

The Pennsylvania Space Grant Consortium  
The Pennsylvania State University  
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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 Pennsylvania Space Grant Consortium (PSGC) is a Designated Grant Consortium funded at a level of **\$730,000** for fiscal year 2008.

## PROGRAM GOALS

**The mission of the PSGC is to expand opportunities for Pennsylvanians to learn about and participate in NASA's aeronautics and space programs by supporting & enhancing STEM education, research, & outreach programs.** Our goals are to:

- Develop opportunities for undergraduate & graduate students to participate in research and discovery, including student flight projects; include programs with a focus on enhancing the participation of students from underrepresented groups.
- Provide graduate & undergraduate training in NASA-related fields through fellowship & scholarship awards; increase the number of awards to students from underrepresented groups.
- Support the development of interdisciplinary courses, curricula, & workshops, including introductory courses designed for undergraduate students not majoring in scientific or technological disciplines.
- Model diversity in space grant leadership, programs, and activities; implement programs targeted at increasing the retention rate of students from underrepresented groups in science & engineering.
- Provide information & programs to increase access to the excitement, knowledge, & technology from America's earth, air & space programs; establish PSGC as a resource & catalyst for aerospace research, education, & economic development.
- Cultivate a statewide network of partners from universities, industry, museums, science centers, state and local agencies to pursue aerospace research, education, and economic development goals.

- Develop earth, air, and space programs to enhance public scientific literacy and to complement community needs.

### **2008/2009 Targets:**

Specifically, we aimed to have 50 PSGC fellowships and scholarships for graduate students and undergraduates. We intended to award 12 state-wide scholarships for NASA Centers, and to have 40 WISER research internships awarded and fourteen MURE research internships. We aimed to award 4 Lehigh-Goddard student research internships, 10 ACURA research internships, and 10 PSU-Abington National Radio Astronomy Observatory internships. We expected to have 15 Mars Society Penn State Chapter members, 4-5 West Chester University astronomy majors (with 2-3 going onto graduate school), 4-5 undergraduates at Franklin and Marshall and/or Gettysburg College performing undergraduate research in the National Undergraduate Research Observatory Program (with 2-3 going onto graduate school). We aimed to have 4 students participate in Nittany Sat, 4 students participate in CanSat, and 8-10 students in reduced gravity student flight program (2 teams). We aimed to have 2 NASA-supported courses offered (Sailplane and Geospatial Training for Preservice Teachers). We aimed to have 10 HBCU participants in our Lincoln University Environmental Sciences Research, 5 students in our BallonSat Program at Cheyney University, 10 students in our Penn State USERS and SPARK programs. For all of our programs, we aim to have over 15.9% awards go to underrepresented minorities and have an application to award ratio of 3. We aimed to have 4 teachers attend the PA Science Teachers Association Conference and 3 teachers attend the BEST Robotics teacher training. We intended to have 75 teachers attend our science workshops at Penn State (with 100% receiving NASA classroom materials, 75% utilizing material in their classrooms within a year, and 15% serving minority student populations). Our aim was to have 50 teachers be part of GLOBE workshops around the state (with 100% receiving GLOBE classroom materials, 75% utilizing material in their classrooms within a year, and 15% serving minority student populations). We intended to have 12 Saturday Science Program events in the year with 15 students participating each time. We expected to have 60 participants in Temple's Engineering Explorers Post and 25 students involved in Temple's Introduction to Electrical & Computer Engineering. Finally, we aimed to support 2 informal education events, distribute 60 newsletters, and have 35 university participants and 2,000 public attendees at Penn State Exploration Day.

