

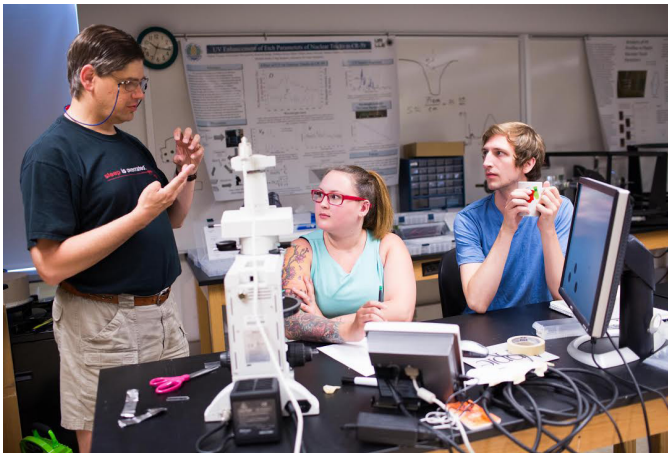


THE PROPOSAL

The Geneseo Office of Sponsored Research Newsletter

Spring 2017

Research Experiences for Undergraduates has a SURGE at Geneseo



JAMES MCLEAN WITH REU STUDENTS SUMMER 2016

SUNY Geneseo became a Research Experiences for Undergraduates (REU) Site in summer 2016, after James McLean, Principal Investigator (PI), and George Marcus, Co-Principal Investigator (Co-PI), both professors of physics, applied for and received a three-year National Science Foundation REU grant. An REU Site consists of a group of undergraduates who work in the research programs of the host institution, mainly during summers. McLean and Marcus recruited students from regional community colleges, but students from across the nation were invited to apply via an NSF database of all 664 REU sites in various STEM disciplines. REU participants receive stipends, on-campus lodging, and travel support.

The primary goal of the REU program is to enhance retention in STEM by targeting students at institutions that do not offer research experiences to their students and those who are members of groups underrepresented in science. Geneseo was one of only three primarily undergraduate institutions of the 58 REU sites in physics to receive the award. It was Geneseo's first-ever offering of an REU, which runs for 10 weeks each summer of the grant.

The Geneseo REU program, Supporting Undergraduate Research at Geneseo (SURGE), gives participants the opportunity to directly apply physics concepts to solve intriguing problems using state-of-the-art instrumentation. Five Geneseo Department of Physics and Astronomy professors and their research students mentored the six REU participants, who were chosen based upon their

interests, skill levels, and letters of recommendation. Participants helped to design detection systems for inertial confinement, design fusion experiments, analyze observational data on nearby open star clusters, engineer an automated positioning system, and debug a neutron detection system. Two students worked on the Geneseo's eGarden project, which researches experimental alternative energy solutions.

The PI and Co-PI arranged to take the participants to the Laboratory for Laser Energetics (LLE), University of Rochester, and Cornell University to tour research facilities, view researchers' projects, and speak with graduate students. At the LLC, the group met with several Geneseo alumni graduate students and several more Geneseo alumni staff scientists, which made an impression upon the REU participants.

Research from the REU projects were presented by two student participants at national meetings. One participant independently presented at the Sigma Pi Sigma Quadrennial Physics Congress PhysCon in San Francisco and another went with 18 Geneseo students to present at the American Physical Society Division of Plasma Physics annual meeting in San Jose.

The REU grant also includes funding for a professional development workshop on mentoring, which will be open to all science faculty. The PI and Co-PI are negotiating with the guest speaker and the workshop may be offered toward the end of the spring 2017 semester.

This year, the REU program will accept seven students and in 2018, eight students. Applications, due on February 17 for the 2017 summer program, are available at: <https://www.geneseo.edu/physics/surge>.



REU STUDENTS, FACULTY AND STUDENT MENTORS



Glenn McClure, English — The Iceman Cometh ... Home



Glenn McClure has returned from Antarctica. He visited the United States Antarctic Research Center, McMurdo Station, to listen, be artistically inspired, and then to create a musical work. The expedition was sponsored by the National Science Foundation Antarctic Artists and Writers Program, “designed to increase understanding and appreciation of the Antarctic and of human activities on the southernmost continent. ... as well as the region’s unique geopolitical and other characteristics.” McClure’s proposal, “Musical Interpretation of and Instructional Module on Ross Ice Shelf Wave-Induced Vibrations,” described how he will translate wave vibration data into music and pilot a middle school, arts-integrated science curriculum that animates Antarctic scientific concepts with hands-on music making activities.

