



PUERTO RICO LOUIS STOKES ALLIANCE  
FOR MINORITY PARTICIPATION



# PR-LSAMP

## 2010-11 ANNUAL PROGRESS REPORT

### YEAR 5 PHASE IV

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**PR-LSAMP 2010-11 ANNUAL REPORT  
YEAR 5 OF PHASE IV**

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## **I. Introduction**

The Puerto Rico Louis Stokes Alliance for Minority Participation PR-LSAMP) is an alliance of three major higher education institutions in Puerto Rico with a total STEM undergraduate enrollment in the Fall of 2010 of 27,258, jointly working to strengthen STEM undergraduate education. Created in 1991, the PR-LSAMP alliance aims at increasing the number of STEM BS graduates, and the number of BS graduates that enroll in graduate school and eventually complete a PhD degree in a STEM field. As of June 2011, PR-LSAMP institutions have awarded 55,480 BS degrees in STEM fields (1991-2011). To achieve this goal, PR-LSAMP works at improving the effectiveness and efficiency of undergraduate STEM education by transforming the teaching and learning culture of the participating institutions. During Phase IV (2006-11) the following institutions are members of the PR-LSAMP alliance: University of Puerto Rico System, Inter American University System, and Pontifical Catholic University of Puerto Rico. The Polytechnic University of P.R. left the alliance at the end of Phase III, and no other institution was added in Phase IV. Since the emphasis of Phase IV is to increase the number of BS graduates that continue on and complete a graduate degree, the current three institutions in the alliance are the main P.R. institutions with this track record.

During Phase IV, PR-LSAMP developed and implemented four main strategies:

1. Enhancing Students Knowledge and Skills for Graduate Studies
2. A Mentored Undergraduate Research Experience, including an annual local scientific forum for students to present their research projects, The Puerto Rico Interdisciplinary Scientific Meeting (PRISM), and travel stipends to present research results at national scientific conferences
3. A Role Model Series to expose students to successful professionals in science and engineering fields to motivate them to continue graduate studies.
4. The Annual Best Practices Conference on Teaching and Learning to continue to expose STEM faculty to successful strategies to improve the teaching and learning process, so as to increase the number of STEM students that obtains a BS degree and continue graduate studies.

The Bridge-to-the-Doctorate HRD/NSF Initiative, implemented in 2003, provides 2-year fellowships to former PR-LSAMP graduates to pursue graduate studies in STEM fields. As of July 2010, 94 fellowships have been awarded.

## **II. Major Accomplishments**

1. In the fall of 2010 27,258 students were enrolled in STEM fields at PR-LSAMP institutions. This represents an increase of 14,686 students (5%) since 1991.
2. In academic year 2010-11, 2,764 baccalaureate degrees were awarded in STEM disciplines. This data is a preliminary data submitted as of June 30, 2011.
3. The PR-LSAMP program has made a significant contribution to the NSF goal of a diversified STEM workforce. It has increased the number of STEM PhD granted to Hispanics from PR-LSAMP Institutions in Natural Sciences from 302 for cohort 2000-05 to 413 for cohort 2004-091, a 37% increase; and the number of STEM PhD granted to Hispanic in Engineering from PR-LSAMP Institutions from 71 for cohort 2000-05 to 119 for cohort 2004-09, a 68% increase.
4. At the local level, the University of Puerto Rico's three graduate institutions, UPR-Rio Piedras, UPR-Mayaguez, and UPR-Medical Sciences awarded 49 PhD degrees in science and engineering in 2010.

5. Seventy four (74) students have been participating in Activity #1 Enhancing Students Knowledge And Skills For Graduate Studies since their freshman year in a sustain 5-year effort (from entrance to graduation) to prepare them for graduate school and pursue a doctoral degree in a STEM field. In this reporting period only four are still taken courses, sixty six student complete graduation and are in graduate school or working in the industry.
6. In academic year 2010-11, PR-LSAMP awarded 435 stipends (\$348,000) to undergraduate STEM students to participate in research experiences and \$87,000 were awarded by PR-LSAMP to researchers to cover laboratory materials for PR-LSAMP participants.
7. Five hundred and five (505) STEM students (372 undergraduates and 133 graduates presented their research projects at the annual Puerto Rico Interdisciplinary Scientific Meeting (PRISM), to an audience of faculty members and students. A total of 990 people attended this meeting this year.
8. Twenty-four (24) undergraduate STEM students received PR-LSAMP travel stipends (\$12,000) to present their research projects in national and international conferences.
9. The National Institute of Standards and Technology (NIST) provided \$15,645 to six undergraduate STEM students to participate in research experiences with nationally recognized scientists, at their main site in Maryland
10. PR-LSAMP institutions secured \$25M in external and institutional funds to implement educational projects geared at strengthening STEM education at their institutions.
11. PR-LSAMP received a \$58,250 supplemental award from NSF to participate in the DOE FaST Program.
12. One hundred and forty six (146) participants from 14 institutions attended de PR-LSAMP 2010 Annual Best Practices Conference on Teaching and Learning (70 STEM faculty members, 36 STEM graduate students, and 40 STEM undergraduate students).

### **III. Participants and Collaboration with Other NSF Programs**

#### **Participating Institutions**

The participating PR-LSAMP institutions in Phase IV are: The University of Puerto Rico System ([www.upr.edu](http://www.upr.edu)); Inter American University System ([www.inter.edu](http://www.inter.edu)), and Pontifical Catholic University of Puerto Rico ([www.pucpr.edu](http://www.pucpr.edu)).

#### **PR-LSAMP Staff**

For the past 19 years the UPR Resource Center for Science and Engineering (RCSE) has served as the umbrella organization in this alliance, promoting the maximum collaboration of all institutions and synergy of efforts. The Project Investigator is Dr. Manuel Gómez, Director of the UPR Resource Center for Science and Engineering. During this period of time, Dr. Ana C. Piñero, served as the Co-PI and Coordinator at the Central Administration. Dr. Piñero retired in 2009. Dr. Ana Rita Mayol has been appointed Co-PI for the PR-LSAMP Program since. The Assistant Coordinator is Prof. Javier Figueroa, who is also the Coordinator of the BD Initiative, and coordinates the implementation of the PR-LSAMP Mentored Undergraduate Research Program and the Role Model Series. The Management Coordinator is Mrs. Ana Feliciano, responsible for the administrative and budgetary aspects of the project. They are all located at the UPR Resource Center for Science and Engineering main facility at the UPR-Rio Piedras Campus.

The Dean of Science and the Dean of Engineering at the participating institutions collaborate with PR-LSAMP staff in the implementation of the PR-LSAMP strategies, and in articulating them with other STEM reform initiatives at their institutions. In institutions where the organizational structure does not provide for a science or engineering dean, the academic dean is the PR-LSAMP collaborator. A STEM faculty member is appointed at each institution by the dean to serve as the PR-LSAMP Liaison Officer, responsible for the on-site implementation of the program. For Phase IV, the PR-LSAMP Liaison Officers are:

Dr. Ivelisse Rubio, UPR-Río Piedras (Computer Science)  
Dr. Jeannette Santos, UPR-Mayaguez (Engineering)  
Dr. Ileana Rodriguez, UPR-Humacao (Chemistry)  
Dr. Belinda Román, UPR-Cayey (Biology)  
Prof. Migdalia Sotomayor, UPR-Aguadilla (Biology)  
Dr. Maiella Ramos, UPR-Arecibo (Chemistry)  
Dr. Alex Sloan, UPR-Bayamón (Biology)  
Prof. Rafael Canales, IAU-Bayamón (Physics)  
Dr. Rosa Brito, IAU-Metro (Chemistry)  
Prof. Carmen Asencio, Pontifical Catholic University (Biology)

Information on the PR-LSAMP staff is found in the web page ([www.prlsamp.org](http://www.prlsamp.org)).

### **Other Collaborating Organizations**

The Universidad Central del Caribe Medical School and the UPR Medical Sciences Campus provide students with research opportunities, particularly to biology and chemistry majors. The National Institute of Standards and Technology (NIST) of the U.S. Department of Commerce and the Smithsonian Institute provide students with research experiences during the summer. Students also benefit from the REU Programs across the nation, and research opportunities at mainland institutions.

### **Collaboration with Other NSF Sponsored Programs**

The Resource Center for Science and Engineering (RCSE) of the University of Puerto Rico serves as the coordinating unit for this alliance, promoting the maximum collaboration of all institutions and synergy. The RCSE coordinates all major STEM systemic educational reforms on the Island, therefore, it provides for an integrated, systemic strategy to increase participation of Puerto Rican students in the STEM pipeline. At the K-12 level, the RCSE completed the implementation of a Distance Learning Program for K-12 Science and Math Teachers. The first of its kind in Puerto Rico, the program made use of distance learning technologies, and one of its key features was the integration of high-level learning computer technologies (mind tools) to train participants in the use of these tools to enhance the teaching and learning process. The project was implemented in 80 schools, covering all educational levels and impacted more than 1,500 teachers. Other K-12 projects implemented by the RCSE included the Statewide Systemic Initiative (SSI), and the Collaborative for Excellence in Teacher Preparation (CETP).

At the undergraduate level, the RCSE also coordinated the Title V Developing Institutions Consortium that included three PR-LSAMP/UPR campuses: Río Piedras, Humacao and Arecibo. The project ended in 2008 and provided for the development of a series of electronic modules to assist STEM students in a variety of science and math courses at the three institutions. The modules deal with foundation knowledge and skills, key concepts, and areas that have proven difficult to master adequately. In the process of developing the modules, STEM faculty developed techniques for making the teaching-learning environment more student-centered. In addition, they became aware of the need for adequate assessment. Models and protocols were developed for developing additional support materials using technology.

At the graduate level, RCSE is coordinating the Institute of Functional Nanomaterials (IFN) sponsored by the Puerto Rico Experimental Program to Stimulate Competitive Research (PR-EPSCoR), co-funded by NSF and the NSF-funded programs GK-12 and coordinated PR-AGEP until June 2011.

The PR-EPSCoR IFN institute brings together 46 scientists and engineers actively working in nanoscience and technology problems from the University of Puerto Rico two main science graduate campuses: Río Piedras and Mayaguez two research intensive four year colleges: Humacao and Cayey Campuses and the Interamerican University. They are organized into four thematically coherent research clusters: 1) Nanoparticles as Tools in BioSensing, Biolmaging, and Novel Treatments; 2) Thin Film Nanostructures for

Logic and Memory Devices 3) Nanotechnology Based Remediation and 4) Nano materials for Renewable Energy - Light Harvesting. These clusters will function as Multicampus Interdisciplinary Research Groups (IRG) that share infrastructure and develop new group research projects and proposals. The IFN works with six strategic national partners: Argonne National Laboratory; Purdue University; UMass, NASA Glenn Research Center, Northwestern University, and Cornell University, all nationally recognized for their centers for nanotechnology research. The Education and Outreach Program goal is to impact the K-16+ continuum by bringing research into the classroom, developing and implementing interdisciplinary educational materials based on research results that are relevant to the curriculum. The plan of the Institute explicitly calls for joint courses and co-supervision of thesis by the 46 professors, grouping participating PhD students into a single community of learners in the fields of nanoscience and nanotechnology. PR-EPSCoR has been key in the strengthening of the Puerto Rico scientific community by increasing the number of competitive researchers and building a sustainable infrastructure for competitive research at the main research universities. The main accomplishments of IFN during year one have been: 1) The IFN researchers published collectively a total of 116 peer reviewed publications; 2) The IFN has a total of \$8.8M in approved competitive grants and has submitted a total of 13 new competitive proposals for the amount of \$9.4M to sustain the institute activities; 3) The IFN researchers mentored 215 students 4) This year, the IFN graduated two PhD students, the two of them Hispanic, one female 4) The IFN has introduced over 4000 persons of all ages and backgrounds to nanoscience and technology, through its education and outreach component and established a Teacher Training Program to train elementary, middle, and high school science teachers in the use and implementation of interdisciplinary educational materials in Nanoscience.

