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For more information, please visit our web page: [http://www.newpaltz.edu/research/usr.html](http://www.newpaltz.edu/research/usr.html)

You may also contact: Maureen Morrow, RSCA Director

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**Upcoming deadlines for the RSCA program sponsored events and funding:**

- Posters on the Hill: November 2, 2016
- Spring 2017 AYURE: December 1, 2016
- NCUR: December 2, 2016
- SURE: early February
- SURE 2017: March 29, 2017
- Faculty Mentor Award: April 5, 2017
- SRS Abstracts: April 13, 2017
- Fall AYURE first call: April 19, 2017

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Editor: Maureen Morrow, RSCA Director

Cover Design: Michelle Pielli, RSCA secretary

Cover Photograph: Morgan Gwenwald
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 for 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 2016 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.

Maureen Morrow
RSCA Director

2016 RSCA Mentor Award

Amy Papaelias (Art/ Graphic Design) was chosen for the mentor award due to her continued efforts to work with students on projects that she characterizes as ‘collaborative’. Amy fosters an atmosphere of mutual intellectual exploration while mentoring projects at the emergent edge of design practice and her work with students is described as career launching. Her recent mentee, Megan Doty (BFA, Graphic Design and French, ’16), contributed in a number of ways to a special issue of Visible Language, including the cover design. Doty commented: “Being exposed to her [Amy’s] participation in a number of communities spanning design typography, digital humanities, pedagogy, and cultural studies was a remarkable factor in my own development”.

Nominations for the the Faculty Mentor Award are solicited each spring semester.
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 17-20).

**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 35 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, also 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 conference.

**Acknowledgements**
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- **Michelle Pielli** (RSCA) for abstract book preparation, cover design and additional support.

**The RSCA Advisory Board:**
Jaclynne Kerner (Art History), Kara Belinsky (Biology), Michael Chuang (Business), Vicki Tromanhauser (English), Heather Shimon (Library), Francis Valiquette (Mathematics), Catherine Paolucci (Teaching & Learning), Maureen Morrow (RSCA Director, Biology) Meredith Eldridge (student representative)
2016 SURE Presentation Schedule

Oral Presentations, Thursday, September 8th

3:30pm Introductions

3:40pm, Miquael Williams, Art History, ‘17 (Mentor: Keely Heuer, Art History)
Beneath the Surface: Ancient Greco-Roman Influences on Minimalist Art

4:00pm, Lindsay Loforte, BFA Sculpture, ’17 (Mentor: Emily Puthoff, Sculpture)
Designing for Bees - Sculpting Resilient Pollinator Communities

4:20pm, Leah Mancini, Psychology, ’17 (Mentor: Doug Maynard, Psychology)
Exploratory Research of Play in Nursing Home Residents

4:40pm, Jaclyn Greco, Adolescent Education, ’18 (Mentor: Kate McCoy, Education)
Problems and Promise: A Preliminary Study on Charter Schools

5:00pm, Emily Gutierrez, Political Science and WGSS, ’17 (Mentor: Jessica Pabon, WGSS)
Locating Latina Feminisms

5:20pm, Kimberly Roman, Elementary Ed, ’17 (Mentor: Kiersten Greene, Elementary Ed)
Foggy Mirrors and Broken Windows: Investigating Colorblindness in Young Series Readers

Poster Sessions Tuesday, September 13th

4:15pm Introductions

Session I - 4:30-5pm

Lauren Shea, Geology, ’17 (Mentor: Gordana Garapic, Geology)
Processes at the Mantle-Crust Transition of Mid-Ocean Ridges

David Foote, Mechanical Engineering, ’18 (Mentor: Heather Lai, Mechanical Engineering)
Acoustical Modeling and Auralisation of Classrooms and Performance Spaces at SUNY New Paltz

Elizabeth Palmer, Chemistry, ’17 (Mentor: Michael Machczynski, Chemistry)
NMR investigation of Laccase Reaction Intermediates

Brandee Williams, Mathematics, ’16 (Mentor: Anca Radulescu, Mathematics)
Fractal Properties of hybrid Mandelbrot Sets

Nikki Rigaud, Chemistry, ’19 (Mentor: Megan Ferguson, Chemistry)
Applying the AdG Model to Quantify Steric Forces of Bacterial Biopolymers
Session II - 5-5:30pm

Edward DeRamon, Chemistry, '17 (Mentor: Daniel Freedman, Dean, Science and Engineering)
Improving 3D Printing

Kate Cushen, Biology/Geology, '18 (Mentor: Alexander Bartholomew, Geology)
Description of Middle Devonian Plant Specimens from the Plattekill Fm., Shokan, N.Y.

Troy Ellick, Biology, '17 (Mentor: Kara Belinsky, Biology)
Using a Bird Feeder Network to Characterize Bird Diversity across a Suburban Campus

Alicia Scott, Electrical Engineering, ‘18 (Mentors: Reena Dahle and Mike Otis, Engineering)
3D Printed Smart Micro-channels Cooling Panel for Improved Solar Panel Efficiency

William Rosenkranz, Chemistry/Philosophy, ’17 (Mentor: Pamela St. John, Chemistry)
Atomic Force Microscopy of Cytoskeletal Proteins in the Presence of Xenoestrogens

Tobin Mathew, Biology/Physics, ’17 (Mentor: Spencer Mass, Biology)
Kinematic Studies of Metamorphosed Axolotl Salamanders

Session III - 5:30-6pm

Cailey Burnett, Geology/Astronomy, ’17 (Mentor: Kaustubh Patwardhan, Geology)
Analog Experimental Models of Lava Lake Crystallization

Matthew Chason, Psychobiology, ’17 (Mentor: Aron Wiegand, Psychology)
Moral Stage Development as a Factor Predicting Depressive Symptomology: An Exploration For Informing Intervention

