

TRiO

McNair Scholars Program
ST. OLAF COLLEGE

Summer Research 2013 Abstract Booklet



<http://wp.stolaf.edu/mcnair/>

TRiO McNair is a graduate school preparatory program funded by the U.S. Department of Education and sponsored by St. Olaf College. It was founded in 1989 and initiated at St. Olaf College in 2007. Nationally there are 158 McNair programs working with over 4,400 low-income, first-generation, and underrepresented undergraduate students. (The federal government defines “underrepresented” to include: Black; Hispanic; American Indian/Alaskan Native, Native Hawaiians and other Pacific Islanders.) The program is further described on our website: <http://wp.stolaf.edu/mcnair/>.

Program Goals

The federal goal of the TRiO McNair Scholars Program is to increase the number of low-income, first-generation, and underrepresented students who participate in undergraduate research, graduate with a B.A., and immediately enter and complete graduate school, with a specific focus on obtaining a Ph.D.. The program identifies students with high academic potential and provides opportunities for students to develop skills necessary to gain admission to and successfully complete graduate study.

All TRiO McNair projects must meet the federally approved program objectives each academic year.

Objective 1: 90% of participants will complete research or scholarly activities each academic year.

Objective 2: 50% of B.A. recipients will enroll in graduate school immediately following graduation.

Objective 3: 80% of first-year graduate students will continue to be enrolled in graduate school.

Objective 4: 10% of participants will attain a Ph.D. within ten years.

Participants

Annually, 27 undergraduates participate in the St. Olaf TRiO McNair Scholars Program.

- Two-thirds of the participants meet federal income guidelines and are from a family in which neither parent graduated from a four-year postsecondary educational institution.
- One-third may be from groups that are traditionally underrepresented in graduate studies.
- Participants have completed at least 2 courses in their major and have a GPA of 2.75 or higher.

Services

McNair Scholars receive assistance with:

- On or off-campus internship placement - summer of sophomore year to explore field
- Research experience - summer of junior year. Participants are paired with a faculty mentor
- Research Writing Course (1 credit and WRI) - summer of junior year to learn how to write an effective proposal, conduct research, and present results
- Preparation for graduate school admissions tests
- Graduate school search and application assistance
- Financial aid, fellowship, and scholarship applications assistance

Highlights

During the summer of 2013, nine students were paired with a St. Olaf faculty mentor who guided their participation in an intensive summer research experience. Working with their mentors, students produced research papers, posters, and presented at the St. Olaf Summer Research Symposium. This booklet highlights the St. Olaf McNair Scholars’ summer research. Faculty mentors support the Scholars and continue to provide guidance about graduate school.

St. Olaf TRiO McNair Demographic Summary (2008-2013)

Total Number of Scholars Completing Undergraduate Research: 59 Females: 39 Males: 20

Scholar Race/Ethnicity:

Asian American/Hmong: 23

Black/African American: 14

Hispanic/Latino: 7

Native American: 2

Pacific Islander: 2

Tibetan: 4

White: 6

BOTH low-income and first-generation: 70%

Total Number of St. Olaf Faculty Mentors: 41 Females: 19 Males: 22

Mentored more than one student or have participated in more than one McNair summer: 9

Post-Graduation Status: 62% of McNair graduates are enrolled in or have completed graduate school.

33% of students are *enrolled* in a Master's program.

19% of students have *completed* Master's program.

10% of students are *enrolled* in a Ph.D. program.



Biography of Ronald E. McNair

"Before you can make a dream come true, you must first have one."

Dr. Ronald E. McNair

In 1986, in memory of Ronald McNair, the U.S. Congress established the Ronald E. McNair Post-Baccalaureate Achievement Program, commonly known as the TRiO McNair Scholars Program.

Dr. Ronald E. McNair's career as a scholar and astronaut stands as an inspiration to all McNair Program participants. Ronald McNair, the second African American to fly in space, was born on October 21, 1950 in Lake City, South Carolina. In 1976 McNair earned a Ph.D. degree in Physics at the Massachusetts Institute of Technology and joined the Hughes Research Laboratories. Ronald McNair completed the training and evaluation course for shuttle mission specialists and began working at the Shuttle Avionics Integration Laboratory and later worked for NASA. Even though Dr. McNair's awards and special recognitions are numerous, he will be best remembered as being among those who died on January 28, 1986 when the Space Shuttle Challenger exploded after the launch. Dr. McNair was a mission specialist on that flight. His lifelong commitment to scholarship lives on in the McNair Scholars who are selected each year to participate in the many McNair programs across the United States.

