SUMMER UNDERGRADUATE RESEARCH EXPERIENCE
Friday, September 20, 2019
Honors Center, College Hall
4:00 – 7:00 p.m.

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Sponsored by:
The SUNY New Paltz Research, Scholarship and Creative Activities Program
For more information, please visit our web page: http://www.newpaltz.edu/research/usr.html
You may also contact: Kate McCoy, RSCA Director, mcoyk@newpaltz.edu 257-2629.

Upcoming deadlines for the RSCA program, sponsored events and funding:
Posters on the Hill: November 5, 2019
National Conference on Undergraduate Research: December 6, 2019
Spring 2020 AYURE: December 2, 2019
SURE 2020: March 30, 2020
SRS Abstracts: April 6, 2020
Faculty Mentor Award: April 13, 2020

Join the SUNY New Paltz RSCA group on Facebook:
SUNY New Paltz Undergraduate Research, Scholarship
and Creative Activities Group

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Welcome and Congratulations to all of the SURE Participants!

SUNY New Paltz strives to enhance students’ intellectual growth through links to faculty scholarship. One mechanism encouraging these links is the Summer Undergraduate Research Experience (SURE) program. This program encourages ongoing faculty-student collaboration by enabling students to work full-time on a project over an 8-week summer period. SURE students work on a particular aspect of the faculty’s research program under close guidance by the faculty mentors.

The 2019 SURE students are given the opportunity to present the results of their research to the community during the fall semester. It has been my great pleasure to work with these students and their faculty mentors this past summer. Their enthusiasm and dedication are an inspiration. I would like to congratulate the student and mentor SURE Alumni for their accomplishments and wish them luck with their continued efforts on these projects. Thanks to everyone who has joined us today in this celebration of the SURE achievements.

Kate McCoy
RSCA Director

2019 RSCA Faculty Mentor Award

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

Judith Halasz (Sociology) is the 2019 Faculty Mentor Awardee. She was selected from a strong pool of nominees for her work mentoring many Sociology and Honors students since her arrival in 2007.

She has co-authored and co-presented with students at professional meetings and has recently submitted work (co-authored with an undergraduate student) to Visual Studies, the flagship journal of the International Visual Sociology Association.

With expertise in both qualitative and quantitative methods, Dr. Halasz has skillfully guided many students’ research in the sociology senior seminar, with some of those projects expanding into full-scale research projects under Dr. Halasz’s guidance and supervision.

Sociology Chair Dr. Sunita Bose applauds Halasz’s extraordinary “commitment and dedication to our students’ professional growth by nurturing their intellectual potential.”
RSCA (Research, Scholarship and Creative Activities) Program

Faculty-student collaborators may propose projects for support through the Summer Undergraduate Research Experience (SURE) and Academic Year Funds programs (AYURE). Both of these programs are competitive and are selected for support by a faculty committee. SURE and AYURE awardees are also eligible for the RSCA Conference Travel Award. Congratulations to all of this year’s award recipients (see pages 17-24).

SURE (Summer Undergraduate Research Experience)
The focus of the SURE program is to encourage 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 up to 40 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. Because the goal of this program is to encourage ongoing faculty-student collaboration, the students are encouraged to continue working on the project during subsequent semesters.

AYURE (Academic Year Undergraduate Research Experience)
The AYURE program, as well as the SURE program, supports student-faculty collaborations on projects that span the disciplines. Projects that generate new knowledge or works are eligible for support. During the semester, students typically spend approximately 10 hours per week on AYURE projects. Funds for supplies and other support of the research, scholarship or creative activities are provided through this program.

URETA (Undergraduate Research Experience Travel Award)
The RSCA program supports SURE and AYURE students to present the results of their collaborative work at professional conferences. Mentors are also supported for travel with the student.

STA (Student Travel Award)
The RSCA program provides travel funding to students who have not participated in AYURE or SURE to present the results of their collaborative work at professional conferences.

Acknowledgments
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Aram Agajanian (Computer Services) for support of the web-based abstract submissions;
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Amy Witkus (RSCA) for abstract book preparation, cover design and additional support.

The RSCA Advisory Board
Inge Anema (School of Liberal Arts & Sciences), Kate Bellody (Library), Claire Dawkins (School of Liberal Arts & Sciences, Student Representative), Preeti Dhar (School of Science & Engineering), Anne Galperin (School of Fine & Performing Arts), Caroline Hoppenwasser (School of Education, Alternate Fall 2019), Baback Izadi (School of Science & Engineering), Jun Lin (School of Business), Kate McCoy (RSCA Director/School of Education), Corwin Senko (School of Liberal Arts & Sciences)
2019 SURE Presentation Schedule

Friday, September 20

4p Introductions

4:10p – 6p Oral Presentations

4:10: **Felicita Chipak**, Communication Disorders - Effects of Infant-Caregiver Interaction Training on Early Communication Development


4:30: **Schuyler Mann**, Mechanical Engineering - Process and Characterization of 3D Printed Copper

4:40: **Jared Weiler**, Biology and Biochemistry - Investigating Paramecium caudatum Response to Infection by Holospora undulata

4:50: **Alyson Hummer**, Psychology (Music) - An Examination of Pedagogy in a Southeast Asian Music Tradition

5:00: **Joel Olzak**, Sculpture - Composed to Decompose: Eco Materialism at Unison Arts Center

5:10: **Robby Cusack**, Printmaking - Greater Sustainability in Printmaking


5:30: **Seth Pearl**, Mechanical Engineering - Generating Hydrokinetic Energy from Auto-Rotating Turbines