The GK-12 Program began in 2009 and is a strategic interdisciplinary partnership between the two largest and most developed research institutes of the University of Puerto Rico System: the Institute of Tropical Ecosystem Studies (ITES) and the IFN, who together provide doctoral research projects to more than half of the graduate students (160) in the PhD programs in chemistry, biology, chemical physics, and environmental science at UPR-Rio Piedras. The GK-12 project will strengthen 7th to 9th teachers and students' scientific knowledge through multidisciplinary explorations of tropical ecosystems and functional nanoscience while improving graduate students' abilities to communicate and teach science. The project has impacted 16 graduate students, 24 science teachers in eight 7th to 12th level schools, and at least 2,000 students at this level have experienced first-hand the excitement of investigative research and have improved understanding of science.

The coordination of these systemic initiatives by the RCSE has promoted the articulation of the pipeline as a unified and coherent effort, fostering a shared vision, the transfer of educational strategies, the cross-fertilization of efforts and the pooling of resources among all levels of the pipeline, leading to a synergistic effect that is critical for achieving lasting change.

#### **IV. Activities and Findings for Year 5 of Phase IV**

##### **ACTIVITY #1: ENHANCING STUDENTS KNOWLEDGE AND SKILLS FOR GRADUATE STUDIES**

###### **Description of Activity #1:**

The target of this activity are STEM students at UPR-Rio Piedras and UPR-Mayaguez, the two alliance institutions with graduate programs. Freshman STEM students will be selected (30 from UPR-Rio Piedras and 30 from UPR-Mayaguez) to participate in core skill workshops and seminars on frontier science and engineering topics to be offered at each institution during the 5-year grant period. This core of students will be tracked for progress as they move through the undergraduate pipeline, from entrance to exit, and enter graduate school to pursue a doctoral degree in a STEM field.

### Findings for Year 5: Activity # 1

**At UPR-Rio Piedras:** In year 2006 thirty-four freshman STEM students start their participation in this PR-LSAMP activity. The majority of participant students have just completed their five year of undergraduate studies, at the moment of this reporting period 31 obtain their bachelors degree (91%) and are in graduate school or in the workforce. Twenty-one workshops/conferences were offered during academic year 2010-11. Table 1 presents the topic of the workshops, the name of the resource and the resource person's STEM field.

**Table 1**  
**Workshops Offered at UPR-Rio Piedras, Academic Year 2010-11**

<b>Workshop</b>	<b>Speaker</b>	<b>Area</b>
Population dynamics of the reintroduced population of the Puerto Rican crested toad at Gabia, Coamo	Rita Caceres UPR-Rio Piedras	Biology
Self - Assembly of Artificial Supramolecules as Fluorescent Molecular Recognition Probes	Diana Silva UPR-Rio Piedras	Chemistry
Ethics in Science Research	Joaquín Medín UPR Bayamón	Physics
In-Situ STEM Measurements of Nanostructures	Jennifer Carpena UPR-Rio Piedras	Physics
Effects of sulfonation level and counter ion substitution on the protons conductivity of SIBS membranes	Sonia Avilés UPR-Mayagüez	Chemical Engineering
Bayes' Factor and Utility Functions	Edgar Almodóvar UPR-Rio Piedras	Mathematics
Effect of Chemical glycosylation on peptides biophysical properties: an experimental and computational study	Yamaha Delgado UPR-Rio Piedras	Chemistry
Evaluation of potential demographic differences in the population of the Mona island iguana, <i>Cyclura cornuta stejnegeri</i> , in different microhabitats of Mona island, Puerto Rico	Cielo Figuerola UPR-Rio Piedras	Biology
Heterobimetallic Pyrazolato Clusters Containing a Redox-Active Fe <sub>4</sub> O <sub>4</sub> Cubane Core	Kennett Rivero UPR-Rio Piedras	Chemistry
Understanding the spread of exotic vines in Puerto Rico through network analysis	Diana Delgado UPR-Rio Piedras	Biology
Predation on the tropical freshwater shrimp <i>Xiphocaris elongata</i> : antipredator responses and cascade effects	María Ocasio UPR-Rio Piedras	Biology
Development of noble metal oxides electrocatalysts for oxygen evolution reaction by the a rotating disc slurry electrode method	Nelson Rivera UPR-Rio Piedras	Chemistry
Research Opportunities in North Carolina State University	Alison Al Baati NCSU	AGEP

<b>Workshop</b>	<b>Speaker</b>	<b>Area</b>
Scales and Measurements in the Cosmological Sciences	Dr. José Alonso UPR-Cayey	Physics
Research Opportunities In Costa Rica and South Africa	Dr. Patty Kustron Director, Enrollment Management Organization for Tropical Studies / Duke University	Biology
Invasive Species and their Impact on Puerto Rican Biodiversity	Dr. Rafael Joglar UPR-Río Piedras	Biology
From Silent Spring to Silent Night: A Tale of Toads and Men	Dr. Tyrone Hayes U.C. at Berkeley	Biology
Forensic Anthropology a Multidisciplinary Science	Dr. Edwin Crespo UPR-Río Piedras	Social Sciences
An Introduction to Molecular Biology	Dr. Irving Vega UPR – Río Piedras	Biology
Puertorican Paleontology and the Fossil Record	Dr. Hernán Santos UPR-Mayaguez	Geology

**At UPR-Mayaguez: In year 2006** forty freshman STEM students start their participation in this PR-LSAMP activity. They have just completed their five year of undergraduate studies, at the moment of this reporting period thirty-five obtain their bachelors degree (87%) and are in graduate school or in the workforce in this 5-year initiative. Twelve workshops were offered during academic year 2010-11. Table 2 presents the topic of the workshops, the name of the resource professor, and the resource STEM field.

**Table 2**  
**Workshops Offered at UPR-Mayagüez, Academic Year 2010-11**

<b>Workshop</b>	<b>Speaker</b>	<b>Area</b>
First PR-LS AMP Science team meeting	Dr. Carlos Ríos-Velázquez and Mr. Josué Malavé	Biology
Research mentoring series: Ribosome synthesis in eukaryotes (using the yeast model)	Dr. David A. Schneider Department of Biochemistry and Molecular Genetics University of Alabama at Birmingham	BioChemistry
SciTeCC 2010: Topic in Biomimetics	Dr. Patricia Ortiz and Prof. Evelyn Montalvo UPR-Mayaguez	Biology
Scientific Journal Round Tables	Dr. Carlos Ríos-Velázquez UPR-Mayagüez	Biology
Active research areas in Science	Dr. Miguel Castro UPR-Mayagüez	Chemistry
Visiting research labs. In Science: Chemistry	Ms. Lianne Miranda Chemical Imaging Center  UPR-Mayaguez	Chemistry
Safety issues when using chemical reagents	Health and Safety Office at UPR-M Mr. Josué Malavé and idarys De Jesús	Health and Safety Office
Patents and invention protection: Developing a Knowledge Based Economy	Dr. Walter O. Alomar Jiménez, P.E., M.B.A. UPR-Mayagüez	Industrial Engineering

<b>Workshop</b>	<b>Speaker</b>	<b>Area</b>
First PR-LS AMP Science team meeting	Dr. Carlos Ríos-Velázquez and Mr. Josué Malavé	Biology
Images of the Earth	Dr. Fernando Gilbes UPR-Mayagüez	Geology
From a Resume to a Biosketch	Mrs. Margarita Carlo UPR-Mayaguez	Human Resources
Ethics in the handling of images	Dra. Aury Curbelo UPR-Mayaguez	Industrial Engineering
Mentors series: do and don'ts during the graduate school experience	Dr. Carlos Ríos-Velázquez UPR-Mayagüez	Biology

## **Activity 2 – Mentored Undergraduate Research Experience**

### **Description of Activity #2:**

During Phase IV PR-LSAMP will offer between 275 and 280 research stipends per year to an average of 200 students per year (a student may participate more than once in a given year) to participate in a mentored research experience. PR-LSAMP will provide participating PR-LSAMP undergraduate students a multi-faceted mentoring program at each institution, consisting of a Mentoring Coordinator, research mentors, and peer mentors. The Mentoring Coordinator at each institution will coordinate the mentorship strategies at each level (group mentorship through workshops, research mentorship, and peer mentorship). Research Mentors will be responsible for developing in PR-LSAMP students basic research skills, while participating in a given research project. Peer Mentors (a PR-LSAMP upper level student in the case of a 4-year institution and an AGEP graduate student or BDP Fellow in graduate institutions) will coach the PR-LSAMP undergraduate student through the stages of development while participating in the research experience and will also serve as a role model. The extent of the Mentored Research Program at each PR-LSAMP institution will vary depending on the number of students participating in research experiences and the number of research mentors.

Seminars will be offered during the academic year and the summer at each PR-LSAMP institution. A central part of this activity will continue to be the Puerto Rico Interdisciplinary Scientific Meeting (PRISM), the major local scientific forum for students from universities across the island to share their research projects and experiences with their peers and STEM faculty members. As part of this component, PR-LSAMP will also provide participants with travel stipends to present their research projects at national conferences.

### **Findings for Year 5:**

All ten PR-LSAMP institutions have established the mentored research experience program. Each institution has a Mentoring Coordinator, responsible for coordinating the program and the group activities. **Table 3** presents the names of the Coordinators per institution and the number of participating students.

**Table 3**  
**Mentoring Coordinator by PR-LSAMP Institution**

PR-LSAMP Institution	Mentoring Coordinator	STEM Field	Number of students Mentored
UPR-Rio Piedras	Javier Figueroa	Biology	47
UPR-Mayagüez	Carlos Rios	Biology	50
	Eduardo Ortiz	Electrical Engineering	
UPR-Humacao	Ileana Rodriguez	Chemistry	13
UPR-Cayey	Belinda Román	Chemistry	10
UPR-Arecibo	Jose Arbelo	Biology	2
UPR-Bayamon	Alex Sloan	Biology	5
UPR-Aguadilla	Liza Jimenez	Biology	7
Pontifical Catholic Univ.	Lizette Santos	Chemistry	13
IAU-Bayamon	Rafael Canales	Physics	8
IAU-Metro	Rosa Brito	Chemistry	6

A total of 114 workshops were offered in the alliance during academic year 2010-11. **Table 4** presents the workshops offered at each institution as part of the program. The institutions' calendar of workshops was posted in the PR-LSAMP web page, so students from the different PR-LSAMP institutions could attend those of their choice. These workshops are open to all STEM students at each institution (PR-LSAMP and NON-PR-LSAMP students can participate).