Anthony Hollander, Biology, ’18, and Heather Wander, pre-Biology, ’19 (Mentor: David Richardson and Jannett Dinsmore, both Biology) Ecological Changes in the Sky Lakes: Largemouth Bass diets and Salamander Communities in Lake Minnewaska

Kieran Pierce, Environmental Geochemical Science, ’17 (Mentor: Huicheng Chien, Geography)
The Impacts of Storm Events on Water Quality

Julian Chipkin, Engineering/Physics ’18 (Mentor: Kevin Shanley, Engineering)
Simulations of Newtonian and non-Newtonian Fluids Undergoing Sudden Expansions and Contractions

Devin Tobin, Psychology, ’16, (Mentor: Lisa Bauer, Psychology)
How Sexism Can Bolster or Depress Self-Esteem, by Type and by Gender
Abstracts (in order of presentation)

Lasting Legacy: The Role of Greco-Roman Visual Culture in the Work of Joseph Beuys and Gerhard Richter

Miquael Williams (Art History)
Faculty Mentor: Heuer Keely (Art History)

Germany has an extensive history involving Greek and Roman visual culture, which largely began in the work of the 18th century art historian Johann Winckelmann, a pioneer in the study of classical art. However, that history also includes the Nazi Party, which during World War II exploited Greco-Roman visual culture to support claims of dominance and ethnic superiority, seen in films such as Leni Riefenstahl’s Olympia Part One: Festival of the Nations. With this historical context as a backdrop, my research explores the continuing relationship between post World War II German artists and Greco-Roman visual culture. This project looks at the work of two artists who both lived through the Nazi regime, Joseph Beuys and Gerhard Richter. By visually analyzing the work of these artists and learning about their lives through primary and secondary sources, my research posits that the use of classical themes in Beuys’ and Richter’s work, unlike in Nazi propaganda, was employed to ensure the wide accessibility of the artists’ messages.

Designing for Bees: Sculpting Resilient Pollinator Communities

Lindsay Loforte (Fine Arts Sculpture)
Faculty Mentor: Emily Puthoff (Fine Arts Sculpture)

Einstein theorized that: “If the bee disappears from the surface of the earth, man would have no more than four years to live.” Bees pollinate ⅓ of the food we eat, adding over $14 billion to the value of U.S. crop production. A 300% worldwide increase in the crop production requiring bee pollination coincides with a 40% drop in the bee population in our nation every year for over 3 years. The mass die-off of bees is caused by habitat and forage loss due to monocultures and pesticides which impair the bees’ food supply, shelter and immune systems.

Our research into the habitat and forage needs of local solitary bees has informed our customized bee habitat designs. We harvested natural materials and built prototypes to test out the efficiency, safety and aesthetic of these nesting materials. We then drew and 3D-scanned pollinator plants to develop complex organic forms that could be digitally fabricated for more efficient production/cleaning. We foresee our research leading to future collaborations with local entomologists, educational programming, and community run pollinator gardens. Our first designs will be sited along the Kingston Greenline, as part of the Kingston Bee-Line, a large-scale, sustainable art project currently being developed by the Hudson Valley Bee Habitat, co-founded by Emily Puthoff, Jen Woodin, and Elena Sniezek. Our designs will be the first along the Bee-Line and our research will inform future designs for pollinator gardens and bee habitats.
Play in Nursing Home Residents

Leah Mancini (Psychology)
Faculty Mentor: Doug Maynard (Psychology)

In the current study, we are exploring the phenomenon of play in nursing home residents. We interviewed 15 nursing home residents to help understand how they have experienced play through their lives, and how their relationship with play has shifted since coming to the nursing home. The interview data are being analyzed using a grounded theory approach, with the intent of developing a new model of play in the context of a nursing home. We used initial interviews with participants to identify main themes and new questions, and conducted follow-up interviews with those same participants to more deeply explore those questions. Emerging themes which will be further explored include barriers to play experienced by the elderly, the ability of elderly to change the way they play, and play as a coping mechanism. For example, the nursing home residents may have a need to play, but are experiencing barriers that come with aging, including physical limitations (e.g., breathing tubes, wheelchairs, and general lack of mobility) and social ones (e.g., isolation, and difficulty communicating due to loss of speech, hearing loss, and dementia). As research continues, how residents respond to these barriers to play and other emerging themes will be more fully analyzed, leading to a better understanding of play in nursing home residents.

Problems and Promise: A Preliminary Study on Charter Schools

Jaclyn Greco (Adolescent Education/Mathematics)
Faculty Mentor: Kate McCoy (Education Studies and Leadership)

The privatization of public schools in the wake of No Child Left Behind and Race to the Top has occurred largely through the creation of charter schools—schools that are run by corporate or “non-profit” entities, funded by public tax dollars. The takeover of public schools by these institutions often occurs in areas of low family income and high poverty rates, where regular public schools are designated as failing because they do not meet standards as measured by test scores. However, beyond biased and unreliable standardized tests there is little done to measure the impact of these schools. In this study, open ended questions elicited participants’ impressions of their charter school experience and its impact on their preparedness for college and/or the work place. Preliminary interviews have yielded complex results that do not clearly support or condemn charter schools. Positive aspects of the charter school experience include small class sizes, sense of community, and caring teachers. Negative aspects of charter schools include their focus on profit before their students, teachers’ low expectations of students, lack of student preparation for higher education, and strict and punitive disciplinary policies. These preliminary findings suggest directions for future studies that can shed light on the impact of privatizing public schools.
**Foggy Mirrors and Broken Windows: Investigating representation in transitional chapter books**

**Kimberly Roman** (Elementary Education)
Faculty Mentor:  Kiersten Greene (Elementary Education)

Although there is a growing awareness of diversity (or lack thereof) in children’s books, there is little known about how transitional chapter books’ representations measure up to reality. Beginning this study, we gathered data on transitional chapter books available at a local school library, classroom library, book store, and community public library in Kingston, NY. We initially looked for representations of diversity within transitional chapter book collections at each location, and compared it to the diversity within the school population. From this we found that there was an over saturation of texts that did not represent the diversity of the student population. Next, we compiled a list of texts that feature characters from diverse backgrounds and created a content analysis tool to determine whether or not the representation is authentic, or, if it instead perpetuates overly commercialized narratives. In this component of the study we found that results varied from book to book but revealed overarching trends. We found that many of the texts presented diversity only in the illustrations but had no clear indicators for diversity in the text; others perpetuated stereotypes while a few represented authentic positive narratives. The findings of this overall study serve as a building block to reflect on the text used to teach. The next step for the study is to determine if or how popular transitional chapter books tackle diversity.