5:40p – 7p Poster Presentations

**Elena Champagne**, Biology and **Katherine Paul**, Biology & Geology - Fish Population Dynamics in Lake Minnewaska

**Sophie Cooke**, Art History (Linguistics) - Speaking Stones: First Person Narrative on Greek Funerary Stelae

**Dan Dannor**, Geology - An Analog for the Formation of the Olivine Zone Within the Palisades Sill

**Tyler Gopee**, Biology - Neuromodulation of Aggression Behavior by Neuropeptide-F in D. Melanogaster
Mia Naglieri, Physics and Astronomy and David Meer, Physics and Astronomy
(History and Geography)
Modeling Torques on Calcite in Optical Trapping

Mia Naglieri (Physics and Astronomy), Nolan Lotter (Physics and Astronomy),
David Meer (Physics and Astronomy) - The Effect of Linearly and Elliptically Polarized Light on Calcite Behavior

Kurt Pressly, Electrical Engineering - Comparing Eye-Voice Lead in Monolingual and Bilingual Readers

Jason Toth, Geography - California Wildfire Distribution from 1980-2016 and Finding High Risk Wildfire Perimeter Areas

Emma Tyrell, Biology and Brianna Flood, Biochemistry - Photographic Analysis of Changes in Lichen Coverage in Response to Air Pollution

Cody B. Wojszynski, Psychology - Individual Differences in Holistic Processing

Rafiq Zaib, Chemistry - Synthesis of Organometallic Photochromic Molecules
**Abstracts**

**Effects of Infant-Caregiver Interaction Training on Early Communication Development**
Felicita Chipak (Communication Disorders)
Faculty Mentor: Dana Arthur (Communication Disorders)

Parental responsiveness to young infants' needs is not only essential for basic survival, but also greatly influences all aspects of development. A confluence of evidence suggests that parental responsiveness has demonstrable effects on emotional, cognitive, and linguistic growth, and that when that responsiveness is impeded, there are notable developmental consequences. There is therefore a growing interest in parental responsiveness styles and techniques in both the academic and private sectors. The current study investigates the underlying rationale and research support for commercially available infant-caregiver interaction training programs, specifically, the “Dunstan Baby Language” (DBL) program, which emphasizes auditory cues in infant cries. A review of background literature in the areas of infant-caregiver interaction training and early attachment preceded participant recruitment attempts. The ultimate goal of this longitudinal investigation is to follow parents of newborn infants who receive DBL training or a control course of general information on infant soothing/swaddling, pre-linguistic communication, and cognitive development. Over the course of a year, data will be gathered through diary entries and parent-administered questionnaires tracking pre-linguistic and cognitive development. Quantitative and qualitative data will be used to compare the intervention and control groups. Implications for future research into and development of parent responsiveness training programs will be discussed.

**The Materials of History, Thought, and Art: an Object Study of New Paltz, NY.**
Claire Dawkins (English and History)
Faculty Mentor: Cyrus Mulready (English)

This research project explores New Paltz history through the study of everyday objects. By researching the history of a spoon, rocking horse, or building, we can reframe history in a way that makes us see how objects play important roles in our lives today. This project traces the day-to-day experiences of French Huguenot Settlers, Native Americans, and past SUNY New Paltz students, through the clothing, tools, and decorations they used. The objects we studied came from local collections and archives at Historic Huguenot Street, archeological digs performed by Prof. Joe Diamond and his students, and the collections housed at the Sojourner Truth Library on the SUNY New Paltz campus. The approach of this project is driven by social histories, which focus on the importance of the common person over larger figures or governments. This project challenges preconceived notions about New Paltz culture and the study of history. By focusing on the most mundane objects, we are able to give a voice to the otherwise forgotten and place ourselves into the homes, social events, and churches of a New Paltz of the past. From the work of other students which I edited and reviewed, and my own research and writing, I was able to create a narrative of New Paltz history accessible to anyone with a computer. This online exhibit, undertaken with the help of the Southeastern New York Library Resources Council’s Hudson River Valley Heritage, is a way to access New Paltz history in a new, inventive way which shines light on often overlooked aspects of local Hudson Valley life.
**Process and Characterization of 3D Printed Copper**

Schuyler Mann (Mechanical Engineering)
Faculty Mentor: Ping Wang (Mechanical Engineering)

Metal 3D-printing is emerging as a potentially revolutionary technique for manufacturing, and more research into the fundamental science and limitations remain to be conducted. In this project, the consideration and challenge of processing 3D-printed copper (Cu) structures was studied, along with the characterization of resulting specimens to investigate the relationship between material processing, structure and property. Cu specimens were prepared by traditional 3D-printing with injection molding technique, where the filament consists of 95% Cu powder and 5% polylactic acid (PLA) as the binding material. Subsequent heat treatments are necessary in order to (1) remove PLA from the specimen, and (2) sinter the loosely packed Cu particles for densification. One of the challenges is to prevent Cu oxidation at elevated temperature. Thus, the primary concern for this research is to create an inert environment during the heat treatment process. Cu specimens were sintered at different conditions to investigate the effect of sintering temperature, time and atmosphere on the mechanical property and material microstructure. For mechanical property, qualitative observation was made for classification. For material characterization, x-ray powder diffraction was employed to identify material composition and phase. While for microstructure analysis, scanning electron microscopy (SEM) was used to examine the particle size and porosity. Results from four specimens will be summarized in the presentation to illustrate the process-structure-property relations unique to 3D-printed Cu structure. Also, feasibility of using traditional 3D-printing system to fabricate metal structure will be demonstrated, followed by plans for future work for further research.

