Summer Undergraduate Research Program

A partnership between the UW-Superior Foundation and the Office of Undergraduate Research, Scholarship, and Creative Activity
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Introduction

The Summer Undergraduate Research Program at UW-Superior provides opportunities for students in all disciplines to pursue a research, scholarly, or creative interest with the guidance of a faculty or staff mentor. Student and mentor work together from proposal development to project design, carrying out the project, and presenting the results. Both students and mentors receive a stipend for the summer, which allows them to be fully immersed in their project.

The 2019 program included 19 students working with 16 different mentors, including 5 first-time mentors. Student projects were half 200-hour fellowships and half smaller developmental projects, which provide a starting point for students early in their academic career, but also allow students to “right-size” projects to accommodate both student and mentor needs. Our collaboration with the University of Colorado-Denver has provided an opportunity for a UW-Superior student to conduct research in a biology lab at the UC-Denver Anschutz Medical Campus in Denver for the past three years. With the departure of Dr. Jenean O’Brien, this partnership is ending but we hope to build on its success to develop other similar collaborative opportunities in the future.

This year I was struck not only by the diversity of the projects that students proposed, but also by the variety of approaches they used to study community issues, work across distances, and combine research with internships and other experiential learning opportunities. As the program has grown and developed, so has the ability of students and mentors to visualize creative ways to use it to meet their academic goals. It is clear in the pages that follow that not only does the Summer Undergraduate Research Program continue to provide UW-Superior students with an invaluable opportunity to develop both academically and personally, it increasingly serves as a unique platform for problem solving on campus and in the community. With the continued support and commitment of the UW-Superior Foundation, we look forward to continued growth.

Special thanks to this year’s proposal review team of Jayant Anand, Sergei Bezroukov, Nick Danz, Mickey Fitch-Collins, Cheong Soon Gan, Brett Jones, Hannah Ramage, Emily Rose, and Edie Wasylszn, and to URSCA program associate Mikayla Haynes, whose creativity and support for the students and myself throughout the program has been invaluable.

Julie O’Leary
Director, Office of Undergraduate Research, Scholarship, and Creative Activity
“The SURF program was one of the main reasons I decided to attend UW-Superior. This project was a wonderful, fun experience that taught me a lot about fisheries research and reinforced my interest in a career in aquatic biology. It also gave me the unique opportunity to spend my summer working in a field I am passionate about and enjoy thoroughly.”

Peter Birschbach conducted a fyke net fish survey on Lake Mackaysee, a 347-acre lake located on Chambers Island in Lake Michigan. After working with the Wisconsin Department of Natural Resources (WDNR) to procure historical data and necessary permits, Peter and his mentor, Dr. Jeffrey Schuldt, travelled to the island and collected data for a week. Results showed that the community structure of the lake has changed since it was last surveyed in 1982. There were fewer bluegill, smallmouth bass, largemouth bass, and northern pike and more pumpkinseed, rock bass, and yellow perch. Average and maximum fish sizes also decreased. Peter continued his work during fall semester, aging fish scales collected during the survey to examine growth rates and age-frequency distributions of populations within the lake.

Peter is a senior biology major and GIS minor at UW-Superior. The idea for his project grew from a discussion with his uncle, who owns a cabin on Chambers Island and shared local concerns about the Lake Mackaysee fish community, wondering if a class at UW-Superior might be interested in using it as a research opportunity. Peter shared his results at the Chambers Island Association annual meeting in July, and has also provided the data to the WDNR, which may use the data for management purposes.
The American Foster System: Themes Taken from Oral Histories of Indigenous People Pre-Indian Child Welfare Act

Meghan Brun was interested in the impact that placement in non-Native foster homes had on Native American children – a common practice before the Indian Child Welfare Act (ICWA) was passed in 1978. She planned to interview Native American people that had been placed in foster homes before ICWA was implemented and examine the effect this had on their cultural identity. An obstacle Meghan didn’t anticipate was the difficulty she had finding willing participants. She attributes this in part to historical trauma and the difficulty those placed in foster homes may have talking about their experience. Meghan was able to conduct interviews with two individuals and learned that both were unaware of their cultural identity while growing up in non-Native foster homes. She concluded that non-Native foster homes had a negative effect on children.