St. Olaf McNair Scholars Staff

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Pictured from left to right:
Melissa Hinderscheit, Janis
Johnson and Heather Campbell



Faculty Mentor: Dr. Matt Rohn

Professor Rohn graduated with an M.A. in Art History and a Ph.D. at the University of Michigan. His dissertation was titled “Visual Dynamics in Jackson Pollock’s Abstractions.” Professor Rohn’s academic accomplishments since then have ranged far and wide. He published “Visual Dynamics in Jackson Pollock’s Abstractions” in 1987, and co-authored “The Prints of Frank Stella: A Catalogue Raisonné, 1962-82” in 1983. He has also published numerous articles and essays, including most recently “Yoshida Hodaka and Post-World War II Japanese and American Artistic Exchange,” in 2012. He has also directed several exhibitions in various museums, and received a number of fellowships and grants, including two CURI grants at St. Olaf and the Ella and Kaare Nygaard Foundation grant in 2012-13. Professor Rohn is currently an Associate Professor of Art/Art History at St. Olaf College, a position he has held since 1994. He also teaches courses in Women’s and Gender Studies, American Studies, Environmental Studies, and American Conversations. In 2000 he became the American Conversations inaugural director. His research interests include 19th and 20th century art, American culture, gender and multicultural studies, social justice, and the art of teaching.

Gabriella Coll

Majors: Art History and Spanish



“The highlight of the summer was getting to know the other McNair Scholars better. I learned about the challenges of conducting intense research, and gained a wealth of knowledge about Native American art. I also gained critical reading, writing, and presentation skills.”

Research Title: Flaten Art Museum’s Native American Art as a Collection

Abstract: In the past two decades, thanks to the Museum director Jill Ewald and her focus on developing a more globalized collection, Flaten Art Museum has been gifted almost 50 works of art by Native American artists. All of the pieces were created in the post-World War II period. This summer we explored the various issues that surround the creation and patronage of these works of art, as well as their presentation in a museum setting. Compared to the collections owned by larger institutions, the random assortment of objects that constitute our modest collection pose a curatorial challenge. Because they fall neatly into three general regions, we grouped them geographically. This offered the best format for the historical and conceptual discussion of issues related to the cultural identity of these indigenous groups. Many of the pieces, though contemporary, speak to historical traditions that go back thousands of years. The complicated relationship between Anglo audiences and Native cultures is reflected in these artistic creations. The potential exhibition that will result from this project offers a good opportunity to start a conversation at St. Olaf College about these works, their context, and the role that the mainstream market has played in their production.

Lansa Dawano

Major: Biology

“The whole research experience was fun and enjoyable, but the highlight was seeing the final product of my research project - the lab manual. It was very rewarding to see the TRiO Student Support Services’ Bridge students use the manual in lab. From my McNair summer, I learned how to conduct research, how to effectively

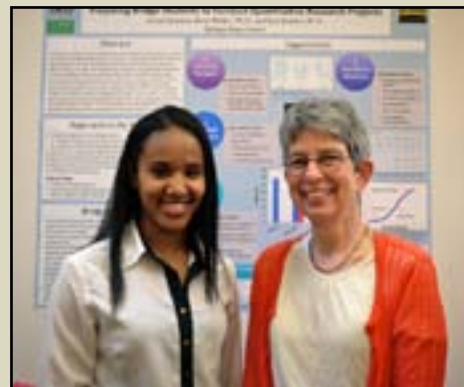


communicate my research project, and I also improved my writing skills through the McNair writing class. I learned more about graduate school and how to develop professional networking skills. My graduate school goals include going to school to become a Physician Assistant. Graduate school is important because it will provide me

with the academic training that I need to pursue my career goals.”