**Investigating Paramecium caudatum Response to Infection by Holospora undulata**

Jared Weiler (Biochemistry and Biology), 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 endosymbiont that occupies the micronucleus of Paramecia in two morphologically distinct forms, the infectious and reproductive form. Once the Paramecium cells begin to starve, and the reproductive forms consume most of the food in the micronuclei, and the bacteria differentiate into infectious forms and break out of the cell to seek other hosts to infect. In order to better understand the response of Paramecia to parasitic infection, we have been tracking the general susceptibility of several naïve Paramecia to the Holospora infection. It was found that some strains are more susceptible than others to the bacterium; however, the mechanism by which the loss of infection occurs has not been characterized. By infecting naïve strains and collecting mRNA at key time points, we will hopefully be able to determine the proteins that are linked to the infection. After determining the highly up and down regulated mRNA sequences in Paramecia strains with varying susceptibility and resistance to infection by Holospora, we plan to do gene knockdowns to determine which genes lead to resistance.
An Examination of Pedagogy in a Southeast Asian Music Tradition
Alyson Hummer (Psychology)
Faculty Mentor: Alex Peh (Music)

In an examination of pedagogy in a Southeast Asian music tradition, Burmese master percussionist Kyaw Kyaw Naing led students, faculty, and community members of SUNY New Paltz in the first Hsaing ensemble in the United States. This ensemble provided an environment in which to learn the musical traditions of another culture while examining and challenging the norms which Western musicians have accepted. The students of Naing learned the music using the traditional instruments of the Hsaing ensemble: *chauk lon bat, kyi-waing, maung-hsaing, si do, hne, sandaya*/piano, *pat-waing, si and wa*, and cymbals. The traditional oral and aural instruction used by Naing created a few barriers, but improved repertoire retrieval and performance of the materials. Educators of music in Western tradition might consider the different instruction approaches to engage students and enhance musicianship.

Composed to Decompose: Eco Materialism at Unison Arts Center
Joel Olzak (Sculpture)
Faculty Mentor: Michael Asbill (Sculpture)

In her book “What’s Next? Eco Materialism & Contemporary Art”, published 2019, pioneering artist, art historian, and curator Linda Weintraub, based out of Rhinebeck NY, lays out the concept of a new Eco Art movement, which reconsiders current methods of making art, influenced by New Materialism. This Eco Material movement rejects anthropocentrism, consumerism, and the general self-serving attitude of humanity, focusing on the greater ecosystem we reside in. Responding to the release of Weintraub’s book and testing the theoretical propositions within, I was invited to work with Weintraub and my mentor, artist and professor Michael Asbill, to produce the first ever Eco Materialism exhibition, titled “Composed to Decompose,” staged in the sculpture grounds of Unison Arts Center. This show focused specifically on the idea of decomposition, works eventually returning to the earth. Over 40 artists from all over the northeast contributed with their own methods, practices, and interpretations of this budding movement. The experience of working with these artists, creating a project for the show, designing the exhibition booklet, along with Weintraub’s text and the guidance of Professor Asbill, provided me with a wide range of curatorial skills, along with a new philosophy of artmaking.
Greater Sustainability in Printmaking
Robert Cusack (Printmaking)
Faculty Mentor: Jill Parisi-Phillips (Printmaking)

Printmaking is an artistic medium that for the most part has been rooted in the use of oil-based inks and toxic solvents. Throughout the summer I researched ways to help transition the SUNY New Paltz Printmaking studio into a non-toxic studio. In our studio we work across a range of Printmaking techniques including lithography, relief, monotype, silkscreen, and intaglio. Additionally, hand-papermaking is covered extensively in the SUNY New Paltz Printmaking program. I investigated ways in each field to root out the use of any toxic solvents and explored ways to reduce the carbon footprint of our studio. In stone lithography, the toxic solvent lithotine is used when preparing your stone for printing. We were able to substitute lithotine with vegetable oil in this process and pull effective lithographic prints. The oil-based inks used to make monotype and intaglio prints were replaced with water and soy-based Akua Inks that produced great results when used with ink modifiers. In the field of papermaking we focused on creating paper from recycled materials and invasive species. Several pounds of paper were formed from both recycled t-shirts and the highly invasive plant Artemisia vulgaris, commonly known as mugwort. Through the summer research we made valuable discoveries in the process of converting the SUNY New Paltz print studio into a non-toxic studio. While this experience also served as a time of experimentation with new printing media, it will absolutely have a lasting impact on the environment and overall safety of SUNY New Paltz students, staff, and faculty.