**Spinel-Hosted Inclusions in Plagioclase-Dunites: Clues to Melt-Peridotite Reaction**

**Lauren Shea** (Geology)
Faculty Mentor:  Gordana Garapic (Geology)

Prior to eruption at mid-ocean ridges, magma is produced in the mantle and migrates upwards, interacting with the shallow-most part of the mantle and previously formed crust along the way. The mantle-crust transition zone is essential because a number of important processes occur that determine the final composition of the erupted basalts. Plagioclase dunites from this zone containing typically 80% olivine, 16% plagioclase, and 2% each of clinopyroxene and spinel were collected from a fertile peridotite massif in Bosnia-Herzegovina. In these, secondary mineral inclusions are abundant in spinel grains and serve as containers that prevent late, low temperature alteration of the original minerals, providing information about the melt composition at the time of spinel growth. This aids in constraining the processes, differentiation of the original melt, temperature, and pressure in the mantle transition zone. After major element analysis, it is evident that the spinel inclusions typically contain pargasite and Na-phlogopite. Additionally, samples from different sections in the massif show distinct characteristics. Spinel grains in finer-grained samples are more Mg-rich, less Cr-rich and TiO2-rich, and those with inclusions are mainly interstitial. The coarse-grained samples contain spinels with inclusions located within olivine grains and the spinels’ chemical compositions show a trend that may suggest the progress of melt-peridotite reaction.
Acoustical Modeling of Classrooms and Performance Spaces at SUNY New Paltz

David Foote (Mechanical Engineering)
Faculty Mentor: Heather Lai (Mechanical Engineering)

Using room acoustics measurements and acoustical modeling software called Odeon, reverberation time and sound pressure levels in three spaces on the SUNY New Paltz campus were examined. Reverberation time is the duration required for the space-averaged sound energy density in an enclosure to decrease by 60 dB after the source emission has stopped. Sound pressure level is the pressure deviation measured from the average atmospheric pressure caused by a sound wave. Before taking measurements, a model of each location was constructed in Odeon which provided acoustical predictions. Three International Standards Organization methods examined reverberation time: Impulse Response Method, Chirp Sine Sweep, and Interrupted Noise Method. When examining sound pressure level, a Type 4204 Blower was used with a NA-27 Sound Level Meter. In Humanities Room 22, material coefficients greatly affected reverberation time. In Shepherd Recital Hall, measurements remained unaffected if objects did not block the line of sight between a sound source and receiver. Lastly, the examination of Studley Theater demonstrated the importance of a geometrically accurate Odeon model and the effect of outside noise. By applying knowledge gained during analysis of the classroom and performance spaces, future research will focus on acoustical improvements to these spaces in addition to examination of an acoustically unique space utilizing the same measurement methods and the auralization tools of Odeon.

On the Hunt for Intermediates: Reducing the Fully Oxidized Forms of a Small Laccase

Elizabeth Palmer (Chemistry)
Faculty Mentor: Michael Machczynski (Chemistry)

Although our main source of energy is coming from fossil fuels, the use of fuel cells would be an excellent alternative energy source. They are up to 3 times more efficient than an internal combustion engine. Fuel cells require a catalyst to help with the reduction, i.e, the addition of electrons, of oxygen to water. A group of proteins, called laccases, are the fastest reacting catalyst. An increase in the rate of this reaction would lead to an increase in the power output of the fuel cell. Each laccase molecule requires four electrons to react with oxygen. Researchers have proposed that the slowest step is the addition of the first electron to the laccase. To test this hypothesis, we used ascorbic acid to add electrons, one-at-a-time, to a laccase called SLAC. The total amount of reduced copper was measured using a biquinoline assay. The locations of the electrons within the protein were detected by U.V-vis spectrophotometer. If the protein starts the reaction after the slow step, there should be a very rapid increase in the rate of the reaction after the slow step. We tested the rates of reaction before and after adding each electron. We added one electron to SLAC and saw no change in the rate of the reaction. Considering that the data is not consistent with the addition of the first electron being the rate-limiting step, we disagree with the proposed hypothesis. Therefore, we propose that the slow step is after the addition of the first electron.
Template Iterations of Quadratic Maps and Hybrid Mandelbrot Sets

Brandee Williams (Mathematics)
Faculty Mentor: Anca Radulescu (Mathematics)

We continue previous work in template iterations of pairs of quadratic complex maps. As a particular problem within the field of non-autonomous discrete systems, we consider iterations of two quadratic maps, according to a prescribed binary sequence, which we call template. We study the asymptotic behavior of the critical orbit, and define the Mandelbrot set as the locus for which this orbit is bounded. However, unlike in the case of single maps, this concept can be understood in several ways. For a fixed template, one may consider this locus as a subset of the two dimensional complex parameter space; for fixed quadratic parameters, one may consider the set of templates which render a bounded critical orbit. In this paper, we consider both situations, as well as hybrid combinations of them, and study basic topological properties of these sets.