Meghan is from Cass Lake, Minnesota, and is an enrolled tribal member of the Red Lake Band of Chippewa Indians. She is a senior at UW-Superior and is majoring in social work and indigenous studies. Meghan was attracted to UW-Superior by the athletic opportunities and stayed because of the community of people she found on campus. She enjoyed her research project and feels she has grown as a student and a scholar while at UW-Superior.
Medical Trauma and Adverse Childhood Experiences

Emma Carroll focused on the question: Are there circumstances where medical trauma meets the criteria for adverse childhood experiences (ACEs)? The ACE framework has been widely adopted in the past ten years to understand adult chronic health issues and risky behaviors which stem from childhood experiences of trauma. Although the list of potential ACEs is extensive, medical trauma is not included among them, and is therefore never considered as having implications into adulthood. Emma conducted a literature review to look for specific criteria for medical trauma and ACEs. She then interviewed two community social workers who work with children who have had chronic or intense medical experiences to gain understanding about the extent to which these experiences would be considered traumatic. As a result of her research, Emma began to question the extent to which ACEs are used as diagnostic tools rather than a potential way to gather insight, and she would like to continue to examine this in the future.

Emma is a senior and has just completed her degree in social work. She chose to attend UW-Superior because it is a small campus that provided the support she needed from other students and faculty, as well as the opportunity to learn crucial research skills. Her topic is personal for her, as she has experienced her own medical related trauma and PTSD that was not properly validated until she was into her adult years. Emma feels strongly that advocating for medical-related trauma and its impacts is an important issue; evaluation of ACE should include all types of trauma, as well as a focus on resiliency.
Describing Ice Sheet Retreat Rates Associated with Climate Change Using Glacial Varves

“Climate change is arguably the largest issue the world faces today and I want to contribute to finding the solution. Understanding past climate change is imperative to understanding how it will affect the present.”

Peter Douglas calculated the retreat rate of the Laurentide ice sheet using glacial varves in sediment cores from lakes in northern Minnesota and Ontario. Varves are annual sediment deposits in glacial lakes with a defined summer and winter layer. By finding patterns in core samples and matching them to patterns in cores from different locations, Peter was able to establish correlations that link core sites together chronologically. He counted varves between sites to determine the amount of time it took the ice sheet to pass between them, and then compared his calculated retreat rates with Greenland Ice Core data. They matched with enough certainty to place Peter’s core sites within a warming period known as the Bølling-Allerød. Peter’s project is part of a larger National Science Foundation funded project under Dr. Andrew Breckenridge. Peter is continuing his work, and plans to present it at the Geological Society of America conference in May 2020.

Peter came to UW-Superior from Chesapeake, Virginia, and is pursuing a degree in environmental science. He became interested in using glacial varves to study climate while on a climatology class trip to Rainy Lake to extract sediment cores for use in a larger project. Peter hopes to bring the skills he learned while working on his SURF project to his future work as he makes his way into the professional world.
“Architecture is a constant source of inspiration for me, and I’d love to use my passion to help preserve these wonderfully intricate buildings for future generations.”

Sonia Fields designed and executed her project with the intent to bring light to the historical buildings of Southern Wisconsin and the impact they have on their respective communities. She studied several of the many historic buildings in Sauk, Dane, and Columbia Counties, near her home. All the buildings are listed on the National Register of Historic Places, which is dedicated to preserving buildings featuring rare and unique architectural elements that qualify for protection. After selecting the unique buildings, Sonia photographed them from several angles to get the best photographic composition, and then used her photographs to carve linoleum blocks, which she then used to make prints.

Sonia, a sophomore majoring in visual arts, is from Prairie du Sac, Wisconsin. She is enamored with the entire process of printmaking and plans to use the techniques she cultivated during this experience for years to come. Her goal as an artist is to sell her work, and she also loves the idea of giving back to her community in some way. Her project allowed her to do this by providing original artwork specialized to local history in the form of the prints she has created, while also providing recognition for her as a growing artist.
Compassionate Courtrooms: How Our Criminal Justice System is Treating Those Struggling with Addiction

“SURF is a learning experience that cannot be matched in the classroom. Being able to take an initiative on my education is something I would recommend everyone do, especially when you can choose a topic that inspires you and your future career.”