**Table 4**  
**Workshops Offered by the Mentored Undergraduate Research Experience Program**  
**Academic Year 2010-11**

Institution	Workshops Offered
UPR-Arecibo	<ul style="list-style-type: none"> <li>Understanding scientific literature</li> <li>Basic Lab Safety</li> <li>Ethics in Scientific Research</li> <li>How to design and conduct Scientific Experiments for Chemistry</li> <li>How to prepare a Curriculum Vitae</li> <li>Effective Oral Presentations</li> <li>Developing statistics knowledge and skills for chemical experiments</li> <li>Laboratory Safety Standards</li> <li>How to write a scientific abstract</li> <li>Introduction to the analysis of Scientific Literature</li> </ul>
UPR-Aguadilla	<ul style="list-style-type: none"> <li>Summer Internship Opportunities</li> <li>Standardized Test Preparation and Tips for Success</li> <li>Ethics in research</li> <li>Laboratory Safety Techniques</li> <li>How to write a Summer Internship/Graduate School Application Essay</li> <li>Effective ways of communicating your scientific results</li> <li>The Flora of the Maricao Nature Reserve</li> <li>Development of Mathematical Algorithms for Bio-optical Experiments in the Mayagüez Bay</li> <li>Tools for Success in Graduate School</li> <li>Critical Thinking Skills</li> </ul>

Institution	Workshops Offered
UPR-Bayamón	Options in Renewable Energy International Society of Automation Ethics Code The History of the International Institute of Tropical Forestry Ecosystem Processes Along an Elevation Gradient in north eastern Puerto Rico Best Practices in Undergraduate Science Education and Training Opportunities for UPR Students System Dynamics for the Study of Chemistry Databases and metadata an introduction to Ecoinformatics How to Make Effective Poster Presentations Critical Thinking Skills Internet Security /Hackers and Today's Trends
UPR-Cayey	Materials Safety Data Sheets Workshop Team work and time management Active research areas in Science Analytical Reading and Thinking Skills in Research Workshop in Research Ethics Presenting your Research Data How to Write Successful Scientific Proposals Art and Mathematics
UPR – Humacao  UPR - Humacao	Exploiting the Biodiversity of Puerto Rico for the synthesis of BioRelevant Chiral Compounds The Puerto Rico North-Eastern Ecological Corridor: Environmental Implications Bioassays in Cancer Tissues: New Techniques The Ecology of the Limestone Formations in Northern Puerto Rico Techniques for Mounting Macroalgae as Herbarium Specimens How to prepare a Curriculum Vitae How to Make Effective Poster Presentations How to write a Graduate School Application Essay Workshop on Optical Astronomy
UPR-Mayagüez	First PR-LS AMP Science team meeting Research mentoring series: Ribosome synthesis in eukaryotes SciTeCC 2010: Topic in Biomimetics Scientific Journal Round Tables Active research areas in Science Visiting research labs. In Science: Chemistry Safety issues when using chemical reagents Patents and invention protection: Developing a Knowledge Based Economy Images of the Earth From a Resume to a Biosketch Ethics in the handling of images Mentors series: do and don'ts during the graduate school experience

Institution	Workshops Offered
UPR-Rio Piedras	<p>Population dynamics of the reintroduced population of the Puerto Rican crested toad at Gambia, Coamo</p> <p>Self - Assembly of Artificial Supramolecules as Fluorescent Molecular Recognition Probes</p> <p>Ethics in Science</p> <p>In-Situ STEM Measurements of Nanostructures</p> <p>Effects of sulfonation level and counter ion substitution on the protons conductivity of SIBS membranes</p> <p>Bayes' Factor and Utility Functions</p> <p>Effect of Chemical glycosylation on peptides biophysical properties: an experimental and computational study</p> <p>Evaluation of potential demographic differences in the population of the Mona island iguana, <i>Cyclura cornuta stejnegeri</i>, in different microhabitats of Mona island, Puerto Rico</p> <p>Heterobimetallic Pyrazolato Clusters Containing a Redox-Active Fe<sub>4</sub>O<sub>4</sub> Cubane Core</p> <p>Understanding the spread of exotic vines in Puerto Rico through network analysis</p> <p>Predation on the tropical freshwater shrimp <i>Xiphocaris elongata</i>: antipredator responses and cascade effects</p> <p>Development of noble metal oxides electrocatalysts for oxygen evolution reaction by the a rotating disc slurry electrode method</p> <p>Invasive Species and their Impact on Puerto Rican Biodiversity</p> <p>Research Opportunities in North Carolina State University</p> <p>Research Opportunities In Costa Rica and South Africa (OTS)</p> <p>Invasive Species and their Impact on Puerto Rican Biodiversity</p> <p>From Silent Spring to Silent Night: A Tale of Toads and Men</p> <p>Forensic Anthropology a Multidisciplinary Science</p> <p>An Introduction to Molecular Biology</p> <p>Puertorican Paleontology and the Fossil Record</p>
Pontifical Catholic University	<p>Laboratory safety standards</p> <p>An Introduction to scientific Literature</p> <p>Research Internships and STEP-UP Program</p> <p>Establishing my personal goals</p> <p>Using Data Bases for Scientific Research</p>
Pontifical Catholic University	<p>English as the main language for scientific communication</p> <p>Ethics in Research</p>
IAU-Bayamón	<p>How to prepare effective scientific posters and power point presentations</p> <p>The use of Data Bases for Scientific Research</p> <p>Oral Presentation practice for Puerto Rico Interdisciplinary Scientific Meeting</p> <p>Laboratory Safety</p> <p>Using Data Bases for Scientific Research</p> <p>Critical Thinking Skills</p> <p>Puerto Rican Manatee conservation program</p> <p>Workshop on Chromatography: HPLC, GC and CE</p> <p>Ethics in Research</p> <p>An introduction to capillary electrophoresis</p> <p>Physics of Ice particles in contrails environment</p> <p>What creativity is?</p> <p>System engineering</p> <p>Time management</p> <p>Basic concepts in oceanography</p> <p>Entrepreneurship techniques for science and engineering students</p>

Institution	Workshops Offered
IAU-Metro	Surviving and Succeeding in Graduate School Using EXCEL for applications in Science and Mathematics Using Data bases ASC and Science Direct Workshop in developing Scientific Creativity Ethics in Research A Guide for Effective Oral Presentations Drill and Practice for the Puerto Rico Interdisciplinary Scientific Meeting Effective guides for the use of conceptual maps "Loansome Doc" How to obtain research articles in PDF by e-mail The use of EndNote for bibliographical search Surviving and Succeeding in Graduate School

**Undergraduate Research Experiences sponsored by PR-LSAMP** - PR-LSAMP awarded 435 stipends to STEM undergraduate majors to participate in mentored research experiences. Also, stipends were awarded to the researchers to cover laboratory materials to be used by the students during their research experiences (\$200 per student), as shown in **Table 5**.

**Table 5**  
**PR-LSAMP Undergraduate Research Experiences**  
**Academic Year 2010-11**

Institution	Stipends Awarded to Students*	\$ Awarded to Students*	\$ Awarded to Researchers for Lab Materials*	Amount of Funds Awarded
UPR-Rio Piedras	117	\$ 93,600.00	\$ 23,400.00	\$ 117,000.00
UPR-Mayaguez	138	\$ 110,400.00	\$ 27,600.00	\$ 138,000.00
UPR-Humacao	37	\$ 29,600.00	\$ 7,400.00	\$ 37,000.00
UPR-Cayey	32	\$ 25,600.00	\$ 6,400.00	\$ 32,000.00
UPR-Bayamon	11	\$ 8,800.00	\$ 2,200.00	\$ 11,000.00
UPR-Arecibo	4	\$ 3,200.00	\$ 800.00	\$ 4,000.00
UPR-Aguadilla	16	\$ 12,800.00	\$ 3,200.00	\$ 16,000.00
Pontifical Catholic Univ.	27	\$ 21,600.00	\$ 5,400.00	\$ 27,000.00
IAU Metro	24	\$ 19,200.00	\$ 4,800.00	\$ 24,000.00
IAU Bayamon	28	\$ 22,400.00	\$ 5,600.00	\$ 28,000.00
IAU Arecibo	1	\$ 800.00	\$ 200.00	\$ 1,000.00
<b>TOTAL</b>	<b>435</b>	<b>\$ 348,000.00</b>	<b>\$ 87,000.00</b>	<b>\$ 435,000.00</b>

\* This figure is not headcount. A student and a researcher may participate more than once during the academic year and the summer research experiences. Funds reported include institutional funds for PR-LSAMP activities.

## Summer 2011 Undergraduate Research Experiences Abroad

Through a concerted effort, PR-LSAMP has been extremely successful in securing undergraduate research experiences abroad for PR-LSAMP students. During the Summer of 2011, 132 students, as shown in **Table 6**, are conducting summer research off the island.

**Table 6**  
**Summer of 2011 Undergraduate Research Experiences Abroad**

<b>Name</b>	<b>Discipline</b>	<b>PR-LSAMP Institution</b>	<b>Research Site</b>
Eunice Lozada Delgado Rey W. Dieppa Ríos	Microbiology Industrial Chemistry	UPR - Humacao	University of Notre Dame, Indiana
Marissa Reyes Díaz	Wildlife Management	UPR - Humacao	University of Colorado at Boulder
Jesús Ayala Figueroa	Microbiology	UPR - Humacao	Univ. of Pennsylvania
Christina N. De Jesús Villanueva	Wildlife Management	UPR - Humacao	American Museum of Natural History
Laura C. Román	Natural Science	UIA – Bayamón	University of Dayton, Ohio
Alexandra M. Rivera	Natural Science	UIA – Bayamón	St. Jude Children's Research Hospital
Eliezer Ferrá José Osorio Joseph Marcano Angel J. Rosado	Computer Science Computer Science Engineering Computer Science	UIA – Bayamón	National Institute of Standards and Technology
José A. González	Aviation	UIA – Bayamón	NASA Langley Research Center
Rafael Rodríguez Rivera	Computer Engineering	UIA – Bayamón	NASA Greenbelt Goddard
Shávea N. Zapata Deemarys N. Soto Fernando Bonilla	Biology	UPR - Aguadilla	Purdue University
Madeline González Bryan L. González	Biology	UPR - Aguadilla	UT Health Science Center
Edhriz Siralieve	Biology	UPR - Aguadilla	National InstituteHealth Step up Summer Program
Charlene Ramos	Biology	UPR - Aguadilla	University of Illinois
Darlene D. López	Biology	UPR - Aguadilla	Case Western Reserve University Schools of Medicine and Dentistry
Angela Torres Harold Medina Pablo Marrero Josean Soberal Yarelis Seguí	Biology	UPR - Aguadilla	University of Iowa
Juhnnel O. Vera	Biology	UPR - Aguadilla	Pennsylvania State University Step up Summer Program
Ileana A. Torres	Biology	UPR - Aguadilla	Brown University, Rhode Island

<b>Name</b>	<b>Discipline</b>	<b>PR-LSAMP Institution</b>	<b>Research Site</b>
Natalia Solá	Biology	UPR – Aguadilla	University of Michigan
Natalie Martínez	Biology	UPR – Aguadilla	University of Pittsburgh School of Medicine
Kaye Long	Biology	UPR – Aguadilla	Michigan State University
Génesis Millán	Biology	UPR – Aguadilla	University of Medicine and Dentistry of New Jersey
Ronald E. Rodríguez	Biology	PUCPR	St. Jude's Children's Research Hospital, Memphis, TN (POE Summer Internship)
Karla Franco	Biology	PUCPR	Vanderbilt University, Nashville, Tennessee
Marie G. Clancey	Biology	PUCPR	John Hopkins University School of Medicine, Department of Nephrology
Omar J. Zayas	Electrical Engineering	UPR – Mayagüez	Procter & Gamble Cincinnati, Ohio
Yolian Amaro Rivera	Chemical Engineering	UPR – Mayagüez	Research Experience for Undergraduates: Radio Telescope Arecibo, PR
Eulisa M. Rivera	Electrical Engineering	UPR – Mayagüez	Research Experience for Undergraduates: University of Wisconsin, Madison
Amarillys Aviles	Electrical Engineering	UPR – Mayagüez	Research Experience for Undergraduates: University of Kentucky
Christian A. Aponte Rivera	Electrical Engineering	UPR – Mayagüez	California Institute of Technology, Pasadena
Erika Y. García Gutiérrez	Electrical Engineering	UPR – Mayagüez	University of Massachusetts Lowell
Rafael A. González	Electrical Engineering	UPR – Mayagüez	Purdue University, Lafayette, IN
Zaide Feliciano	Electrical Engineering	UPR – Mayagüez	Georgia Tech Lorraine Metz, France
Sergio García	Electrical Engineering	UPR - Mayagüez	University of California, Berkeley
Yancy Díaz	Electrical Engineering	UPR - Mayagüez	John Hopkins University
José Pabón	Electrical Engineering	UPR - Mayagüez	Georgia Institute of Technology
Melanie Quintana Kibsain Rosario Alberto Pérez Patricia Pérez Albersy Armina Carlos Font	Biology	UPR – Arecibo	University of Wisconsin-Madison
Rebecca Maysonet	Biology	UPR – Arecibo	University of Kentucky
Jesús Vega	Biology	UPR – Arecibo	Texas A&M University

