

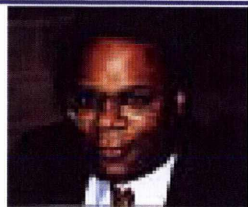
The Impact of State University of New York Louis Stokes Alliance for Minority Participation (SUNY LSAMP) 1996-2011

**Building the Advanced Technological Workforce through
Collaboration, Discovery, and Innovation:
Academia, Industry, and Government as Partners
In Knowledge Development and Economic Growth**



"SUNY LSAMP is preparing future STEM leaders who will be at the forefront of discovery, innovation, and STEM-supported economic development", Dr. David Ferguson, SUNY LSAMP Project Director

EXECUTIVE SUMMARY, *Dr. David Ferguson, Project Director*



Overview

Since 1996, the State University of New York Louis Stokes Alliance for Minority

Participation (SUNY LSAMP) has been helping to change the basic shape of STEM education and forging new opportunities for underrepresented minority (UREP) students in New York State. From its inception, SUNY LSAMP has consisted of sixteen higher education institutions (four major university centers, three four-year colleges, eight community colleges and one college of technology) within a four hundred mile area across New York State in urban, suburban and rural settings. The other key partners in the Alliance are: Brookhaven National Laboratory, a major research institution now being operated by SUNY Stony Brook and Batelle International; the NSF funded SUNY Alliance for Graduate Education and the Professoriate (SUNY AGEP) and the New York State Education Department Collegiate Science and Technology (CSTEP) programs.

Since its inception, SUNY LSAMP has made great strides in enrollment and degree production. It has increased underrepresented minority (UREP) science, technology, engineering and mathematics (STEM) enrollment by **372%**, community college STEM enrollment by **410%** and bachelor degree production by **88%** SUNY LSAMP has taken a leadership role in STEM

curricular reform on its campuses and has acted as an agent of change on a range of issues related to the needs of UREP STEM students. This process has led to the engagement of every facet of our institutions (faculty, staff, administrators, and department/programs), helped to create new infrastructures and partnered in campus reform efforts such as learning communities and undergraduate colleges.

In this period, SUNY LSAMP has been continually broadening its mission. In recognition of these efforts, NSF awarded SUNY LSAMP a two year grant of \$200,000 to undergo research about the effectiveness of student support services and issues that affect student choice of graduate study. The project worked towards creating models of best practices in UREP STEM education. Project results have been disseminated through scholarly articles, presentations at conferences, on relevant web sites and through the Center for Inclusive Education at Stony Brook University.

In addition, SUNY LSAMP has received six grants of \$987,000 for NSF fellowships and support services for 12 LSAMP graduates yearly through the LSAMP Bridge to the Doctorate program. This program has increased the UREP STEM doctoral pool by bringing in students who have been in LSAMP programs across the country and supporting them in their first two years of graduate study and on to completion of their Doctorates.

COVER PHOTO

Picture of Protein DNA complex by Kevin Hauser, SUNY LSAMP Bridge to the Doctorate student. This photo was the brochure cover winner at the 2011 American Chemical Society Meeting

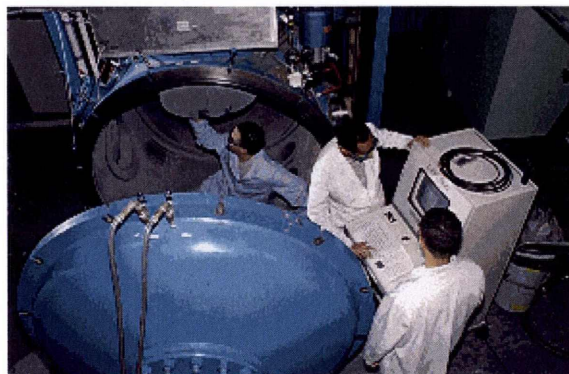
Opportunities and Challenges

This is an exciting time for science and engineering. Around the world, there is a growing awareness of the critical importance of scientific and technological advancements in enhancing economic growth and quality of life. At the same time, there is a rapidly expanding perspective that critical issues of our time, including energy and environmental issues and global health and prosperity, demand interdisciplinary thinking and wise leadership in socio-technological policies. The sheer intellectual excitement of doing STEM is increasingly intertwined with unprecedented urgency to use scientific and technological advancements for human good and the betterment of life in all its forms.

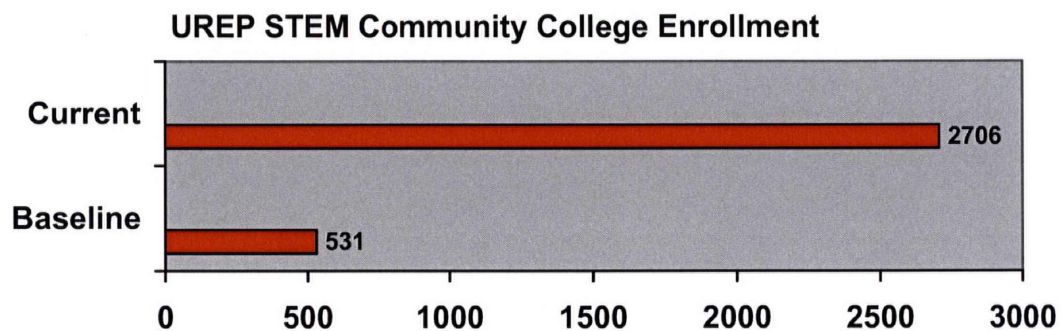
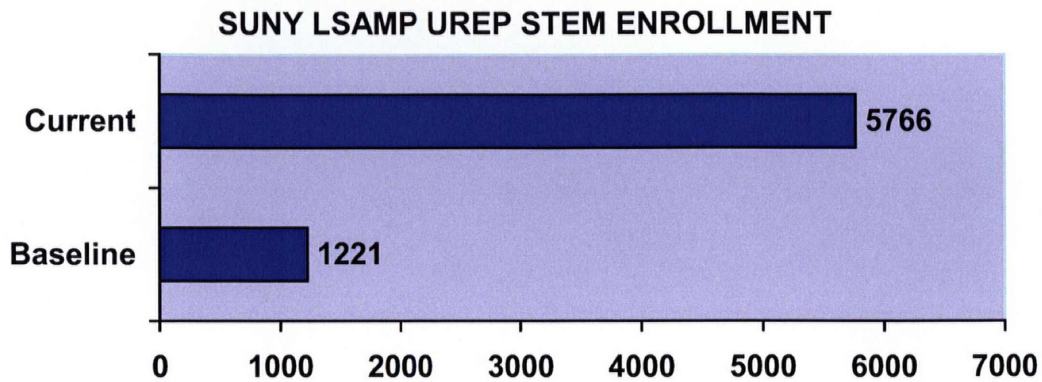
The challenges of knowledge development and application require unprecedented collaboration among academia, industry, and government. In regard to this collaboration, SUNY LSAMP has been a partner in each area and in bringing the areas together. First, SUNY LSAMP has helped students to achieve, at the highest level, in their academic work. Second, SUNY LSAMP scholars have entered the STEM workforce through internship and career employment with a variety of industries. Third, SUNY LSAMP has collaborated with local government (Community Colleges), State government (e.g. New York State Education Department—STEP and CSTEP, the SUNY Office for Diversity, Equity and Inclusion), and Federal Government (BNL, externally-funded grants). Finally, SUNY LSAMP will be a participant in New York Governor Cuomo's Regional Economic Development thrust. Samuel L. Stanley, M.D., President

of Stony Brook University and PI on SUNY LSAMP, is a member of the Long Island Regional Economic Development Council. Dr. David L. Ferguson, Director of SUNY LSAMP, will work closely with the President on issues related to the participation of underrepresented groups in Long Island economic development trusts and encourage similar participation by SUNY LSAMP faculty and staff in the other nine Regional Economic Development Areas across the State: Capitol Region, Central New York, Finger Lakes, Mid-Hudson, Mohawk Valley, New York City, North Country, Southern Tier, and Western New York.

