PUERTO RICO SPACE GRANT CONSORTIUM
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Puerto Rico Space Grant Consortium is a Designated/Program Grant Consortium funded at a level of $730,000 for fiscal year 2008.

PROGRAM GOALS

A. Increase the number of undergraduate students pursuing studies in NASA-related areas and doing NASA-related undergraduate research.
B. Increase the number of students pursuing graduate studies in NASA-related areas.
C. Increase the participation and contribution of researchers in NASA-related research.
D. Establish long-term collaborative projects with NASA Research Centers.
E. Develop and expand pre-college activities in NASA-related areas to increase student interest in aerospace science and careers and promote the incorporation of NASA-related science topics and content in the pre-college classrooms.
F. Disseminate information on NASA-related research and development to the general community to build support for the enhancement of NASA-related research and other activities in PR.

PROGRAM/PROJECT BENEFIT TO OUTCOME 1

Two Hispanic U.S. citizens enter the NASA workforce: Azlin Biaggi and Francisco Sola are two outstanding Hispanic U.S. citizen students of the doctoral program in Chemical Physics at the University of Puerto Rico who did a research internship in NASA Glenn Research Center sponsored by PR Space Grant Consortium. They did an excellent job at GRC according to their supervisors. Soon after her return, Ms. Biaggi completed the requirements of the PhD degree, while Mr. Sola is scheduled to graduate on spring 2009. Both of them applied for a job at GRC and were short-listed for interview. They have recently received indication that a formal job offer will be made to both of them shortly.

PROGRAM ACCOMPLISHMENTS

- **Outcome 1:**

a. All the 26 fellowship/scholarship awardees (100%) are involved in NASA-related research under the guidance of a faculty member.
b. All the 26 fellowship/scholarship awardees (100%) presented their research project in at least one specialized research forum.
c. Sixteen fellowship/scholarship awardees (65%) published their research work in a peer-reviewed journal and appear as co-authors of the article(s).
d. Nineteen Hispanic U.S. citizen students obtained a research internship experience sponsored by PRSGC in NASA-related research.
e. Two internship graduate students applied for a job in NASA GRC are received indication that a formal job offer will be made to both of them shortly.

- **Outcome 2:**

a. The number of minority students in PR pursuing graduate studies in mission-based NASA R&D activities increased from 15 in 2005, to 24 in 2006, to 39 in 2007, to 73 in 2008. This sustained increment is the result of the expansion of collaborations with NASA centers and the increased number of faculty members doing NASA-related research in PR over the past few years.
b. As of December 2008, there are 35 researchers in PR doing NASA-related research and/or education projects in collaboration with NASA centers (Goddard Space Flight Center, Ames Research Center, Glenn Research Center) and the Jet Propulsion Laboratory. The majority of these projects were directly or indirectly supported through PRSGC (either seed grants, travel grants to NASA centers, and fellowships/scholarships to the participating students).
c. PRSGC helped to establish the Center for Advanced Nanoscale Materials (CANM) that officially started in October 2008. CANM is an interdisciplinary and multicampus research and education University Research Center (URC) partnership project between NASA and the University of Puerto Rico that brings together thirteen researchers from three different campuses and four different departments to work on research projects relevant to NASA in collaboration with NASA Glenn Research Center (GRC), NASA Ames Research Center (ARC), and the Jet Propulsion Laboratory (JPL), in areas that correspond primarily to the Exploration Systems Mission Directorate, and secondarily to the Aeronautics Research Mission Directorate. CANM-NASA-URC will make a strong contribution to the objectives of the NASA Education portfolio assigned to URCs, namely: Faculty and Research Support (thirteen faculty and researchers, and three post doctoral fellows per year for a period of five years), Student Support (fourteen undergraduate and fourteen graduate students per year, for a total of 140 student-years), and Targeted Institution Research and Academic Infrastructure (three Hispanic serving institutions strategically distributed across the Jurisdiction).

- **Outcome 3:**

a. A total of 70 teachers participated in professional development and training opportunities designed to equip them with the skills and knowledge to attract and retain students in STEM disciplines while introducing them to NASA-related topics. The teachers also received specific practical ideas as how to incorporate the experience and content in their classrooms.
b. PRSGC has taken advantage of the excellent collaboration among teachers in the Marcelino Canino NASA Explorer School in Dorado (~ 1000 7^{th}-9^{th} students) in order to develop sustained professional development and training opportunities. NASA content learned through different professional development activities is also used in the Spanish, English and Social Studies lessons during the school year as part of their Integrated Curriculum Project. Materials provided during the NASA workshops or downloaded from NASA sites are also used. Workshops were given to the non-NES teachers in the school to disseminate the activities and/or materials brought from NES workshops held in Mainland. All teachers are impacted through these activities (45 teachers).
c. Climate Education Program: A virtual community using Blackboard for the continuous training on the incorporation of climate and ocean studies in the 7^{th}-12^{th} curricula; 25 teachers & 15 participating schools; includes continued education workshops; online weather studies in collaboration with the American Meteorological Society (AMS); online ocean studies in collaboration with AMS; and the Physical Sciences Technology Project, 62 m^2 Facility, with permanent storage of NASA-relevant multimedia materials, science collection, and an educational material evaluation facility.
d. The Mayaguez Educational Resource Center (south-west), the Arecibo Integrated Science Multi-use Laboratory (north-west), and the Rio Piedras Physical Sciences Technology Project (metro area and east) are three full-time sites with a permanent storage of NASA-relevant multimedia materials and multimedia science collections servicing teachers and students , and an educational material evaluation facility for in-service and pre-service teachers. Together, they serve the whole Jurisdiction: they provide services to over 500 in-service teachers per year, over 300 pre-service teachers each year, over 2000 middle- and high-school students per year.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Longitudinal Tracking:**

a. Number of program student participants employed by NASA, aerospace contractors, universities, & other educational institutions: 4

b. Number of undergraduate students who move on to advanced education in NASA-related disciplines: 90
c. Number of under-represented and under-served students participating: 152