Research Title: Preparing Bridge Students to Conduct Quantitative Research Projects

Abstract: Introducing mathematics into introductory biology courses exposes students to the modern integrated approaches in science. This project illustrates how the two disciplines can be incorporated into introductory science courses to guide students through basic laboratory methods. Our goal was to prepare incoming Summer Bridge St. Olaf students who come from low-income, first-generation backgrounds to design independent research projects and communicate quantitative data orally and in writing. We developed four laboratory experiments that introduce typical biological tools and generate quantitative data as well as graphical exercises to enrich student insight and understanding of biological principles. These tightly structured exercises lead directly to quantitative research projects designed and carried out by the Bridge students. This quantitative research approach is being implemented in August 2013 and will be assessed through an end-of-course survey.



Faculty Mentor:

Dr. Anne Walter

Dr. Anne Walter received her B.A. from Grinnell College in Biology, her M.S. in Zoology from the University of British Columbia, and her Ph.D. in Physiology and Pharmacology from Duke University. Her research interests include membrane biophysics, enzyme activities, and permeability as a function of lipid composition. Dr. Walter has published numerous articles throughout her career. Her most recent publication titled “The Vesicle to Micelle Transition of Phosphatidylcholine Vesicles Induced by Nonionic Detergents: Effects of Sodium Chloride, Sucrose and Urea” was published in 2000. Dr. Walter has taught at St. Olaf since 1994 and earned the title as Paul & Mildred Hardy Distinguished Professor of Science. Dr. Walter was also the Chair of the Biology department from 2002-2010. From 1994 to 2008, Dr. Walter was a member of the committee that planned and designed Regents Hall. Her favorite classes to teach are animal physiology, neuroscience, and biology 121 for the TRiO Student Support Services’ Summer Bridge Program.



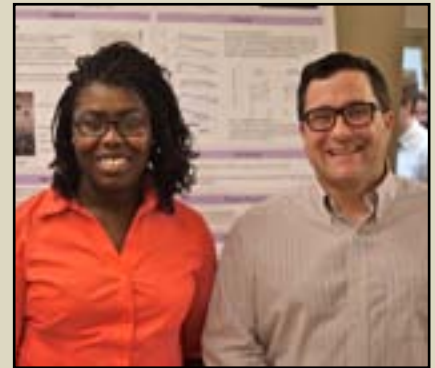
Chiamaka Isiguzo

Major: Biology

“The highlight of the McNair summer was continuing research with Professor Demas and being able to improve and learn new skills and techniques. From my McNair summer I gained a deeper love of research in addition to knowing that I wanted to pursue academic medicine.”

Research Title: The Impact of Contrast on Non-Visual Photoreceptors

Abstract: Retinal ganglion cells (RGCs) are the output cells of the retina. The vast majority of these RGCs are responsible for relaying visual information from rod and cone photoreceptors to the brain. However, a minority of these cells, called melanopsin RGCs (mRGCs), project to non-visual centers of the brain that control light dependent behaviors such as pupil constriction and regulation of the circadian rhythm (light/dark cycle). Specifically, these cells are able to tune the body’s biological systems to the outside environment. For example, during periods of lightness, the body produces more hormones that will help an individual with their increased activities; whereas, during periods of darkness, hormone production. Unlike the RGCs involved in vision, mRGCs are themselves photoreceptors. In other words, they are capable of responding directly to light without input derived from rods and cones and are sufficient to drive non-visual light dependent behavior. This raises an intriguing question. If mRGCs can control non-visual behaviors independently of rod and cone input, why are they connected to the rest of the retina? We postulate that rod and cone input help mRGCs estimate mean light levels. To test this hypothesis, it is necessary to measure the intrinsic response of mRGCs to contrast. We did so by recording extracellular mRGC responses to light stimuli with contrast, and without contrast, while blocking rod and cone input. We found that mRGCs responded differently when we blocked their rod and cone input. The intrinsic light responses of mRGCs were largely insensitive to contrast. These results suggest that rod and cone input may not be necessary for mRGCs to be able to accurately estimate mean light levels during periods of high contrast.