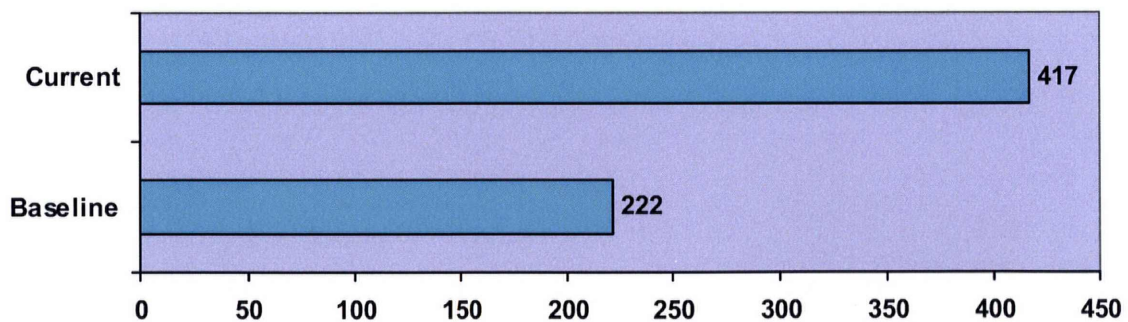
Students in Geo-Thermal Lab at Stony Brook University



SUNY LSAMP BENCHMARKS: 1996 to 2010



SUNY LSAMP UREP STEM Bachelors Degrees



Since 1997, **4939** UREP STEM students have received **Bachelor's Degrees**

Since 1997, **680** UREP STEM students have received **Master's Degree**

Since 1997, **161** UREP STEM students have received **Doctoral Degrees**

An average of **412** Level 1 students received comprehensive services per year.

An average of **44%** of SUNY LSAMP students continue on to STEM graduate school yearly (over twice the national average for UREP STEM students)

We have provided two year NSF Graduate Fellowships to **60** UREP STEM graduate students through our Bridge to the Doctorate (BD) program.

SUNY LSAMP is preparing and producing WORLD CLASS SCHOLARS, RESEARCHERS and STEM WORKFORCE PROFESSIONALS

NSF Graduate Research Fellowship

Winners (NSFGRFP)

- Jude Safo (Stony Brook)
- Maria Rodolis (New Paltz)
- Elizabeth Millings (Stony Brook)
- Dmitri Vaughan II (Albany)

Honorable Mentions: NSFGRFP

- Javier Monzon
- Kevin Hauser
- Luisa Torres
- Marie Raphaelle Jean
- Karen Torrejon

Other Awards and Honors

- NIH Minority Post-Doctoral Fellowship
- NIH Fellowship in Chemical Biology
- Trjitzinsky Scholarship from American Mathematical Society
- Association of Women Geologists
- IBM Science Award
- SUNY Chancellor's Academic Excellence Award
- NYS Underrepresented Graduate Fellowships
- GEM Fellowship
- NSF IGERT Fellowships
- NASA Jenkins Graduate Fellowship
- Barry Goldwater Scholarship
- Museum of Natural History Grant
- UNCK-Merck Fellowship
- Fullbright Fellowship
- Bunton-Waller Fellowship
- Percy Sutton Award
- (MARC) Career Fellowship award
- American Society of Engineering Education Post- Doctoral Fellowship
- Math for America, Newton Fellowship
- Society of American Military Engineers (SAME) Scholarship

Author or co-authors of articles in:

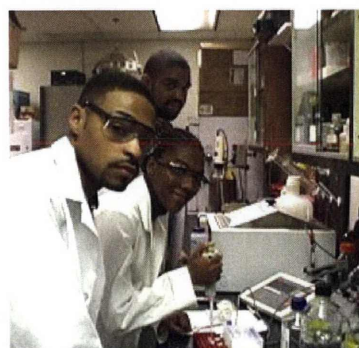
Journal of Physical Chemistry
Society for Neuroscience on line
Invertebrate Neuroscience
Journal of Behavioral Ecology
American Journal of Primatology
Journal of Physical Chemistry
Bioscience
Physical Chemistry Chemical Physics

Chapters in books:

Frontiers in Aging Neuroscience
Leaping Ahead, Advances in Promimian Biology
Metabolism of Drugs and Xenobiotics

Papers and posters presented at:

American Society of Mammalogists
Ecological Society of America
Experimental Biology Meeting
American Physiology Society
Metropolitan Association of College and University Biologists
Annual Biomedical Conference for Minority Students (ABRCMS)
Leaders Alliance Symposium
Materials Research Society
Society for Neuroscience
American Society of Primatologists
Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy
Preparing for the Professoriate Conference
Gathering of Scholars Conference
Society of Integrative and Comparative Biology Conference
American Chemical Society
SACNAS



JUDE SAFO

"After completing my Ph.D., I intend to commit myself to a life of research and mentoring much in the likeness of the Professors who inspired me"

Jude majored in Engineering Science with a minor in Physics at Stony Brook and was a SUNY LSAMP Bridge to the Doctorate student from 2010 to 2011. He received his Master's degree in 2011 and is currently starting the Ph.D. Program in Nuclear Engineering at MIT. **In 2010 he received the NSF Graduate Research Fellowship** that he will be using at MIT for his doctoral studies. As an undergraduate Jude was inducted in Sigma Pi Sigma honor society (awarded to Physics majors with a minimum 3.5 GPA) and Tau Beta Pi Engineering Honor Society (awarded to the top 8% of the engineering class). As President of the Society of Physics Students he required that all members offer tutoring to students in gatekeeper physics courses. He participated in IRAD projects while interning with Department of Defense programs at Lockheed Martin and Northrup Grumman and worked as Research Assistant at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Lab in the Department of Energy SULI program. This summer he was selected to participate in the Nanosystems Initiative summer program in Munich, Germany.

Jude Safo (left) with Dr. A. James Hicks and BD students



MARIA RODOLIS

"I found out about the REU through my school's LSAMP program... Coming to this program made me completely reassure myself that research is definitely my passion and I'm going to do this for the rest of my life", From DVD, Research Experiences for Undergraduates in Costa Rica.

