University at Buffalo
STEM Diversity Programs
School of Engineering and Applied Sciences

LSAMP Summer Program Newsletter, Summer 2017

UB Louis Stokes Alliance for Minority Participation (LSAMP) 2017 Summer Research Interns attended an Etiquette Luncheon, held at the Buffalo Niagara Marriott.

The **Office of STEM Diversity Programs** in the **University at Buffalo** **(UB)** **School of Engineering and Applies Sciences (SEAS)** is pleased to highlight the accomplishments of our **2017 Louis Stokes Alliance for Minority Participation (LSAMP) Summer Research Internship Program**.

LSAMP is funded by the **National Science Foundation (NSF)** and seeks to increase the number of underrepresented students pursuing degrees in science, technology, engineering and mathematics (**STEM**) disciplines. The program funded 12 undergraduates for research internships during a 10-week summer program.

Students spent a minimum of 30 hours per week in the lab under the direction of a UB Faculty Member. Additional time was spent on "soft skills" and community service activities. Soft skills workshops included *Lab Safety, Dress for Success, Public Speaking, Professional Networking, Marketing Yourself for Life, Putting Your Best Foot Forward* and *DISC Training*. The students also toured local industries including the Buffalo Niagara Medical Campus, Jacobs Institute, Buffalo Water Authority, Darien Lake Theme Park and a UB Sustainability Tour. Community Service projects included a "Litter Mob" clean-up in Buffalo's Allentown neighborhood, Adopt-a-Beach clean up of Woodlawn Beach, and clearing invasive species at Tifft Nature Preserve.

The program culminated with research poster and oral presentations at the UB Undergraduate Research Conference in Niagara Falls, NY. The Undergraduate Research Conference is a national conference with over 300 participants, sponsored by the UB McNair Scholars Program. The students did a wonderful job with their various presentations and are excited to continue research in their disciplines.

Words from the Director
Dr. Letitia Thomas

Letitia Thomas, PhD
Director of STEM Diversity Programs

What a wonderful summer! The 2017 LSAMP Summer Research Interns showed up and showed everyone how we do research at UB!

As the largest and most comprehensive of all the State University of New York institutions, UB is well recognized as a premier, research-intensive public university. As a member of the Association of American Universities, where the majority of the federally funded university research that contributes to our economic competitiveness, health, well-being, and national security takes place, it is in our DNA to prepare the next generation of scientists and engineers for global leadership.

LSAMP students were proud to be a part of UB's research legacy, and their research mentors are some of the finest scholars in the country. Students researched everything from fractals, to fragility curves, machine learning to 5G networks, flame retardants to fracking, surfactants to cell culture. During these ten weeks we did science, performed service and gained soft skills. It was tough but the students persevered and had a great attitude along the way. The staff appreciated each and every student more than we can say.

We hope you enjoy our summer program review as much as we did, creating these moments.

~Dr. T

2017 LSAMP Summer Research Interns

Intern	Mentor	Major
Hector Barreto-Vazquez	G. Ekin Attila	Biological Sciences (University of Puerto Rico, Cayey)
Sykhere Brown	Johannes Hachmann	Chemical and Biological Engineering
Emmanuel Canales	Marina Tsianou	Chemical and Biological Engineering
Bryan Cruz Padilla	Diana Aga/Steve Travis	Chemistry (University of Puerto Rico, Cayey)
Destiny Diaz	Jae-Hun Jung	Mathematics
Nasiah Johnson	Nicholas Mastronarde	Electrical Engineering
Mohamed Kawy	Marina Tsianou	Chemical and Biological Engineering
Harrison Lofredo	Paul DesJardin	Mechanical and Aerospace Engineering
Akirah Matthews	Negar Elhami Khorasani	Civil, Structural and Environmental Engineering
Amit Mehrotra	Paul Cullen	Biological Sciences
Olive Smith	Jonathan Lovell	Biomedical Engineering
Starla Taylor	Kenneth Hoffman	Biomedical Engineering