Amber Heidenreich studied drug treatment courts, which are an alternative to incarceration for substance abusers. She reviewed literature to gain an understanding of best practices for drug treatment court operations and then applied that knowledge to create interview questions for local drug court professionals. Through the interviews, Amber learned how the programs operate in Duluth and Superior. She learned that public support is vital for the success of drug treatment courts and those participating in them. Public awareness of how this form of restorative justice benefits the participants and the community is important to gaining this support.

Amber, a junior from Phillips, Wisconsin, is majoring in legal studies and political science. She was drawn to UW-Superior for the chance to play college hockey, and was quickly attracted to the Legal Studies program by the passion and experience of the professors. A course on alternative dispute resolution inspired her to look at other ways the criminal justice system has adapted from its traditional focus on incarceration to the healing and treatment of those who enter into the system.
Economics of Community Engagement: Not-For-Profit vs. For-Profit Hospitals

Michael Huttner was interested in the topic of not-for-profit hospitals and why communities choose them over for-profit hospitals, which are generally expected to be more cost-effective and of higher quality. Michael performed a case study analysis of St. Mary’s Hospital in Superior, Wisconsin, along with extensive literature review and data analysis. He learned that not-for-profit hospitals enjoy some advantages, such as tax-exempt bonds, that allow them to outcompete for-profit hospitals. His comparisons showed that, on average, not-for-profit hospitals outperform for-profit hospitals in all areas evaluated. The non-profit hospitals provide better quality care, are more cost effective, provide better community assessment needs, and are more accessible to the public when compared to a for-profit hospital.

Michael is a junior pursuing degrees in economics and history. He came to UW-Superior for the small campus and to be near Lake Superior. He observed the number of non-profit hospitals operating in the Twin Ports and wanted to study the issue further. Michael appreciates the support of his mentor, Dr. Sakib Mahmud, and the opportunity SURF funding provided to pursue a self-managed project and to gain valuable experience in research and data collection. He intends to pursue further research on this topic with guidance from Dr. Mahmud.
“This summer project and funding gave me the skills, the confidence, and the drive to continue my education beyond a bachelor’s degree and allowed me the creativity to study what I love.”

Lauren Johnson conducted a narrative analysis to attempt to understand why women run for Congress. She drew eight categories of potential motivational factors from the literature and general knowledge surrounding the topic and then looked at the personal biographies and interviews of 14 women currently serving in Congress. Her analysis revealed some key findings, including that policy and their constituents are the most-mentioned motivational factors for women in Congress, rather than partisanship. She also learned that a college degree appears to be a necessity for any woman running for Congress – unlike men, no woman has been elected to Congress without at least a bachelor’s degree. Lauren concluded that the roadmap to running for office is less clear for women than for men, and it would benefit girls and women who seek careers in politics to be aware of the formative influences of family, role models, and professional goals.

Lauren is from Floodwood, Minnesota, and is majoring in secondary English education with a minor in political science. She was drawn to UW-Superior by the location, small campus, and Teacher Education program. Lauren discovered her love for politics in an entry level political science class and fostered this passion by taking every opportunity to learn more, including a writing class where she worked with her mentor, Dr. Jamie White-Farnham, who encouraged her to apply to the SURF program.
Makenna Kullman studied popular movements aimed at removing barriers surrounding the use of psilocybin (magic mushrooms). She chose three initiatives involved with changing the legal status of psilocybin or entheogens – Decriminalize Denver, Psilocybin Initiative of Oregon, and Decriminalize Nature Oakland – and analyzed the similarities and differences in their arguments and approaches. She gathered information by reading academic articles, books, online newspapers, and public documents. Makenna discovered arguments based on individual rights, therapeutic potential, the fact that psilocybin and entheogens are naturally occurring substances, and the historical and cultural use of psychedelics over centuries. She continues to monitor developments around this issue and hopes to present her findings at a conference to others interested in the issue and to make professional connections in the psychedelic community.