Maria graduated from SUNY New Paltz with a B.S. in Chemistry in 2010. Maria's first research experience was in working on "Synthesis and Testing of Antimicrobial Activity of Monobactams" which she presented several times including the 2010 American Chemical Society National Conference in San Francisco. She then worked at La Selva Biological Station in Costa Rica in summer 2009 on a project titled, "An Investigation in the Vegetative Buds of *Tectaria Lizarzburui* at La Selva Biological Station, Costa Rica" which she presented as a poster at the 2009 LSAMP International Conference in Florida. She also received the SUNY Chancellor's Award for Student Excellence in 2010. She participated in the MHIRT program on a molecular biology and virology project at Centro de Biología Molecular Severo Ochoa in Madrid Spain during the summer after she graduated. **Maria won the NSF Graduate Fellowship in 2010** and began her PhD program at the University of Warwick in the UK in Fall 2010. Just before she started her doctoral program, she returned to New Paltz to present a program to students about travel and research abroad.



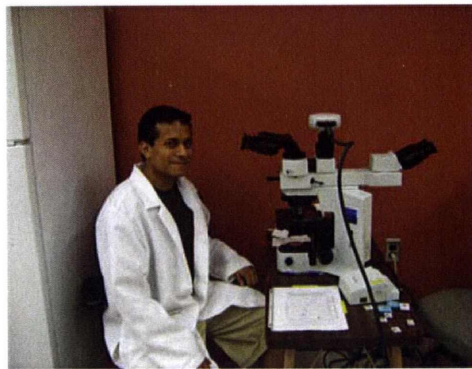
Some of the institutions in which SUNY LSAMP students have been enrolled include:

University of Warwick, England, Harvard, Tufts, CUNY Graduate Center, Queens College, Lehmann College, Long Island University, UC- San Diego, UC- Berkeley, U. Pittsburgh, Binghamton University, Clemson, Fordham, Columbia, Northwestern, Howard, University of Maryland College Park, Tulane, SUNY Albany, Georgia State, University at Buffalo, Purdue, Stanford, Montana State, Albany College of Nanotechnology, Emory, MIT, Penn State, University of New Haven, Columbia Teachers College, U. Arizona, RIT, MIT, U. Florida, Albert Einstein, Montana State, Case Western, Stony Brook,

PH.D. COMPLETION OF SUNY LSAMP GRADUATES

Graduates have completed doctorates and become STEM faculty and researchers at NIH, CDC, BNL and the Defense Departments.

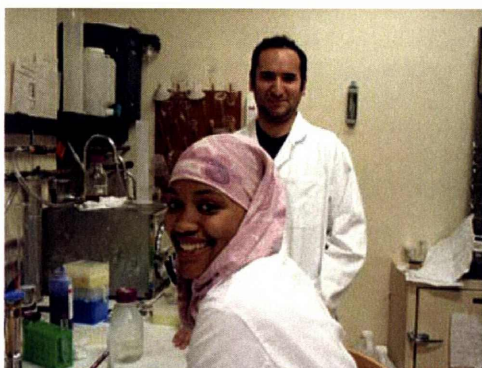
- Sunyata Smith (Old Westbury), Md/Ph.D Immunology, Albert Einstein School of Medicine
- Marvin Vasquez (Stony Brook), Materials Science, Stony Brook
- Wesley Francillon (Stony Brook), Materials Science, Stony Brook
- Melody Goodman (Stony Brook), Biostatistics, Harvard
- Giselle Medina (New Paltz), Microbiology, Stony Brook
- Yared Alemu (Stony Brook), Electrical Engineering, Stony Brook
- Susan L. Campbell (Albany), Neuroscience, University of Alabama, Birmingham
- Marjorie Bonhomme (Old Westbury), Physiology and Biophysics, Stony Brook
- Federico Casares (Old Westbury), Marine Sciences, Stony Brook
- Jamilah Abdur Rahim (Binghamton) Mechanical Engineering, University of California, Santa Barbara
- Mary Osisami (Stony Brook), Genetics, Stony Brook



SUNY LSAMP STUDENTS ARE GIVING BACK TO OTHERS

SUNY LSAMP and its students place a high priority on making sure that successful students act as role models and mentors to new students in the pathway. For example:

- Students act as peer mentors (high school to undergraduate to graduate, advanced graduate to beginning graduate).
- Students are going to local secondary schools to act as tutors, mentors and help recruit students to college and STEM careers.
- Students have developed hands on activities to excite young children about science. One example is a Chemistry program developed for kindergarten students.
- Students have developed workshops to help new college students. One example is a Science Empowerment workshop developed by a current BD student.
- Students are helping each other prepare fellowship and graduate school statements and applications. For example, one NSFGRFP winner worked with students on preparing their personal statements.
- Students have participated in programs and panels on key issues. One example is a student who studied in an international NSF REU and then returned to encourage undergraduates to do international research.
- When students become graduate students, they are actively mentoring UREP STEM undergraduates in their laboratories.



GIANCARLO CUADRA (shown mentoring a UREP STEM undergraduate in photo)

Giancarlo was born in Peru and came to the United States in the mid 1990's. After learning the language and graduating from high school, he enrolled at Rockland Community College. He then received his BS in Cell and Molecular Biology at Binghamton where he participated in the LSAMP (Binghamton Success) Program and did summer research at the University of Rochester in a program called Graduate Experience in

Biomedical Sciences for minority students. He started his PhD work at Binghamton in Biological Sciences in 2009 where he is working on understanding the physical and chemical interactions that occur among bacteria that form the early dental plaque in the human oral cavity. He expects to finish his PhD by 2012. Upon graduation, he plans to join a lab either in the academic or industrial settings." *LSAMP has helped tremendously during my undergraduate years because it gave me the necessary strategies and tools to maintain a high GPA. I met Karen Catalano who taught me how to study for tough courses. Some of these strategies included time management workshops, plans to study for exams with "maps" that aided the understanding of the material and the Friday lunches that took the edge off a stressful week. Meeting other students in the same conditions as myself gave me a sense of belonging and the feeling of "I'm not alone" when it came to stress and hard work week by week.*

THE ECONOMIC AND SOCIETAL IMPACT of SUNY LSAMP

SUNY LSAMP's efforts are part of broad-based national efforts to produce a diverse science, technology, engineering and mathematic (STEM) workforce crucial to our ability to compete in the global marketplace in the 21st century.

"First, the productivity of the entire nation depends on the achievements of everyone. The Louis Stokes Alliance for Minority Participation (LSAMP) has been funded and supported by the NSF because we cannot wait a generation for better prepared students to arrive at colleges. We, as a society, have to do our best for underrepresented minority students of all ages." **Leo Gafney, SUNY LSAMP Research Report**

1. PRODUCING THE HIGH TECHNOLOGY WORKFORCE

SUNY LSAMP graduates have been leaders in STEM education, research and in the high technology workplace-setting policy, performing cutting edge research, inventing new products and processes and participating in efforts to increase diversity. A sample of current efforts of SUNY LSAMP graduates include:

Fighting causes and costs of disease by doing:

- Research on causes and cures for epilepsy
- Statistical analysis of epidemiology of autism
- Statistical analysis of cancer research
- Biostatistics for public health policy
- Director of a Center for Public Health and Health Policy working on health disparity issues
- Making radioactive doses used to detect cancer in PET scans
- Developing non-antibiotic treatments for oral health care

Helping promote energy sources and the environment by working on:

- Renewable energy
- The effects of fluorocarbons on the environment
- Research on coyotes for species preservation
- Research on developing the Smart Grid
- The effect of Biomass Burning Aerosols on Cloud Formation and Climate Change
- Designing solar panels for Lefrak City in New York
- How to get rid of marine oil spills