Meet the Office of STEM Diversity Programs Staff

STEM Diversity Programs welcomes a New Staff Member, Ms. Sonia Grant

Sonia Grant, MS
Assistant for STEM Diversity

The Office of STEM Diversity Programs would like to welcome ***Ms. Sonia Grant***, our new Assistant for STEM Diversity Programs. Ms. Grant has been at UB for the past 5 years, serving as an Administrative Assistant in Cora P. Maloney College, the Office of the Dean for Undergraduate Education, and most recently in the Academic Advising Office. Ms. Grant has a Masters Degree in Economics from UB and is currently pursuing her Masters in Higher Education, with plans to continue on to her doctorate. Ms. Sonia will be doing many of the duties that Nancy Campos performed before she left for a Director's position at SUNY Newpaltz.

Ms. Sonia is excited to be a part of the office and looks forward to meeting all LSAMP, STEMinism, and UB NERDS students as well as members of NSBE, SHPE and WiSE!

Meet our new Research Methods Instructor, Mr. Ogechi Ogoke

Ogechi Ogoke is a doctoral student in the UB Department of Chemical and Biological Engineering and served as the LSAMP Research Methods instructor for the LSAMP Summer Research Internship Program. He will continue to work with LSAMP students during the academic year and a love for teaching led him to LSAMP and the Research Methods job opportunity.

Ogechi Ogoke, BS
Research Methods Instructor

Ogechi's interest in chemical engineering and fascination for math, chemistry, biology, and physics led him to become a peer led tutor to incoming freshman in general chemistry, calculus and physics while an undergraduate at the University of Maine. He was a member of a number of organizations including the American Institute for Chemical Engineers (AIChE), and the American Chemical Society (ACS). Ogechi founded the National Society of Black Engineers (NSBE) chapter at the University of Maine, and with other members, worked on a number of projects to inspire students to achieve and pursue higher aspirations then they might have thought possible.

During his current doctoral work, Ogechi is investigating the differentiation of human embryonic stem cells towards the development of micro-engineering liver tissue. The overall goal is to determine an effective means to treat liver disease and its related end-stage liver cancer. He is currently wrapping up a review article that is geared towards summarizing the various aspects of liver cell therapy, in hopes of having his subsequent doctoral work published.

LSAMP was happy to add Ogechi to our team and we look forward to working with him for years to come!

LSAMP Summer Research Program Interns

Akirah Matthews

Civil, Environmental and Structural Engineering
University at Buffalo
Mentor: Dr. Negar Elhami Khorasani (L)

Developing Fragility Curves to Assess Seismic Vulnerability of Bridges in Downtown Seattle, WA

Evaluating consequences of an earthquake on roadway accessibility is essential for emergency operations after an earthquake. One of the parameters that affects roadway accessibility is functionality of critical bridges. This project will focus on assessing performance of bridges in downtown Seattle (WA) and consists of two parts. The first part collects existing seismic fragility curves for vulnerability assessment of bridges and compiles them in an interactive tool. The second part applies the collected fragilities to identify critical bridges in downtown Seattle. The outcome of this research can be used for mitigation strategies related to emergency operations in earthquake prone areas.

