’20
Mentor: Michael Asbill, Studio Art FAB
Composed to Decompose: Creating and Curating Eco Materialism

Katherine Paul, Contract Major, ’20 and **Elena Champagne**, Undeclared, ‘22
Mentor: David Richardson, Biology
Diversity and Ecosystem Effects of Fish in the Sky Lakes on the Shawangunk Ridge

Seth Pearl, Mechanical Engineering, ‘21
Mentor: Rachmadian Wulandana, Mechanical Engineering
Hydrokinetic Energy Conversion Potential of Vortex-Induced Generators

Kurt Pressly, Electrical Engineering (Computer Science),’20
Mentor: Inge Anema, Electrical Engineering
Preliminary Measurements of Eye-Voice Leads in Second-Language Speakers

Jason Toth, Geography, ’20
Mentor: Huicheng Chien, Geography
Evaluating the Environmental Factors Controlling California Wildfires Using GIS

Emma Tyrell, Biology, ‘19 and **Brianna Flood**, Biochemistry, ‘22
Mentor: Jannett Dinsmore
Using Lichen in the Shawangunk Mountains as an Indicator for Air Quality and Pollution

Jared Weiler, Biology and Biochemistry, ’21
Mentor: Lydia Bright, Biology
Tracking Early to Late Infection Stages in *Paramecium* Hosts Infected by *Holospora* Bacteria

Cody B. Wojszynski, Psychology, ‘20
Mentor: Elizabeth Hirshorn, Psychology
Examining the Relationship between Word Inversion Sensitivity and Phonological Processing

Rafiq Zaib, Biology, ‘21
Mentor: Miles Wilklow-Marnell, Chemistry
Synthesis of New Photochromic Ligands for Functional Organometallic Materials

Fall 2019 AYURE Award Recipients

Hanaa Ahmed, Biology/Chemistry & Disaster Studies
Mentor: Maureen Morrow, Biology
T Cell Signaling in Response to Atrazine

Kaitlyn Baudille, Chemistry (Biochemistry)/Mathematics, '20
Lily Kharlamb, Biochemistry, '21
Mentor: Preeti Dhar, Chemistry
Synthesis, Purification and Characterization of Bromo Alcohols

Caitlyn Castro, Music (Classical Performance), Creative Writing, '20
Mentor: Christiana Fortune-Reader, Music
Exploring Compositional Techniques for the Contemporary String Quartet

Terence Costigan, Mechanical Engineering, '21
Mentor: Ping-Chuan Wang, Mechanical Engineering
Feasibility Assessment of Metal 3D-Printed Ultrasonic Spray Nozzle

Nicole DePaola, Biochemistry, '19
Brianna Flood, Biochemistry, '22
Mentors: Pamela St. John, Chemistry & Spencer Mass, Biology
Determination of the Amount of BPA Absorbed in Planaria Using Isotope Labelling

Anthony Ibanez, Chemistry, '20
Mentor: Frantz Folmer-Andersen, Chemistry
Enantioselective Liquid/Liquid Extraction of Amino Acids

Stella Katz, Theatre Arts, '20
Mentor: Andrea Varga, Theatre Arts
Costume Design & Illustrations for *She Kills Monsters* by Qui Nguyen

Abraham Longbotham, Physics, '21
Mentor: Anca Râdulescu, Mathematics
Effects of Local Mutations in Quadratic Template Iterations

Sergio A. Lopez, Psychology/Evolutionary Studes, '21
Mentor: Corwin Senko, Psycholog
Uncertainty & Guilt: The First-Generation College Student Experience

Nolan Lotter, Physics (Astronomy/Music), '20
Mentor: Catheine Herne, Physics & Astronomy
Holographic Optical Trapping for Attraction Force Measurements

Faye Lyons, Physics, '20
Mentor: Catherine Herne, Physics & Astronomy
Polarimetry in Action in Optical Tweezers

Ryan Mansell, Biology/Chemistry, ‘20
Mentor: Lydia Bright, Biology
Exploring Susceptibility of *Paramecium* to *Holospora* Infection through Gene Knockdowns

Shayna Murphy, Anthropology/History, ‘20
Mentor: Kate McCoy, Educational Studies & Leadership
Exclusionary Practices: Unionizing Gold Miners in 1880 Alma, Colorado

Sery Pak, Biology, ‘21
Aabir Aslam, Biology, ‘21
Mentors: Preeti Dhar, Chemistry & Aaron Haselton, Biology
Extraction and Phytochemical Analysis of *Sausurea Lappa*

Gladis Philip, Biology ‘21
Mentor: Aaron Haselton, Biology
Adipokinetic Hormone and Aggression in *Drosophila Melanogaster*.