<b>Name</b>	<b>Discipline</b>	<b>PR-LSAMP Institution</b>	<b>Research Site</b>
Melanie Reyes	Biology	UPR – Arecibo	Virginia Bioinformatics Institute, Virginia Tech
Marlis Mojica	Biology	UPR – Arecibo	South Dakota State University
Ángel González	Biology	UPR – Arecibo	Texas A&M University
Zairin Torres	Biology	UPR – Arecibo	Naval Research Laboratory
Ángel Fontán	Biology	UPR – Arecibo	University of Oklahoma Health Science Center
Naiomy Ríos	Biology	UPR – Arecibo	University of Massachusetts, Amherst
Edwin Martínez	Computer Science Department	UPR – Arecibo	National Aeronautics and Space Administration, Huntsville, Alabama
Raúl Viera Mercado Daniel Vélez	Computer Science Department	UPR – Arecibo	University of South Florida
Keishla Ortiz López	Computer Science Department	UPR – Arecibo	University of California, Berkeley
Einar Rosario Natal	Computer Science Department	UPR – Arecibo	Hispanic Association of Colleges and Universities
Kemuel Cruz	Computer Science Department	UPR – Arecibo	Michigan State University
Gabriel Feliciano	Computer Science Department	UPR – Arecibo	Research Experience for Undergraduates Michigan State University
Julissa Rivera Alejandro Medina	Department of Physics Laboratory	UPR – Arecibo	Naval Research Laboratory, Washington, D.C.
Edwin A. Rosado	Computational Biology	UPR – Rio Piedras	University of Pittsburgh TECBio
Giovanni Báez	Theoretical Physics	UPR – Rio Piedras	University of Nebraska
Sebastián Pérez	Biology Research	UPR – Rio Piedras	Columbian University Summer Research Program
Raysa E. López	Neurobiology	UPR – Rio Piedras	Parque Investigaciones Biomédicas, Barcelona, Spain
Beatriz Guerrero	Neurobiology	UPR – Rio Piedras	Summer Scholars Program, Rochester, NY
Laura Padilla	Biology	UPR – Rio Piedras	University of California San Diego, Summer Undergraduate Research Fellowships Program
Omar Gutiérrez	Forest Ecology	UPR – Rio Piedras	Boston University, Summer Undergraduate Research Fellowship Program

<b>Name</b>	<b>Discipline</b>	<b>PR-LSAMP Institution</b>	<b>Research Site</b>
Emy Rivera	Astrophysics	UPR – Rio Piedras	Research Internships in Science and Engineering, Deutscher Akademischer Austausch Dienst, Dortmund, Alemania
Alessandra Alicea	Biology	UPR – Rio Piedras	Tufts University, Building Diversity in Biomedical Sciences, Boston
Adriana Rodríguez	Chemistry	UPR – Rio Piedras	Research Experience for Undergraduates, University of Texas at El Paso,
Janice Soto Morales	Biology	UPR – Rio Piedras	Summer Medical Dental Education Program, Case Western Reserve University
Betsabé Castro	Biology	UPR – Rio Piedras	Research Activities at Rocky Mountain Biological Laboratory (Colorado)
Aleshka Carrión	Physics	UPR – Rio Piedras	Science Undergraduate Laboratory Internships / Brookhaven National Laboratory, Long Island, NY
Alice Arroyo Erick Pérez Valeria Rivera Erick Rodríguez Laura Vicente Lester Rosario	Biology Biology Biology Biology Chemical Engineering Biology	UPR – Cayey	University of Minnesota
Carlos Báez Pabón Elias Rosario Joshua	Biology Chemistry Chemistry	UPR – Cayey	Pennsylvania State University
María Bernand María Castello Janice Díaz Sheydanis Díaz Amarilys López Jennifer Ocasio Mónica Ríos	Biology Biology Biology Biology Chemistry Biology Biology	UPR – Cayey	Michigan State University
Carlos Castrodad Jessica Díaz Luke Rodríguez	Biology	UPR – Cayey	Tufts Medical School
Luis De Jesús Alexandra Rosado	Chemistry	UPR – Cayey	New York University at Buffalo
Stephanie Delgado Frank Soto	Biology	UPR – Cayey	University of Wisconsin
Adriana Díaz Marienid Flores	Biology Chemistry	UPR – Cayey	University of North Carolina, Chapel Hill

Name	Discipline	PR-LSAMP Institution	Research Site
Jesse Díaz	Biology	UPR – Cayey	Marine Biological Laboratory University of Florida
Amaris Borges Luis Rodríguez	Chemistry Biology	UPR – Cayey	University of Pennsylvania
Juan G. Feliciano Gabriel J. Pérez	Biology	UPR – Cayey	Virginia State University
Wilmarie Fuentes	Biology	UPR – Cayey	Purdue University
Michael Gómez	Biology	UPR – Cayey	Polaris Project, Russia
Melisa Medina	Chemistry	UPR – Cayey	Scripps Research Institute
Janice Nieves	Biology	UPR – Cayey	Harvard University
Dorianmarie Vargas	Biology	UPR – Cayey	North Carolina State University
Omar Padilla Frances González	Chemistry Biology	UPR – Cayey	San José State University
Paola La Santa Victoria Ortiz Vázquez Ormarie	Biology	UPR – Cayey	University of Georgia
Jarelys Pérez	Biology	UPR – Cayey	University of Medicine and Dentistry, New Jersey
Iván García Pedro Rodríguez Carlos Santos	Biology	UPR - Cayey	Boston University
Eduardo Hernandez Vanessa Pinto Lyanne Rolón	Biology	UPR - Cayey	Western Michigan University
Durán Rodney Francisco Fuster	Biology	UPR - Cayey	University of Colorado
Paola Zayas	Biology	UPR – Rio Piedras	The Genome Institute Washington University at St. Louis

**The Puerto Rico Interdisciplinary Scientific Meeting** – The Puerto Rico Interdisciplinary Scientific Meeting (PRISM) is the annual islandwide forum for undergraduate and graduate STEM students to present their research projects to their peers and STEM faculty members. For the past 19 years PR-LSAMP has co-sponsored this activity with the local chapter of the American Chemical Society and the AGEP Program. The 2011 PRISM was held at the Inter-American University, Bayamon Campus. A total of 505 STEM students, 372 undergraduate and 133 graduate students (407 in the sciences, 89 in engineering, and 9 in mathematics) from the different PR-LSAMP institutions presented their research projects to an audience of students and faculty members. A total of 990 people participated of this meeting this year.

This year the invited speaker was Dr. Tyrone Hayes, professor at the Department of Integrative Biology at UC-Berkeley who talked about ***“From Silent Spring to Silent Night: A Tale of Toads and Men”***. Dr. Hayes obtained his PhD from the Department of Integrative Biology at the University of California, Berkeley in 1993 and his current projects focuses on developmental endocrinology with an emphasis on evolution and environmental regulation of growth and development.

A workshop for middle and high school teachers was offered for the first time during the PRISM. Fellow-Teacher Teams from the GK-12 Program “From Hectares to Nanometers: a Multidisciplinary Exploration of Functional Nanomaterials and Tropical Ecosystems” offered a workshop developed by three fellow-teacher teams related to the plenary session that helped participating teachers relate the concepts seen in the scientific talk to the curriculum.

### Travel to Scientific Meetings

During 2010-11 PR-LSAMP provided a total of \$12,000 in travel stipends for students to present their research projects in national conferences. Twenty-four (24) STEM students from five (5) PR-LSAMP institutions benefited from this PR-LSAMP initiative. Examples of national forums attended are the AAAS, ACS, and AICHE. **Table 7** presents by institution the number of students that received travel stipends and total amount of funds awarded.

**Table 7**  
**Travel Stipends Awarded to STEM Undergraduate Students**  
**To Present Research Projects at National Scientific Conferences in 2010-11**

Institutions	Number of Participants	Funds Awarded (\$)
UPR Rio Piedras	10	\$5,000
UPR Mayaguez	6	\$3,000
UPR Cayey	2	\$1,000
IAU Bayamon	3	\$1,500
PCUPR	3	\$1,500
<b>Total</b>	<b>24</b>	<b>\$12,000</b>

### NIST Summer Internships

Since Phase I the National Institute of Standards and Technology (NIST) of the U.S. Department of Commerce, has been providing summer research experiences to PR-LSAMP students. During the summer of 2011, six students, from two different PR-LSAMP institutions participate in the 9 to 12 week summer Internship Program. NIST provided a total of \$15,645 to cover stipends, housing, and travel expenses. This internship provides students with the opportunity to work in research projects with mainland STEM students and nationally recognized researchers. **Table 8** presents the name of the participants and their research field.

**Table 8**  
**NIST Summer of 2011**  
**Name of PR-LSAMP Participants, Institution and STEM Field**

Name of Student	Institution	STEM Field
Aida Colon	UPR-Mayaguez	Electrical Engineering
Alexander Ortiz	UPR-Mayaguez	Electrical Engineering
Eliezer Ferrá	IAU-Bayamon	Computer Science
Name of Student	Institution	STEM Field
Joseph Marcano	IAU-Bayamon	Electrical Engineering
Jose Osorio	IAU-Bayamon	Computer Science
Angel Rosado	IAU-Bayamon	Computer Science

## **FaST (Faculty and Student Teams) and SULI Summer Internship Program**

PR-LSAMP received a \$58,250 Supplemental award to participate in the DOE FaST and SULI Summer Internship Program. With these funds two professors and seven students participated this summer (2011) at Argonne National Laboratory and Brookhaven:

1. Dr. Eduardo Ortiz, an Electrical and Computer Engineering professor at UPR-Mayaguez, was sponsored to conduct research with three of his students, Carlos Torres Casiano, Maria Gonzalez Pardo and Edmarie Arce Febles, at the Argonne National Laboratory. They would be working with Dr. Guenter Conzelmann renewable resources, specifically the variability in the power supply needed.
2. Dr. Yi Jia from the Department of Computer and Electrical Engineering at UPR-Mayaguez was sponsored to to participate this summer in the FaST Program at Argonne National Lab working in collaboration with Dr. Charlie Catlett on the current or potential issues relating to the power consumption and hardware failure in HPC machine room, choose appropriate sensor materials, sensor buses and micro-controllers, design and build environmental sensor system, deploy it and closely examine collected environment data. Dr. Jia would be working with his three students: Michael Rodriguez, Dennis Negron and Miguel Rosado.
3. The undergraduate student, Aleshka Carrion from the University of Puerto Rico, Rio Piedras Campus, Department of Physics, was accepted at Brookhaven National Laboratory to work this summer under the supervision of Dr. Mel Morris in a project titled "Research in Meteorological Systems" which will be carried out at the Northeast NOAA Weather Center located in Brookhaven.

### **ACTIVITY #3 – ROLE MODEL SEMINARS**

#### **Description of Activity #3:**

Role Model Seminars will be established at each participating PR-LSAMP institution to provide students an opportunity to hear and meet nationally renowned scientists, local researchers and scientists, and engineers working in industrial settings in Puerto Rico. The program will have a dual purpose, to enhance students' academic preparation through the scientific topic to be covered by each speaker, and to have the speakers serve as role models. Speakers will share pivotal events and influences on their educational, personal and scientific careers, such as significant events that shaped their decision to remain in school and conduct studies in a scientific or engineering field; mentors; major influences, such as research experiences or participation in scientific fairs, and particularly, obstacles encountered and how they overcame them. Following this presentation designed to establish rapport with the students, speakers will cover a scientific topic based on his/her field of research. Former and current PR-LSAMP BDP Fellows will attend these conferences to also serve as role models and share with undergraduate students their graduate experience.