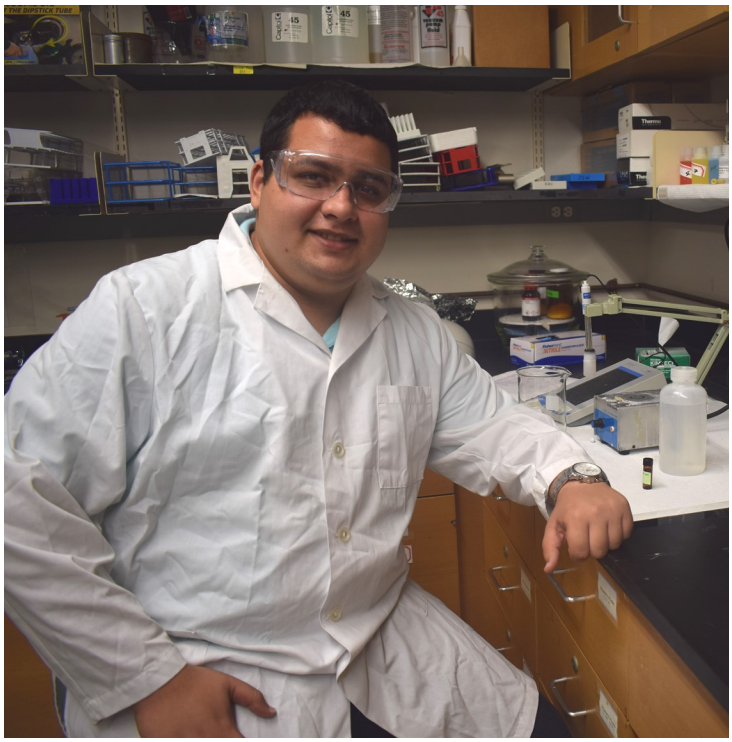
Destiny Diaz

Mathematics
University at Buffalo
Mentor: Dr. Jae-Hun Jung

Reproducing Fractals in Nature Using Affine Transformations

Fractals are self similar structures. In our research, we develop a method to analyze the characteristics of a fractal then reproduce it using a unique affine transformation. We began our research by studying different affine transformations and the fractals they produce using Python. During this process, we investigated thein verse transformations to study the hidden transform process. We then analyzed a specific self similar structure and determined if we could find the affine transformation of this fractal by simply analyzing the image. Our research will aid in efficiently being able to generate a fractal so its behavior can be studied.

Brian R. Cruz Padilla
Chemistry
University of Puerto Rico, Cayey
Mentor: Dr. Diana Aga/Steven Travis



Optimization for the Analysis of Flame Retardants by GC-MS/MS

Flame Retardants such as Polybrominated dipehenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs) have been used in production of many products including electronics, household furniture, and machinery. These compounds have been shown to bioaccumulate and persist in the environment as well as show toxic effects in organisms. Extraction methods for these lipophilic compounds from complex matrices can be difficult and time consuming. The goal of this research is to create a simplified method of extraction and analysis using pressurized liquid extraction, a lipid clean up step, and analysis using gas chromatography tandem mass spectrometry.

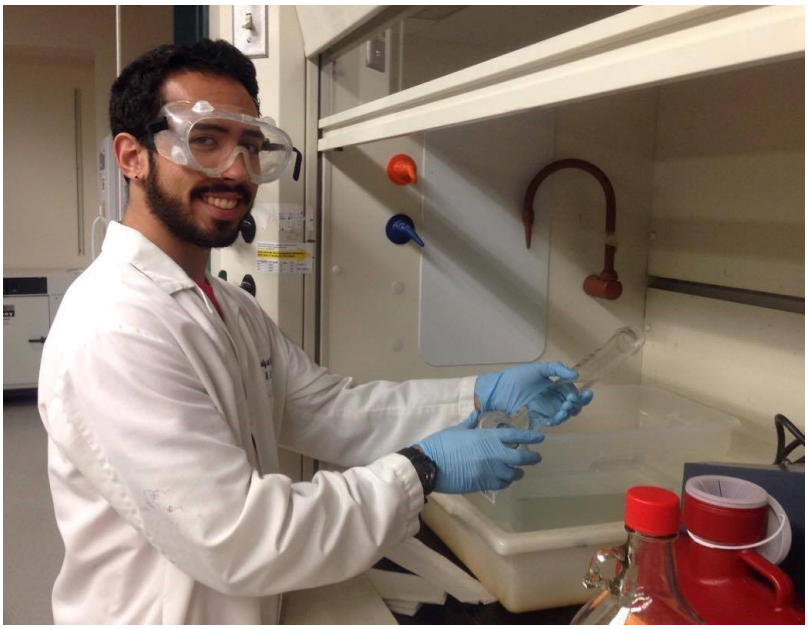
Amit Mehrotra
Biological Sciences
University at Buffalo
Mentor: Dr. Paul Cullen