### **PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, OR 3)**

**NASA Strategic Outcome #1** - Sylvia Stein Scholar Jessica Tramaglini, who this past year was a leader in SSPL, Sailplane, the Penn State microgravity team and was an intern in the NASA Academy Program, has been offered a job at Johnson Space Center starting after her graduation. She will be a United Space Alliance flight controller with the attitude determination and control group. With this career opportunity, she can eventually be a certified flight controller in ISS mission control. Last summer, Jose Bernardo led the University of Pittsburgh's microgravity team in a successful flight program. He presently attending the Georgia Institute of Technology pursuing a Ph.D. in aerospace engineering (in the Aerospace Systems Design Laboratory). Jose wants to work in the area of human space exploration. Tony Tao, who last year was in intern at JPL, has been requested to return to JPL for a second year continuing his pipeline to possible NASA employment.

University of Pittsburgh undergraduate student Charles Sleasman, who received a PSGC scholarship this year, has a manuscript in press in the journal *Science*. University of Pittsburgh undergraduate Beth Oczypok, who received a PSGC scholarship this year, is working on muscles in *C. elegans* (nematodes) that were in space for six months as part of NASA STS-117. Her PSGC-funded work has resulted in a number of other honors, presentations, and a pending paper. Franklin and Marshall's Brian Burt and Isaac Waldstein traveled to Australia in the summer to collect data at the Hobart telescope in Tasmania commensurate with the launch of Gamma-Ray Large Area Space Telescope.

**NASA Strategic Outcome #2** – High School students Peter Malamas, Jaime Marrero, Stephen Stone, and Carmen Carangi, who all attended Temple University's Introduction to Electrical Engineering course this year, reported they are now inspired by the course to pursue engineering in college.

## PROGRAM ACCOMPLISHMENTS

**NASA Strategic Outcome #1**– Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Educate & Employ)

In 2008/2009, we exceeded our first goal by having a total of 70 fellowships and scholarships. We approached our goal with 2 funded Lehigh-Goddard student research internships, and we met our goal of having 12 awarded state-wide scholarships for NASA Centers.

We approached our goal with 29 WISER research internships awarded, and we met our goal of 14 MURE research internships. We exceeded our goals with 21 ACURA research internships and 17 PSU-Abington National Radio Astronomy Observatory internships.

We fell short of our target with only 2 West Chester University astronomy majors (and 1 going onto graduate school). At Franklin and Marshall & Gettysburg, we exceeded our targets with 8 undergraduates performing undergraduate research in the National Undergraduate Research Observatory Program. Of these, 2 are going onto graduate school.

We greatly exceeded our goals with 34 students participating in Nittany Sat, and 15 students participating in CanSat. We also met our goal of having 2 teams involved with NASA's reduced gravity national competition (each team had four members).

In course development, we exceeded our goals with 47 students involved in the Sailplane class, and we approached our target with 3 students in our Geospatial Training for Preservice Teachers class.

We failed to have any HBCU participants in our Lincoln University Environmental Sciences Research or in our BallonSat Program at Cheyney University. We exceeded our goal of 12 students in our Penn State USERS and SPARK programs. For higher education and research infrastructure programs, we have ~4% of the participants from under-represented minority groups. For fellowship and scholarship, we exceeded our

target, having ~19% from underrepresented groups. Overall, ~ 9% of our students were from underrepresented groups, somewhat short of our target of 15.9%.

**NASA Strategic Outcome #2** – Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Engage & Educate)

We did not send any teachers to attend the PA Science Teachers Association Conference, and we had 3 (rather than 4) teachers attend the BEST Robotics teacher training. We had 73 teachers attend our science workshops at Penn State (with 100% receiving NASA classroom materials. From the previous year’s group of teachers, we had 98% report that they were utilizing the material in their classrooms. 4.9% of the teachers were from schools that serve minority populations. We had 104 teachers take part in GLOBE workshops around the state (with 100% receiving GLOBE classroom materials and 15% serving minority student populations). 81.2% of the teachers report utilizing material in their classrooms within a year.

We met our goal with 12 Saturday Science Program events in the year with an average of 15.9 students participating each time. We had only 12 participants in Temple University’s Engineering Explorers Post (with 75% of the participants coming from underrepresented minority populations). We had 18 (rather than 25) students involved in Temple’s Introduction to Electrical and Computer Engineering (with 55.5% of the participants from minority populations).