Faculty Mentor:

Dr. James Demas

Dr. James Demas grew up in the Washington DC area. He received a B.A. in Physics from Columbia University and then went on to earn his B.S. in Biology from the University of Maryland. In addition, he received a Ph.D. in Neuroscience from Washington University in St. Louis. His research is focused on the retina which is the neural part of the eye. Specifically, his research is focused on the retinal circuits that estimate the brightness of the environment. Throughout the years, he has authored or co-authored with numerous scientists in his field to publish findings about the behavior of these retinal circuits. In 2013, Dr. Demas was awarded the Magnus the Good award for his research involving optogenetic investigation of neural circuits underlying reward seeking. Outside of St. Olaf, Dr. Demas loves to spend time with his family and enjoys surfing, downhill skiing, and sailing.



Faculty Mentor: Dr. Ted Thornhill

Professor Ted Thornhill received an M.S. in applied social research from Florida State University and holds a Ph.D. in sociology from the University of Massachusetts-Amherst. Professor Thornhill’s dissertation explored how family and education sculpt black college students’ racial ideologies. His research interests include racism and antiracism, critical race theory, social class inequality and crime. In 2011 he had an article published in the Journal of Ethnicity in Criminal Justice titled “African Americans and the Marijuana Legalization Paradox: Do Race-Specific Murder Victimization Rates and Race-Specific Drug Arrests Explain It?”. Professor Thornhill currently teaches in the Sociology/Anthropology Department at St. Olaf College.



<http://wp.stolaf.edu/blog/researchers-examine-effect-of-race-on-callback-rates-for-job-interviews/>



Britt Letcher

Majors: Music, Race and Ethnic Studies

“The major highlight of my McNair summer was getting to know my mentor and fellow scholars. It is a rare and beautiful thing to have nine students of color hang out and talk about our research and higher education goals. My future career goal is to become a professor someday and graduate school is integral for that goal. I never thought graduate school was a possibility for me until I entered the TRiO McNair Scholars program.”

Research Title: Racism and Bilingualism in the American Job Market

Abstract: Previous studies have proven that employers routinely discriminate against potential employees during the first round of the job application process. Survey data confirms that we typically associate names with certain racial and ethnic groups. This gives employers the opportunity to weed out candidates from specific races before reading a résumé or meeting the applicant. There are a few gaps in previous research which we care to address, such as how foreign language acquisition impacts job opportunities. In America an increasing emphasis has been placed on acquiring foreign language skills, particularly Spanish. It is considered beneficial or required to be bilingual in English and Spanish for a growing number of jobs. We plan to investigate disparities that may exist between equally qualified candidates of different racial backgrounds and study how being bilingual in English and Spanish increases or decreases discrimination. We have collected race-signifying names that were used to create fictitious resumes that will be sent to real job openings. We will send eight résumés to each job, with representation from Asians, blacks, whites, and Latinas of both genders. We will record the number of call backs each name receives. We will then analyze how race, language, and gender moderate call back rates.



Faculty Mentor:

Dr. Kevin Crisp

Dr. Kevin Crisp graduated from Haverford College in 1998 with his B.A. in Psychology with a concentration in Brain and Behavioral Science. He earned his Ph.D. in Neuroscience from the University of Minnesota in 2003. Dr. Crisp's areas of expertise include computational modeling of neuronal biophysics and circuits, repair and regeneration of injured nervous tissue, invertebrate circulatory system and invertebrate neurobiology. Over the years, Dr. Crisp has held numerous positions in his field from the University of Minnesota to the University of Miami and is currently an associate Professor at St. Olaf College. At St. Olaf College, Dr. Crisp serves as the advisor for the Pre-Med club, Neuroscience Club, Mayo Innovation Scholars Program, Biosource Internship Program, as well as the TRiO McNair Scholars Program. On top of his services as a mentor and as an advisor, Dr. Crisp also serves the St. Olaf community as the chair of the Health Professions committee.

Erick Marigi

Majors: Math and Biology

"Getting the opportunity to work on a very real-world, interdisciplinary project was a great experience. This required the entire team to draw on our diverse educational experiences and work as one unit in order to make progress."

Guttu Maskalo

Majors: Biology, Race and Ethnic Studies

"The highlight of the summer was the research experience and getting to know the McNair Scholars. I learned that science does not happen over night; patience is required to be a scientist. My future goal is to pursue graduate school to become a Medical Doctor and help the community I left back in Ethiopia."