- **Course Development:** Number of new or revised courses targeted at the STEM skills needed by NASA that are developed with NASA support: 3 (one undergraduate laboratory, and two graduate courses).
- **Matching Funds:** 81% of NASA funds are leveraged with a direct cash match. An additional 25% in-kind match is provided. The total leverage of NASA funds is thus 105%. In total, there is $105 of leverage funding for each $100 that is provided by NASA.
- **Minority-Serving Institutions:** The high percentage of Hispanic U.S. citizens who obtain PRSGC's fellowship/scholarships is a direct consequence of the demographics in PR (97% Hispanic U.S. citizens) and a reflection of broad inclusive higher education system established in PR. All the Higher Education institutions in PR are Hispanic Serving Institutions, twelve of which belong to the Consortium. Currently, all the students supported by PRSGC are Hispanic:
  - **a.** Number of program student participants from underrepresented groups employed by NASA, aerospace contractors, universities, & other educational institutions: 4
  - **b.** Number of undergraduate students from underrepresented groups who move on to advanced education in NASA-related disciplines: 90
  - **c.** Number of under-represented and under-served students participating: 152

IMPROVEMENTS MADE IN THE PAST YEAR

In 2008, PRSGC decided to give especial emphasis to the development of Hardware Projects (microsatellites, cansats, student rockets, robots, alternative energy sources) as an effective tool to attract and engage students into STEM areas, enhance their conceptual science understanding, and lead them into research. Funding grew in this area from about 1% in 2004 to 8% in 2008, and is expected to be the main area of growth in the next few years. This has also been a great area for collaboration among affiliates, which resulted in joint affiliate proposals submitted for this purpose to our Lead Office, collaboration with Goddard Space Flight Center in the Robotics Academy and its expansion to PR, and collaboration with other consortia, most notably Colorado Space Grant Consortium and Virginia Space Grant Consortium.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

PRSGC brings together fourteen affiliate institutions with diverse missions and strengths, covering all geographic areas of Puerto Rico. This inclusive composition ensures that the broadest sector of individuals and groups across the Jurisdiction are served by PRSGC. The members meet twice a year at a different PRSGC institution each time to discus the progress and direction of the Consortium. This is addition of the continuous communication among the consortium members, and with the director and project manager that occurs via telephone, email, and personal visits in all directions. The communication is both ways, with the director and project manager informing about the news and priorities established by the National Space Grant & Fellowship Program and the affiliates informing about their progress, needs, concerns, and interests. The affiliates also do a great deal of networking in these meetings and in many other occasions on their own initiative, oftentimes coordinating activities together and having invited speakers from each other institutions. This kind of Jurisdiction-wide integration of resources and opportunities is effectively fostered by the PRSGC. The following table summarizes the Consortium members' descriptions.

Institution	Type of Institution	Key Characteristics
Metropolitan University of Puerto Rico	Hispanic Serving Institution Four-year College Private	Enrolls 10,000 students and has science and technology as its primary mission.
National Astronomy and Ionosphere Center, Arecibo Observatory Visitor's Center	National facility for astrophysics and atmospheric sciences supported by NSF and managed by Cornell University	Strengthens scientific and engineering research by supporting activities which provide undergraduate and graduate students with opportunities to further their

		education. NAIC contributes to the general understanding and appreciation of science by initiating and participating in public education and outreach programs.
Polytechnic University of Puerto Rico	Hispanic Serving Institution PhD Granting University Private	Enrolls 6,000 students and has engineering as its primary mission.
Pontifical Catholic University	Hispanic Serving Institution Four-year College Private	Enrolls 5,000 students and has liberal arts and science as its primary mission.
Puerto Rico Astronomy Society	Jurisdiction-wide amateur astronomy organization	Promotes astronomy by increasing the general public's knowledge of the discipline.
Interamerican University at Bayamon	Hispanic Serving Institution Four-year College Private	Enrolls 5,000 students and has engineering and science as its primary mission.
University of Puerto Rico at Arecibo	Hispanic Serving Institution Four-year College Public	Enrolls 4,000 students and has science as its primary mission.
University of Puerto Rico at Bayamon	Hispanic Serving Institution Four-year College Public	Enrolls 5,000 students and has engineering and science as its primary mission.

Continuation:

Institution	**Type of Institution**	**Key Characteristics**
University of Puerto Rico at Carolina	Hispanic Serving Institution Four-year College Public	Enrolls 5,000 students and has science and liberal arts as its primary mission.
University of Puerto Rico at Cayey	Hispanic Serving Institution Four-year College Public	Enrolls 6,000 students and has science as its primary mission.
University of Puerto Rico at Humacao	Hispanic Serving Institution Four-year College Public	Enrolls 6,000 students and has science as its primary mission.
University of Puerto Rico at Mayagüez	Hispanic Serving Institution PhD Granting University Public	Enrolls 12,000 students and has engineering and science as its primary mission.
University of Puerto Rico at Rio Piedras	Hispanic Serving Institution PhD Granting University Public	Enrolls 19,000 students and has science and liberal arts as its primary mission.
Univision Puerto Rico	Broadcasting Corporation Jurisdiction-wide coverage Private	Provides public service information and awareness of PRSGC's activities and opportunities to the PR community.