McClure consulted with Dr. Peter Bromirski, an oceanographer at the Scripps Institute of Oceanography who records wave vibrations (at frequencies below the hearing threshold) to measure the movement of the Ross Ice Sheet, before writing the proposal and then accompanied the scientist on a research expedition that started in October 2016 and spanned three weeks. While in Antarctica, McClure made field recordings of environmental sounds that will accompany live performances of the musical work. He documented his experiences, which included encounters with Weddell seals, Emperor penguins, and Adélie penguins; and an improbable chance encounter with Secretary of State John Kerry, in a blog on his website, <https://artforbrains.com>.

Peak moments of McClure’s Antarctic experience include:

- Training for survival, including setting up a tent in subzero weather; ascending from a crevasse, and preventing frostbite.
- The cooperative spirit of the international scientists, born from the Antarctica Treaty of 1959, which declares the continent free and independent and prohibits any nation from owning Antarctica, exploiting its resources or deploying weapons.
- Hearing cheering scientists reacting to breaking news that 600,000 square miles of the Southern Ocean has finally been designated as the “Ross Sea Marine Protected Area.” <http://www.bbc.com/news/science-environment-37789594>.
- Performing music for scientists and attending a concert at the New Zealand scientists’ Antarctic base.
- Being immersed in the “frightening terrible beauty” of the vast continent. Although Antarctica is “utterly gorgeous, it was created by forces that are entirely antagonistic to human beings,” McClure said.

The penultimate peak moment was listening to a machine that records all the lightning strikes on the planet as they occur in real time. “It sounds like a microwave popping corn. It was the first time I ever listened to the entire planet at the same time, as opposed to the sound of lightning wherever I was standing at that particular moment.”

Josie Reinhardt, Biology — Fruit Flies and Stalk-eyed Flies Answer Genetic Questions

Assistant Professor Josephine (Josie) Reinhardt, a member of the cluster hire (2015) of Computational Analysis faculty, focuses her research efforts on evolutionary genetics, a branch of biology that covers every level of complexity in biology from single molecules to the evolution of species.

In graduate school, Reinhardt rotated laboratories, learned how to program computers, and wrote programs to analyze genetic data. Her technical skills coupled with empirical research have helped her answer genetic questions about *Drosophila melanogaster*, commonly known as the fruit fly, and stalk-eyed flies of the *Diopsidae* family. A unique feature of *Diopsidae* is that their antennae are located on stalks, and males’ elongated eyestalks are a sexually selected ornament, much like the male peacock’s colorful tail fan.

Reinhardt’s research asks big questions about small molecules –Where did the original copy of a gene come from? –Did all genes arise from a single gene, or did they come from different origins? –How do genetic changes affect diversity? This line of inquiry has found that new genes are often only expressed in male sex tissues, the cells that are precursors to sperm, and whether a new gene is passed on is dependent upon sexual selection, including something called “sperm competition.” Fruit flies are promiscuous, and it may be that sperm containing certain mutations have advantages over other sperm and are thus selected for fertilization.

Reinhardt also studies meiotic drive, whereby a species produces offspring broods that are overwhelmingly (sometimes 95% or more) female. One might think that this would soon lead to extinction as the species runs out of males, but this isn’t happening. Instead, male stalk-eyed flies with meiotic drive are less successful in sexual selection because they have shorter eye-stalk ornaments. This keeps meiotic drive from taking over the species. Studying the genome sequences of many individuals in species with meiotic drive helps to understand what genes might be involved, Reinhardt says. A long-term goal of all her research is to understand the function of these evolutionarily interesting genes. She plans to reach that goal by altering genes artificially using CRISPR, a technology that can induce mutation within a gene. To support her research, Reinhardt is applying for external funding, through collaborative efforts with other institutions and as a Principal Investigator.