Quantifying Steric Forces of Bacterial Polymers

Nikki Rigaud (Chemistry)
Faculty Mentor: Megan Ferguson (Chemistry)

Gram-negative bacteria have biopolymers known as lipopolysaccharides (LPS). LPS are used for cellular adhesion and interactions amongst cells. LPS are important since there is a positive trend involving bacterial virulence and the amount of LPS. By studying the steric forces of LPS, we hope to better understand how these bacteria interact as well as how to treat pathogenic bacteria. The primary tool used in this project is Atomic Force Microscopy (AFM), which can take force curves on a micro scale, in this case bacteria. Force curves are taken by having the tip of the AFM instrument extended and retracted, showing the subsequent forces. The research uses phosphate buffer solutions with varying salt concentrations or pH, along with different strains of bacteria. Once these force curves have been taken, they are applied to the Alexander and de Gennes (AdG) model, which describes the steric forces of polymers. This model includes a density-related parameter termed s. The s parameter is poorly understood and has been assumed to be the root spacing, or space between the bases of the LPS molecules. However, since the LPS can interact with each other, it may also be the mesh shaping, or space between each tangled LPS section. Thus, to understand the s parameter better, this experiment varied the pH and the buffer salt concentrations to determine if the s is the mesh or root spacing. At this point, the data support the interpretation of s as the mesh spacing.
**Catalysis of the Hydrolysis of Poly (Methyl Methacrylate) Using Chaotropic Agents**

**Edward DeRamon** (Chemistry)
Faculty Mentor: Daniel Freedman (Dean, Science and Engineering)

Poly (methyl methacrylate) (PMMA) is a thermoplastic comprised of an ester containing polymer. PMMA as a copolymer with polyacrylic acid (PAA), is used as a support material in additive manufacturing (AM—commonly known as ‘3D printing’). AM is a process in which successive layers of materials are formed under computer control to create an object. AM systems are used in several industries such as aerospace, architecture, automotive, defense, and medicine for rapid prototyping and mass production. After a part is produced, PMMA/PAA can be hydrolyzed with sodium hydroxide, causing the support material to become water soluble, allowing it to be effectively washed away. This reaction can take several hours, causing a bottleneck in successive production. We sought a catalyst to increase the rate of this reaction while remaining cheap and waste free. By measuring the rate of hydrolysis by proton NMR, we found that the addition of chaotropic agents, particularly ethanol, effectively quadrupled the rate.

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**Examination of Middle Devonian plant specimens of the Plattekill Fm., Shokan, NY**

**Kate Cushen** (Biology/Geology)
Faculty Mentor: Alexander Bartholomew (Geology)

The Devonian Period (417-365 mya) was a period of time in Earth's history with monumental changes in the botanical environmental landscape. What began as primarily algae, non-vascular or only one or two types of vascular plants, all restricted to areas such as streams or ponds, became complex terrestrial ecosystems of upland forests and tall (>10m) trees. The rocks that comprise the Catskill Mountains contain an incomparable record of time through the Devonian period, including the oldest known liverworts, and the many elements of the Gilboa Forest deposit that preserved portions of hundreds of large trees. In the summer of 2013, the SUNY New Paltz Geology Department was donated a sizable collection of fossil plant specimens from the area around West Shokan, NY. This collection is one of few known from the interval below (read: older than) the Gilboa deposit that contains numerous specimens of well-preserved plant material, and is an important window into the early history of plant life on land. Methods of cataloguing the fossils included describing, numbering, and photographing each specimen, and preparing thin sections to examine mineral content of carbonaceous materials contained in the fossils. Field work included searching for new specimens from similar areas in New York State with the ultimate goal of adding them to the Geology Department collection and furthering the understanding of where these samples fit into the knowledge of New York State Devonian fossils.
Using a Feeder Network to Characterize Bird Communities across a Suburban University Campus

Troy Ellick (Biology), Aidan Mabey (Environmental Studies) and Laura Stark (Biology)
Faculty Mentor:  Kara Belinsky (Biology)

Birds act as our friendly flying neighbors, dispersing seeds, pollinating plants and reducing insect’s populations wherever they thrive. It is because of this that bird diversity is important for an ecosystem. Within the SUNY New Paltz Campus grounds there several habitat types all supporting different species of birds. We hypothesized the more urban central campus, and turf areas would have low diversity due to large relative abundances of the invasive house sparrows, while the wooded residential and forest edge areas will have higher overall diversity, with more even abundances of native species (with natives dominating at the forest edge). To determine the species composition of these habitats, we used a network of 16 birdfeeder stations throughout campus, with feeders in each of the four habitat types. Bird diversity and abundance at each feeder was sampled using 2 mist nets that were opened for three hours on 2 different dates over 3 months. We banded 662 birds totaling 18 species and found the largest invasive species presence in the urban central campus. Forest edge feeders were found to have the smallest abundance of invasive species and a higher diversity of noninvasive species. Turf and Residential areas had similar abundances, but differed in primary species. Our results support the hypothesis that the urban central campus is a less suitable habitat for native species and that forest edge has the lowest invasive species population on campus.

3-D Printed MicroFluidics as a Novel Means to Cool Photovoltaics

Alicia Scott (Electrical Engineering)
Faculty Mentors:  Reena Dahle and Mike Otis (both Engineering)

In this paper, a high-resolution stereolithographic SLA 3-D printer is used to create a film with microfluidic channels that can be applied to the back of any solar cell in order to act as a heat exchanger. It is known that solar panels perform better at cooler tempertures. Measured results indicate up to a 6% improvement in performance efficiency with the use of a parastatic pump and a serpentine microfluidic array with a footprint of 180 mm by 115 mm. This increase in efficiecy would amount to an increase of 7.5 Watts per square meter of solar panel, which equals an extra 12.27 Watts for a standard sized solar panel. A 3-D printed system can allow for lower manufacturing costs on the small scale and can be easily scaled to fit many size panels and arrays.
Adsorption of Microtubules onto APTES Coated Mica

William Rosenkranz (Chemistry)
Faculty Mentor: Pamela St. John (Chemistry)