Isma Rajpura, Biology, ‘21
Mentor: Megan Ferguson, Chemistry
Global vs. Local: Comparing Diversity of *Paramecium* Isolates Collected Worldwide to Local Samples

Sona Sharan, Mechanical Engineering, ‘20
Mentor: Rachmadian Wulandana, Mechanical Engineering
Investigation of Water Wheel as Hydrokinetic Turbines for Renewable Power Generators

Morgan Slater, Environmental Geochemical Science, ‘20
Mentors: Salvatore Engel-Di Mauro, Geography & Megan Ferguson, Chemistry
Trace Element Contamination in Brooklyn Urban Community Gardens

Matthew Smith, Electrical Engineering, ‘21
Mentor: Reena Dahle, Electrical Engineering
3-D Printed Flexible Passive Sensor for Measuring Torque on Wind Turbine Blades

Sachin Thackeray, Biology/Chemistry, ‘20
Mentor: Miles Wilklow-Marnell, Chemistry
Synthesis and Characterization of Anthraquinone-Based Pincer Complexes of Iridium

Miguel Vasquez, Audio Engineering Contract Major, ‘20
Mentor: Sun Hee Kil, Theatre Arts
Silent Disco with Silent Live Band

Krystal Yohannan, Biology, ‘21
Mentor: Spencer Mass, Biology
Further Studies Comparing Locomotion in *Ambystomoid* Salamanders

Spring 2020 AYURE Award Recipients

Hollie Burton, Geography (Environmental Concentration/Environmental Studies, ’21 &
Liam Salisbury, Geography (Planning Concentration)/Political Science, 21
Mentor: Melissa Rock, Geography
Newburgh Water Contamination: Risk and Uncertainty over PFOS Exposure

Chris Civil, Chemistry, ‘21
Mentor: Miles Wilklow-Marnell, Chemistry
Extraction and Insecticidal Properties of Natural Products from Native Birch Trees

Mario Cortes-Mendoza, Molecular/Cellular Biology, ‘20
Mentors: Lydia Bright, Biology & David Richardson, Biology
Changes in *Paramecium* Populations in Shawangunk Lakes in Response to Acid Rain

Mara Einson, Theatre/Political Science, ‘20
Mentors: Lauren Bone Noble, Theatre Arts
(suff)RAGE *A Comical Tragedy Full of Historical Inaccuracies*

Natalie Margaret Houle, Theatre Arts: Design & Technology/Music, ’21 &
Conor Thiele, Theatre Arts: Design & Technology/Audio Engineering, ‘20
Mentor: Sun Hee Kil, Theatre Arts
OSC and DMX Lighting Control on Qlab

Nataniell Ilyayev, Mechanical Engineering, ‘21
Mentor: Rachmadian Wulandana, Mechanical Engineering
Shape Optimization of 3D-Printed Vortex-Induced Auto-Rotating Turbines

Sery Pak, Biology, ’21 &
Aabir Aslam, Biology, ‘21
Mentors: Aaron Haselton, Biology & Preeti Dhar, Chemistry
Insecticidal Activity of *Sausurea lappa* Against *Drosophila suzukii*

Leo Santala, Mechanical Engineering, ‘21
Mentor: Ping-Chuan Wang, Mechanical Engineering
Investigating Process-Property Relationship for 3D-Printed Copper Structure

Jacqueline Taylor, Mechanical Engineering, ’20 &
Hadi Rabadi, Mechanical Engineering, ‘20
Mentor: Jared Nelson, Engineering Programs
Effect of Agronomic Variables on Natural Fiber Mechanical Properties

Student Travel Award Recipients

URETA

-Undergraduate Research Experience Travel Award: conference travel funding provided to students who participated in AYURE or SURE. Thirteen URETA students presented at professional conferences during the 2018/2019 Academic Year.

STA

-Student Travel Award: conference travel funding provided to students who have not participated in
AYURE or SURE. Eleven STA students presented at professional conferences during the 2019/2020 Academic Year.

Publication Opportunities for Undergraduates

Stanford Undergraduate Research Journal is an annual peer-reviewed publication of research articles written primarily by Stanford undergraduates, but also well-qualified students at other institutions, from all academic fields. http://surj.stanford.edu

Pittsburgh Undergraduate Review PUR is a multidisciplinary journal that accepts papers from around the world http://www.pur.honorscollege.pitt.edu/

Undergraduate Economic Review aimed at promoting high quality undergraduate research http://titan.iwu.edu/%7Eecon/uer/index.html

Undergraduate Journal for Global Business and Community, offers undergraduate students a venue for publishing works http://jgbc.fiu.edu/index.php?journal=JGBC