International Impact

- Designing and building a water system in Rio Hondo, Honduras
- Constructing homes through a Service Learning Project in Nicaragua

Cutting edge engineering and technology including new inventions and processes including:

- Using nanotechnology to bioengineer a novel model for glaucoma screening

- Doing analysis of high technology materials for defense purposes
- Doing research on bioacoustics
- Inventing a new methanol EK pump that is pending a new patent
- Developing safety procedures for astronauts
- Working on cyber safety

SUNY LSAMP graduates currently have professional positions at:

- Department of Defense
- NASA Goddard Space Center
- NIH
- Brookhaven National Laboratory
- Mercury Solar Systems
- US Census Bureau
- General Electric
- Bentley Systems
- IBM
- Regeneron
- Raytheon
- United Illuminating
- New York City: Teachers of Mathematics,
- Barclays
- Goldman-Sachs
- Liberty Mutual

- Mayo Clinic
- Lockheed Martin: System Integrations, Maritime Systems, Radar Systems
- 3M
- US Army
- Turner Construction
- Consolidated Edison
- Proctor and Gamble- Production Engineer
- NASA Goddard Space Center
- Defense Contract Management Agency
- NAVAIR
- MTA Boston
- United Technologies
- Northrop Grumman
- Cardinal Health
- Laboratorio Clinico La Merced (San Juan)
- Colleges and universities as faculty, researchers and program staff: Connecticut Community College, Washington University of St. Louis, Stony Brook University, University at Buffalo, Harvard University, Kingsborough Community College (math instructor), Hofstra University (Engineering instructor) University of Buffalo Institute for Lasers, Photonics and Biophotonics

“LSAMP has equipped and empowered me to become a leading professional at NIH. As a contracting officer at the NIH, I reflect on the academic training, professional development and personal mentoring of the LSAMP staff. The impact of the LSAMP program on my life and others who I’ve touched is priceless. It is with humility and honor that I am a supporter of LSAMP’s programmatic efforts”. Latosha Frink



Sabrina Thompson: Stony Brook Alumna Becomes a Rocket Scientist

Sabrina was born in a small town on Long Island, New York, called Roosevelt. Unlike many, she did not grow up with the desire to become an engineer. In fact, she did not know what an engineer was until the 12th grade, when she started to seek possible majors for college. She is proud to be the first in her family to obtain both a bachelor's and master's degree (She also aims to be the first to attain a PhD.) Growing up in the poorest town on Long Island did not hinder her from achieving success in endeavors she pursued. When Sabrina was trying to decide on a college major, one of her high school teachers informed her that the science and math courses required for a mechanical engineering degree would be too hard for her. Instead of taking his advice, she accepted it as a challenge and set out to prove him wrong. And, indeed, she did.

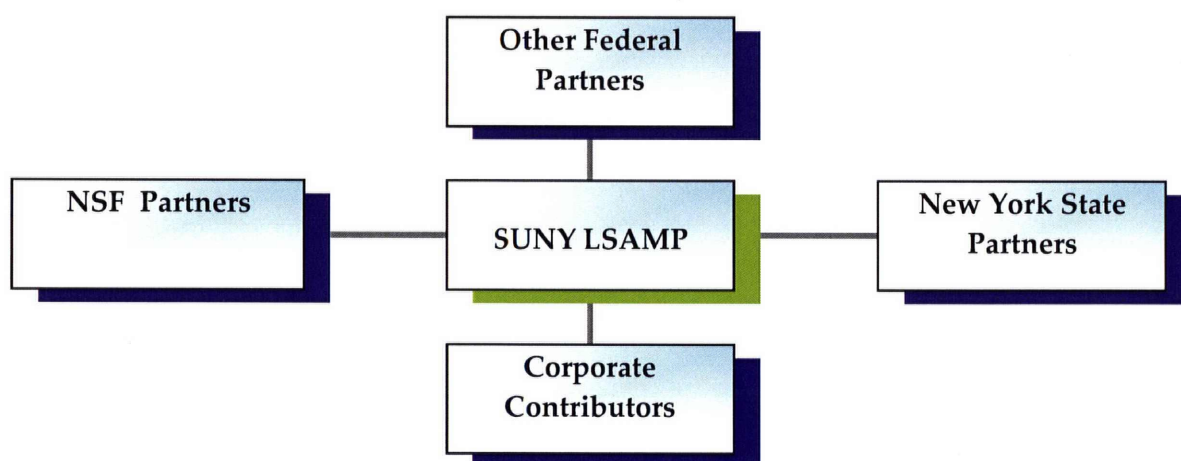
Today, Ms. Thompson works with a team of safety experts to keep the brilliant minds at NASA Goddard Space Flight Center safe and protected in the workplace by identifying potential hazards and creating solutions to mitigate them. Throughout her career, she has remained passionate about innovation, space exploration and having a positive impact on society. She encourages the next generation to pursue their dreams or passion and to refuse to settle for less than they are capable of achieving, just as many of those around her wouldn't let her settle. *"They pushed me to limits I thought I could never cross and I am forever thankful,"* she said. Ms. Thompson earned a bachelor's degree in mechanical engineering from Stony Brook as a SUNY LSAMP student and a master's degree in aerospace engineering from Georgia Institute of Technology, Atlanta, Georgia.

" I participated in the CSTEP program the summer before my freshman year at Stony Brook and participated in LSAMP my entire undergraduate career. Without these two programs, I may not have made it through the first year, let alone graduated. The CSTEP program not only "gave me a taste" of what I would experience my first year at Stony Brook through the intense coursework and unfamiliar college life, but it also enabled me to be a part of the network of students and faculty members that utilized each other as resources, mentors and friends. LSAMP provided me the financial, academic, emotional and social support I needed throughout my undergraduate career. The LSAMP and CSTEP mentors' and advisors' care for the student goes far beyond the classroom." Sabrina Thompson

2. ECONOMIC IMPACT ON PROGRAMS AND INSTITUTIONS

Resources are always limited and sharing them is the only way to add value to them, benefiting the students served and the institution. Carefully used and shared resources will help lead to continuity and quality services. From SUNY LSAMP Research Report

Faculty and professional staff in SUNY LSAMP campuses have been taken a leadership role in gaining support from New York State, private foundations, and federal sources for programs that serve UREP STEM students. This has made a great impact on students, programs and changes in policy and practice and greatly increased the number of UREP STEM undergraduate and graduate students receiving degrees.



Dollar Impact

These funds have helped to institutionalize program elements, provide funding for program staff, provide space and materials to run programs, create permanent funding for programs and more.

Time period	State Government	Campus funding	Corporation and Foundation	Funds from collaborative grants	TOTALS
Phase I	1,231,161	9,744,243	845,423	1,582,663	13,403,490
Phase II	801,905	6,178,027	310,235	3,129,047	10,418,214
Phase III*	6,380,954	7,575,000	54,000	4,474,845	18,484,799

* This phase is not completed yet. These are funds to date.