Microtubules are polymers of tubulin proteins. These versatile cytoskeletal components are responsible for numerous cellular processes including the maintenance of cellular structure, motion of chromosomes in the nucleus, and other locomotive processes. Research into the effects of xenoestrogens on the structure and function of proteins and cellular processes have yielded frightening results about the possibility of protracted exposure to those chemicals. In this research project, a technique was developed to adsorb microtubules onto mica surfaces with the goal of studying the protein's topography in the presence of BPA, a xenoestrogen. A polymerization assay was performed using concentrated samples of tubulin to verify the presence of microtubules in solution using UV Vis spectroscopy. Topography experiments were performed with an atomic force microscope (AFM) and mica surfaces were prepared by forming a self-assembled monolayer (SAM) on the mica surface using aminopropyltriethoxysilane (APTES). The surface was exposed to a glutaraldehyde solution prior to adsorbing the protein to help position and fix the microtubules to the APTES coated mica. AFM images of microtubules collected in fluid showed the structures with diameters of approximately 20 nm and variable lengths. Roughness measurements of the tubulin surface were also performed.

Kinematics of Neotenic Salamanders

Tobin Mathew (Biology)
Faculty Mentor: Spencer Mass (Biology)

Axolotls (Ambystoma mexicanum) are neotenic salamanders that do not typically undergo metamorphosis. They remain aquatic when they reach sexual maturity. Very rarely, some axolotls may spontaneously metamorphose into the terrestrial adult form. Due to the rarity of metamorphosis, very little is known about the biology of terrestrial axolotls. We have three of these metamorphosed axolotls in our laboratory. While observing these axolotls interact with their environment, we noticed that they walked in a seemingly clumsy and awkward fashion. This case study uses motion analysis of slow motion video to investigate the kinematics of terrestrial salamander locomotion. We are comparing terrestrial axolotl locomotion to a close relative in the same genus that does normally metamorphose: the tiger salamander (Ambystoma tigrinum). Due to the fact that axolotls are adapted to an aquatic environment, there may be losses and/or changes in developmental processes relative to other terrestrial ambystomoids that would not become phenotypically apparent until metamorphosis. Future studies will examine the neuromuscular anatomy after their natural death to determine whether there are gross anatomical differences between metamorphosed axolotls and tiger salamanders.
Experimental Models of Solidification of Crystal-laden Kīlauea Iki lava lake, HI

Cailey Burnett (Geology)
Faculty Mentor: Kaustubh Patwardhan (Geology)

A fundamental principle of geology ‘present is the key to the past’ is beautifully illustrated in the study of lava lakes. i.e. as Kīlauea Iki lava lake was studied from its birth to near complete solidification, lessons learned here can be applied directly to older, previously solidified magma bodies, as well as to presently active volcanoes. In Nov-Dec 1959, lava containing ~17% olivine phenocrysts (Garcia, 2003) erupted at the summit of Kīlauea Volcano and flowed into the adjoining Kīlauea Iki crater filling it to ~640m across and ~135m deep. As the lava lake filled most of the phenocrysts sank towards the lower parts of the lake while some were captured in the upper crust. This resulted in an S-shaped vertical profile with an olivine-depleted (1-3% olivine) upper part and an olivine-enriched (40% max.) lower part (Helz, 1989).

We designed experimental lava lake models with the goal of reproducing the S-shaped vertical distribution profile of phenocrysts. Paraffin wax and glitter particles represent magma and olivine phenocrysts, respectively. A molten paraffin-glitter mixture at ~54°C is stirred/poured into an aluminum foil “crater,” and then frozen. Cross-sections of the solidified lake are photographed and imported into ImageJ to analyze the final distribution of glitter particles at various depths. Vertical profiles of our experimental models reveal a glitter particle distribution similar to the real world S-shaped characteristic profile recorded at Kīlauea Iki.

Decision Making as a Factor Predicting Emotional Cognition

Matthew Chason (Psychobiology) and Zachary James (Psychology)
Faculty Mentor: Aron Wiegand (Psychology)

This experiment was designed to study the relationship between depressive symptoms as defined by Keller and Nesse, and Kohlberg’s developmental moral stages. While evidence supports the idea that clinical depression is maladaptive, Keller and Nesse were able to show that individual depressive symptoms are both adaptive and situation specific in nature. Kohlberg’s moral stage theory posits that throughout one’s life, one progresses morally through a series of stages, where moral beliefs influence one’s perceptions and actions within their environment. If both of these ideas are true, it might be possible that one’s moral beliefs, which influence one’s perception of a situation, may play a role in the depressive symptoms they are more likely to experience in general. It is hypothesized that conventional stage participants attuned to maintaining norms and interpersonal accord might experience statistically higher social loss associated depressive symptoms. Conversely, post conventional stage participants attuned to a moral autonomy might experience statistically higher failure associated depressive symptoms. 64 out of 188 participants were statistically analyzed to determine correlation. Some applicants were rejected due to an affirmative answer to the question of previous diagnoses of a mental disorder, while others were rejected on the grounds of incomplete response sets. While no correlation was found this might be in part due to the low N of conventional moral participants.
Largemouth Bass and Salamander Communities in Lake Minnewaska

Anthony Hollander (Biology) and Heather Wander (Biology)
Faculty Mentors: David Richardson (Biology) and Jannett Dinsmore (Biology)

Lake Minnewaska had been historically fishless. Minnows were unintentionally introduced into the lake in 2008, but have since disappeared starting in 2014. Largemouth Bass (LMB) were first seen in Lake Minnewaska in 2011. We do not fully know the effects of these accidental introductions on the lake because they have been so recent. Our research focuses on analyzing the diet and survival ability of the LMB and examining changes in the salamander community. We caught LMB via electrofishing at night for three consecutive weeks and assessed the population size using mark and recapture techniques. We compared the current population size to past years to determine how well the LMB have been surviving since the loss of the minnows. We also analyzed the LMB diets through gastric lavage. Finally, we deployed traps to survey existing salamander species currently in the lake and the role which they play within the ecosystem. LMB are the only fish currently within the lake and the population has been steadily decreasing since minnows have disappeared. LMB have been surviving by eating various macroinvertebrates, zooplankton, and juvenile bass. Salamander diversity has also gone down to only one salamander species from 9 species prior to the fish introductions. It is important for us to understand how the food web has been affected so that we can determine whether certain steps towards conservation need to be taken in this lake or other ecosystems with a similar situation.