Interfering with Aggregate Formation in Saccharomyces Cerevisiae

How individuals cooperate is an important question. Budding yeast cooperate by filamentous growth, a foraging response to nutrient limitation. We identified an aspect of filamentous growth where cells cooperate in groups called aggregates. Cells deficient in adhesion, which is required for filament formation, did not participate and interfered with aggregate formation. We are testing whether cells lacking the sucrose metabolic enzyme invertase (which is secreted and shared by cells) are aggregate deficient. Understanding the mechanics of cooperation may provide evolutionary insights and have benefits in industrial processes involving fungi, as well as combating parasitic fungi.

Héctor D. Barreto Vázquez

Biological Sciences
University of Puerto Rico, Cayey
Mentor: G. Ekin Attila



Role of Triacylglycerol Biosynthesis During Apoptosis

The role of specific lipid species in apoptosis is not well understood. Polyunsaturated fatty acid containing triacylglycerol (PUFA-TAG) accumulation has been reported during apoptosis due to activated TAG biosynthesis, with one potential role being to protect cells from membrane damage.[1] We hypothesized that the inhibition of PUFA-TAG biosynthesis will cause toxicity due to membrane damage. We are currently assessing cell viability under different apoptotic conditions to study the effect of inhibition of TAG biosynthesis in the presence of apoptotic agents. Our findings will elucidate unknown and potentially protective roles for TAG biosynthesis during apoptosis.

Sykhere Brown

Chemical and Biological Engineering
University at Buffalo
Mentor: Johannes Hachmann

Applicability Domain of Machine Learning Models for the Structurally Limited Chemical Data Sets Generated by Virtual High-Throughput Screening

Virtual high-throughput screening, in combination with machine learning, can provide valuable contributions in the discovery of new materials with targeted properties. For small compounds, this process is relatively quick; however, when extending the library to larger compounds, the process increases in complexity. Thus, restricting the library to smaller compounds is the most practical strategy. As a side effect, the reliability and generalizability of prediction models for the structurally limited datasets becomes problematic. In the current work, we try to quantify the applicability domain of prediction models that are based on training sets with limited size of compounds.

Nasiah Johnson

Electrical Engineering
University at Buffalo
Mentor: Dr. Nicholas Mastronarde (R)

A Look Into 5G Technologies for Everyday Devices Connected to the Internet

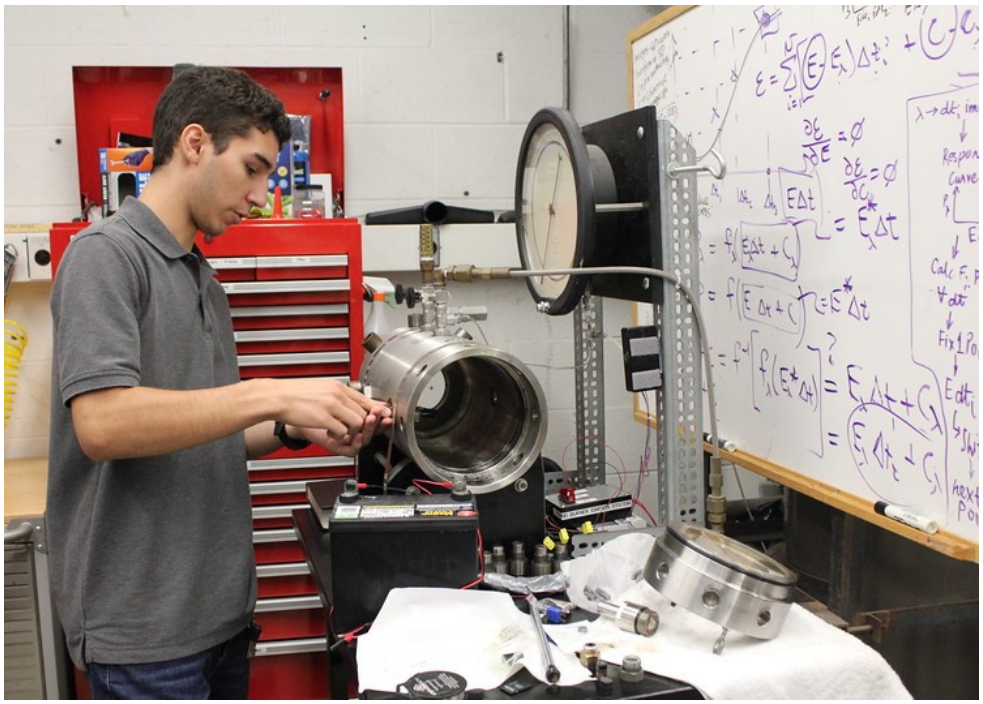
By 2020, up to 30 billion devices will be connected to the Internet. Many of these will be low power, low data devices that cannot be easily integrated into existing cellular networks. Emerging 5G network technologies are in development to support this massive number of devices. This study investigates an extension of the famous Slotted ALOHA medium access control protocol, which has been considered for this new technology. In Slotted ALOHA, time is divided into slots in which each user transmits a packet with some probability to one receiver. The extension incorporates reception by multiple receivers to improve network efficiency.