Collaborators	Services
<p>NSF Partners Alliance for Graduate Education and the Professoriate (AGEP) Bridge to the Doctorate (BD) Broadening Participation in Computing (BPC) Graduate Research Fellowship Program (GRFP) Opportunities for Diversity in Geosciences (OEDG) Research Experience for Undergraduates (REU) Scholarships in Science, Technology, Engineering and Mathematics (S-STEM)</p>	<p>Undergraduate scholarships Graduate fellowships Recruitment of UREP STEM graduate students Summer and academic year research Summer Research Institutes Outreach to secondary school students Academic support services Preparation for graduate school Preparation for applying to graduate school Peer and professional mentoring/ advisement Preparation for and participation in professional STEM conferences</p>
<p>Other Federal Partners Brookhaven National Laboratory (BNL) Bridges to the Baccalaureate (NIH) Educational Opportunity Program (EOP) McNair Scholars Program Minority Access to Research Careers: NIH (MARC) NY Space Grant: NASA Learn and Serve America</p>	<p>Placement in cutting edge research Summer research programs Placement in research for transfer students Academic support services Placement in service settings Summer bridge programs (pre-freshmen, community college transfers) Preparation for and placement in graduate study Research and internship placements Undergraduate scholarships</p>
<p>New York State partners Collegiate Science and Technology Program (CSTEP) Science and Technology Entry Program (STEP) Underrepresented Graduate Scholarships Office of Diversity, Equity and Inclusion NYS Regional Economic Development Councils</p>	<p>Undergraduate recruitment Academic support services Community building Internship and research placements Graduate fellowships, support services and professional travel stipends Promoting UREP STEM issues within the SUNY system Promoting diversity in the STEM workforce</p>
<p>Corporate partners BP Amoco Computer Associates International BAE Kodak Citigroup Motorola Kaplan Petersons</p>	<p>Student scholarships Paid internships Funds for summer programs Contributions to UREP STEM professional student societies (NSBE, SHPE, SWE etc.) Outreach to secondary school students Contributions (goods and service) Funds for GRE preparation</p>

THE IMPACT OF CORPORATE SUPPORT

SUNY LSAMP faculty and staff have worked actively with key administrators and development personnel on our campuses to not only get corporate support for our programs but also to bring issues of access and equity to the attention of companies and help them train and recruit a diverse high technology workforce. We have received funds ranging from \$5000 to almost half a million dollars to provide scholarships, provide paid internships, support program components and donate computers and other supplies to the programs.

An example of corporate support: CA Access and Excellence Scholarship Awards CEO of Computers Associates with Scholarship Winners



When SUNY LSAMP was funded, President Kenny the SUNY LSAMP PI, approached Computer Associates (CA) to request funding for African American men who were severely underrepresented in computer sciences. CA provided funds to support sixteen students- 13 freshmen and three transfer students who received both scholarships and paid internships. The funding helped to change a department that had a very poor track record for diversity. For example in 2000,

only two African American students majored in computer science and none in 1999. Because of this funding, enrollment for African American males increased by 56% and helped to build a UREP community in the department for the first time. Recognition of problems encountered by these (and other) students led to significant changes in the computer science gatekeeper courses. This funding therefore not only helped individual students but helped change department culture to make needed changes in computer science courses in order to retain more domestic and UREP students in the future as well as helping to bridge the current digital divide.

"I'm enrolled at Gannon University going for a Masters in controls systems (GE is paying) which I should complete by end of this spring. Life is hectic but I feel like I'm learning so much. I cannot express how much your support over the last 10 years has meant to me. I definitely would not be where I am today without the support of you and the LSAMP/MAAP/CSTEP programs and the resources I have been blessed with". Jahmil Campbell University at Buffalo

IMPACT ON HIGH TECHNOLOGY WORKFORCE DEVELOPMENT

With program support, SUNY LSAMP Level 1 students participate in internships and research placements that prepare them for professional positions in the high technology workforce. The list below of research and internship placements in which are students have been involved, illustrates the the range and quality of these placements.



“I attribute much of my success to the support from the LSAMP program, which, during my undergraduate studies, guided, supported and exposed me to conduct and present research to the scientific community.” Dr. Marvin Vasquez, Researcher, Department of Defense

Cutting Edge Research at University and Government Settings

Ge*NY*sis Center for Excellence in Cancer Genomics, Pharmaceutical Research Institute, Center for Advanced Sensors and Environmental Systems, Energy Systems Institute, NYS Center for Engineering Design and Industrial Innovation, Roswell Cancer Institute, NYS Center of Excellence in Bioinformatics and Life Sciences, High Performance VLSI and System Architecture Lab at Buffalo, NASA Goddard Institute of Space Studies at Columbia University, Solar Energy Consortium, Cold Spring Harbor Laboratory, Buffalo Cardiac Molecular Electrophysiology Laboratory, Department of Homeland Security, New York Department of Energy Conservation , Army Corps of Engineers, NYC Department of Environmental Protection, Howard Hughes Medical Institute EXROP program, DOE Laboratory at Oakridge, ORISE Program, NASA, NYC Office of Environmental Protection, UMDMJ, Columbia Presbyterian Hospital, Stratton VA Medical Center, Montefiore Medical Center, Winthrop University Hospital, Ordway Research

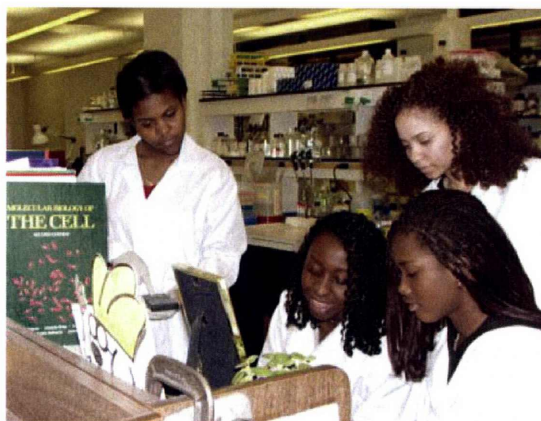
Institute, David Axelrod Institute, Buffalo Psychiatric Center, SYNCEDII, Columbia Presbyterian Hospital, Champion Learning Center, Americorps Highland Residential Center, Princeton University, Georgia State University, the University of Maryland Medical School, the US Army Armament Research Center, the University of California San Diego Super-Computer Center, Tufts, Penn State, University of Wisconsin, Virginia Tech, UMBC, SUNY Downstate, University of Virginia, Stanford, Albert Einstein, Columbia, Clarkson, Iowa State, Marquette, University of Arizona, University of Illinois. the Thermal Spray Lab, Polymer Research Center, the Marine Sciences Research Center, the Center for Molecular Medicine, the Linear Accelerator, the Buffalo Earthquake Center and Buffalo Virtual Reality Lab, Albany Nano-sciences Facility and The Energy System Institute. There were also placements that were possible because of new collaborations between University and government agencies. For example, students were placed at the DNA Center, a collaboration between the University at Albany, the New

York State Police Forensic Center, NOAA, Stratton VA Hospital and the New York State Department of Health

High Technology Corporate Internships

Daylight Forensic, General Electric, Northrop Grumman, Hydrogel Laboratory, Merck, Morgan Stanley, Hewlett Packard, Solaris Inc., IBM, Delphi, GE Power Train at General Motors, Sikorsky Aircraft, Lockheed Martin Maritime Systems and Sensors, Lockheed Martin Mitchell Field, United Illuminating, Solar Energy Consortium, Citibank, Sterling National Bank, OSI Pharmaceuticals, Pfizer, Boeing Aircraft, Excelon, Parker Hannifin, Long Island Railroad Engineering Internship, General Physics Inc., Birdair Inc., Boeing, Coldstone Creamery, Con Edison, Fed Ex, U.S. Power Generation, American Brass, Liberty Mutual, Citigroup Information Tech