New Preparative Methods for the Purification of Single Enantiomer Compounds
Anthony Ibanez (Chemistry)
Faculty Mentor: Frantz Folmer-Andersen (Chemistry)

Chiral molecules called enantiomers are non-superimposable, mirror image, constitutional isomers. These isomers have identical properties, other than their interactions with other chiral molecules. As the majority of biological molecules exist as single enantiomers, the ability to separate or synthesize single enantiomers has important application in the field of pharmaceuticals. Liquid/liquid extraction, which utilizes the solubility of amino acids complexed to chiral receptors in non-polar solvents, and enantioselective catalysis, which utilizes enantiomers complexed to achiral molecules in a chiral orientation, provide methods to preferentially prepare compounds as single enantiomers. Novel chiral molecules using both the DACH and BINOL subunit were compared to simpler analogous DACH based compounds to determine their effectiveness in enantioselectively preparing chemicals. Effectiveness was quantified as enantiomeric excess (ee), which was determined by CSP-HPLC.
Generating Hydrokinetic Energy from Auto-Rotating Turbines

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

Within developed and established societies harnessing energy for usage has proved to be a vital element in maintaining these civilizations. Energy can be purposed for use in electricity and transportation. The most widespread solution for extracting energy is through the use of burning fossil fuels. While this method provides us with the most energy compared to other solutions, it has negative irreversible effects on our environment. An explored alternative to burning fossil fuels has been through using renewable energy, which makes use of environmental resources in an effort to extract energy from it. The concentration for this research focuses on extracting renewable energy from flowing water. Within this field of study there are two methods for extracting energy: hydropower (also referred to as hydroelectric), is the more commonly used method that generates sufficient power but has strong negative effects on the marine life at the side of the extraction apparatus. In contrast, hydrokinetic energy will be this closely examined in this research for its more environmentally friendly benefits. Through the use of a custom flow tank in Resnick Engineering Hall, this research will consist of tests involving a 3D printed bladeless turbine suspended within the flow tank. Varying the frequency output of the pump coupled with the inclusion of blockages to determine the conditions that result in the best power generation. Through testing, a critical frequency was discovered, in which all output frequencies above and below the critical frequency did not yield as much power. Additionally, the inclusion of a blockage increased the auto-rotation of the turbines. Further experiments will include varying the geometric shape of the turbines and modifying the dimensions of the blockages. This research will be heavily based on the work previously done by Khan, Skews and Ashwin.

Neuromodulation of Aggression Behavior by Neuropeptide-F in D. Melanogaster

Tyler Gopee (Biology)
Faculty Mentor: Aaron Haselton (Biology)

Neuromessenger proteins such as Neuropeptide-F (NPF) have been linked to aggression in animals such as the fruit fly Drosophila melanogaster. To better understand NPF’s influence on aggression, we investigated the direct effects of NPF release on fly fighting aggression behaviors. Utilizing targeted gene-expression techniques that can be confirmed via antibody-based immunohistochemical tissue analysis, we created a transgenic line of flies with light-inducible ion channels in NPF-secreting cells. Upon confirmation, utilizing optogenetic tools we performed fly fight bioassays in a ring with limited food to see the direct effects of NPF on aggression through light activation. The results of this study suggest the secretion of NPF impinges upon aggression circuits enough to depress aggression levels in flies.
Speaking Stones: First Person Narrative on Greek Funerary Stelae
Sophie Cooke (Art History/Linguistics)
Faculty Mentor: Keely Heuer (Art History)

This research project explores the use of first-person narrative in ancient Greek society, with respect to grave stelae and funerary monuments. The language on grave inscriptions can reflect a society’s ideas on death and the deceased person who it commemorates. First person narrative (I and me) adds a personal touch to the gravestone inscription, making it seem that the monument speaks of the deceased itself, or the deceased has gained their voice again. By analyzing the frequency of first-person narrative usage and connecting the identities of the deceased figures whose gravestones utilize this form of speech, I aim to find the defining factor which causes first person narrative to be used. By creating a corpus of examples, I was able to analyze and organize the factors affecting this trend in Greek gravestones over three different periods – Archaic, Classical, and Hellenistic. First-person narrative can take different forms, with each ranging in popularity though the years. Regardless of form, majority of the deceased whose gravestones speaks in first person can be labeled as a secondary citizen or an untimely death. Secondary citizens in ancient Greece are essentially everyone except land-owning males, meaning women, foreigners, slaves, etc. Those who suffer from untimely deaths are mostly children, who have perished before reaching marriage and therefore maturity. The use of first person language on these gravestones grants autonomy and a new chance at an independent voice in the confining and expectant society of ancient Greece. This project highlights the power that language has to alter someone’s identity, from that of ‘secondary’ in real life, to a powerful position even in death.

Photographic Analysis of Changes in Lichen Coverage in Response to Air Pollution
Emma Tyrell (Biology), Brianna Flood (Biochemistry)
Faculty Mentor: Jannett Dinsmore (Biology)

Lichen grows at a relatively slow rate and is highly sensitive to air pollution, specifically sulfur dioxide, making many species suitable bio-indicators of air pollution and acid rain. A 1974 study qualitatively recorded a decrease in lichen coverage on the rock faces at four separate locations in the Shawangunk Mountains when compared to photos taken from 1890-1932. Increases in sulfur dioxide from coal-fired power plants contributed to the notable increase in acid rain at the time. Since 1990 amendments to the Clean Air Act, significant decreases in sulfur dioxide have been observed, as well as recovery in the pH of rainfall in the northeastern United States. It was hypothesized that these improvements in air quality would be confirmed by a positive impact on lichen growth when compared to levels from the 1970s. Archived photos from the Mohonk Preserve were used to locate the sites from the original study and new photos were taken. All photos were digitally analyzed using ImageJ software to obtain a quantitative analysis of lichen growth trends. Photographic analysis indicated a decrease in lichen coverage from 1870-1932 to the 1970s. An increase in lichen coverage from 1974 to 2019 was only observed at one of the three original study sites (STOCAV), while two sites (LAKSHB and PINBLU) experienced decreases in coverage during this same time period. These results suggest an overall decrease in the lichen coverage since the 1970s.
**Fish Population Dynamics in Lake Minnewaska**  
Katie Paul (Biology and Geology), Elena Champage (Biology)  
Faculty Mentor: David Richardson (Biology)