Harrison Lofredo

Mechanical & Aerospace Engineering
University at Buffalo
Mentor: Dr. Paul DesJardin

Burn Rate Efficiency of Rocket Propellant Mixtures

The Strand Burner, also known as the Crawford Bomb, is a low cost approach for testing rocket propellant. This project uses a high-pressure chamber donated by Canty Engineering and a strand holder we designed. The propellant we tested is a mixture of aluminum, ammonium perchlorate, HTPB (binder), curative, and other strengthening agents. Propellant burn rates were calculated using basic diagnostics including chamber pressure, propellant temperature, and duration for the propellant to burn over a specific distance.



Olive Smith

Biomedical Engineering
University at Buffalo
Mentor: Dr. Johnathan Lovell

Light Triggered Release of Gene-Carrying Polyplexes

The objective of gene therapy is to treat or prevent disease through the use of gene editing and its success depends on safe, specific and efficient delivery of therapeutic genes to the nucleus of a cell. However, because most delivery vehicles enter the cell by endocytosis, therapeutic genes become damaged by lysosomal enzymes. Light-triggered gene delivery has been employed to overcome this obstacle. Having light-triggered release of genes within a cell limits biological effects to illuminated areas, allowing investigation, through the use of polymer/GFP complexes, on how this method could be used to accomplish gene editing in regions of interest.

Starla Taylor

Biomedical Engineering
University at Buffalo
Mentor: Dr. Kenneth Hoffman

Methylene Iodide as a Radiographic Contrast Material in Diagnosis of Tooth Cracks

Cracks in the teeth are common and can lead to pain and infection. Current methods for diagnosis do not allow assessment of crack depth. In this study, methylene iodide (MI) was tested as a radiographic contrast material. MI was found to provide sufficient contrast for crack visualization, and cracks were discernible for a range of x-ray beam angles. It was found to evaporate exponentially, with a half-life of about 20 minutes. These results indicate that MI may be a useful addition to existing methods for diagnosis and evaluation of tooth cracks.

Emmanuel Canales
Chemical and Biological Engineering
University at Buffalo
Mentor: Dr. Marina Tsianou

Surfactant Association in Aqueous Solution to Inform Environment and Health Impacts

Fluorinated surfactants find niche applications because of their high chemical and thermal stability and their unique ability to render surfaces non-stick (Teflon-like). However, the widely used perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are extremely resistant to degradation in the environment, bioaccumulate, and have long half-lives in humans; accordingly, PFOA and PFOS were recently phased out [EPA 505-F-14-001]. This study addresses aqueous solution properties of fluorinated surfactants, with a focus on how such surfactants interact with (bind to) other molecules or particles/surfaces. The knowledge generated will facilitate the removal of fluorinated surfactants from the aquatic environment or blood.