Impacts of Storm Events on Water Quality in the Upper Esopus Creek Watershed

Kieran Pierce (Chemical Geology)
Faculty Mentor: Huicheng Chien (Chemical Geology)

Water is essential to human life and the health of the environment. Water quality is also closely linked to the surrounding environment and land use. As water quality declines soil erodes and contaminants are flushed into water bodies by surface runoff. The primary objective of this project is to understand the impact of storm events on water quality in the Upper Esopus. This objective was achieved by collecting field data and laboratory analysis. The study sites are located in the Upper Esopus Creek watershed. Water quality was sampled at gauge stations USGS 01362370 on Stony Clove Creek at Chichester, NY and USGS 01362200 on Esopus Creek at Allaben, NY. The daily streamflow data is measured by USGS, where data is available to the scientific community. When storm events are expected, sites where visited to collect data and water samples before, during and after the storm events. Water quality variables included water temperature(°C), dissolved oxygen (DO), [pH], conductivity (uS/cm), orthophosphate [PO4-x] (where x is the varying ion of the molecule), and nitrate [NO3-]. The results show there are nonlinear relationships between water quality variables and streamflow. During the high streamflow, [pH], temperature, uS/cm decrease, but [PO4-x], [NO3-], and DO increase. The result also indicates water temperature is an important variable controlling DO and [pH].
Simulation of the Manufacturing Process of Foamed Cement

Julian Chipkin (Mechanical Engineering/Physics)
Faculty Mentor: Kevin Shanley (Mechanical Engineering)

Foamed cement has been used widely by the petroleum industry as a high-stress-resistant, low density material to withstand extreme downhole environments inherent to offshore wellbores. A lack of understanding of how foamed cement sets under subsurface field conditions can lead to risk assessment uncertainties and compromised well integrity. The National Energy Technology Laboratory (NETL) has developed a novel procedure for manufacturing foamed cement in a laboratory environment which entails forcing the fluid through a series of sudden contractions and sudden expansions. This work investigated the effects of such geometric features on the internal pressure and velocity fields of cement during the manufacturing process. Numerical simulations were conducted on a fluid flowing through three key geometric configurations chosen to mimic the aforementioned process with density and viscosity comparable to the cement produced by NETL. It was observed that the velocity profiles developed and regressed quickly and efficiently, achieving uniform parabolic shapes while traversing both sudden contractions and sudden expansions. Predictable trends in flow patterns were also exhibited by sudden contractions followed by sudden expansions.
2015 SURE Award Recipients

**Jared Flagler**, Geography, ’16 (Mentor: Huicheng Chien, Geography)
Combining Air Temperature and Streamflow to Estimate Stream Water Temperature

**Sarah Sansone**, ’16 and **Sawyer McFadden** ’18, both Environmental Geochemical Science
(Mentor: Shafiul Chowdhury, Geological Sciences)
Groundwater Flow Modeling to Evaluate the Potential for Stream Bank Erosion

**Dante Peluso**, Electrical Engineering, ’16
(Mentor: Reena Dahle, Electrical, Mechanical, & Computer Engineering)
The Use of 3D Printing to Design an Increased Bandwidth Microstrip Patch Antenna

**Maddie-Blair Wright**, Biology, ’16 (Mentor: Aaron Haselton, Biology)

**Ryan Baker-Urzua**, Environmental Geochemical Science (Biology), ’16 (Mentor: Eric Keeling, Biology) Effects of Prescribed Fire on Ecophysiology, Germination, and Relative Abundance of Chestnut Oak Seedlings at Mohonk Preserve, NY

**Paulina Lustgarten**, Sociology, ’16 (Mentor: Scott LeVine, Geography)
Establishing Preference Structures for Automated Vehicles’ Novel Traffic-Operations Regimes

**Meredith Eldridge**, Biology/Psychology/Creative Writing, ’16 (Mentor: Spencer Mass, Biology)
Comparative Kinematics of Gait, Breathing and Feeding in Ambystomoid Salamanders

**Josh Johnikutty**, Biology (Cell/Molecular)/Chemistry, ’17 (Mentor: Spencer Mass, Biology)
Further Investigation of the Actin Cytoskeleton of Regenerating Planaria Exposed to Xenoestrogens

**Christian Zoeger Boggiano**, Mechanical Engineering (Business), ’17 (Mentor: Jared W. Nelson, Electrical, Mechanical, & Computer Engineering)
Use of Digital Image Correlation to Reduce Material Testing Requirements for Carbon Fiber Reinforced Plastic Qualification

**Megan Doty**, Graphic Design BFA, French BA, ’16 (Mentor: Amy Papaelias, Art Department)
Designing Digital Scholarship: Print and Web Design Explorations for a Special Issue of *Visible Language* Journal

**Bryan Krebs**, Biology Concentration Organismal/Environmental, ’15
(Mentor: David C. Richardson, Biology)
Ecological Communities in the Sky Lakes: Zooplankton Diversity, Size and Ingestion Rates

**Ari Pignatelli**, Mechanical Engineering, ’17 (Mentor: Kevin T. Shanley, Electrical, Mechanical, & Computer Engineering)
Numerical Analysis of Air Infiltration/Exfiltration through Automated Sliding Doors on a Commercial Low-Rise Building during a Single Door Opening Event

**Olivia Seirup**, Mathematics (minor: Deaf Studies), ’16 (Mentor: Francis Valiquette, Department of Mathematics)
Two-Dimensional Discrete Euclidean Invariant Variational Problems
Fall 2015 AYURE Award Recipients