**NASA Strategic Outcome #3** – Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA’s mission (Inspire and Engage)

Finally, we exceeded our goals by supporting 3 informal education events (STEM Summit, State Geographic Bee, and STEM Center) aimed at building and enhancing our network of state-wide partners. We, however, only distributed 26 newsletters and had 34 university participants and 1,200 public attendees at Penn State Exploration Day. PSGC continued to provide NASA Explorer School teachers support by sending 2 teachers to the Sally Ride Conference and partial support for the Space Explorers Professional Development Program for Shaw Middle School. In addition, PA teachers were provided professional development support by sending a teacher to the Crystallization in Space Workshop and matching funding support for 4 schools to participate in the Space Explorers Professional Development Program. We also provided evening public events that were not part of our established metrics. These were an evening to watch the NASA Phoenix lander arrive to Mars, an “In the Shadow of the Moon” movie night, and an evening lecture by Jim Kasting on Mars Climate.

## **PROGRAM CONTRIBUTIONS TO PART MEASURES**

- **Longitudinal Tracking:** Total awards = 128. Fellowship/Scholarship = 120, Higher Education/Research Infrastructure = 8. 22 of the total awards represent underrepresented minority F/S funding. For those students that were significantly

supported from FY08 funds, 1 student is working for a NASA contractor and the remaining 100 have not yet received the degree that they were pursuing while the received their Space Grant award. For all students that were significantly supported in the period spanning FY06-FY08, 5 students graduated and are pursuing advanced STEM degrees, 1 student is working for a NASA contractor, 3 students accepted STEM positions in industry, 1 is working at a NASA center, and 5 are working in STEM positions at non-K-12 academic institutions. The remaining students have not yet received the degree that they were pursuing while the received their Space Grant award.

- **Course Development:** We continued our support of the Penn State Sailplane class and the Geospatial Training for Preservice Teachers class at California University of Pennsylvania (see above for enrollment data).
- **Matching Funds:** We had a total of \$547,000 of matching funds for the past year (0.75 per NASA \$).
- **Minority-Serving Institutions:** Specifically, Cheyney University of Pennsylvania is the oldest of the Historically Black Colleges and Universities in America. The focus of PSGC support to Cheyney has been to help their faculty establish a BalloonSat program. Lincoln University, another HBCU, is nationally recognized for producing African Americans with undergraduate degrees in the physical sciences, computer sciences, biological and life sciences. PSGC funding focuses on student research regarding laboratory applications in environmental science in order to complement new courses in development at Lincoln.

## IMPROVEMENTS MADE IN THE PAST YEAR

The PSGC staff at the Lead Institution has changed dramatically in the last year. Our staff consists of a new Director (0.3 FTE), Assistant Director (1.0 FTE), Budget Manager (1.0 FTE), and Program Coordinator (1.0 FTE). The Assistant Director is the only carry-over employee from the previous year and she was promoted from Educational Program Manager to Assistant Director in May 2009. The Lead Institution office also employs two part-time computer assistants (between 0-0.5 FTEs). We have successfully streamlined the office and now support between 3.3-3.8 FTEs, down from last year which was between 4.0-4.5 FTEs. No staff FTEs have been supported at the affiliate campuses.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The PSGC has fourteen academic and industry affiliates. It has fourteen academic affiliates. In addition to the lead institution, The Pennsylvania State University, the affiliate members are: California University of Pennsylvania, Carnegie Mellon University, Cheyney University, Clarion University, Franklin & Marshall College, Gettysburg College, Lincoln University, The Pennsylvania State University-Abington campus, Susquehanna University, Temple University, the University of Pittsburgh (including their NASA Educator Resource Center), and West Chester University. Additionally, Lockheed Martin Corp. is an industry affiliate of the PSGC.