The Dialectics Undergraduate Journal of Leadership, Politics, and Society aim is to promote undergraduate discourse and scholarship and to encourage students to pursue and engage in thoughtful discourses on topics of societal importance. http://www.abington.psu.edu/dialectics/

Pi Sigma Alpha Undergraduate Journal of Politics built a reputation for publishing outstanding research by undergraduate students. http://web.ics.purdue.edu/~psalpha/journal/call.html

Issues in Political Economy is committed to supporting and encouraging quality undergraduate research in all areas of economics. http://www.elon.edu/e-web/students/ipe/journalinfo.xhtml

Critique provides a forum for graduate and undergraduate students of politics to express and exchange diverse ideas and to imagine new possibilities for democracy and justice https://about.illinoisstate.edu/critique/Pages/default.aspx

Journal of Science and Health at the University of Alabama - JOSHUA includes topics with societal or ethical implications, emerging methodologies or fields, et cetera. http://www.bama.ua.edu/~joshua/index.htm

The Penn Bioethics Journal is the nation's premier peer-reviewed undergraduate bioethics journal. http://bioethicsjournal.com/about/

BIOS to publish their undergraduate biology work http://www.tri-beta.org/publish.html

IMPULSE is the first international, online neuroscience journal for undergraduate publications. http://impulse.appstate.edu/

Undergraduate Research Journal for the Human Sciences. The URC Undergraduate

Research Journal is an annual online national, reviewed journal dedicated to the publication of undergraduate student research. The twofold purpose of the journal is to foster and reward the scholarly efforts of undergraduate human sciences students as well as to provide a valuable learning experience. http://www.kon.org/CFP/cfp_urjhs.html

National Undergraduate Research Clearinghouse accepts any scientific manuscript. They can be empirical studies or literature reviews.
http://www.webclearinghouse.net/help.php

American Journal of Undergraduate Research A refereed journal for undergraduate research in the pure and applied sciences, mathematics, engineering, technology, and related areas in education. http://www.ajur.uni.edu/

Catalyst: Rice Undergraduate Science and Engineering Review http://catalyst.rice.edu/ Submissions for reviews will be accepted from undergraduate students who have performed science or engineering research at any international university or research institution laboratory.

The Undergraduate Psychology Journal (UPJ) at the University of California Los Angeles is a publication which features outstanding research work performed by undergraduate students at UCLA and around the country http://www.studentgroups.ucla.edu/psychjournal/

The Yale Review of Undergraduate Research in Psychology is an annual journal that showcases the best and most original research in psychology conducted by undergraduates from around the world. http://www.yale.edu/yrurp/

Psi Chi Journal of Undergraduate Research a national, fully reviewed, quarterly journal dedicated to the publication of undergraduate psychology student research.
http://www.psichi.org

Journal of Young Investigators JYI's web journal (which is also called JYI) is dedicated to the presentation of undergraduate research in science, mathematics, and engineering. http://www.jyi.org/about/

Morehead Journal of Applicable Mathematics MEJAM accepts papers which are outside the realm of the typical undergraduate curriculum and which emphasize the applicability of mathematics while maintaining significant mathematical interest.
http://www.moreheadstate.edu/mejam/

Rose-Hulman Undergraduate Mathematics Journal is devoted entirely to papers written by undergraduates on topics related to mathematics
http://www.rose-hulman.edu/mathjournal/index.php

Journal of Undergraduate Chemistry Research is a new peer review journal that will be published quarterly with papers of original research performed by undergraduates.
http://www.vmi.edu/show.aspx?tid=36955&id=2214&ekmensel=8f9c37c3_156_160_

2214_3

The Allegheny Review is one of America's few nationwide literary magazines dedicated exclusively to undergraduate works of poetry, fiction, creative nonfiction, and art http://alleghenyreview.wordpress.com/

The Oswald Review, An International Journal of Undergraduate Research and Criticism in the
Discipline of English http://scholarcommons.sc.edu/tor/

Young Scholars in Writing: Undergraduate Research Young Scholars in Writing: Undergraduate Research in Writing and Rhetoric, a peer-reviewed journal for undergraduates.http://cas.umkc.edu/english/publications/youngscholarsinwriting/index3.html

Undergraduate Journal of Service Learning and Community-
Based Research http://www.bk.psu.edu/Academics/33679.htm.

History Matters: An Undergraduate Journal of Historical
Research. http://www.historymatters.appstate.edu/

AnthroJournal is an open source journal of outstanding scholarly research papers and reports authored primarily by undergraduate and graduate college students. http://www.anthrojournal.com/

Valley Humanities Review http://www.lvc.edu/vhr

Discussions, the Undergraduate Research Journal of Case Western Reserve University Information about *Discussions* can be found at: http://case.edu/discussions/