Lake Minnewaska, located on the Shawangunk Ridge, had no fish for almost 100 years. With improvements to lake acidification, minnows and largemouth bass were unintentionally introduced and coexisted together for several years. In 2014, the minnows were all eaten, leaving bass as the only species present in this lake. The juvenile bass diet consists of insect larvae and zooplankton, while adult bass are strictly piscivorous. Since the lake provides little food for the adult bass, this may ultimately affect the dynamic of the population. The purpose of the study is to determine if there has been a change in the bass population and population demographics. With the help of the New York State Department of Environmental Conservation, we used electrofishing boats to collect a large sample of bass. We used mark and recapture method to calculate the estimated population size. In addition, we measured the weight, length and girth of each fish to identify age and health of the bass. The majority of the population are smaller juvenile bass with a smaller number of adult bass. The larger adult bass are likely reproducing at a high rate and consuming their young. Population size estimates between 2013 and 2019 have stabilized, showing that the rates of reproduction and consumption are balanced. Largemouth bass can sustain themselves in an environment with little variation in prey and still continue their predatory diet.

**Synthesis of Organometallic Photochromic Molecules**  
Rafiq Zaib (Chemistry)  
Faculty Mentor: Miles Wilklow-Marnell (Chemistry)

Photochromic compounds are composed of molecules that capture light and change conformation, or form new bonds, which stores the energy absorbed in the form of a “metastable” or “activated” complex. Compounds that can store sunlight and release this energy later in the form of heat by reverting to their inactivated form may be utilized as solar thermal fuels. These types of fuels could help supplement photovoltaic cells by storing energy for use when the sunlight is not available or provide emergency warmth which can be “recharged” in sunlight among other potential uses. Synthesized in 1969, the photochromic molecule 1,4-methano-11,12-dihydroanthracene-9,10-dione can store up to 20kJ/mol of energy by absorbing ultraviolet light and undergoing a complex rearrangement of bonds. However, thermal reversion to the inactivated state was inefficient without catalysts and required high temperatures, solar thermal fuels should absorb visible light, and the process was not recyclable. Current research shows that bonding a metal atom to a photochromic compound can shift the light absorbed into the visible range, help facilitate thermal reversal through chemical processes not available without metal atoms and increase reusability. In this work we aim to synthesize a modified version of 1,4-methano-11,12-dihydroanthracene-9,10-dione which can be attached to transition metals to form organometallic complexes and investigate their photochromic properties.
Comparing Eye-Voice Lead in Monolingual and Bilingual Readers
Kurt Pressly (Electrical Engineering/Computer Science)
Faculty Mentor: Inge Anema (Communication Disorders)

Language is humankind’s most fundamental form of communication. Languages, reading speed, and comprehension differ for everyone, but messages always remain the same. The purpose of this research was to investigate how pausing in reading aloud affects reading comprehension in monolingual and bilanguage readers. In addition to collecting eye-tracking and spectrographic data from reading aloud, the integration of both sets of data was used to compute the eye-voice lead for each group. The eye-voice lead is the time interval between when a word is fixated on with the eye and when it is read out loud. Tobii eye tracking technology was used for all participants during oral reading. A variety of other measurements were taken involving eye data and audio data, which includes pause and fixation analysis. All data points were analyzed in MATLAB using a variety of generic algorithms which were used for all participants.

California Wildfire Distribution from 1980-2016 and Finding High Risk Wildfire Perimeter Areas
Jason Toth (Geography)
Faculty Mentor: Huicheng Chien (Geography)

Over the past couple of decades there has been an alarming amount of natural disasters occurring all over the world. Wildfires are one of the many and have displaced not only humans but also animals living in an ecosystem. In California, 10,260 wildfires were reported between 1980 and 2018. The average 10-year percent U.S. wildfire starts are 88% human caused and 12% lightning caused. Wildfires can occur anywhere. However, the fuel including trees and underbrush, weather including temperature, wind, and moisture, and topography including the slope and aspect may determine the birth, growth, and death of a wildfire. The objective of this study is to analyze the relationship among the occurrences of wildfires, weather, and topography. The data of wildfire perimeters from 1980 to 2018 were downloaded from the Fire and Resource Assessment Program (FRAP). Gridded temperature and moisture data were downloaded from NOAA Climate Data Online (CDO). Slope and Aspect were developed using 30-meter Digital Elevation Model (DEM) using ArcGIS spatial analysis. Spatial and temporal mapping will be used to analyze the relationship among wildfires, weather, and topography. This research will help shed light on high-risk areas to help protect the residents of California, vegetation and wildlife.
An Analog for the Formation of the Olivine Zone Within the Palisades Sill
Dan Dannor (Geology)
Faculty Mentor: Kaustubh Patwardhan (Geology)

The Palisades Sill is a roughly 200 million-year-old rock formation found from southern New York through southern New Jersey. This unit, 300 meters thick and 80 to 150 kilometers wide, formed by the intrusion of magma between already existing rock units. In the lower 6 to 12 meters of the sill, there is an Olivine-Zone (OZ) that contains up to 25% olivine (Gorring, 1995). In this research project, we tested the hypothesis that the OZ formed through a separate magma injection containing olivine (Husch, 1990; Puffer, 2009). Molten paraffin wax and fine-grained glitter are used as analogs for liquid magma and olivine crystals respectively. Glitter-free wax is injected between ice-cooled foam sheets as the preexisting rock and allowed to partially solidify for 1-2 minutes. Next, a second batch of wax with glitter is injected to create a “glitter-zone” within the model paraffin sill. Our results show a distinct glitter-zone between 0.77 to 0.89 non-dimensional depth from the top. In the Palisades Sill the OZ occurs from 0.91 to 0.97 non-dimensional depth. These results tell us that the OZ in the Palisades Sill likely formed through a separate injection containing olivine crystals.