Department, Entergy, Goldman Sachs, Dow Chemical, URS Corp, Executive Performance, Winthrop University Hospital, 3M, General Electric Aircraft Engines, Foundation for Glaciological Research, Merck, The Cardiopulmonary Research Institute, Delphi Thermal and General Electric Aircraft Engines, The Roswell Park Cancer Institute, Merck, Pfizer, Lincoln Labs at MIT, Pratt and Whitney, General Electric, Verizon, IBM, Computer Associates, Symbol Technologies, Pitney Bowes, Ford, Intel, Toyota, Citigroup, APEX, Ingram micro Licensing, Sloan Kettering, BAE, Texas Instruments, Moog, the FBI, Otis Elevator, Moody's Investor Services, Biodynamics, Publishers Clearing House, Rochester Medical Center, General Electric Power Generation Division and Boston Transportation Authority



"Being a part of the LSAMP program has been instrumental to my success as an undergraduate. I had the opportunity to participate in several summer REU programs at Rochester Institute of Technology, Brookhaven National Laboratory, and University of Alabama at Birmingham because I receive tremendous support from my LSAMP mentors and peers. I plan on pursuing my doctorate degree in Chemistry or Biomedical Sciences, and I hope to pursue a career as a Forensic Scientist."

Charmaine Williams: Binghamton University

IMPACT ON EFFORTS TO PRODUCE GLOBAL SCHOLARS AND RESEARCHERS

SUNY LSAMP is working to build opportunities for students to engage in international study and research. Some of our current efforts include:

International Placements, Presentations and Workshops

- MHIRT Summer Research Program in Madrid
- LSAMP International Program in Costa Rica
- Doing research on lemurs in Madagascar
- Working on an Engineers without Borders project in Honduras
- Working on a Service Learning Project building homes in Nicaragua
- Presenting research at the International Atomic Energy Commission in Vienna
- Attending the Nanosystems Initiative Munich summer program
- Presenting research at the 30th International Congress of Society Italiana de Patalogia in Salerno
- Presenting research at the Protein Society Meeting in Zurich
- Presenting research at Menoufia University in Shebin El-Kom, Egypt



Christina Abate is a junior in Mechanical Engineering with a concentration in Sustainable Engineering at Binghamton University. She has worked with Engineers Without Borders (EWB) and The Right Side of History Campaign at Binghamton University. In the summer of 2010, she received an internship with Solarias INC. and designed a solar panel system for Lefrak City, Queens, New York which was built. *“Before joining LSAMP I was struggling academically because I was over extending myself among all of the extracurricular activities I was involved with. I was considering dropping engineering and did not have an effective method for studying and managing my time. After joining LSAMP I was introduced to an inspirational group of students and faculty. Through the motivating support network established within Binghamton University’s LSAMP program I learned proper methods for studying and managing my time. LSAMP also provided support so that I could afford to attend the Society of Hispanic professional engineers National Conference in Cincinnati, Ohio where I benefited from an amazing networking experience, had interviews with Toyota and IBM and learned how to develop an impressive resume. In addition, LSAMP supported me when I traveled to a the community of Rio Hondo in western Honduras to build a water distribution system I spent over a year designing and fundraising for with a senior industrial systems engineering team and Binghamton University’s chapters of SHPE and EWB. Before joining LSAMP graduate school was never something I saw in my future; thanks to their weekly group meetings about applying to graduate school knowledgeable faculty and guidance, I now believe I have the potential to attain a PhD in sustainable engineering. In the summer of 2011, through LSAMP’s research internship program I had the honor to work with two PhDs on researching the incorporation of sustainable engineering in engineering education, research and practice. This was a very educational experience which strengthened my desire to attain a PhD in sustainable engineering. LSAMP at Binghamton University has provided me with the confidence, support and educational environment I*

needed to get on the right path for graduate school and I sincerely believe that without it, graduate school would not have been in my future plans and I might not have continued to pursue an engineering major."

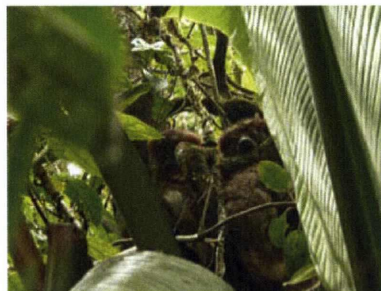


Water Tank built by team led by SHPE in Binghamton in Rio Hondo, Honduras



Catherine Depeine (seen with the research team she trained in Madagascar) is researching vocal communication in primates. She began studying vocal communication at the Cornell lab of Ornithology where she analyzed raven vocalizations. She is the co-author of a publication where she demonstrated that singing behavior is a good predictor of subsequent aggressive behavior in the banded wren. She was a SUNY LSAMP BD student at Stony Brook from 2009 to 2011 and currently completing her Master's

Thesis on the social behavior, vocalizations, ranging behavior, and diet of woolly lemurs. Catherine Depeine went to Madagascar to do research in summer and fall of 2010. She won travel scholarships from The American Society of Mammologists and The National Society of Primatologists to finance part of the costs of her trip. Once in Madagascar she led a team of up to five people, four local guides and one Malagasy student. The photo shows her work group in Madagascar and the animal that she was studying there. She was responsible for the research project from start to finish. She wrote up a research proposal, applied for grants, and ordered or borrowed research equipment. She learned a great deal about perseverance when she had to wait two months to obtain a research permit. For nine weeks, her team and she spent an average of five days a week, eight hours a day searching for a nocturnal lemur.



Woolly Lemur in Madagascar

IMPACT ON PEDAGOGY, CURRICULUM AND STUDENT SUPPORT

“Although very difficult to quantify, in New Paltz’s experience over the past 15 years of programming for underrepresented STEM students, the fact that a supportive community in the science and engineering areas is created and maintained for these students is a major factor in their retention and success. While individual elements of the program structure such as tutoring and textbook lending and offering research opportunities are essential, it is the surrounding scaffolding of community that makes the program successful. Over the years, a community of supportive faculty, tutors, program staff and students has been created in the majors served by LSAMP.” **Stacie Nunes, Hudson Valley Regional Director, SUNY LSAMP**

Components

- Recruitment: high school to college, two year to four year transfers, undergraduate to graduate school
- Scholarship and stipend support
- Workshops and tutoring in STEM disciplines that promote success in gatekeeper courses
- Mentoring programs that link faculty, graduate students and staff to students
- Paid research and internship placements
- Opportunities for students to attend professional conferences and present the results of their research
- Assistance to students in preparing for and applying to graduate programs
- Innovative enrichment courses and program models
- Research and scholarship about UREP STEM issues
- Social, cultural and community building activities
- Bridge to the Doctorate programs for LSAMP graduates
- Business, industry, community and national organization involvement
- Increase in degree production in STEM majors
- Continuation on to graduate study and the professoriate
- Curricular and pedagogical reform
- Institutionalization of LSAMP program elements

Innovative Courses and Pedagogy Developed by SUNY LSAMP

The Success Course is designed to deal with academic, social and personal issues that are seen as key to success for entering students. Activities range from conceptual mapping to stress reduction.