Elizabeth Mallinson, Theatre Arts: Design and Technology, ‘16
(Mentor: Ken Goldstein, Theatre Arts)
Projection Design for William Shakespeare’s Julius Caesar

Dana Weintraub, Theatre Arts/English Literature, ‘16
(Mentor: Ken Goldstein, Theatre Arts)
Scenic Design and Research for William Shakespeare’s Julius Caesar

Maddie-Blair Wright, Biology, ‘16
(Mentor: Aaron Haselton, Biology)
A Comparative Investigation of Thermal Stress Resistance in the Invasive Paper Wasp, Polistes dominulus, and its Native Counterpart, Polistes fuscatus

Chevonne McInnis, Physics, ‘16
(Mentor: Catherine Herne, Physics and Astronomy)
Measuring Rotation Rates of Optically Rotating Asymmetrical Absorbing Objects

Ann O’Brien, Physics/Mathematics, ‘16
(Mentor: Catherine Herne, Physics and Astronomy)
Manipulating Birefringent Crystals with Polarization Singularity Modes

Christina Johnson, Biology, ’16, Alvin Mathew, Biology, ‘16
(Mentor: Spencer Mass, Biology)
Developing Planarian Blastemal Cell Culture Techniques for Confocal Imaging

Renato Lúcio de Carvalho, Chemistry, ’16, Isadora Maria Vicente da Silva, Chemistry, ’16, John Hoffman, Biochemistry, ‘16
(Mentors: Maureen Morrow, Biology, Preeti Dhar, Chemistry)
Phytochemical and Antimicrobial Evaluation of Heracleum maximum Extracts

Bethany O’Hara, Biology, ‘17
(Mentors: Maureen Morrow, Biology, Frantz Folmer-Andersen, Chemistry)
Purification and Characterization of an Antifungal Metabolite

Jessica Mortensen, Anthropology/Biochemistry, ‘17
(Mentor: Kenneth Nystrom, Anthropology)
Dietary Reconstruction of the Impact of Romanization at the site of Nadin, Croatia

Rachel Marra, Physics/Astronomy, 16
(Mentor: Anca Radulescu, Mathematics)
A Systems Model of Brain Dynamics in Compulsive Behavior

Ari Pignatelli, Mechanical Engineering, ‘17
(Mentor: Anca Radulescu, Mathematics)
Dynamic Behavior for Networks of Coupled Complex Logistic Maps
Fall 2015 AYURE Award Recipients continued…

Angela Chen, ’15, Matthew Farragher, ’16, both Environmental Geochemical Science
(Mentor: David Richardson, Biology)
Water Chemistry and Zooplankton Dynamics across the Sky Lakes

Kyle F. Law, Psychology/Economics, ‘16
(Mentor: Corwin Senko, Psychology)
Math Magic Study

Gabrielle Buck, EGS/Mathematics, ‘16
(Mentor: Ekaterina Shemyakova, Mathematics)
Orbits of Darboux Transformations of Type I

Simon Li, Economics/Mathematics, ‘17
(Mentor: Ekaterina Shemyakova, Mathematics)
Darboux Transformations and Berezinians

Abigail Fagan, Chemistry, 17
(Mentor: Pamela St. John, Chemistry)
Fluorescence Detection of Xenoestrogens Using HPLC

Nicholas Golom, Biology, ‘16
(Mentor: Jason Valens, Biology)
Comparison of Metagenomic Representations of Biofilm Populations with Confocal Visualization using Species-specific Fluorescent DNA Probes

Krista Arena, Theatre Arts, ‘16
(Mentor: Andrea Varga, Theatre Arts)
Costume Design & Illustrations for A View From The Bridge by Arthur Miller: A production of the Theatre Arts Department

Rachel Amelia Rienecker, Theatre Arts, ‘17
(Mentor: Andrea Varga, Theatre Arts)
Costume Design & Illustrations for The Great Gatsby: A Blackbox production of the Theatre Arts Department

Julie Planke, Psychology, ‘16
(Mentor: Sarah Shuwairi, Psychology)
Developmental Differences in Oculomotor Activity toward Possible and Impossible Figures

David Weddle, History, ‘16
(Mentor: Heinz Insu Fenkl, English)
Korean History for Babos (Babo is the Korean word for “dummy”)
Spring 2016 AYURE Award Recipients

Joseph Dunstan, Chemistry, ’17
(Mentor: Frantz Folmer-Anderson, Chemistry)
Investigation of Molecular Recognition by Novel Macrocycles

Elizabeth Levy, Psychology/Sociology, ’17
(Mentor: Glenn Geher, Psychology)
Behavioral Correlates of Neanderthal Genetic Overlap

Tobin Mathew, Biology/Physics, ’17
(Mentor: Spencer Mass, Biology)
Comparative Kinematics of Gait in Ambystomoid Salamanders

Jaclyn Greco, Secondary Education, ’18
(Mentor: Kate McCoy, Educational Studies)
Understanding the Impact of Charter Schools: A Preliminary Study

Steven Roberts, Contemporary Music Studies, ’17
(Mentor: Alex Peh, Music)
Karl Heinz Stockhausen’s Tierkreis Arranged for Piano Duet
2015-16 URETA Recipients

Recipients of the Undergraduate Research Experience Travel Award (URETA)
-conference travel funding provided to students who participated in AYURE or SURE

Bryan Krebs, ’15, and Valerie Stanson, ’15, both Biology, traveled to Baltimore, MD, over the summer to present their research at the Ecological Society of America conference.

Ann O’Brien, Physics, ’16, traveled to San Jose, CA to present her research at the Frontiers in Optics/Laser Science conference.