Mohamed Kawy
Chemical and Biological Engineering
University at Buffalo
Mentor: Dr. Marina Tsianou

Polymer Performance in Brines for Unconventional Oil and Gas Extraction Applications

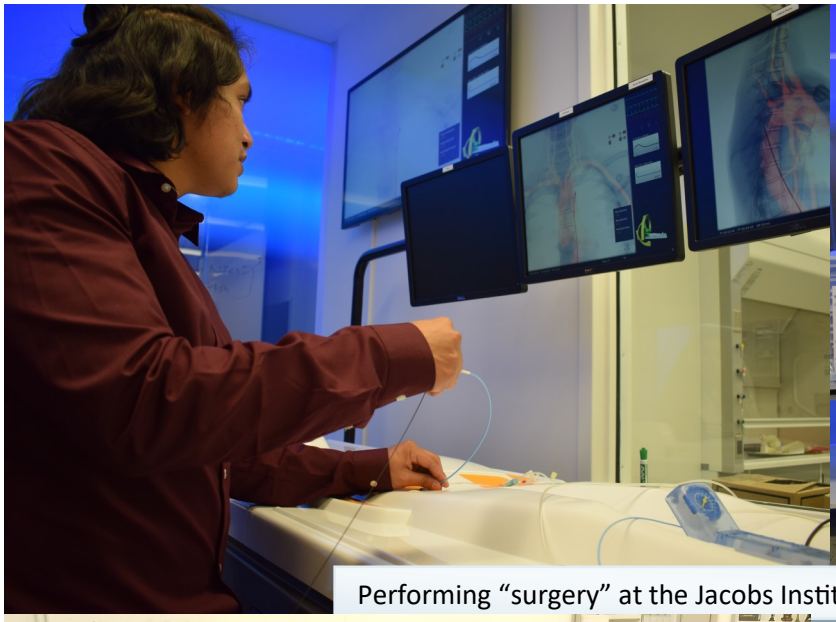
The growth of unconventional oil and gas extraction has been enabled by hydraulic fracturing which involves the injection into shales of aqueous suspensions of particles (proppant) that prop fractures open and increase hydrocarbon permeability. Polymers are essential ingredients of hydraulic fracturing fluids to modify viscosity and suspend particles. Unconventional oil and gas extraction uses large amounts of fresh water and produces equally large amounts of saline water (brines). This study addresses solution properties of water-soluble polymers, with a focus on effects of high salinity. The knowledge generated will facilitate the utilization of brines, thus easing freshwater scarcity and waste-water disposal.

LSAMP Summer Research Program Events

LSAMP students visit the Jacobs Institute on the Buffalo Niagara Medical Campus

"Litter Mob" clean up in Allentown

Ogechi and Harrison at the Buffalo Niagara Medical Campus



Performing “surgery” at the Jacobs Institute during the simulation exercise

Team work makes the dream work! LSAMP interns getting ready to attend the UB Research Conference.

Woodlawn Beach Clean Up

Students receiving a special behind the scenes tour of Darien Lake Theme Park

Ready to enjoy lunch at the Etiquette Luncheon, during the STEM Soft Skills Day

Adopt-a-Beach clean up at Woodlawn Beach

Clearing invasive species at Tifft Nature Preserve

LSAMP Interns strike a pose at the UB Research Conference

LSAMP Interns cleared 191 pounds of trash from Woodlawn Beach!

LSAMP Interns visit the Buffalo Water Authority

UB LSAMP Summer Interns at the Clinical and Translational Research Center (CTRC)

Having fun cleaning up trash in Allentown

Thank you to our sponsors & partners!

Program Staff

Letitia Thomas, PhD
Director for STEM Diversity Programs
lthomas@buffalo.edu

Sonia Grant, MS
Assistant for STEM Diversity Programs
sgrant2@buffalo.edu

Ogechi Ogoke, BS
Research Methods Instructor
ogechiog@buffalo.edu

Casterland Fanfan, BA
UB STEM Newsletter Editor
casterla@buffalo.edu

Jose Escobar
UB STEM Student Assistant