Engineering Innovation and Fundamentals of Physics and Chemistry Models were developed directly linking concept mapping and tutoring to the lectures and content of STEM gatekeeper courses.

Research Methods Course includes topics such as: ethics, discovering a research topic, communication in research, conducting a literature review, qualitative and quantitative methods in research, analysis of journal articles, poster designs and presentations.

Math Enrichment Modules and Math Boot Camps were developed for incoming students who scored poorly on the math placement exams to help with math and science gatekeeper courses. Models use both intensive workshops and summer immersion models.

Peer Mentor Training involved the development of a comprehensive peer mentoring program which includes a training manual that can be used by other programs to implement this program

Discovering Engineering is a redesigned engineering design course that combines design and technical problems with the development of study, writing and group work skills and also helps students look at values and moral reasoning and their connection to design issues.

Introduction to Engineering is a redesigned course using real life casebook examples that provide realistic experiences in different engineering disciplines.

Introduction to Biomedical Research gives students an introduction to issues in biomedical science and helps develop the skills necessary for the responsible conduct of research.

Redesign of Existing Courses SUNY LSAMP faculty are working with STEM departments in biology, physics, chemistry, calculus and engineering courses. They are designing courses that link concepts to research methods, using labs to build conceptual learning, identifying course core competencies and developing exams that test these competencies.

Skill-Based Career Skills Workshops is a new model that connects the academic skills with real life skills that are needed for high technology careers.

Learning to Learn Program uses hands on experiences to introduce the idea of STEM fields to UREP students.



Dimitri Vaughn II graduated from the University at Albany in 2008 with a B. S. in Chemistry and minor in mathematics. Upon graduation, he immediately started graduate school at Penn State University the following summer (6/1/2008) on a summer research award conducting research on Inorganic Nanomaterials in the lab of Dr. Raymond Schaak. He continued in the lab of Dr. Schaak, supported on a Bunton-Waller fellowship for the next two years reaching Ph. D. Candidacy (Inorganic Chemistry) and completing all comprehensive exams. He is currently funded on a National Science Foundation Graduate Research Fellowship (2010-2013) and has three publications in peer-reviewed journals. Dimitri states, "*LSAMP, CSTEP, Student Support Services, and the Educational Opportunity Program provided me with direct one-on-one contact with mentors*

who worked as role models for me in my development as a professional and a scholar. The LSAMP/CSTEP/UA Summer Research Program which was introduced to me through these services, solidified my decision to attend graduate school and ultimately my dream of becoming an academic research professor. This program also inspired me to 'pay it forward' and address the need of education in my surrounding communities."

IMPACT ON THE RESEARCH BASE ABOUT BEST PRACTICES IN UREP STEM EDUCATION

SUNY LSAMP Phase III Research Project

SUNY LSAMP completed a research project that examined the structures and processes required to identify best practices for the delivery and administration of support services and identified the various factors, attitudes and experiences that lead UREP STEM students to graduate school and on to the professoriate. The findings from this study are providing a model for planning successful strategies for academic and personal support and encourage progression to graduate study for UREP STEM students in a variety of educational settings.

1. *Organizational Structures.* Programs work best when personnel and resources were coordinated with projects that had related goals, using the norms of efficiency and effectiveness.

2. *Undergraduate Research.* This is the most important activity in leading students to experience science and to consider graduate school, and the research mentor is the foundation for a profitable research experience.

"For me it was thinking outside the box. It is different from going to classes and taking tests. Research gives you the chance to work independently but also in a way that connects with other people in your field."

3. *Tutoring, Course-Related Workshops, and Curriculum Initiatives.* It is important that tutoring programs provide good training and supervision for tutors, careful record-keeping, and that they encourage students to see that tutoring and participation in workshops are not simply for remediation.

"It took me some time to decide that I needed tutoring because in high school I didn't have any problems understanding material and getting good grades."

4. *Process Workshops and Freshman Success Courses.* Today's college students need assistance in areas such as time management, study and test-taking skills, improved writing and group work. There are various ways in which these skills can be taught and practiced.

5. *Community Building, Advising, Communication and Social Support.* Minority students often succeed or fail depending on whether they find themselves in a group of motivated peers. Programs can help create this kind of community with on-going activities that offer advice and encouragement within a supportive social structure.

An AMP-connected counselor spoke as follows:

“When minority students say they want to major in science, math, or engineering, I tell them they have to find a study buddy. I believe it is two or three times harder for an under-prepared minority student to succeed than for mainstream student. Minority students need to build a social network so they will have support when they find how much more time they will have to spend studying. The social events--pot-luck supper, and the like--are not just social; they are also an important academic support.”

6. Interest in Graduate School Interest, application to, and entrance into graduate school depends on a variety of related factors, usually including: undergraduate research, trips to conferences and likely institutions, early preparation for GRE's and other requirements.

7. Success in Graduate School Success or failure in graduate school can often be traced back to an early understanding of expectations and procedures, formal and informal, that provide the framework for a program or department. Well-developed programs can help students gain this understanding.



Karen Torrejon is currently a doctoral student at the College of Nanoscale Sciences and Engineering at the University at Albany. Her field of research is nanomedicine, specifically using nanotechnology as a tool to bioengineer a novel model for screening of glaucoma. She will be submitting her first grant proposal and second peer reviewed publication by this winter. *“The LSAMP/CSTEP program is the reason why I have been able to assess my career path as a future medical scientist*

because it provided me with the help, experience and exposure of the field in order to become a mature and educated graduate from the University at Albany. I have recently received Honorable Mention by the National Science Foundation for the research and accomplishments I have achieved thus far. Recognitions like this one made me look back and think about how I got to where I am right now and how I became who I am; and I have to admit that if it was not for all the people at LSAMP/CSTEP who supported me during my undergraduate career, who provided me with resources to aid my education and who did not doubt my capabilities I would not be where I am right now. In addition, the mentoring opportunity CSTEP provided me with, allowed me to become a mentor to younger students and help them to see their true potential. My undergraduate career was a great one because of the LSAMP/CSTEP program.”

DISSEMINATION OF BEST PRACTICES

SUNY LSAMP has played a leadership role in disseminating best practices in UREP STEM education to a national audience. Here is a selection of some of the presentations and publications by the SUNY LSAMP alliance.