Mapping Bicycle Racks & Usage with ArcGIS: Connecting College & Community Initiatives

Michael Reed '17, Geological Sciences
Sponsor: Margaret Reitz, Sustainability/Student Life

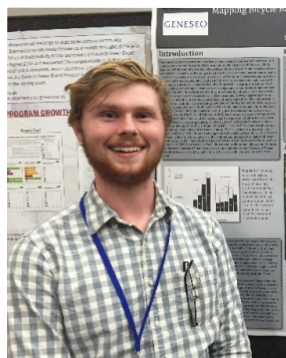
WHAT IS YOUR PROJECT? This project focused on the spatial placement of bike racks both around campus and within the town of Geneseo. A higher dispersion of racks in these areas makes it easier for students to access facilities, stores, and friends by a means that requires zero fuel or resources. The project's goal was to analyze spots that may be lacking racks and to establish a collaboration between the college and the town to work together to address bike rack needs.

IS THERE ANYTHING THAT HAS SURPRISED YOU? Being a science major, attendance at the Association for the Advancement of Sustainability in Higher Education Conference & Expo was definitely a different experience than I'm used to. I ended up coming out of the conference feeling invigorated and brimming with ideas that I would love to see piloted in Geneseo.

HOW HAS WORKING ON THIS PROJECT IMPACTED YOUR LONG TERM PLANS? As a geography minor, I also enjoy doing work with mapping and GIS, and this was just another way to prove that I like doing just that with my work. In the future I would like to make software and GIS skills a big part of my work in geology (fingers crossed). But overall the project also helped me confirm that I like doing research, which reinforced my desire to attend graduate school.

WHAT HAVE YOU ENJOYED THE MOST? I enjoyed the people I got to work with the most. Getting a chance to work with Dr. Reitz was a great experience for me, and she had so much to share and help me with. Also chatting with Dan DeZarn and other heads of sustainability at various colleges has been a great joy for me; hearing various perspectives and ideologies about the trends within this field was a great opportunity for me to not only learn, but truly understand what sustainability directors have been trying to accomplish at their respective institutions.

WHAT ADVICE DO YOU HAVE FOR OTHER STUDENTS WHO MAY BE INTERESTED IN WORKING ON A RESEARCH PROJECT? Simply ask. I mean ask when trying to find a research project, as well as when you are in the thick



of one. I ended up getting into this project by simply talking with Dr. Reitz and the subject just came up and it all just sort of happened. I hit roadblocks and points where I didn't know what I was doing. The only way to come out of that was to ask all your resources what to do. I reached out to Meg and professors from various departments to obtain their feedback on what they thought might work well, and I don't think the work would be half as successful

Synthesis of Stercobilin: A Potential Biomarker for Autism

Jordan Coffey '18, Biochemistry
Faculty sponsor: Amber Charlebois, Chemistry



WHAT IS YOUR PROJECT? Dr. Troy Wood's laboratory at SUNY Buffalo, has observed that a compound in urine known as stercobilin can be analyzed and used as a biomarker to determine if a person has autism when they are born. People with autism have a smaller quantity of the biomarker in their urine, and by comparing the concentration of stercobilin in urine to an internal standard, it can be determined whether a person has autism. My responsibility, in collaboration with Dr. Wood's laboratory, has been to synthesize the internal standard by different organic chemistry methods.

HOW IS YOUR PROJECT FUNDED? A Geneseo Foundation Undergraduate Summer Fellowship and the Geneseo Foundation and the Geneseo Student Association Undergraduate Research Grant.

WHAT HAS SURPRISED YOU? It wasn't until I joined this project that I became aware of how much biochemistry is involved with autism. People with autism have significant differences compared to people without autism in terms of digestive bacteria. It has been known that health-related issues stem from the microbiomes in people's intestines, but I never thought that those differences could be associated with autism.

HOW HAS WORKING ON THIS PROJECT IMPACTED YOUR LONG TERM PLANS? I am so grateful for the opportunity to be doing chemistry research with Dr. Charlebois. My research has really opened my eyes to how applicable chemistry is to many different topics. I've become more excited about all of the opportunities that chemistry can provide in terms of an occupation later, and my research experience has inspired me to pursue and incorporate chemistry into any occupation in my future.

WHAT HAVE YOU ENJOYED THE MOST? I have really enjoyed applying the techniques that I have learned in class to a topic that is important to the general population. I never thought that I would have the opportunity to create a method for diagnosing autism that could potentially be in use by the time I have children; and what is more exciting is that I was able to apply information from classes in my major to make this possible. It affirms my decision about becoming a biochemistry major.