Modeling Torques on Calcite in Optical Trapping
David Meer (Physics and Astronomy), Mia Naglieri (Physics and Astronomy)
Faculty Mentor: Catherine Herne (Physics and Astronomy)

Describing the forces on an object is key to their manipulation. We created calcite “engines” with optical trapping that produce a non-uniform rotation. Calcite’s high birefringence and its rhombohedral shape have dramatic consequences on the resulting forces that differentiate it from the sphere that has typically been used in other optical trapping models. These differences are demonstrated in this project, with the calcite trapped in a Gaussian beam. To construct the model, we laid out the physical differences and optical properties of calcite and how that affects a ray of light as it is reflected and refracted through the crystal. We demonstrated the forces and the torque on the crystal at any given rotational position. We show that the effect of the net torque due to scattering forces on the crystal is analogous to the trapping of glass cubes, with a minimum torque at “stable” positions; two corners directly parallel with the beam propagation direction. There are “unstable” positions with maximum torque when edges or faces of the crystal are parallel to the beam direction.
The Effect of Linearly and Elliptically Polarized Light on Calcite Behavior
Mia Naglieri (Physics and Astronomy), Nolan Lotter (Physics and Astronomy),
David Meer (Physics and Astronomy)
Faculty Mentor: Catherine Herne (Physics and Astronomy)

Optical trapping has greatly contributed to the advancement in fields such as biology, where living specimens can be more precisely examined and analyzed, and nanotechnology, where trapping can push nano-scale particles through constricted areas. Therefore, the ability to manipulate the motion of optically trapped objects is a very powerful and useful tool. The subject of our research was calcite, a birefringent material which spins when optically trapped by circularly or elliptically polarized light. The calcite samples were suspended in a few different aqueous solutions. To gain control over the calcite crystals, the power and polarization of the diode laser beam were changed by various degrees. We captured numerous videos of the calcite crystals spinning or being trapped, which we then used to plot the crystals’ orientation. We noticed two particular behaviors from the crystals when under elliptically and linearly polarized light. Under elliptically polarized light, the top corner of the calcite crystal rotated with an elliptical precession due to its shape and birefringence. Under linearly polarized light the calcite crystal aligned along the polarization axis depending on its uniformity. In this presentation we demonstrate the observed behavior and offer new insight into the source of our observations. Understanding this behavior can allow for the optical manipulation of calcite and other objects in future studies.

Individual Differences in Holistic Processing
Cody Wojszynski (Psychology)
Faculty Mentor: Elizabeth Hirshorn (Psychology)

High level reading proficiency is a necessity of the modern day lifestyle, and understanding differences in achieving this proficiency is crucial. While most English readers rely on an analytical (phonological) style word decoding, research has shown that some English readers utilize a more holistic decoding approach. Interestingly, Chinese individuals tend to exhibit a more holistic reading style and rely less on phonological processing during reading. This study looks at differences in analytic versus holistic decoding in English readers and how they related to both word level and sentence level processing. We predict that English readers who use a more holistic style decoding will show patterns similar to those reported of Chinese readers. More specifically, we expect that individuals who have greater holistic decoding would be relatively less influenced by phonological priming and show better comprehension in sentences containing a high phonological repetition (tongue twisters), which is typically difficult for English readers. This pattern of results would suggest that there is variability in how phonological information is used at various levels of processing English readers. Future research can further define how individuals differ in decoding styles to achieve the same high-level reading. This may be especially relevant for implementing new teaching techniques designed for individuals with impaired phonological processing.
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), ‘19
Mentor: 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 and Astronomy (History and 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 Asbili, 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 2018 AYURE Award Recipients

Heh-Soo Choi, Computer Science, ‘19
Mentor: Min Chen, Computer Science
Image Classification with Artificial Neural Network

JinSoo Choi, Computer Science, ‘19
Mentor: Min Chen, Computer Science
Genetic Algorithm based Edge Detection for Image Segmentation

Winiffer Conce Alberto, Molecular/Cellular Biology, ‘19
Mentor: Lydia Bright, Biology
Exploring Susceptibility of Paramecium to Holospora Infection

Katherine Dobosh, Biology, ‘19
Mentor: Lydia Bright, Biology
Tracking Paramecium Population Changes from Season to Season in Local Ponds

Timothy Earl, Physics, ‘18
Mentor: Catherine Herne, Physics & Astronomy
Polarimetry on Rotating Rhombohedral Calcite

Simone Evans, Mathematics & Biochemistry/Music, ‘19
Mentor: Anca Râdulescu, Mathematics
Universality of Dynamic Behavior in Low-Dimensional Nonlinear Networks

Ashley Fisher, Biology/Spanish and Deaf Studies, ‘19
Mentor: Maureen Morrow, Biology
T cell Signaling in Response to Atrazine

Dylan Fitzmaurice, Biochemistry/Applied Mathematics, ‘19
Mentor: Megan Ferguson, Chemistry
Examining Interactions between Bacterial Cells with AFM