#### **Findings for Year 5:**

As part of the Role Model Seminar Series this year, and in conjunction with the Mentoring Component and the Bridge to the Doctorate Program, we offered 13 conferences as part of the "Sixth Transdisciplinary Research Conference" where national and international renowned scientists of different areas spoke to undergraduate and graduate students. **Table 9** shows a list of all the conferences offered.

**Table 9: Role Model Seminars Offered by PR-LSAMP, Academic Year 2010-11**

<b>Speaker</b>	<b>Title of Conference</b>	<b>Site</b>	<b>Audience</b>
Michael P. Blanton, Ph.D., Health Sciences Center, School of Medicine, Texas Tech University	Heterologous Expression, Affinity-Purification and Structural Analysis of Neuronal Nicotinic Acetylcholine Receptors	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Satheesh Palaninathan, Ph.D., Department of Biochemistry and Biochemistry and Biophysics, Texas A&M	Designing the Super Glue: Inhibitors for Transthyretin Amyloidosis	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Margarita Ortiz, Ph.D., Chemistry Department, UPR Humacao	New Methodologies for the Synthesis of Alcohols and Amino Derivatives as Nicotinic Receptor Agonists	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Mauro Costa-Mattioli, Ph.D., Baylor College of Medicine, Houston, TX	Translational Control of Long-Lasting Synaptic Plasticity and Memory	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Jin Jun Shi, Ph.D., Laboratory of Nanomedicine and Biomaterials Harvard Medical School	Targeted Nanomedicine: : Evolution of Nanoparticle Technologies and Bench to Bedside Translation	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Héctor D.Abruña, Ph.D., Department of Chemistry and Chemical Biology and Energy Materials Center at Cornell Baker Laboratory, Cornell University	Discovery and Characterization of Novel Materials for Fuel Cell Applications	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Michael Pettes, Ph.D., Department of Chemical Engineering University of Texas at Austin	Structure-Thermal Relationships in Carbon Nanotubes and Bilayer Graphene	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Michael E. Mackay, Ph.D., Department of Materials Science and Engineering, University of Delaware	Understanding Polymer-Based Solar Cell Performance	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Robyn Hannigan, Ph.D., Department of Environmental, Earth and Ocean Sciences, University of Massachusetts at Boston	Otolith mineralogy - structure and function at the crystallization front	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Stefano Decesari Ph.D., Institute of Atmospheric Sciences and Climate, National Research, Council of Italy	The Evanescent Sources of Atmospheric Humic- like Substances	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Alexandra Mello Schmidt, Ph.D., Universidade Federal do Rio de Janeiro	Spatio-temporal Modelling for the Early Detection of Dengue Epidemic Outbreak	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students

(continued):

Speaker	Title of Conference	Site	Audience
Wojciech Jadwisieniczak, Ph.D., School of Electrical Engineering & Computer Science, Ohio University	Challenges and Opportunities for III-Nitride Semiconductors Doped With Lanthanides	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students
Tiffany S. Santos, Ph. D., Argonne National Laboratory	Digital Synthesis: A Pathway toward New Materials	Conrad Condado Plaza	Faculty, BDP Fellows, PR-LSAMP Students

#### **ACTIVITY #4: THE ANNUAL BEST PRACTICES CONFERENCE ON TEACHING AND LEARNING**

##### **Description of Activity #4:**

PR-LSAMP offers the Annual Best Practices Conference on Teaching and Learning. Approximately 200 STEM faculty members attend this event. Local and national resources are selected to present their successful teaching and learning strategies. The event continues to sustain the network of support developed among STEM faculty members from the different PR-LSAMP institutions. This network is also reinforced electronically through the PR-LSAMP Website.

##### **Findings for Year 5:**

For the past nine years PR-LSAMP has been sponsoring an annual conference on Best Teaching and Learning Practices to Improve Students' Academic Performance. The conference was held on October 29, 2010. We had four main speakers, Dr. Geri Richmond, University of Oregon, "Assembling a Scientific Career with a Full Tool-Box"; Dr. Ramón López, University of Texas-Arlington, "Some Things Physicists Have Learned About Physics Education by Doing Research in Cognitive Science"; Dr. Héctor Joel Alvarez, University of Puerto Rico-Rio Piedras, "The Prevalence of Misconceptions in Secondary Science Teachers Candidates: Implications for the Development of Science Concepts" and Dr. Noah Finkelstein, University of Colorado at Boulder, "Answering the Nation's Call: The Role of Scientists in Transforming Education".

BD Fellows from different cohorts attended the activity together with 40 STEM undergraduate students, and 70 STEM faculty members for a total of 146 participants.

#### **ACTIVITY #5 - THE BRIDGE-TO-THE-DOCTORATE PROGRAM**

The thrust of this activity is to motivate former PR-LSAMP students to continue graduate studies in a STEM field. The BD Program offers 12 fellowships annually (except for Year 1 when only 10 fellowships were awarded) for the first two years of graduate studies. In August 2003 PR-LSAMP received its first Supplemental Award to initiate the Bridge-to-the-Doctorate Program. In this annual report results from Cohorts 1 to 5 are presented, as funds were provided as a supplemental award to PR-LSAMP. As of August 2007, BDP became a separate program, and results for all Cohorts starting with Cohort VI are reported separately. Currently we have been funded to sponsor two additional cohorts (Cohorts VIII and IX).

## Findings for the BD Program – The First Five Cohorts

The Bridge-to-the-Doctorate Program awarded 58 fellowships to the first five BDP Cohorts (2003-2007). Seven fellows complete their Ph.D. degree and ten finish their masters and are in the academia or in the workforce for a total of 17. The rest of the group forty one fellows are still in the pipeline for obtaining their Ph.D. Fellows represents all STEM disciplines, as shown on **Table 10**.

**Table 10**  
**Number of BD Fellowships by STEM Discipline**

STEM Discipline	Fellowships
Chemistry	28
Biology	12
Engineering	7
Physics	6
Marine Sciences	3
Mathematics	2
<b>Total</b>	<b>58</b>

**Table 11** shows per Cohort, the number of fellowships and the scientific conferences attended by the Fellows.

**Table 11**  
**Fellows and Scientific Conferences attended by BDP Cohort**

Cohort	Fellows	Scientific Conferences
1	10	185
2	12	95
3	12	209
4	12	182
5	12	148
Total	58	819

## Tracking Academic Performance of BDP Fellows

Since its inception, the BD Program developed a structured system for tracking the academic progress of BD Fellows. BD Fellows complete and sign a Monthly Progress Report Form, which includes space for comments by the professors who teach the courses in which the Fellows are enrolled. At the end of each month, the BD Fellows submit the report to the BD Coordinator in order to receive the monthly stipend. The Coordinator reviews and discusses the report with the Fellows and meets with professors, as needed, to discuss academic progress. This has proven to be an effective mechanism for addressing problems as they emerge. Also, the BD Coordinator maintains constant communication with BD Fellows, through the Support Program activities, e-mails, visits to their labs, and individual and group meetings. Continuous monitoring of BD Fellows academic progress and compliance with departmental requirements will continue to be enforced.

Former and current BD Fellows that are still in the PhD pipeline are required to yearly complete an online Student Tracking Questionnaire. The BD Coordinator keeps abreast of their academic and research progress and future plans upon obtaining the degree. A permanent mailing address (usually the parents') has also been requested from the Fellows as an additional channel for communication.

In addition, the Student Tracking Questionnaire includes an Academic Progress Report Form for BD fellows that are active in a MS or PhD program. It is annually updated, to gather data to measure progress are: GPA; number of graduate credits approved; passing of qualifying exams; submission and approval of thesis project; number of publications; number of presentations in scientific meetings, scientific meetings attended, courses and training abroad, and expected graduation date. Analysis of the data obtained of Cohorts 1-8 reveals the following major accomplishments:

- Sixty nine BD Fellows (73%) are in the PhD pipeline and should contribute significantly to the diversifying the National STEM workforce (See Table 1).
- A total of sixteen BD fellows (17%) have entered the workforce in academia, industry, or government research centers. Of these, six fellows (6.4%) have obtained their PhD and fifteen (16%) their MS degrees, of these five have continued to complete their PhD (See Table 6 and tables 7-14).
- Three BD graduates, two of these female, have a promising future in leadership position in mainland agencies; two of these are Research Scientists at NASA Glenn Research Center and one recently joined the ARMY Corps of Engineering. One former fellow is completing a Postdoctoral Fellowship at Texas A&M University, and was awarded the 2011 Ford Fellowship, the only one awarded that year.
- The PR-BD Initiative has been successful in recruiting first generation low-income students, which are mainly located at 4-year institutions. Forty three percent (43%) of all BD Fellows have at least one parent with only a high school diploma or less and 9.5% are first generation students.

**Tables 12-17** show the Fellow's progress in the PhD pipeline by Cohort.

Table 12  
Results of Tracking of BD Fellows as of May 2011

Tracking	Number of Fellows	Percentage (%)
Completed PhD Degree and are incorporated into the STEM workforce	6	6.4%
Completed MS Degree and are incorporated into the STEM workforce	10	10.6%
Completed MS degree and is an active student in a PhD program	5	5.3%
Active student in the PhD pipeline	64	68.2%
No longer in STEM fields	9	9.5%
<b>Total</b>	<b>94</b>	<b>100%</b>

**Cohort #1 (2003-05)** - Ten BD fellowships were awarded. **Table 13** shows Cohort #1 Fellows' progress in the PhD pipeline.

**Table 13**  
**Cohort # I (2003-05) BD Fellows' Progress in the PhD Pipeline, June 2011**

Fellows	STEM Field	Degree Date
Azlin Biaggi	Physics	PhD 2008
Daniel Caballero (1 year award)	Chemistry	PhD 2010
Betzaida Castillo	Chemistry	PhD 2009
Omar Cruz	Chemistry	Opted for a job in industry
Agustín Díaz	Chemistry	PhD 2010
Luzed Díaz	Biology	Opted for a job in industry
Marilyn García	Chemistry	PhD 2011
Karilys González	Chemistry	PhD 2012
Jessica Oyola	Chemistry	PhD 2011
Yamaris Pacheco	Chemistry	PhD 2012
Michelle Cartagena	Chemistry	PhD 2011

**Cohort #2 (2004-2006)** - The twelve Cohort #2 Fellows began graduate studies in August 2004. **Table 14** shows Cohort #2 Fellows' progress in the PhD pipeline.

**Table 14**  
**Cohort #2 (2004-06) BD Fellows' Progress in the PhD Pipeline, June 2011**

Fellows	STEM Field	Graduation Date
Olga Abreu	Marine Sciences	Opted for Employment
Deborah Acevedo	Chemistry	MS 2009
Lourdes Cabello	Chemistry	Opted for Employment
Madalis Casiano	Chemistry	Opted for Employment
Yashira Estrada	Marine Sciences	Opted for Employment
Luis González	Civil Engineering	MS 2007 / Working in Industry
Miguel González	Chemistry	MS 2007 / PhD 2011
Laura Granell	Biomedical Science	MS 2007 PhD 2013 Yeshiva University
Yaritza Maldonado	Marine Sciences	MS 2010
Yeira Padilla	Chemical Engineering	PhD 2009
Luis A. Rodríguez	Civil Engineering	MS 2007 / Working in Industry
Priscilla Santiago	Chemistry	MS 2007

**Cohort #3 (2005-2007)** – Fellows from Cohort #3 began graduate studies in August 2005. **Table 15** shows Cohort #3 Fellows' progress in the PhD pipeline.