Makenna is a senior studying psychology and sociology. She grew up in Eau Claire, Wisconsin, and transferred to UW-Superior in 2018. She chose her research topic because she was curious about societal responses to recent changes to the legal status of psychedelics and wanted to learn more about the issue and about psychedelics themselves. Makenna is passionate about her research topic, which inspired her to get involved with the community by going to educational seminars, volunteering, and sharing what she has learned to increase awareness about psychedelics.
Naum Kuzmanovski spent the summer getting an introduction to the field of graph theory. In mathematics this is the study of structures called graphs, which can be visualized as a set of points on a plane connected with lines. Naum also worked with structures called posets (partially ordered sets) which can be visualized in the same way as graphs. These structures have many applications in the modern world. For example, in a map of a city, the crossroads are the points and the roads are the lines connecting them. Navigation systems interpret maps in this way and use graph theory to indicate the best path to take from one point to another. Naum gained understanding about the field by studying proofs of several classic results in this area and learning some proof techniques used in the field.

Naum is a sophomore majoring in computer science, and an international student from Macedonia. He was introduced to his research topic by a fellow student, Jounglag Lim, who also studied math as his SURF project. Naum found that his problem was more challenging than it first appeared and it gave him a good introduction to higher level math research.
Daniela Leon Vargas worked with Dr. Lorena Rios Mendoza on an ongoing research project addressing microplastic pollution. Daniela was interested in learning whether polycyclic aromatic hydrocarbon (PAH) compounds are more concentrated in synthetic debris, such as microplastics, than in natural debris like leaves and sticks. Working with samples collected from Newton Creek and the St. Louis River Estuary in Superior, Daniela separated debris from the samples into natural and synthetic fibers, and completed the identification and quantification of the synthetic debris. She continues to work on the final step of identifying and quantifying PAHs in both types of debris.

Daniela is an international student from Bogota, Colombia. She is a junior studying aquatic biology and fishery sciences, with a minor in chemistry. Daniela has been involved in research since she was a freshman and has had the opportunity to work on projects that address microplastic pollution from Lake Superior to Mexico. She has learned that not only do microplastics contribute to pollution by themselves, they also bring with them concentrations of toxic compounds that are dangerous to the environment. Daniela’s goals include working with conservation programs in marine biology, and developing 3D prosthetics for animals without the use of plastic. The opportunity to do research is key to her plans to attend graduate school.
“The SURF program allowed me to carry out this amazing project that helped me get more experience with microbiology research and laboratory methods, which are very important as I plan on attending graduate school.”

Giulia Martin’s research has roots in the Tiny Earth project, which seeks to engage students in hypothesis driven research while crowd-sourcing the discovery and characterization of novel antibiotic producing soil microbes. Giulia studied juniper, a plant native to our region which is used by Native communities as a medicinal to treat a variety of conditions, including tuberculosis. She compared the microbial diversity within soil from a location where juniper grows to a control, non-juniper soil. Giulia collected soil from both conditions, cultured it in the laboratory on agar plates, and monitored the samples for microbial growth. Giulia’s initial results showed some interesting and significant differences between her samples. Her study was the first part of a three-step research plan, providing background information for the steps to come. Giulia is continuing to work on her research, testing the microbes she found in the juniper soil to determine whether they show inhibitory activity towards a relative of the tuberculosis bacteria, *Mycobacterium segmatis*, and whether there are any antibiotic producing bacteria present in her samples. The last step will be chemical extraction of the plant metabolites from the juniper, which will also be tested against *M. segmatis* for the same goal.

Giulia, an international student from Brazil, is majoring in biology, pre-med and health, with a minor in behavioral neuroscience. Giulia appreciated the opportunity the Summer Undergraduate Research Program provides for international students, since their access to grants and fellowships is limited.
The Influence of Social Reaction of Help-seeking Behavior

“The SURF program has given me a significant advantage in applying for graduate school in clinical psychology and made me prepared for research at a master’s program level.”

Katja Nielsen conducted her research on the subject of help-seeking behavior, examining the question of whether validating comments about an individual’s struggle decrease negative self-stigma and increase the likelihood of them asking for help. Katja designed an experiment to test her hypothesis, collected data on the responses of participants in the study, and analyzed results to understand the interaction between the type of comments and the response time. Katja conducted a literature review prior to her project and this provided the foundation for her summer research, as well as her senior research project on the influence of personality on help-seeking.