Research Title: Progress Towards the Development of Wireless, Passive Electrophysiological Instruments

Abstract: Modern implantable devices require invasive methods of wires and batteries. Wires can inhibit an animal's mobility presenting issues in neuroethological studies, be displaced, or present an increased opportunity for infection. Batteries are large, generate undesirable heat and require surgical replacement. Our aim is to develop a wireless method for recording impulses that uses current traveling through the natural conductive pathway of the body as opposed to radio frequency emission. We propose to do so using passive (battery free) resonance circuit technology. First, we developed a passive probe to record intracellular nerve impulses. We sought to improve the sensitivity of the probe by running trials using earthworms and leeches. Specifically, we looked to record intracellular nerve signals by passing a carrier signal to the probe through various tissues, modulating the carrier at the site of recording, and demodulating the signal with a receiver outside the body. Our experiments have clarified the obstacles that remain, specifically the small amplitude and low power of nerve field potentials. To address these issues we need to amplify the nerve signals prior to entering the probe, which poses a challenge for the passive nature of our device. We have therefore begun examining the use of energy harvesting technology to avoid the use of battery power. If ultimately successful, this technology will not only improve intracellular physiological readings, but may have implications for wireless signal and energy transmission.



McNair alum, Pa Ku Lee, visits at the Research Symposium with former mentor, Dr. Chandran, and Scholar Amanda and her daughter.

Amanda Moua

Major: Social Work

“The highlight of the summer was working with my mentor on writing a policy paper. I learned a lot about myself as a writer and student. My graduate school goal is to attend the University of Minnesota to earn my Master’s degree in Social Work.”

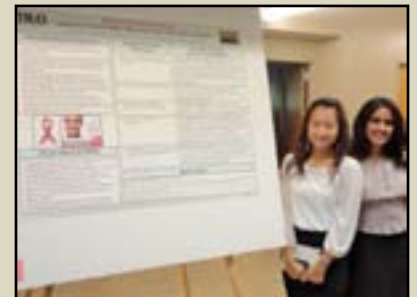


Research Title: The National HIV/AIDS Strategy: Impact on Black Men Who Have Sex with Men (BMSM)

Abstract: Among the many groups affected by the HIV/AIDS epidemic in the United States, black men who have sex with men (BMSM) have been identified as the most vulnerable and the least likely to get tested and receive treatment. Historically, this group has been highly stigmatized, disempowered, received very little support or services and has fallen through the cracks in the discourse on HIV/AIDS prevention and intervention. There has also been limited social work research examining their unique challenges and strengths. The National Strategy on HIV/AIDS (NHAS) is the latest in a long line of policy measures that have attempted to address the needs of domestic populations who are vulnerable to HIV/AIDS. This article draws from limited but crucial research and thought in social work that explores the use of the strengths framework to guide policy. The article explores whether the NHAS is a strengths-based policy and how effectively it recognizes the contributions and strengths of the population of BMSM and addresses their specific unique situation of HIV/AIDS vulnerability. Recommendations for social work researchers and policy practitioners include increasing familiarity with the NHAS and its programs, enhancing the involvement of social workers in the implementation of NHAS and the evaluation of its programs, and embracing the diversity and strengths of BMSM.

Faculty Mentor: Dr. Devyani Chandran

Dr. Devyani Chandran is an Assistant Professor in the Department of Social Work and Family Studies at St. Olaf College. She received her Master’s in Social Work from the Tata Institute of Social Sciences. After completing her Master’s in Social Work, she went on to pursue a Ph.D. in Social Welfare at the University of Kansas. She completed her dissertation on HIV/AIDS among Older Adults and earned her Ph.D. Her expertise lies in prevention theory and intervention particularly in the areas of HIV/AIDS and drug and alcohol use. Dr. Chandran has been involved in community efforts to understand drug and alcohol behaviors of Northfield youth as well as community collaborations in community based projects. She has published many peer-reviewed manuscripts including “HIV/AIDS Prevention in Adults over Fifty: A Strengths Approach to Social Cognition Theory.” Dr. Chandran has contributed greatly to the St. Olaf community and we will remember the wonderful commitment, passion, and memories she created for her students and her profession. We wish her well in her new position. She will truly be missed and all that she has accomplished will not be forgotten.