State University of New York Louis Stokes Alliance for Minority Participation: Report on Best Practices, Gafney, ERIC online ED512437

Getting in the Groove: A Short Summer Research Experience Builds Skills and Belonging, Nunes, American Society of Engineering Education Conference

SUNY LSAMP: Experiences, Successes and Challenges, Catalano, Frontiers in Education Conference

The Binghamton Success Program: Institutionalizing A Minority Engineering Program, Catalano and Catalano, Frontiers in Education Conference

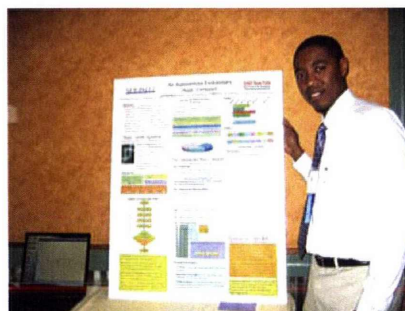
Minorities in Engineering and Applied Sciences- Success Stories, Kenny, Northeast Regional American Society of Engineering Education Conference

Best Retention Practices in SUNY LSAMP: Evaluation Findings, Gafney, Ferguson SUNY STEM Conference

Inclusivity and Excellence in Science and Engineering Education, Ferguson, Archie Lacey Award, New York Academy of Sciences

The Quest for Excellence: Preparing Minority Students for Twenty-First Century Professions in Science and Technology Professions, Teoh, Archie Lacey Award, New York Academy of Sciences

Status and Experiences of Minority Graduate Students in STEM Disciplines, Mc Afee, National Academy of Engineering and AAAS



IMPACT OF THE BRIDGE TO THE DOCTORATE PROJECT

Success in Recruitment, Selection and Degree Completion

Recruitment	There have been 136 applicants for 60 * spots
Selection	<p><u>All five cohorts have achieved full enrollment</u> <u>Students are from a wide range of institutions</u> SUNY LSAMP institutions: Buffalo, Buffalo State, Albany, Binghamton , New Paltz, Old Westbury , Stony Brook Other New York State Colleges: Medger Evers , City College Queens College, Hunter College, Clarkson , Cornell , Syracuse HBCU's: Toogaloo College, Savannah State College, Grambling State College Hispanic Serving Institutions: U. of Puerto Rico- Universidad Metropolitana, U. of Puerto Rico- Humacao, U. of Puerto Rico- Cayey Other: University of Florida- Gainesville, Chicago State College, California Polytech</p> <p><u>Students have been chosen from a wide range of STEM majors</u> Computer Science; Chemistry; Aeronautical, Biomedical, Civil, Chemical, Mechanical, Electrical, Computer and Industrial Engineering; Materials Science; Pharmacology and Toxicology; Biophysics; Molecular and Cellular Biophysics and Biochemistry; Cancer Epidemiology; Ecology and Evolution; Atmospheric Sciences; Marine Sciences; Physiology ; Genetics; Biopsychology; Molecular Genetics and Microbiology; Applied Mathematics and Statistics; Computational Sciences</p>
Retention	<p>The programs have a 96.6% retention rate SUNY LSAMP students have an average GPA of 3.25</p>
Degree Completion	<ul style="list-style-type: none"> - Seven students have completed STEM doctorates ** - Two students are getting post docs: one at Rutgers, one NSF ASEE Corporate Post-doc at Bentley Systems. - Thirty students have either completed masters or will be completing by summer 2011, a completion rate of 89.2% (with the balance scheduled to complete in 2011-2012) - Thirtyone students are currently in or have completed doctoral programs or will be entering doctoral programs by fall 2011 (53.3%)

* Currently recruitment is underway for 12 students at Binghamton University for fall 2011

** Since the first BD cohorts started in 2006, students are just beginning to complete doctorates.

SUNY LSAMP BD programs have greatly expanded the pool of students by accepting students with special backgrounds and experiences

We have made the recruitment of students with diverse histories and situations a high priority. Some examples included students who were

- Unsure whether to get a Ph.D. or medical degree but decided pursue a Ph.D. in order to study epilepsy because of her brother's severe disease
- Recommended by a faculty member where he was a lab technician. He was able to overcome poor undergraduate grades and is now almost ready to advance to candidacy
- Had poor undergraduate grades because of medical problems but who was recommended by faculty at the BD institution. He has now been admitted into their doctoral program with a very high GPA
- Was not interested in graduate study until identified by his faculty mentor during a SUNY LSAMP undergraduate research experience
- Faced with severe problems of homelessness and dislocation in her family but because of BD funding was still able to successfully complete a masters degree with plans to continue to doctoral study.

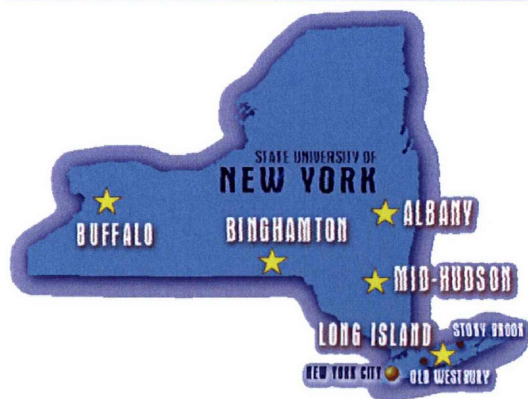
Shayri Greenwood was a SUNY LSAMP BD student at Stony Brook from 2006 to 2008. She then won the prestigious New York State Turner Fellowship for Underrepresented Graduate Students. She completed her Masters in Biopsychology and will be completing her doctorate in this summer. Greenwood was unsure initially whether to pursue a Ph.D. or MD/Ph.D. but because of her excellent undergraduate research she was nominated for the SUNY LSAMP Bridge to the Doctorate (BD) fellowship by her current faculty mentor, Dr. Brenda Anderson. Her experience as a BD student quickly convinced her to pursue a Ph.D. in Biopsychology. The initial impetus for her research was a desire to help find a cure for epilepsy because of her brother's severe illness. Her dissertation is focused on understanding the activation of cell death pathways following moderate seizures using the Kainic acid model of temporal lobe epilepsy and she is also investigating whether moderate seizures effects learning and memory in rats. She will be pursuing a Post- Doctorate next fall working in Dr. Wilma Friedman's lab at Rutgers University. Dr. Anderson characterizes Shayri as follows: *"Shayri is an amazing student. She has made tremendous growth as a student, and her dedication is exceptional. Her project has been challenging at every stage, and yet she steadily makes progress, and has collected very interesting data."* Not only an excellent researcher and teacher already, she has made it a top priority to encourage other UREP students. She has presented Success in Science Empowerment workshops to UREP and low income students, helped recruiting efforts for UREP STEM graduate students and mentored minority undergraduates presenting their research at STEM conferences.



Ivonne M. Ferrer is a Ph.D. candidate in the Department of Chemistry at the University at Buffalo (UB). Ms. Ferrer was a SUNY LSAMP BD student from 2007 to 2009 under the mentoring of Dr. Luis Colon. Her research involves the synthesis and study of metal oxides (i.e., hafnia and zirconia) monolithic structures with hierarchical porous architecture. A patent is pending on the innovative application of the methanol oxide monoliths synthesized in her research group. Ivonne has presented her work in multiple regional and national scientific meetings such as *The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy*, as well as the *American Chemical Society*. In addition to her research, Ivonne has served as a teaching assistant (TA) for *Advanced Analytical* at UB. She has been involved in promoting Chemistry and motivating students from underrepresented groups to seek research opportunities. She has been a mentor to students in the UB Chemistry Dept.'s Research Experience for Undergraduates (REU) Program and provided workshops at her alma mater, the University of Puerto Rico at Cayey, on the Next Generation of Micro & Nano Technology. She also enjoys giving back to the community by volunteering for National Chemistry Week at the Buffalo Science Museum and for the Science Fun Night at the Buffalo Native American Magnet School, where she has the opportunity to reach out to young students with interests in science.



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SUNY College at Old Westbury

Farmingdale State College

Suffolk Community College

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