

PR Space Grant Consortium

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AFFILIATE MEMBERS

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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 Grant Consortium funded at a level of \$590,000 for fiscal year 2007.

PROGRAM RELEVANCE TO NASA

Space Grant consortia build human capital and research expertise to support NASA programs and missions, expand NASA's expertise and educational networks, and bring knowledge and awareness of space to a broad range of constituents in every state. Puerto Rico Space Grant Consortium (PRSGC) the research and education capabilities in NASA-related fields in Puerto Rico and contributes to the Nation's Science and Technology enterprise by capitalizing on the institutional and human capital available in the Jurisdiction. The Consortium implements a research and education agenda relevant to Puerto Rico and NASA and disseminates knowledge about the NASA mission and the associated opportunities available for students, teachers, professors and researchers. By improving the quality and relevance of research and education in the Jurisdiction, PRSGC helps to nurture and expand a diversified and sophisticated workforce capable of contributing to meeting the needs of our Nation.

PROGRAM BENEFITS TO THE JURISDICTION

The mission of the Puerto Rico Space Grant Consortium is to enhance the Jurisdiction's research and education capabilities in Science, Technology, Engineering and Mathematics, in areas of common interest to NASA and Puerto Rico. PR Space Grant Consortium implements a highly competitive undergraduate and graduate level fellowship program in support of NASA-related projects being developed in Puerto Rico and deploys an ambitious seed grant research program to establish the foundation of NASA-relevant research and stimulate competitive proposal submissions to NASA's Directorates. The formation of long lasting partnerships with NASA centers and programs gives a strong groundwork for the successful implementation of PR Space Grant Consortium's agenda. Moreover, alliances have been formed with major systemic education efforts in Puerto Rico, leading to a robust program of activities at the pre-college level and a pipeline into higher education in Science, Mathematics and Technology. The thirteen affiliates are geographically distributed in such a way as to cover the whole population and all social levels, making it possible to reach a large cross-section of the Jurisdiction's population, thereby enhancing awareness about NASA's vision and mission, and their implications to Puerto Rico's students and the science and technology community.

PROGRAM GOALS

Puerto Rico Space Grant Consortium's goals are born from NASA's educational target outcomes, namely: 1) Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Employ and Educate); 2) Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Educate and Engage); 3) Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire). The corresponding specific goals for the Jurisdiction are:

- Substantially increase the number of underrepresented students pursuing graduate studies in NASA-related areas.
- Significantly increase the participation and contribution of researchers in Puerto Rico to NASA-related research in the national context.
- Develop and expand pre-college outreach activities in NASA-related areas to increase student interest in aerospace and promote the incorporation of aerospace topics in the pre-college class room.
- 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 Puerto Rico.
- Enhance PR's research capability and infrastructure in NASA-related areas relevant to NASA's long-range National development plan.
- Establish long-term collaborative projects between institutions in PR and NASA Research Centers and other National Space Grant Consortia that will enhance local capabilities and contribute to the achievement of national goals in aerospace-research development.