Amber Funk, Biology/Psychology & Art Studio, ’18 & Lindsey Griffin, Biology/Chemistry, ’19
Mentor: Spencer Mass, Biology
Hypertrophy or Proliferation in Planarian Regeneration

Jordan Greenough, Chemistry (Biochemistry emphasis), ‘19
Mentor: Preeti Dhar, Chemistry
Evaluation of Heracleum maximum (HM) Extracts for Acetylcholinesterase (AChE) and Butyrylcholinesterase (BChE) Inhibition

Johanna Levey, Physics & Astronomy, ‘19
Mentor: Catharine Herne, Physics & Astronomy
Controlling Calcite Rhombohedrons in a Polarized Optical Trap
**Fall 2018 AYURE Award Recipients (continued)**

**Tucker Lundgren**, Mechanical Engineering/Mathematics, ‘19  
Mentor: Anca Râdulescu, Mathematics  
A Pharmacokinetic Model of Lead-Calcium Interactions

**Degen Mariniello**, Chemistry with a concentration in Biochemistry, ‘19  
Mentor: Preeti Dhar, Chemistry  
Using Sodium Borohydride/Bromine to Open Cyclic Ethers

**Troy Moody**, Biochemistry/Philosophy, ‘19  
Mentors: Pamela St. John & Spencer Mass, Chemistry & Biology  
Correlation between BPA Absorption and Regeneration in Planaria

**Victoria Narici**, Anthropology/Biology, ‘19  
Mentor: Spencer Mass, Biology  
Characterizing the Gait Cycle in Ambystomoid Salamanders

**Hanami Robles and Bryan Feigel**, Mechanical Engineering, ‘19  
Mentor: Jared Nelson, Engineering Programs  
Isolating Mechanical Property Variation of Natural Fibers

**Jacqueline Taylor**, Mechanical Engineering, ‘20  
Mentor: Rachmadian Wulandana, Mechanical Engineering  
An Active Cooling System for Photovoltaic Solar Panel

**Cassandra Williams**, Mathematics, ‘21  
Mentor: Anca Râdulescu, Mathematics  
Revising Estimates of Glutamate Transporter Density in Astrocytes: A Geometric Computation
Spring 2019 AYURE Award Recipients

Katherine Dobosh, Biology and Psychology, Evolutionary Studies, ‘19
Mentor: Lydia Bright, Biology
Tracking Paramecium Population Changes from Season to Season in Local Ponds

Michele Lederer, Mechanical Engineering, ‘20
Mentor: Rachmadian Wulandana, Mechanical Engineering
Investigation of 3D-Printed Metal Heat Sinks for Microchips Cooling

Melissa Maddux, Biochemistry, ’20
Mentor: Frantz Folmer-Andersen, Chemistry
Simple DACH Ligands for Enantioselective Molecular Recognition

James Mahoney, Chemistry, ‘19
Mentor: Miles Wilklow-Marnell, Chemistry
Synthesis/Characterization of Quinoid-Based Iridium Pincer Complexes

Lina McCary, Mechanical Engineering, ‘20
Mentor: Ping-Chuan Wang, Mechanical Engineering
How Localized Joule Heating Degrades Integrated Circuit (Microchip)

Conor N. O’Riordan, Mathematics, ‘19
Mentor: Hyunchul Park, Mathematics
Markov Chains and Their Simulation

Gerlando Volpe, Theatre Arts (Design/Tech Concentration)/Film Studies, ’19
Mentor: Sun Hee Kil, Theatre Arts
Designing Customized Entertainment Show Control MIDI Controllers
**Fall 2019 AYURE Award Recipients**

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

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

**Matthew Smith**, Electrical Engineering, ‘21  
Mentor:  Reena Dahle, Electrical Engineering  
3-D Printed Flexible Passive Sensor for Measuring Torque on Wind Turbine Blades
2018-19 Undergraduate Research Experience
Travel Award (URETA) Recipients

Conference travel funding is provided to students who participated in AYURE or SURE.

The following students presented their research at conferences around the world.

**Franchesca Areby**, Communication Disorders/Spanish, ‘19, traveled to Brazil in December to present her research at the 19th International Conference on Advanced Robotics and to University Park, PA to present at the Penn State Undergraduate Exhibition in Hispanic & General Linguistics in October.

**Jinsoo Choi**, Computer Science, ’19, traveled to Cambridge, MA to present her research at the 2018 IEEE MIT Undergraduate Research Technology Conference in October.

**Simone Evans**, Biochemistry/Mathematics, ’19, traveled to Baltimore, MD in January to present her research at the Joint Mathematics Meeting and to Vestal, NY in April to present at the Second Northeast Regional Conference on Complex Systems.

**Dylan Fitzmaurice**, Biochemistry/Applied Mathematics, ’19, presented his research at the 63rd Annual Meeting of the Biophysical Society in Baltimore, MD in March.

**Steven T. Lundgren**, Mechanical Engineering, ’19, traveled to Evanston, IL in January to present his research at Dynamics Days 2019.

**Eli Mehmeti**, Electrical Engineering, ’19, traveled to Atlanta, GA over the summer to present his research at the IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting.

**Kevin Morataya**, Biochemistry, ’19, traveled to Orlando, FL in the spring to present his research at the American Chemical Society Convention.


**Conor O’Riordan**, History & Mathematics/German, ’19, traveled to Northampton, PA in April to present his research at the Undergraduate Research Conference in German Studies.