**Table 15**  
**Cohort #3 (2005-07) BD Fellows Progress in the PhD Pipeline, June 2011**

<b>Fellows</b>	<b>STEM Field</b>	<b>Graduation Date</b>
Félix Araujo	Biology	MS 2009
Sofía Burgos	Biology	PhD 2012
Enid Contés	Chemistry	PhD 2012
Yisaira Díaz	Chemistry	PhD 2012
Giselle Flores	Chemistry	PhD 2011
José González	Biology	PhD 2011
Ana Longo	Biology	MS 2008 / PhD 2014 Cornell Univ.
Yazmín Martínez	Physics	Opted for employment
Pamela Medina	Biology	Opted for Employment
Manuel Rivera	Physics	MS 2011
Francisco Solá	Physics	PhD 2009
Damaris Suazo	Chemistry	MS 2009 / PhD 2014

**Cohort #4 (2006-2008)** – The twelve Cohort #4 Fellows began graduate studies in August 2006. **Table 16** presents Cohort #4 Fellows' progress in the PhD pipeline.

**Table 16**  
**Cohort #4 (2006-08) BD Fellows' Progress in the PhD Pipeline, June 2011**

<b>Fellows</b>	<b>STEM Field</b>	<b>Graduation Date</b>
Edward Avilés	Chemistry	PhD 2013
Jesúan Betancourt	Chemical Physics	PhD 2013
Bárbara Casañas	Chemistry	MS 2010 / PhD 2014
Yanira Enríquez	Chemistry	PhD 2013
María del Mar García	Chemistry	PhD2013
Griselle Hernández	Chemistry	PhD 2014
Mariely Hernández	Mathematics	MS 2011
Pablo Hernández	Biology	MS 2012
Iván López	Physics	MS 2008 / PhD 2012
Fernando Piñero	Mathematics	MS 2010
Francheska Ruíz	Ecology	MS 2011
Pamela Vallejo	Chemistry	PhD 2013

**Cohort #5 (2007-2009)** – Cohort #5 Fellows began graduate studies in August 2007. **Table 17** presents Cohort #5 Fellows' progress in the PhD pipeline

**Table 17**  
**Cohort #5 (2007-09) BD Fellows' Progress in the PhD Pipeline, June 2011**

<b>Fellows</b>	<b>STEM Field</b>	<b>Graduation Date</b>
Ismael Alicea	Chemistry	PhD 2012
Juan Burgos	Physics	PhD 2014 Michigan State Univ.
Ana R. Cameron	Chemical Eng.	PhD 2012
Manuel Delgado	Biology	PhD 2013
Rosalyn González	Biology	On leave for health reasons

Fellows	STEM Field	Graduation Date
Dionne Hernandez	Chemistry	PhD 2013
Ruth Hidalgo	Mechanical Eng.	MS 2009
Karinél Nieves	Chemistry	PhD 2013
Ida Pantoja	Biology	PhD 2013
Damián Reyes	Chemical Eng.	PhD 2012
Carlos A. Rodríguez	Biology	MS 2011
Denisse Soto	Chemical Eng.	PhD 2012

**PR-LSAMP Students that Received a BD Fellowship from Mainland LSAMP BD Sites:**

The strong network between LSAMP programs throughout these eight years that BD awards have been in place has led twenty-nine (29) PR-LSAMP undergraduate students, who have completed their BS at a PR-LSAMP institution, to receive a BD fellowship from an LSAMP institution in the Mainland to continue their graduate studies in a STEM discipline (2003-2010). Table 18 shows the BD recipients the cohort and the sites that awarded the fellowships:

**Table 18**  
**Undergraduate PR-LSAMP Alumni that have received BDP Fellowships at Mainland LSAMP Institutions**

Name	Cohort & Year	Discipline	Degree Granting Institution	LSAMP Institution
Miguel Acosta	Cohort III / 2005	Chemical and Biochemical Engineering	UPR-Mayagüez	University System of Maryland
Natalia Córdova	Cohort V / 2007	Mathematics	UPR-Río Piedras	Colorado State University
Carlos Herrera	Cohort V / 2007	Biology	UPR-Río Piedras	Colorado State University
Gladys Bonilla	Cohort VI / 2008	Physics	UPR-Río Piedras	Colorado State University
Katherine Dávila	Cohort VI / 2008	Environmental Sciences	UPR-Río Piedras	Colorado State University
Daniel Feliciano	Cohort VI / 2008	Chemistry	UPR-Río Piedras	Colorado State University
Juliana G. Camacho	Cohort I / 2003	Chemical Engineering	UPR-Mayagüez	The Texas A&M System
Deborah M. Román	Cohort I / 2003	Natural Science	UPR-Mayagüez	The Texas A&M System
Migvia del C. Vázquez	Cohort I / 2003	Chemical Engineering	UPR-Mayagüez	The Texas A&M System
Myra Méndez	Cohort II / 2004	Industrial Engineering	UPR-Mayagüez	The Texas A&M System
Marcos López	Cohort IV / 2006	Electrical Engineering	UPR-Mayagüez	The Texas A&M System
Louis M. Colón	Cohort VI / 2008	Physics	UPR-Río Piedras	University of Florida
Natalia Díaz	Cohort VIII / 2010	Biology	UPR-Río Piedras	University of Florida
Miguel Lugo	Cohort VIII / 2010	Civil Engineering	UPR-Mayagüez	University of Florida

<b>Name</b>	<b>Cohort &amp;Year</b>	<b>Discipline</b>	<b>Degree Granting Institution</b>	<b>LSAMP Institution</b>
Enixy Collado	Cohort IV / 2006	Coastal Marine Biology	UPR-Humacao	State University of New York
Ivone M. Ferrer	Cohort V / 2007	Chemistry	UPR-Cayey	State University of New York
Jesús M. Velázquez	Cohort V / 2007	Chemistry	UPR-Cayey	State University of New York
Daniel García	Cohort I / 2003	Electronics Engineering Technology	UPR-Bayamón	Western Alliance to Expand Student Opportunities
Edgardo L. Ramirez	Cohort III / 2005	Microbiology	UPR-Humacao	Western Alliance to Expand Student Opportunities
José M. Vega	Cohort IV / 2006	Secondary Education Mathematics	UPR-Cayey	Western Alliance to Expand Student Opportunities
Romarie Morales	Cohort VI / 2008	Political Science/Economics and Mathematics	UPR-Río Piedras	Western Alliance to Expand Student Opportunities
Yaralid Sotomayor	Cohort VI / 2008	Microbiology	UPR-Mayagüez	Western Alliance to Expand Student Opportunities
Isabel García	Cohort III / 2005	General Biology	UPR-Humacao	Washington Baltimore Hampton Roads Alliance
Jorge Vélez	Cohort V / 2007	Geology	UPR-Mayagüez	Washington Baltimore Hampton Roads Alliance
Laura Pedro	Cohort IV / 2006	Chemistry	UPR-Río Piedras	University of Illinois at Chicago
Geovanni Ojeda	Cohort VI / 2008	Chemistry	UPR-Río Piedras	University of Illinois at Chicago
Pedro A. Torres	Cohort VI / 2008	Mathematics	UPR-Mayagüez	North Carolina State University
Mariann Z. Vázquez	Cohort VI / 2008	Civil Engineering	UPR-Mayagüez	North Carolina State University

## V. Undergraduate STEM Education

During academic year 2010-11 PR-LSAMP institutions secured a total of \$25M to enhance, strengthen, and sustain their STEM Programs. **Tables 19 to 26** present the educational initiatives initiated or continued at each PR-LSAMP institution. Projects are presented by funding source and amount of funds assigned for that year.

**Table 19- UPR-Aguadilla**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Mathematics and Science Partnership (MSP)	US Department of Education	600,000
Minority Science and Engineering Improvement Program (MSEIP)	US Department of Education	185,000
Días de desarrollo de facultad	UPR Aguadilla	2,000
Fondos de Mejoramiento de facultad	UPR Aguadilla	5,640
11mo Simposio Investigación Subgraduada	UPR Aguadilla	300
Fishing Communities in Action	National Fish and Wildlife Foundation	65,617
Young Scholars in Action: Reducing Marine Debris in PR	National Oceanic and Atmospheric Administration	57,016
Dune Restoration	Rip Curl Pro- Planet	13,700
<b>TOTAL</b>		<b>\$929,273</b>

**Table 20 - UPR-Arecibo**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Collaboration through Technology Initiatives to Enhance Academic, Student and Library Support Services (TV-COOP)	US Department of Education	700,000
ENVIRO-CHEM Research Experience for Underrepresented minority Teachers and Students through Mentoring	The Camille and Henry Dreyfus Foundation, Inc.	56,234

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Laboratory Enhancement and Curricular Revision for the Veterinary Technology Program	US Department of Agriculture (USDA) Cooperative State Research, Education and Extension Service (CREES) Program	75,000
Integrated Science Multiuse Laboratory (ISMuL)	Puerto Rico Space Grant Consortium (PRSGC) – NASA	50,000
Mini-grant for chemical technology students to travel to the 239 <sup>th</sup> ACS National Meeting & Exposition in San Francisco , CA	UPRA Student Council – Institutional	1,500
Mini-grant for chemical technology students to travel to the 239 <sup>th</sup> ACS National Meeting & Exposition in San Francisco , CA	UPRA Chancellor – Institutional	800
Minority Travel Award for Undergraduate Students (2) to attend the SOT Annual Meeting in Salt Lake City, UTAH	Society of Toxicology (SOT)	5,000
Minority Travel Award for Advisor (1) to attend the SOT Annual Meeting in Washington, DC	SOT (External) & UPRA (Institutional)	2,500
Instituto para el entendimiento en ciencias y Matemáticas Integrando la Investigación y la Tecnología (ENCIMAIT)	US Department of Education (DE): Project Title IIB, Math & Science Partnership (MSP) & DECEP-UPRA	750,000
Construction of a Solar Energy System (SES) at the University of Puerto Rico at Arecibo	ARRA-State Energy Program & Sun Energy Program	100,000
Donation to student members from the UPRA ACS SA Chapter to attend the 241 <sup>st</sup> ACS National Meeting & Exposition in Anaheim, CA	Econo Supermarket	25
Donation to student members from the UPRA ACS SA Chapter to attend the 241 <sup>st</sup> ACS National Meeting & Exposition in Anaheim, CA	San Sebastian's Mayor Office	100
Donation to student members from the UPRA ACS SA Chapter to attend the 241 <sup>st</sup> ACS National Meeting & Exposition in Anaheim, CA	Jayuya Mayor's Office	300
Donation to student members from the UPRA ACS SA Chapter to attend the 241 <sup>st</sup> ACS National Meeting & Exposition in Anaheim, CA	Hatillo State Representative	100
<b>TOTAL</b>		<b>\$1,741,559</b>

**Table 21 - UPR-Cayey**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
RISE	National Institute of Health	435,308.00
RIMI	National Institute of Health	12,474.75
INBRE	National Institute of Health	153,116.00
Howard Hughes	Howard Hughes Medical Institute	12,000.00
Upward Bound	US Department of Education	319,202.00
Student Support Services	US Department of Education	547,419.00
Honor's Program	Institutional	104,960.56
Tutoring Program	Institutional	4,000.00
Sponsored Conference and Activities	Institutional	7,285.00
Scholarships	American Chemical Society	6,500.00
Scholarships	Rafael Carrión, Jr. Foundation	8,750.00
Scholarships	Metronic Foundation	500.00
Scholarships	The Clara Abbott Foundation	9,000.00
Scholarships	Scholarships' Foundations	10,100.00
Scholarships	USA Funds	1,500.00
Scholarships	Merck Donation	6,000.00
Scholarships	Johnson and Johnson	1,000.00
<b>TOTAL</b>		<b>\$1,639,115.31</b>

**Table 22 - UPR-Rio Piedras**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
CPATH-1: Asserting Parallel Computational Thinking in to Undergraduate 4-year Computer Science Curriculum	NSF	78,458
MRI-R2: Acquisition of genomic and bioinformatics technology to promote research at the UPR	NSF	637,664