PROGRAM ACCOMPLISHMENTS

- The PRSGC Scholarship/Fellowship Program provides incentives to attract more students into STEM fields, particularly minorities and women. The competition announcement is released yearly in early spring and disseminated throughout the state by mail, email, flyers, bulleting boards, the PRSGC website (prnasa.org), and the affiliate institutions. The criteria for selection are a composite of academic standing, scholarly productivity, research project relevance to the NASA mission and vision, career goals, and financial need. A total of 175 applications were evaluated for a 17 % success rate (29 awards: 11Phd/9MS/9BS). The selection process was done in coordination with three other scholarship programs managed through the UPR's Resource Center for Science and Engineering, namely NSF, DoE, AGEP, which together with PRSGC grant 45 PhD scholarships per academic year in PR. This state-wide coordination helps ensure the most appropriate distribution of awards within the state, eliminates the possibility of double awards, and avoids duplicate paperwork to applicants, advisors, and professors who write recommendation letters. The selection committee included 20 scientists and academic leaders representing most fields and many different institutions. After a logistics and information session, the reviewers worked in small panels divided by research fields. These panels then brought their recommendations to a plenary panel, where open discussions ensured that the best candidates for each type of program were selected. The PRSGC fellowship/scholarship awards are as follows: monthly stipend of \$1400 for PhD students, \$1000 for MS students, \$600 for BS students; tuition payment of \$600 per semester for PhD and MS students only; travel expenses up to \$1500 for students to present their research in national conferences.
- In 2007, seven research and education projects received seed-funding from PRSGC. They were evaluated by a review panel that included researchers from NASA and the academia. Proposals were considered competitive based on the relevance to NASA and potential for developing into a more complex collaborative project.
- As of December 2007, there are 32 researchers in PR doing NASA-related research and/or education projects in collaboration with NASA centers. 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).
- During 2007, PRSGC helped to establish two collaborative research projects with NASA Glenn Research Center, which involve ten researchers from PR, three UPR campuses, and two branches in NASA GRC: the Electrochemistry Branch and the Polymers Branch. As part of these projects, two graduate PRSGC fellows are scheduled to spend 3 months in GRC to work on NASA-relevant research that is also part of their approved thesis research plan.
- The Student Satellite Program has impacted approximately three hundred and fifty undergraduate students and two hundred seventy middle school students. So far nine microsatellites have been launched, flown, and valuable meteorological data recovered on all missions.

- After pilot-testing and developing an undergraduate student microsatellite elective course at UPR for two years under a “special topics in physics” codification, the curriculum committee has recommended its official codification as a Meteorology Course with two parts: Course METE 3XX1 – Meteorological Microsatellites I; Course METE 3XX2 – Meteorological Microsatellites II.
- A total of 194 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:
- A week of hands-on learning during the professional enhancement activities carried out at Inter American University of Puerto Rico. 24 teachers from 20 different private and public schools completed the course. The teachers also received suggestions as how to incorporate the experience and content in their classrooms.
- PRSGC has taken advantage of the excellent collaboration among teachers in the Marcelino Canino NASA Explorer School in Dorado in order to develop sustained professional development and training opportunities. Some of the activities co-sponsored by PRSGC during 200-2008 are summarized below: visit of Astronaut Ellen Baker to give a conference on Life in Space and Careers in NASA, all faculty and students in the school attended her lecture (~1000); visit of Dr. Carlos Ortiz-Longo from Johnson Space Center, addressed 7th, 9th, and especial education teachers and students about NASA’s mission and careers in NASA; some of the 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. Moreover, workshops are given to the other 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):
- Climate Education Program: A virtual community using Blackboard for the continuous training on the incorporation of climate and ocean studies in the 7-12 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 m² Facility, with permanent storage of NASA-relevant multimedia materials, science collection, and an educational material evaluation facility.
- 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 Island of PR: over 500 in service teachers per year, over 300 pre-service teachers each year, over 2000 middle- and high-school students per year.