**Rory Schiafo**, Biology, ’19, traveled to Louisville, KY over the summer to present her research at the 2019 ESA/USSEE Joint Meeting and to Highmount, NY to present Catskill Environmental Research and Monitoring Conference in October.

**Anna Woodworth**, Anthropology, ’19, presented the results of her research at the SAA conference in Albuquerque, NM in April.
Student Travel Award (STA) Recipients

Conference travel funding is provided to students who have not participated in AYURE or SURE

Christina Krause, Psychology, ’19, travelled to Baltimore, MD to present her research at the 2019 SRCD Biennial Meeting and to New York City to present at the Eastern Psychological Association conference in March.

Nicole Lee, Biology, ’19, traveled to Riverdale, NY in April to present her research at the 73rd Annual Eastern Colleges Science Conference.

Shayna Murphy, Anthropology/History ’20 and Carly Janelle Fant, Anthropology/Biology, ’19 presented their research at the Society for American Archaeology in Albuquerque, NM in April.

Nicholas Piaquadio, Electrical Engineering/Physics, ’19, traveled to Atlanta, GA to present his research at IEEE APS 2019.

Amy Reinhardt, Anthropology ’19, traveled to Portland, OR in March to present her research at the Society for Applied Anthropology.
RSCA is proud to announce that two New Paltz students were accepted to present the results of their faculty-mentored research projects at the 2019 National Conference on Undergraduate Research (NCUR) held April 11-13 at Kennesaw State University in Georgia. NCUR is very competitive. Congratulations!

**Winiffer Conce Alberto,** Biology, ‘19  
Mentor: Lydia Bright, Biology  
Investigating Paramecium Caudatum Susceptibility to Holospora Undulata Infection

**Katherine Dobosh,** Biology, ‘19  
Mentor: Lydia Bright, Biology  
Tracking Genotypic Changes in Paramecium Isolates between Ponds and Seasons in Ulster County, NY
SUNY Undergraduate Research Conference (SURC)

Twenty New Paltz students, listed below, presented the results of their faculty-mentored research projects at the second annual SUNY Undergraduate Research Conference (SURC) at Farmingdale State College. The conference was held on April 26, 2019.  https://www.farmingdale.edu/surc/

Shefa Alzeq, Mechanical Engineering, ‘19  
Mentor: Ping-Chuan Wang, Mechanical Engineering  
Characterizing Joule Heating in Integrated Circuit Microchip

Kira Andrade Solano, Mechanical Engineering, ‘19 and  
Jaime De La Vega, Mechanical Engineering, ‘19  
Mentor: Rachmadian Wulandana, Mechanical Engineering  
Flow Tank Design and Experimentations

Nigel Caprotti, Mechanical Engineering, ‘19 and Pedro Guerrero, Mechanical Engineering, ‘19  
Mentor: Rachmadian Wulandana, Mechanical Engineering  
Transcritical Vapor Compression Refrigeration: R744 and Beyond

Kieran Cavanagh, Mathematics/Mechanical Engineering, ‘19  
Mentor: Rachmadian Wulandana, Mechanical Engineering  
CFD Simulations of Flow Past Cylinders Confined to a Plane Channel

Winiffer Conce, Molecular/Cellular Biology, ‘19  
Mentor: Lydia Bright, Biology  
Investigating Paramecium Caudatum Susceptibility to Holospora Undulata Infection

Katherine Dobosh, Biology and Psychology/Evolutionary Studies, ‘19  
Mentor: Lydia Bright, Biology  
Tracking Genotypic Changes in Paramecium Isolates between Ponds and Seasons in Ulster County, NY

Ashley Fisher, Biology/Spanish & Deaf Studies, ‘19  
Mentor: Maureen Morrow, Biology  
T Cell Signaling in Response to Atrazine

Michele Lederer, Mechanical Engineering, ‘19  
Mentor: Rachmadian Wulandana, Mechanical Engineering  
Investigation of the Effectiveness, Durability and Economic Advantage of 3D Printed Heat Sinks

Nicole Lee, Biology, ‘19 and Winiffer Conce, Molecular/Cellular Biology, ‘19  
Mentor: Lydia Bright, Biology  
Investigating Paramecium Caudatum Susceptibility to Holospora Undulata

Jennifer Luu, Mechanical Engineering  
Mentor: Rachmadian Wulandana, Mechanical Engineering  
Self-Unfolding Mechanism with Shape Memory Alloys
Lina McCary, Mechanical Engineering, ‘19
Mentor: Ping-Chuan Wang, Mechanical Engineering
Investigating Reliability of Embedded Resistor in IC Chip

Seth Pearl, Mechanical Engineering, ’21, Michelle Wong, Mechanical Engineering, ‘19 and Jessy Li, Mechanical Engineering, ‘19
Mentor: Heather Lai, Engineering
Multi-Material Testing

Jacqueline Taylor, Mechanical Engineering, ’20
Mentor: Rachmadian Wulandana, Mechanical Engineering
Active Cooling for Photovoltaic Panels

Sachin Thackeray, Biology, ‘19 and James Mahoney, Chemistry, ‘19
Mentor: Miles Wilklow-Marnell, Chemistry
Quinone-Based Pincer Complexes of Iridium

Sam Trollo, Sociology/Women, Gender and Sexuality Studies, ‘19
Mentor: Jessica Pabón, Women’s, Gender, and Sexuality Studies
Bodies on Paper: Zines as Transfeminist Artifacts