WHAT ADVICE DO YOU HAVE FOR OTHER STUDENTS? It doesn't matter what major a student has; any research is important and can lead to incredible opportunities and changes. I would highly recommend taking the opportunity to do research so you can apply what you have been learning in the classroom to exciting, practical uses. My life has been changed by this opportunity, and I am so grateful to have been a part of this research project.



Student Summer Research Volunteers

College policy requires that students who wish to volunteer their time conducting research or other scholarly projects with faculty members during the summer be officially appointed as volunteers of the College. This creates an official relationship between the College and the student during the summer months (outside of academic coursework or employment) and provides for indemnification in most circumstances. The Geneseo Volunteer Policy is available at: https://www.geneseo.edu/admin_finance/policies_procedures and the Application for Volunteer Services form is available on the Human Resources forms page: <https://www.geneseo.edu/hr/forms>

This requirement DOES apply to: Students who are volunteering their time on summer research/scholarly projects outside of formal coursework or research employee positions (either through College/Geneseo Foundation funds or the Research Foundation of SUNY on external grants) and, students who are using Geneseo Foundation Undergraduate Research Grants during the summer months, if they are not enrolled for academic credit related to their research project or are not employed by the College for summer research (through College/Geneseo Foundation funds or through external grants).

This requirement DOES NOT apply to: Students who are enrolled for academic credit related to their summer research; Geneseo Foundation Undergraduate Summer Fellowship recipients; and students who are employed by the College for summer research (through College/Geneseo Foundation funds or through external grants).

Please note that students are not subject to background checks. Toward the end of the semester, a notice will be sent regarding student volunteer appointments.



Take a minute to join CUR at no charge! Our enhanced institutional membership covers the cost. CUR provides a true wealth of information and resources regarding undergraduate research across diverse fields, and an electronic subscription to the CUR Quarterly is included when you join at: https://members.cur.org/members_online/members/newmember.asp

After you enter your name and title, please be sure to select "State University of New York at Geneseo" from the drop-down list. The system should alert you to the fact that your membership is covered and then will prompt you to continue to add your contact information. CUR provides many resources, including webinars, seminars, workshops and institutes on various topics related to undergraduate research. If you have an interest in attending an off-campus CUR event, please contact Anne Baldwin, Office of Sponsored Research, and we may be able to provide travel support.

NIH Academic Research Enhancement Award (AREA) Program

National Institutes of Health (NIH) AREA grants are intended to stimulate biomedical and behavioral research in colleges and universities that have not been major recipients of NIH support, such as primarily undergraduate institutions. These grants support smaller-scale research projects that expose undergraduates to research and strengthen the applicant institution's research environment. Proposed projects must involve undergraduates, whose roles may range from design of experiments to collection of data to drafting of journal articles. Other investigators or trainees such as high school students or post-baccalaureate persons may also be included. Additional details can be found on the AREA website: <https://grants.nih.gov/grants/funding/area/area.htm>.

Most NIH divisions participate in the AREA program. A list of these Institutes and Centers, which includes AREA program research topics of particular interest to each, may be found at: https://grants.nih.gov/grants/funding/area_grant_objectives.htm.

There are standard deadline dates for AREA proposals: February 25, June 25, and October 25. Awards may be up to three years in length and direct costs may be up to \$300,000.

Upcoming Campus Deadlines

Faculty Programs

- Feb. 24 Hurrell/McNaron Award for Scholarly Presentation; Proposal Writing Support Awards; Presidential Summer Faculty Fellowships; Geneseo Foundation & Roemer Summer Faculty Fellowships
- May 5 Summer Faculty Travel Grants (2017-18 year); Summer Incentive Grants (2017-18 year)

Student Programs

- Feb. 27 Geneseo Foundation & Kyrwood Undergraduate Summer Fellowships; Geneseo Foundation Student Assistantships
- Apr. 17 Undergraduate & Graduate Research & Travel Grants

GREAT Day http://www.geneseo.edu/great_day

Mar. 10 GREAT Day SUBMISSIONS deadline

Apr. 25 GREAT Day

www.geneseo.edu/sponsored_research