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Long Term Research in Environment Ecol Program (Supplement)	NSF	16,407
Long range Improvement of Chemistry Education at UPR-RP	US Department of Education	198,571
Small Molecule Self-Assembly in Aqueous Media (SC1)	NIH	329,958
The role of a novel tau-associated protein in neurodegeneration (SC1)	NIH	259,226
New Asymmetric Organoborane Conversions via 9-Borabicyclo (3.3.2) Decanes	NIH	240,000
Gene profiling of nervous system regeneration using a novel organism (RO3)	NIH	74,500
Support for University Biomedical Excellence at UPR-RP (R25)	NIH	1,617,259
Synthesis of Polypropionate Antibiotics Via Epoxide Chemistry (SC1)	NIH	320,550
New Leads Against Cancer and Infectious Diseases from Puerto Rican Reef Species (SC1)	NIH	309,357
Marine Fatty Acids as New Antifungal anti Mycobacterial and Top-Agents (SC1)	NIH	256,375
Molecular control of intestinal regeneration (SC1)	NIH	329,625
Optimal Mathematical Models of Renal Processes (SC1)	NIH	149,000
Biochemical Characterization of the Regulatory T- Cell Protein LAG-3	NIH	111,375
Computational Quest for Nanocatalysts with Novel Zeolitic Carbon Support for Bioethanol Production	Oak Ridge National Lab	25,000
Serial Blockface SEM Labels for Assessing Nervous System Plasticity (Subcontract)	Nanoprobes, Incorporated NIH	361,529
Neuroscience Research Opportunities to Increase Diversity (NeuroID)	NIH	204,485
Renovating Infrastructure for Tropical Ecology and Environmental Sciences	NSF	1,149,687
IDBR: Development of a High Resolution Serial Block-Face Scanning Electron Microscope	NSF	250,000
Probes and Instrumentation for Monitoring and Manipulating Nervous Systems Plasticity	Memorandum of Agreement with Nanoprobes, Inc.	115,715
Luquillo LTER Program 4: Understanding Change in Ecosystems of North eastern Puerto Rico	NSF	820,000
Collaborative Research: Landsliding, land-use change and carbon dynamics in a Central American mountainscape	NSF	172,971
Chemical Protein Glycosylation	NIH	293,787
Synthesis of Polypropionate Antibiotics Via Epoxide Chemistry	NIH	1,307,475
New Leads Against Cancer and Infectious Diseases from Puerto Rican Reef Species (SC1)	NIH	268,200
Integration of Informatics and Quantitative Concepts in Biology at UPR (supplement)	NIH	180,025
Collaborative research: The generation of a biodiversity hotspot: paleobiogeography of the Caribbean inferred from multiple arachnid lineages with differing dispersal abilities.	NSF	118,229
Memorando de Entendimiento entre UPR-RP y la Escuela de Medicina	Centro Dotal de Investigación de Servicios de Salud	45,000
Actividades de Apoyo al Programa de Matemáticas de Departamento de Educación de PR	Department of Education of Puerto Rico	1,092,347
Desing and Development of Novel Room Temperature Magnetolectric Multiferroics for Multifunctional Devices	US Department of Defense (ARO)	570,500
<b>TOTAL</b>		<b>\$11,903,275</b>

**Table 23 - UPR-Mayaguez**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Summer program for 20 high school students, for them to learn about careers in transportation. It last one month.	Federal Highway Administration (via Autoridad de Carreteras)	51,951
32 Student / 10wks doing Research in the US Army Corp of Engineers.	US Army Corp of Engineers (ERDC)	567,428
Talleres para retención del estudiantes en su grado de agrimensura y topografía	Instituto de Agrimensores del (CIAPR)	5,000
Research experience for undergraduate, high school students and teachers ; Clubs formation	NSF	65,000
Internado de verano de meteorología para estudiantes subgraduados	NOAA	50,000
Student preparation for international competitions	American Mathematical Society Epsilon fund, Accesoalexitouniversitario, Fundacion Gauss, AMC	40,560
Actividades Semana del Ingeniero, Competencias Estudiantiles, Representación de sociedades estudiantiles, Casa Abierta, Reto Colegial	Boeing, Exxon, Lockheed Martin, Eastman Chemical, Abbott	138,500
Demostraciones en escuelas, mejoramiento profesional de maestros	DE Titulo 5	30,000
Research experience for undergraduate and outreach activities for high school students and teachers in the areas of electronics, radars, weather, and solar energy.	NSF	22,000
6 wk internship for undergraduate students 4 to UR (University of Rhode Island)	Federal Highway Administrator	18,000
Fellowship	Federal Highway Administrator	33,000
Undergraduate Research	IBM, MIT Lincoln Lab, Harris Corp., ARMY – EDRC/EYAK, MG	32,000
PR weather camp 17 students, 1 week and other outreach activities	NOAA	11,500
Fellowship	Venegas Construction	1,500
Fellowship	Exxon Mobil	2,000
Scholarships	Junior Science Scholarship	3,500
Scholarships	St. Jude Medical School	3,000
Scholarships	Army Emergency	4,920
Scholarships	Elks Foundation	1,000
Scholarships	P.I.S.O. Scholarship	3,000
Fellowship	UNAVCO, Inc.	15,000
Scholarship	Xerox	4,500
Scholarship	American Chemical Society	17,500
Scholarship	Avon Foundation	1,000
Scholarship	Cornell	2,541
Scholarship	Clara Abbott Foundation	87,500
Scholarship	Air Force	2,000
Scholarship	Lifescan, Inc.	4,500

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Scholarship	Abbott	4,000
Scholarship	Scholarship	10,000
Scholarship	Accenture	2,700
Scholarship	Verizon Foundation	50,000
Scholarship	USA Fund	7,500
Scholarship	Kimberly Clark	13,600
Scholarship	Boeing	32,000
Scholarship	Medtronic	9,500
Scholarship	Hershey	1,450
Scholarship	Johnson & Johnson	2,000
Scholarship	Legado Ing. Samuel Vazquez	3,000
Scholarship	Asociacion Puertorriqueña del Concreto	1,500
Scholarship	National Weather Association	1,000
Scholarship	Cardinal Health	2,000
<b>Total</b>		<b>\$1,358,650</b>

**Table 24- UPR-Humacao**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Marine Education	NOAA	50,560
Cabo Rojo Salters Microbial Observatory	NSF	15,000
Undergraduate Research Training Program / CFDA 93.859	NIH	292,895
Minority Biomedical Enhancement / CFDA 93.859	Department of Health and Human Services	418,730
Bringing Biotechnology to the hands of high-school students in Puerto Rico	Amgen Foundation – Bruce Wallace Program	93,917
Prevención de la Violencia Domestica	Oficina de la Procuradora de las Mujeres, Estado Libre Asociado de PR	65,460
Nanotechnology Applications and Career Knowledge	NSF	129,998
Creating a hybrid clean room for nanotechnology research education	Compañía de Fomento Industrial de Puerto Rico	183,500
MBRS Support of Continuous Research Excellence	Department of Health and Human Services	431,690
Advancing Competitive Biomedical Research in Puerto Rico	NIH	674,484
Creating a Caribbean Computer Center for Excellence	NSF	57,400
Supporting for students	US Department of Education	397,867
Programa UpWard Bound	US Department of Education	250,000
Post Baccalaureate Achievement Program	US Department of Education	225,562
Violence Prevention	US Department of Justice	700,000
Rapid Re-Housing Program (HPRP)	Municipio de Humacao	28,333
Servicios Integrales a Deambulantes de Humacao	Municipio de Humacao	45,094
<b>TOTAL</b>		<b>\$4,060,490</b>

**Table 25 – IAU-Bayamon**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
GEM: Multiple satellite study of dayside transient events in the magnetosphere ATM –GEO / ATM – Mageneticospheric Physics	NSF	57,308
Changing studen's paradigm about learning (MSEIP)	US Department of Education	153,985
Characterization of Laser Plasma Filaments in the Neutral Atmospheric	ARO	192,194
Multi-disciplinary systems engineering: Engaging MSI STEM Students Student	NASA MURP, Sistema Universitario Ana G. Méndez	61,246.48
Improvement of Life Science Programs @ IAUPR Barranquitas and Bayamón Campus	US Department of Education	90,574
CINEMA (CubeSat for ION, Neutral, Electron, Magnetic Fields)	NSF Space Weather CubeSat proposal	7,500
Student Support Services Program	US Department of Education	293,864
Titulo II-B: Mathematics and Science Partnerships Program – MSP 21 ( Phase II)	US Department of Education	597,343
Electrode Components & Diagnostics Equipment for Portable Power Attitude Determination Systems (ADS)	Nuvant System	33,500
In-situ study of direct ammonia alkaline fuel cells (DAAFCs) for water remediation applications	LSU	8,000
Affiliate Plan – PR Space Grant Consortium Bayamon Campus	UPR-RP	121,294
	Puerto Rico Space Grant Consortium – NASA	24,200
SDS Bayamón Campus Associate Nursing Degree (HRSA)	US Department of Health & Human Services	20,379
SDS Bayamón Campus Baccalaureate Nursing Degree (HRSA)	Department of Health & Human Services	77,226
Development of a Chloroplast Chelator System for Mercury Phytoremediation	NSF	78,500
Working Plan of the IAU Bayamón PR Nasa Affiliate	Puerto Rico Space Grant Consortium-NASA	13,000
Development of Micro-Turbine at IAUPRBC for preliminary validation of diagnostic methods master service agreement	Pratts & Whitney	12,000
Alliance for Minority Participation	UPR-RP	500,000
Economics aids for Students Pilots	Jorge Ortiz Brunet Endowment	16,170
Capital Grant for Construction	Caribbean Stranding Network	4,525
Administration Grant	Coca-Cola Bottling Company	8,519
2009 Student Edition: Accounting and Tax Software	PR Soft Inc.	36,000

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Air Transportation for Endangered Species	Puerto Rico National Guard	25,000
Materials and food supplies for one of the Technical Institute Program	Goya Puerto Rico Inc.	4,500
Materials and food supplies for one of the Technical Institute Program	Econo Supermarkets	3,600
Samples text books provide for curriculum evaluation	Pearson Prentice Hall Editors	2,994
<b>TOTAL</b>		<b>\$2,443,421.48</b>

**Table 26 – Pontifical Catholic University of P.R.**

<b>Project Description</b>	<b>Sponsor</b>	<b>Amount of Funds</b>
Modification of Electrocatalyst Surface Composition and Performance by Molecularly-Directed Deposition of Adsorbates at Pt(hkl) Electrodes and Preferentially-Oriented Pt Nanoparticles	Institutional Research-PCUPR	10,000
“Integración de la tecnología de forma efectiva en el salón de clases”	Institutional Research-PCUPR	10,000
Synthesis, Kinetics, DNA-Metal Interaction and Biological Activity of Ruthenium and Palladium Complexes	Institutional Research-PCUPR	10,000
Synthesis of Diamidines with Ether, Hydroxymethylene, Amine, Amide, Thioamide Groups as a Linker Between Two Aromatic Rings	Institutional Research-PCUPR	10,000
Calcium carbonate (CaCO <sub>3</sub> ) precipitation induced by Bacteria: characterization of ybcF gene in Bacillus subtilis	Institutional Research-PCUPR	10,000
“Caracterización y análisis del paisaje sonoro del arrecife de coral del cayo Sor Isolina Ferré en la Bahía de Ponce”	Institutional Research-PCUPR	10,000
Elucidating unidentified function of eighteen genes of Debaryomyces hansenii and their role in osmoadaptation	Institutional Research-PCUPR	10,000
Establish of a New BS Biotechnology Program with Emphasis in Agrobiotechnology	US Department of Agriculture	133,000
Transforming Science Instruction for Current and Prospective Students of PCUPR (Title V Ponce)	US Department of Education	643,525
<b>TOTAL</b>		<b>\$846,525</b>

<b>GRAND TOTAL</b>	<b>\$24,922,308</b>
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## VI. Contributions to the Development of Human Resources

In academic year 2010-11, PR-LSAMP institutions awarded 2,764 baccalaureate degrees in science, technology, engineering, and mathematics (STEM) disciplines. Since 1991, **PR-LSAMP institutions have awarded a total of 55,480 BS degrees in STEM fields, making a significant contribution to the STEM workforce.** Table 27 presents the number of STEM degrees awarded per academic year, and Table 28 the number of BS degrees awarded in 2010-11 by PR-LSAMP institution.