Faculty Mentor:
Dr. Jim Farrell

Dr. Farrell, McNair colleague, friend, and mentor sadly passed away this summer due to complications from Leukemia.

Professor Jim Farrell received his M.A. in History and Ph.D. in American Culture from the University of Illinois, Champaign-Urbana. His research touches on various aspects of American life, including material culture and our relationship with natural spaces. In his courses, Professor Farrell expands upon these topics, teaching students “the moral ecology of everyday life.” Encouraging students to live intentionally, he pushes them to question whether our American values align with our practices. Along with teaching about American culture and nature in his St. Olaf courses, he has published numerous books and articles, including “The Nature of College,” a book about the moral and environmental implications of college students’ habits. All of his work seeks to help us “think twice about the American environmental values we actually embody in our everyday lives.”



Zoey Slater

Majors:

English, American Studies, and Media Studies

“It was a joy working with Jim Farrell this summer and it was an honor to complete his final projects. Our research team is extremely thankful to have met him, and we hope his passion lives on through the lives he changed. Working with Dr. Farrell taught me that environmentalism is connected to every facet of human life, and this summer has fostered a serious personal interest in environmentalism and activism. My future goals include applying the marketing and writing skills I learned this summer to work in strategic communications and apply to Master’s programs in Communications.”

Research Title:

Marketing the Environment and Sustaining St. Olaf

Abstract: During the 2012-2013 academic year, student researchers created several projects to encourage sustainable behavior in the St. Olaf student body. They built the framework for SustainAbilities, a student-run, residence life program that allows students to practice sustainability through event programming, visible commitments, and green room certification. The program was created to help students become ecological citizens: individuals able to create sociopolitical action on climate change, live sustainably, and build sustainable communities. Despite attempts at implementation last year, students at St. Olaf have not widely adopted the SustainAbilities programs. Research in the summer of 2013 investigated how St. Olaf’s current sustainability programming can be improved, specifically focusing on how to market projects that encourage students to practice sustainable behavior. The project included work with the 2013 Green Residence Hall project, the website, the pilot Environmental Conversations program, and SustainAbilities at large. The comprehensive marketing plan will influence all aspects of SustainAbilities and will allow the organization to create intentional messaging and program design that students will more easily adopt.



Zoua Xiong

Majors: Psychology and English as a Second Language

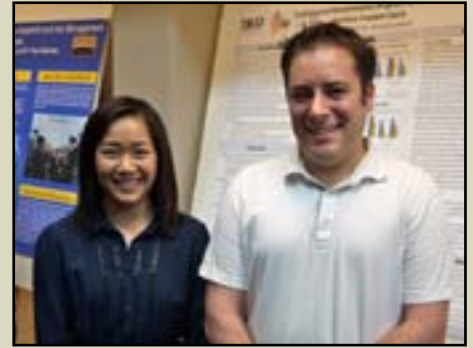
“The highlight of my summer was conducting research which taught me to think more critically and having a mentor who provided valuable assistance along the way. This research has taught me to have a deeper appreciation for the hearing impaired and deaf culture, as well as hearing and its role in speech perception and language processing. I hope to apply to a speech-language therapy program with an emphasis in bilingual speech-language pathology.”

Research Title: Training and Rehabilitation Program for New Adult Cochlear Implant Users

Abstract: A cochlear implant (CI) is a surgical treatment for deaf or severely hard of hearing individuals that can provide a sense of hearing. With the new electrical device most individuals are able to hear sound, yet there is profound variability across cochlear implant users in how well they can perceive speech, especially in difficult listening environments. This variability may derive from the lack of standardized training and rehabilitation programs after implantation. The purpose of this study is to gain a better understanding of cognitive factors that contribute to speech and language processing in adult cochlear implant users and to develop a training program that will help them hear better.

We evaluated the materials used in a 5-day training program that was tested with normal hearing subjects listening to cochlear implant simulations in order to adapt it for use with cochlear implant users. To do this, we examined the intelligibility of talkers (a variety of male and female speakers) and environmental sound materials used in the training study to determine whether they are optimal for a rehabilitation program to postlingually deafened cochlear implant users.