Katja is an international student from Denmark. She first came to UW-Superior on a study abroad trip, wanting to experience American college life. Upon returning to Denmark, she realized that the people she had met and the opportunities she had been given at UW-Superior exceeded her expectations, so she returned to complete her bachelor’s degree in Psychology with an emphasis on research in the field. Katja discovered her research interest in help-seeking behavior in a psychology class. Her summer undergraduate research project gave her the opportunity experience the entire research process of creating a hypothesis, designing an experiment, conducting the research and writing a research paper while also pursuing her interest in why people do not seek help.
“This fellowship and the support of my mentor, Julie Gard, has changed my life. It has not only shaped and nurtured my writing ability, but it has transformed my perception of my value in this world.”

Anna Njau created a collection of fictional short stories based upon the experiences of four different generations of women in her family, including herself. The stories, successfully linked with related motifs and imagery, were ultimately combined into a novella titled *Trees on the Hillside*. The novella’s final short story titled “The Mulberry” will be published in an upcoming issue of Still Point Arts Journal. Anna has submitted the entire novella for publication to several presses and she is awaiting responses.

Anna is originally from the Ozark Mountains area of southern Missouri. After enduring a natural disaster and working through its aftermath, she made the decision to leave a lengthy career in healthcare behind her. She’d always written but lacked the courage to share her work or pursue a writing career. When a fortuitous turn of events led to her husband’s company relocating their family to Wisconsin, Anna realized that the change was an opportunity to focus on honing her craft. After reading about UW-Superior’s communicating arts and writing programs, she knew she’d found the right learning environment. What she didn’t realize was that she would also discover the most welcoming and supportive group of educators imaginable. Anna plans to continue this project by writing about the experiences of more women in her family, and eventually pursue publication of a novel-length work.
Influence of Youth Unemployment on Youth Migration in Ecuador

Angélica Remache López was inspired by the primary problems that young people in her home country, Ecuador, are facing and researched the influence of the youth unemployment rate on youth migration. She utilized quantitative and qualitative methodologies to analyze the relationship between the two variables. She learned that for decades there has been a direct relationship between employment and migration in young people. This awareness motivated her to develop policy recommendations based on local and national realities, with the goal of changing the narrative of this situation in Ecuador.

Angélica is a senior majoring in Political Science and Economics. She has always been passionate about helping people, especially young people, and has looked for new opportunities to do so while at UW-Superior. Angelica is currently Ecuador’s Youth Ambassador to the Friendship Ambassadors Foundation and represents Ecuador in the Youth Assembly at the United Nations. She is also a co-founder of Youth Leaders for Global Change, which seeks to increase international leadership opportunities for youth through one-year, youth-led projects and resolutions modeled after the UN Sustainable Development Goals. She completed her summer research project while working as an intern in the Office of the President of the United Nations General Assembly this past summer. Angelica hopes to make her policy recommendations a reality and thereby help young people in Ecuador.
Dark Store Theory in the Retail Industry and Its Impacts on the City of Superior

“This project helped me learn more about the real world – I had the opportunity to go outside of campus, meet and interview people, and deal with real situations.”

Ramesh Shrestha studied the growing number of cases throughout the Midwest where big-box retailers are using “dark store theory” to reduce their property taxes. Dark store theory holds that large retail stores should be assessed at the same property tax rate whether they are operating or sitting empty. Ramesh looked at lawsuits in the Midwest involving the use of dark store theory, as well as the current lawsuit against the City of Superior by Walmart, to learn about the repercussions when big-box retailers win the cases. He learned that there have been significant tax impacts to municipalities where big-box retailers have prevailed. Ramesh also interviewed local government officials to learn how they are approaching the Walmart lawsuit and what could happen if the City of Superior loses.

Ramesh is a junior majoring in business administration and economics. He is from Kathmandu, Nepal. Ramesh was interested in the opportunity to attend college in the U.S. and friends recommended UW-Superior as a welcoming and supporting environment that is great for learning. Dr. Sakib Mahmud introduced Ramesh to the concept of dark store theory and he wanted to learn more about it. His research project gave him the opportunity to meet many new people and make connections while tackling a real world issue.
Investigating Gene-Environment Interactions in a Zebrafish Model of Fetal Alcohol Syndrome

“The opportunity to work in this research lab was amazing, and I would not have been able to do it without the generous funding that I received for this project. This research will help me in the future and I couldn’t be more appreciative towards the donors who funded this opportunity.”