- Extended Visit of Distinguished NASA Scientist and Role Model: Eng. Gloria Hernández, through the Leadership Development Program of NASA Goddard Space Flight Center, joined the PR Space Grant for a period of four months to help us in our educational efforts. Outcomes: Educational techniques were taught designed to help school children understand better why math, science and technology are so important in space exploration. She also offered talks on NASA'S Role in Science and Careers in NASA.
- Partnership with PRIOR: The Puerto Rico Institute of Robotics, PRIOR, is a program created by an alliance between NASA Goddard, Polytechnic University of PR (PUPR), the government of PR, PRSGC, and the local industry. The purpose is to establish a Robotics Institute to strategically position Puerto Rico as a research center to support the preparation of the Engineers and Scientist of the future. Summer Robotics Academy 2007: presentations at 10 High Schools reached around 300 students and 20 teachers; four students from each school were selected; a total of 40 students participated in the full program; the forty students were divided in 2 sessions of two weeks. Robotics Technology Challenge: 24 H.S. participated within the metropolitan area; presentations held at schools reached over 500 students and more than 60 teachers; 196 students were selected and trained, they were required to be in H.S. with minimum GPA of 3.0 or have a special ability. FIRST Robotics Competition: PRIOR is sponsoring 8 teams to compete in Orlando, Florida in March 2008. All 8 teams are working under the same roof. Impact: 80 students, 8 teachers, 20 parents.
- The Mayaguez Planetarium is able to operate full-time thanks to the partnership with PRSGC. It held 117 regular shows for schools and special groups, reaching a total of 7223 people, mostly students from middle school. Moreover, workshops developed around special topics reached around 3000 students and their teachers: Solar Eclipse, Space Week, 50 Years of Space Age Celebration, NASA Spinoff Technologies, and Space Exploration.
- Univision Puerto Rico is a broadcasting corporation that partnered with PRSGC and serves the PR community by participating in PRSGC events and informing the public about them. Univision Puerto Rico airs 30 seconds an hour of public service announcements, many of which are employed by PRSGC-related activities. PRSGC provides points of contact to the Univisión scientific personnel to obtain interviews with NASA personnel and behind the scene coverage of launching activities that are transmitted live to PR and coast to coast to the US Hispanic communities through the National Univision Network.
- Arecibo Observatory Visitors' Center: part of the National Astronomy and Ionosphere Center (NAIC), a national research facility, operated by Cornell University under a cooperative agreement with the National Science Foundation. As part of its mission, NAIC contributes to the general understanding and appreciation of science by initiating and in participating public education and outreach programs. The exhibit program offers a framework of basic astronomy and atmospheric science, and provides an understanding of the function and operation of the Arecibo Radio Telescope. Over 110,000 visitors tour the Visitor Center every year.

- Through a collaboration with Dr. Carmen Pantoja (UPR-Rio Piedras) a series of hands-on activities in astronomy for the visually impaired were produced. This material is being used by UPR faculty, library, and AO Visitor Center. The AO is acting as the national repository for the dissemination and distribution of these materials developed to teach astronomy for the visually impaired.
- Puerto Rico Astronomical Society (PRAS) Affiliate: Currently enjoying the participation of 135 dues-paying members and increasing. PRAS organizes monthly observational activities for the general public as well as astrophotography workshops for members at the Bayamón Science Park. The Society's Periodic Publication "El Observador" has been enhanced, articles are more varied (from highly technical to "Astrokids", English & Spanish); additional space for announcements of activities; circulation increased; also sent to schools, universities & institutions. The publication of 300 copies of our newsletter has continued on a monthly basis, covering over 100 schools and other learning institutions. A solar observing event was held in the premises of the Arecibo Observatory (Visitor's Center). Close to 500 participants gathered for enjoyment of this event. A special observing session was held at Cibuco Historic Park for viewing and photographing a Lunar Eclipse. About 7 telescopes were used in this activity with the participation of 50 students and general public. A special observation and photography session was held at the municipality of Toa Alta to cover this unusual event. About 30 members, students and general public participated. Two star gazing activities were conducted in this newly formed chapter. The first one, on October 19 at Sun Bay Beach, was sponsored by Vieques chapter staff and, the second one, was conducted by staff personnel of Fish and Wildlife Service on October 20, under the beautiful dark skies of Red Beach. In each of these events we had the attendance of 150 students, teachers and general public.

STUDENT ACCOMPLISHMENTS

- 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. 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.
- A total of 123 college students received significant support during 2007 in projects that foster their competitiveness in STEM areas. 29 received full college scholarships/fellowships, 54 received significant support under Higher Education programs, and 40 received significant support under Research Infrastructure programs. 42% of all awardees are female and 99% are Hispanic. There are more students who qualify both in terms of their economic need and academic performance to receive some form of significant support. However, this was the maximum that the 2007 budget allowed. Moreover, the fellowship/scholarship application success rate is 36%, but the recommendation for funding from the evaluation committee applied to about 50%. Hence, 14% of the applicants who were "very good" candidates did not receive an award. PRSGC is concerned with the potentially wrong message that these deserving but declined students might receive. We encouraged them to participate in NASA-related projects and to re-apply in the next cycle. Future opportunities for budget increment will be employed to bridge this gap.