Results showed that the experimental group performed better than the control group, thus demonstrating the effectiveness of the training program. New talkers were more intelligible than old talkers. Environmental sound materials on test day contained more unfamiliar sounds that required more channels and relied on more spectral cues for identification which is why performance on day five was poorer than the training days. These findings will allow us to make adjustments in the training materials to adapt to CI users' needs, and help them learn to hear better with their device.

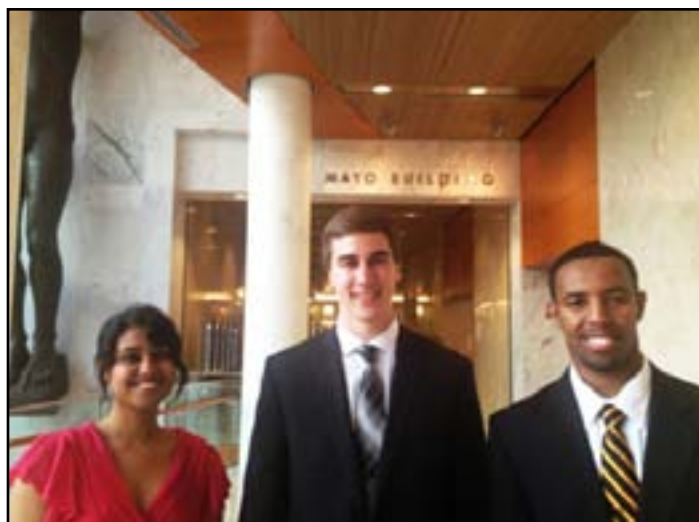
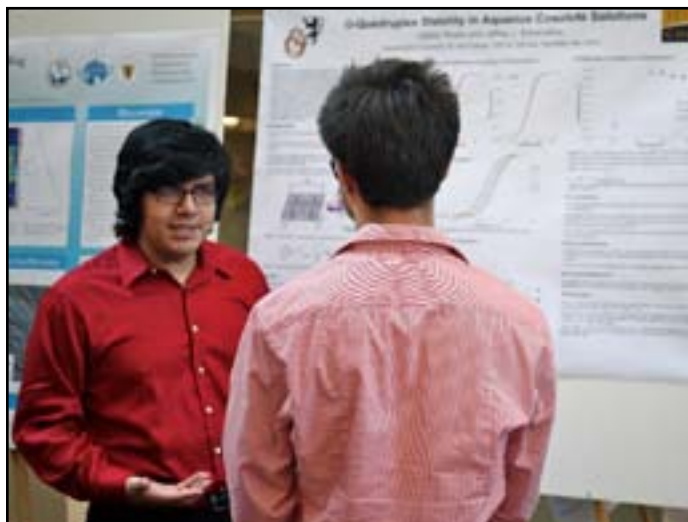


Faculty Mentor:

Dr. Jeremy Loebach

Dr. Loebach joined the St. Olaf community in the fall of 2009 and is currently an assistant professor in the Psychology Department with affiliations in the Neuroscience program and linguistic studies. He received both his graduate and doctoral degrees in Biological Psychology at the University of Illinois-Urbana Champaign (UIUC). He then went on to Indiana University to finish his postdoctoral in the area of Cognitive Psychology. His areas of interests include speech and language recognition and perception and cochlear implants. Of the numerous journals that Dr. Loebach has published, his article titled Perceptual Learning of Spectrally Degraded Speech and Environmental Sound, looking at training cochlear implant users on speech and environmental sound recognitions revealed profound findings, which resulted in his current research on cochlear implant users. While teaching at UIUC, he was honored as one of the teachers ranked as 'excellent' by the students. Currently, Dr. Loebach maintains an active research program at St. Olaf, training and mentoring undergraduates in research and internships.

ADDITIONAL SUMMER UPDATES



Top Left: As a sophomore and TRiO McNair and Beckman Scholar, Carlos Rivera participated in CURI research and presented his research at the St. Olaf Research Symposium.

Top Right: Abdi Musse interned with the Mayo Innovation Scholars program as a Medical Device Marketer conducting research, and shadowing residents and medical students.

Middle: McNair alumni Quyen, Blanca, and Kristell visit with McNair staff at the annual Research Symposium.

Bottom: Hawera Butta interned in Japan at an organic farm that teaches sustainable agriculture to community leaders from developing countries.