Amanda Sergent participated in UW-Superior’s collaboration with the University of Colorado – Denver, which provided the opportunity for her to conduct summer research at the UC-Anschutz Medical Campus in Denver in the lab of Dr. Kristin Artinger. Amber worked on a project using zebrafish as models for studying fetal alcohol syndrome. To do this, she set up tanks of zebrafish to lay embryos, which were then collected and dosed with ethanol at four different concentrations. The embryos were then put in an incubated and the cartilage formation of the face was examined through imaging, dissection, and measurement to determine whether ethanol influenced the facial formation. From her project, Amanda learned that ethanol, even in very small amounts, does affect the way facial features are formed.

Amanda is from Eagle River, Wisconsin. She came to UW-Superior for athletic opportunities and appreciates the small campus, which provides the opportunity to meet with her professors and get one on one help if needed. Amanda has always been interested in doing some sort of research, and the collaboration with UC-Denver gave her that opportunity, which she hopes will lead to more opportunities in the future.
Indigenous Justice: Recommendations for Expanding Tribal Jurisdiction in the Wake of the VAWA Reauthorization Act

“This summer project and funding was very impactful on my future career path. I realized I can combine this passion with law to make legal change, and have shifted my focus to attending law school on an Indian Law track after graduation.”

The research question Shalese Snowdon set out to answer was, “What are the legal and other obstacles, if any, to tribal nations exercising greater prosecutorial jurisdiction and control over crimes against Native women?” She used both qualitative and quantitative methods - reading law review articles, government and non-profit reports, civil and criminal code, Supreme Court cases, treaties, and conducted six interviews with attorneys and judges working with tribal nations. Shalese found that most tribal nations in Minnesota and Wisconsin are not implementing the provisions of the Violence Against Women Act (VAWA). Actions that would enhance tribal authority to successfully implement VAWA provisions include greater recognition of tribal governments, improved cooperation between federal, state and tribal governments, financial support from state and federal governments, and legislative action to enhance tribal authority.

Shalese is a senior legal studies and indigenous studies student. Her hometown is Warroad, Minnesota, and she is affiliated with the Ojibwe Nation of the Turtle Mountain Band of Chippewa Indians and Animakee Wa Zhing First Nation. Shalese’s SURF project was a continuation of research she began last year as a McNair Scholar. Shalese is passionate about the topic of violence against Indigenous women and would like to work as an attorney for a tribal nation and play a role in establishing legislation to help tribal nations be stronger partners in criminal cases, especially those involving violence against Indigenous women.
The Superior Amateur Hockey Association and the Local Economy

“My project was a great opportunity to learn about a local athletic organization as well as the basics of academic research. The project funding improved my living condition during summer and I was able to purchase textbooks for fall semester.”

Sam Waylee Jr.’s project involved the Superior Amateur Hockey Association (SAHA), a non-profit organization that supports youth hockey in Superior. SAHA holds hockey tournaments throughout the year, which attract an audience of all ages from both within and outside of Superior. In this way, SAHA plays an important role in bringing people to the local area and thereby supporting various economic activities in Superior. Sam’s research was part of a project to measure the importance of an athletic organization such as SAHA to the surrounding community. Sam’s work included literature review of studies on athletic organizations, data collection on Superior and Douglas County, interviewing the Executive Director of SAHA to learn about the organization, and development of survey questions for hockey teams and fans. Sam learned that research requires a lot of time and it can be challenging. His work will be used as the foundation for a larger economic impact study of SAHA.

Sam is a junior double majoring in economics and finance. His hometown is Abidjan, Cote d’Ivoire. As a student athlete on the UW-Superior men’s soccer team, Sam was excited to be part of a project related to the local hockey association. He was also motivated by the fact that the project results will be useful to the local community. Sam’s project helped him develop his skills conducting meaningful literature reviews and data analysis and provided the opportunity to prepare questions for future use in a survey.