**Table 27**  
**Total Number of BS STEM Degrees Awarded by Academic Year**

Academic Year	Number of STEM BS Degrees Awarded
1990-91	1,709
1991-92	1,840
1992-93	1,896
1993-94	2,086
1994-95	2,281
1995-96	2,674
1996-97	2,754
1997-98	2,726
1998-99	2,789
1999-00	2,771
2000-01	2,893
2001-02	3,094
2002-03	3,207
2003-04	3,123
2004-05	3,106
2005-06	3,124
2006-07	2,654
2007-08	2,674
2008-09	2,661
2009-10	2,660
2010-11	2,764
<b>TOTAL</b>	<b>55,480</b>

\*Data for 2010-11 is a preliminary data as of June 30, 2011 and it is subject to revision.

**Table 28**  
**BS Degrees Awarded by PR-LSAMP Institution in Academic Year 2010-11**

Institution	Degrees Awarded
University of Puerto Rico	1,889
Pontifical Catholic University	110
Inter American University	725

\*Data for 2010-11 is a preliminary data as of June 30, 2011 and it is subject to revision.

**Table 29** presents the number of BS degrees awarded per STEM discipline in Academic Year 2010-11.

**Table 29  
STEM Baccalaureate Degrees Awarded by Discipline in 2010-11**

STEM Discipline	BS Degrees Awarded
Chemistry	243
Physics/Astronomy	94
Mathematics	34
Life Science	1,419
Computer Science	249
Engineering	613
Geosciences	4
Agricultural Sciences	73
Environmental Sciences	35
<b>TOTAL STEM Disciplines</b>	<b>2,764</b>

**\*Data for 2010-11 is a preliminary data as of June 30, 2011 and it is subject to revision..**

**Enrollment in STEM Disciplines at PR-LSAMP Institutions**

In the Fall of 2010 27,258 students were enrolled in STEM fields at PR-LSAMP institutions. This represents an increase of 14,686 since 1991. **Table 30** shows undergraduate STEM enrollment from 1991 to 2011 **Table 31** shows undergraduate enrollment by STEM discipline in the Fall 2010, and **Table 32** presents STEM undergraduate enrollment in the Fall of 2010 by institution.

**Table 30  
Total Undergraduate STEM Enrollment By Academic Year  
at Participating PR-LSAMP Institutions**

STEM Undergraduate Enrollment	Academic Year
12,572	1991-92
14,557	1992-93
14,818	1993-94
16,344	1994-95
19,139	1995-96
23,159	1996-97
24,767	1998-99
23,476	1999-00
23,427	2000-01
26,524	2001-02
27,529	2002-03
27,068	2003-04
28,299	2004-05
27,993	2005-06
23,825	2006-07
23,975	2007-08
25,471	2008-09
26,849	2009-10
27,258	2010-11

**Table 31**  
**Undergraduate Enrollment at PR-LSAMP Institutions By STEM Discipline**  
**Fall 2010**

STEM Discipline	Undergraduate Enrollment Fall 2010
Chemistry	2,070
Physics/Astronomy/Electronics	1,066
Mathematics	447
Computer Science	3,027
Geosciences	132
Engineering	6,234
Life Sciences	12,777
Environmental Science	478
Agricultural Science	1,027
<b>TOTAL ALL STEM DISCIPLINES</b>	<b>27,258</b>

**Table 32**  
**Undergraduate STEM Enrollment by PR-LSAMP Institution Fall 2010**

Institution	STEM Enrollment Fall 2010
UPR-Rio Piedras	2,984
UPR-Mayaguez	8,097
UPR-Humacao	1,036
UPR-Cayey	1,259
UPR-Bayamón	1,896
UPR-Arecibo	797
UPR-Aguadilla	984
UPR-Ponce	844
Inter American University	7,931
Pontifical Catholic University	1,430
<b>TOTAL</b>	<b>27,258</b>

### Baccalaureate Graduates that Continue Graduate Studies

The PR-LSAMP program has made a significant contribution to the NSF goal of a diversified STEM workforce. It has increased the number of STEM PhD granted to Hispanics from PR-LSAMP Institutions in Natural Sciences from 302 for cohort 2000-05 to 413 for cohort 2004-091, a 37% increase; and the number of STEM PhD granted to Hispanic in Engineering from PR-LSAMP Institutions from 71 for cohort 2000-05 to 119 for cohort 2004-09, a 68% increase.

Table 33 shows the leading U.S. Baccalaureate Institutions of U.S. Hispanic Ph.D.'s in the natural sciences for the 2004-2009, and Table 34 for engineering fields.

**Table 33**  
**Top 25 Baccalaureate Institutions of U.S. Hispanics PhDs (US Citizens Only)**  
**Natural Sciences 2004-09**

Baccalaureate Origin Institution	Degrees Awarded	PR-LSAMP INSTITUTIONS
<b>University of Puerto Rico-Mayaguez</b>	<b>146</b>	UPR-MAYAGUEZ = 146
<b>University of Puerto Rico-Rio Piedras Campus</b>	<b>145</b>	UPR-RIO PIEDRAS = 145
University of California-Los Angeles	49	UPR-HUMACAO = 41
University of California-Berkeley	47	UPR-CAYEY = 29
<b>University of Puerto Rico-Humacao</b>	<b>41</b>	UPR-MEDICAL SC. = 18
The University of Texas at Austin	40	PUCPR = 16
University of Florida	40	IAU = 12
University of California-Davis	38	UPR-AGUADILLA = 6
University of Arizona	35	
New Mexico State University-Main Campus	34	
The University of Texas at El Paso	32	
Cornell University	31	
University of Miami	31	
Texas A & M University	30	
Massachusetts Institute of Technology	29	
University of California-Irvine	29	
<b>University of Puerto Rico at Cayey</b>	<b>29</b>	
Harvard University	28	
University of California-San Diego	28	
Florida International University	27	
Rutgers University-New Brunswick	27	
University of California-Santa Cruz	26	
University of New Mexico-Main Campus	25	
The University of Texas at San Antonio	24	
Florida State University	18	
<b>TOTAL TOP 25 INSTITUTIONS</b>	<b>1029</b>	
<b>TOTAL RESEARCH DOCTORATES IN SCIENCE</b>	<b>2481</b>	

Other institutions in Puerto Rico with BS graduates that went on to receive a PhD during this period of time were: UPR Medical Sciences Campus (18); Pontifical Catholic University (16), Inter American University (12), and UPR-Aguadilla (6). In summary, from the top 25 of Hispanic doctorate recipients, institutions in Puerto Rico accounted for 38% of the baccalaureate origins of the Hispanic PhDs in the natural sciences, and 17% of all institutions.

**Table 34**  
**Top 25 Baccalaureate Institutions of U.S. Hispanics PhDs (US Citizens Only)**  
**Engineering 2004-09**

Baccalaureate Origin Institution	Degrees Awarded
<b>University of Puerto Rico-Mayaguez</b>	<b>113</b>
University of Florida	21
Massachusetts Institute of Technology	17
University of California-Berkeley	17
The University of Texas at El Paso	16
Florida International University	12
Georgia Institute of Technology-Main Campus	12
The University of Texas at Austin	12
Texas A & M University	11
University of California-San Diego	10
New Mexico State University-Main Campus	9
University of California-Davis	8
Cornell University	7
Rutgers University-New Brunswick	7
University of Illinois at Urbana-Champaign	7
University of Miami	7
Johns Hopkins University	6
Purdue University-Main Campus	6
University of California-Los Angeles	6
<b>University of Puerto Rico-Rio Piedras Campus</b>	<b>6</b>
Rensselaer Polytechnic Institute	5
University of Arizona	5
University of Maryland-College Park	5
University of Michigan-Ann Arbor	5
University of New Mexico-Main Campus	5
<b>TOTAL TOP 25 INSTITUTIONS</b>	<b>335</b>
<b>TOTAL RESEARCH DOCTORATES IN ENGINEERING</b>	<b>579</b>

Source: NSF/NIH/ USED/NEH/USDA/NASA, Survey of Earned Doctorates NORC

At the local level, the University of Puerto Rico's three graduate institutions, UPR-Rio Piedras, UPR-Mayaguez, and UPR-Medical Sciences awarded 49 PhD degrees in science and engineering in 2010. Table 35 presents the number of PhD degrees awarded by these three campuses in 2009-10 by science and engineering.

**Table 35**  
**Number of PhD Degrees Conferred during the academic year 2009-10 by UPR System**

<b>Institution</b>	<b>Number of PhD Degrees</b>	<b>Science and Engineering</b>
UPR-Rio Piedras	25	Chemistry (11) Biology (3) Chemical Physics (10) Mathematics (1)
UPR-Medical Sciences	7	Microbiology (1) Anatomy (1) Biochemistry (3) Physiology(2)
UPR-Mayaguez	17	Marine Sciences (6) Engineering (10) Applied Chemistry (6) Computer Science (2)
<b>Total</b>	<b>49</b>	

**Table 36**  
**Number of PhD Degrees Conferred by the University of Puerto Rico**  
**in Science and Engineering Field from 1990 to 2010**

<b>Year degree was conferred</b>	<b>Number of PhD Degrees Conferred</b>
1990	14
1991	9
1992	9
1993	17
1994	12
1995	10
1996	17
1997	16
1998	31
1999	22
2000	25
2001	36
2002	32
2003	30
2004	23
2005	31
2006	48
2007	29
2008	51
2009	52
2010	49
<b>TOTAL</b>	<b>514</b>

## **VII. Dissemination, Publications and Products**

### **Dissemination**

#### **The PR-LSAMP Web Page**

The PR-LSAMP web page ([www.prlsamp.org](http://www.prlsamp.org)) describes the PR-LSAMP program, including the calendar for the current year activities; information on past, current, and up-coming main events, such as the Puerto Rico Interdisciplinary Scientific Meeting and the Annual Best Practices Conference on Teaching and Learning. It also includes the PR-LSAMP Annual Reports with detailed descriptions on the activities and findings, and the data on enrollment and degrees awarded by institution.

The electronic data base system of the PR-LSAMP Web Page provides for: 1) electronic registering for all PR-LSAMP activities; 2) an electronic file on STEM researchers; 3) electronic evaluation of PR-LSAMP participants in undergraduate research experiences by the researchers; 4) electronic evaluation of all applications by the staff for compliance with PR-LSAMP requirements; 5) sending e-mails in group format; 6) electronic letters of recommendations and certification of work; 7) immediate access to individual data of PR-LSAMP participants, and 8) statistics on enrollment and degrees for any given year.

#### **Other Dissemination Efforts**

PR-LSAMP Liaison Officers, STEM faculty members and PR-LSAMP undergraduate and graduate students continue to be our best spoke-persons for the project as they attend and/or present their research projects in national scientific conferences

### **Publications**

#### **The PR-LSAMP Newsletter**

A Newsletter is published twice a year and disseminated to all institutions in Puerto Rico and to LSAMP institutions nationwide. It includes the highlights of the activities and main events. Also, special issues are produced to cover significant events, such as the Bridge-to-the-Doctorate Fellowship Program

#### **The PR-LSAMP Annual Report**

A copy of the PR-LSAMP Annual Report is sent to the Presidents, Chancellors, Deans and Department Directors of all the PR-LSAMP institutions. A copy is also sent to the PI of the LSAMP institutions nationwide.