Sarah Sansone ’16, and Sawyer McFadden ’18, both EGS, presented the results of their research at the Geological Society of America conference in Baltimore, MD. (Pictured here)

Megan Doty, Graphic Design, ’16, presented the results of her research at the Undergraduate Network for Research in the Humanities meeting in Davidson, NC.

Rachel Marra, Astronomy/Physics, ’16, presented her research at the Dynamic Days Conference in Durham, NC.

Meredith Eldridge, Biology, ’16, traveled to the Society for Integrative & Comparative Biology (SICB) conference in Portland, OR, to present her research.

Krista Arena, Theatre Arts/History, ’16, Rachel Rienecker, Theatre Arts/Music, ’17, Dana Weintraub, Theatre Arts/English Literature, ’16, and Elizabeth Mallinson, Theatre Arts: Design/Tech and Digital Media Production, ’16, presented their research/costume design at the United States Institute for Theatre Technology (USITT) Salt Lake City, UT.

Alvin Mathew, ’16, Christina Johnson, ’16, Josh Johnikutty, ’16, Zackary Thom, ’16, and Tobin Mathew, ’17, all Biology, traveled to Woods Hole, MA, to present their research at the Northeast Regional Meeting of the Society of Developmental Biology

Julie Planke, Psychology/Psychobiology, ’16, presented her research at the International Conference on Infant Studies in New Orleans, LA.

Elizabeth Palmer, Chemistry, ’17, traveled to the 4th Bioinorganic Meeting at Penn State University to present her research.

Steven Roberts, Music, ’17, traveled to the Anatolia College Summer Music Performance Program in Thessaloniki, Greece to perform/present his research.

Ryan Baker-Urzua, ’16, and Matthew Farragher, ’16, both EGS presented their research at the Ecological Society of America Annual Meeting in Fort Lauderdale, FL.
**Student Travel Award (STA) Recipients**

**Recipients of the Student Travel Award (STA)**
- conference travel funding provided to students who have not participated in AYURE or SURE

**Licelotte Fernandez Veras**, Computer Engineering, ’16, traveled to Columbus, OH, to present her research at the 2016 Capstone Design Conference. (in photo, far right)

**Caitlin Kennedy** ’16, and **Joanna Herron** ’16, both Mathematics, presented their research at the Joint Mathematics Meeting in Seattle, WA.

**Amy Glazer**, Biology, ’16, traveled to Portland, OR, to present her research at the Society for Integrative & Comparative Biology (SICB) conference.

**Jaclyn Swiderski**, English/Linguistics, ’16, presented the results of her research at the 2016 Sigma Tau Delta Convention in Minneapolis, MN.

**Sara Shameem**, ’15, and **Brooke Banfi**, ’15, both Communications, traveled to Baltimore, MD, to present their research at the Eastern Communications Association 6th Annual Undergraduate Scholars Conference.


**Robert Vetri**, Classical Performance, ’18, traveled to Thessaloniki, Greece to perform/present his research at the Anatolia College Summer Music Performance Program.
NCUR

RSCA is proud to announce that seven New Paltz students were accepted to present the results of their faculty mentored research projects at the 30th anniversary of the National Conference on Undergraduate Research (NCUR) held April 7-9, 2016 at the University of North Carolina Asheville. NCUR is very competitive and once again New Paltz students had a 100 percent acceptance rate! Congratulations to all!

Anthony Albanese, Sociology/Religious Studies, ‘16 (Mentor: Judith Halasz, Sociology)
Opiate or Stimulant: Examining the Role of Religiosity in Social Movements

Jared Flagler, Geography, ‘16 (Mentor: Huicheng Chien, Geography)
Combining Air Temperature and Streamflow to Estimate Stream Water Temperature

Bethany O’Hara, Biology, ‘17 (Mentors: Maureen Morrow, Biology, and Frantz Folmer-Andersen, Chemistry)
Purification and Characterization of an Antifungal Metabolite

Jessica Mortensen, Anthropology/Biochemistry, ‘17 (Mentor: Kenneth Nystrom, Anthropology)
Dietary Reconstruction of the Impact of Romanization at the site of Nadin, Croatia

Rachel Marra, Physics/Astronomy, ‘16 (Mentor: Anca Radulescu, Mathematics)
A Systems Model of Brain Dynamics in Compulsive Behavior

Kyle F. Law, Psychology/Economics, ‘16 (Mentor: Corwin Senko, Psychology)
Math Magic Study

Jaclyn Greco, Secondary Education, ‘18 (Mentor: Kate McCoy, Educational Studies)
Understanding the Impact of Charter Schools: A Preliminary Study

SURC

Seven New Paltz students, listed below, presented the results of their faculty mentored research projects at the second annual SUNY Undergraduate Research Conference (SURC) at SUNY Cobleskill. The conference was held on April 15, 2016. http://blog.cobleskill.edu/SURC/surc.html

Ari Pignatelli, Mechanical Engineering,’ 17 (mentor: Anca Radulescu, Mathematics)
Real and Complex Behavior for Networks of Coupled Logistic Maps

Sam Lacovara, Women's, Gender, and Sexuality Studies, ‘16
(mentor: Jessica Pabón, Women’s, Gender, and Sexuality Studies)
Gender as Affect: Feeling the Radical Potential for Queer Survival Beyond Binaries

Julie Planke, Psychology, ‘16 (mentor: Sarah Shuwairi, Psychology)
Differences in Transitional Saccades in 4-month-olds When Viewing Pairs of Possible and Impossible Objects

Jessica Mortensen, Anthropology/Biochemistry, ‘17 (mentor: Ken Nystrom, Anthropology)
Iron Age Croatia: Reconstruction of Diet

Coreyann Spence ‘16, and Madalena Spero ‘16, both Psychology (mentor: Maryalice Citera, Psychology)
Generational Differences in Emotional Word Use

Elizabeth Wittman, Sociology, ‘16 (mentor: Roberto Velez-Velez, Sociology)
DREAMed: Undocumented Youth in the Art of the latest Immigration Reform Movement