

## **Pennsylvania Space Grant Consortium**

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### Affiliate Members:

California University of Pennsylvania

Carnegie Mellon University

Cheyney University

Clarion University

Franklin & Marshall College

Gettysburg College

Lehigh University

Lincoln University

Penn State Abington College

Susquehanna University

Temple University

University of Pittsburgh

West Chester University

Lockheed Martin Corp

**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 Consortium is a Designated 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. Pennsylvania students and faculty are engaged in research projects that contribute to NASA's Aeronautics, Science, Exploration, and Space Operations Mission Directorates.

**Program Benefits to the State:** Space Grant is contributing directly to the development of a highly skilled and technically literate workforce in Pennsylvania. We are providing opportunities for our undergraduate and graduate students to engage in NASA-related

research and then connecting these university students to precollege classrooms across the state to further build student interest in science and engineering careers.

**Program Goals:** Our consortium program goals are all designed to move us toward the achievement of NASA's Three Strategic Education Outcomes, as outlined below:

Outcome #1 – Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals

Goal #1: Provide graduate and undergraduate training through the mechanism of fellowship and scholarship awards to students in disciplines needed to achieve NASA's mission and strategic goals.

Goal #2: Provide opportunities for undergraduate and graduate students to participate in research and discovery. Implement programs targeted at increasing the retention rate of students from underrepresented groups in science and engineering.

Goal #3: Develop and promote opportunities for students and faculty to participate in national research and flight programs

Goal #4: Support the development of interdisciplinary courses, curriculum, and workshops utilizing NASA content, including introductory courses designed for undergraduate students not majoring in scientific or technological disciplines.

Goal #5: Enhance the capability of Consortium Institutions to engage faculty and students in NASA-related research.

Outcome #2 – Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty

Goal #6: Provide content-rich, inquiry-based professional development courses to precollege science educators in NASA-related science topics.

Goal #7: Provide enrichment programs that engage K-12 students in NASA research and flight missions, especially for students from Pennsylvania's underserved rural and urban populations.

Outcome #3 – Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission

Goal #8: 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.

Goal #9: Conduct public outreach events that educate the public about NASA research and flight missions and the ways in which our member universities participate in those programs.

**Program Accomplishments:** In FY2007, we supported several student research experience programs state-wide, including the WISER and MURE programs which target

women and underrepresented minority students in STEM disciplines. We received 78 applications for the NASA Academy and related internship programs for summer 2007. We sponsored a total of 10 students for Internships at the NASA Centers. The consortium awarded 60% of our fellowships and scholarships to women (31/52) and 10% to minorities (5/52). If we include awards for our various NASA internships and our MURE & WISER undergraduate research programs, then overall our consortium provided 67% (60/89) of our awards to women and 28% (25/89) to underrepresented minority students (up from 17% in 2006). State-wide our percentage of Fellowship and Scholarship awards to women students (67%) is well above the national program average (41.6%). Our success in this area is due primarily to our WISER program for first-year women students. Our percentage of awards to underrepresented minority students (28%) is above the national program average (20.2%) and we greatly exceeded our target of 15.9% of awards to underrepresented minority students (based on our state higher education enrollment percentage for all minority ethnicities, as reported in fall 2001 by the Chronicle of Higher Education). We added Lehigh University as a new Affiliate bringing our total number of college and university members up to 14 institutions. We continued collaborations with other NASA Education & Public Outreach (E/PO) programs beyond the Space Grant network. Our Director leads the E/PO activities for the Penn State Astrobiology Research Center, a member of the NASA Astrobiology Institute (NAI), and for the NASA Swift mission. During summer 2007, we offered five one-week residential workshops for middle and high school science teachers. Topics included evolution, astronomy, meteorology, and high energy astrophysics. Workshop instructors include faculty involved in the NASA Astrobiology Institute, the Chandra and Hubble missions, and NASA's MIDEX Swift project.

**Student Accomplishments:** The most concrete measure of success in the Space Grant program is the continuing academic progress and engagement of our students in NASA-related education and employment. In 2007 Pennsylvania Space Grant continued to effectively track the progress of the current and former recipients of fellowship and scholarship awards and participants in its Higher Education and Research programs. This web-based, automated, system allows self-reporting of post award educational history, employment history, anecdotal, and other information by former recipients. Participants involved in Space Grant programs during each program year are added to the system before the end of the spring semester to ensure contact by the system prior to graduation.

For FY2007, 117 Pennsylvania students received significant support from Space Grant. The vast majority of these students are still enrolled in the degree plan in which they received their support. A student is classified as having received significant support from Space Grant if they received a single award from Space Grant of \$2500 or more or spent greater than 160 hours participating in a Space Grant program. Of the students who received significant support by Space Grant during the 2006 & 2007 fiscal years and who have completed the degree in which they received their Space Grant support, 90% of the students went on to either pursue advanced STEM degrees or to be employed in STEM disciplines. Of these, 40% were employed in a STEM related position in Academia, 20% were employed in a STEM related position at a non-NASA contractor, 10% were

employed by NASA, 10% were employed by a NASA contractor, and 10% went on to pursue an advanced degree in a STEM related position.

### **Anecdotal Evidence of success in NASA workforce development**

When asked how participation in Space Grant programs impacted her education and career, Jennifer Eigenbrode, a 2000-03 Space Grant participant who currently works at NASA/Goddard in the Solar System Exploration Division as a Research Scientist, replied:

The opportunities and experiences I had as a Space Grant fellow led me to be the NASA scientist I am today. The Space Grant program gave me the opportunity to engage the public with my scientific interests in understanding the evolution of life on Earth and how we might detect it elsewhere. The program also helped me understand the public's value in space and Earth science and technology. I have been actively involved in developing and applying life detection instruments in Mars analog environments on Earth and am now involved in the 2009 Mars Science Laboratory mission to investigate the habitability of Mars using similar techniques. (Jennifer Eigenbrode, 2000 NASA Space Grant Fellowship, 2001 NASA Space Grant Fellowship, 2002 NASA Space Grant Fellowship, 2003 NASA Space Grant Fellowship, NASA/Goddard-Solar System Exploration Division - Research Scientist)

Other notable comments from former participants include:

I am currently a NASA postdoc for the astrobiology institute. Involvement with Space Grant encouraged me to pursue this. It also made me develop a love of outreach education. I am in the astrobiology field, working on deep marine sediments. (Jennifer Biddle, 2002 NASA Space Grant Fellowship, 2003 NASA Space Grant Fellowship, 2004 NASA Space Grant Fellowship, 2005 NASA Space Grant Fellowship, University of North Carolina - Postdoctoral Researcher)

It gave me a better feel for the field I want to work in after graduation (Dec 07). Being a student program manager for our satellite project was definitely a valuable experience which I plan to use in my future career. I was always attracted to the aerospace industry but having worked on a hands-on project helped me find my strengths and my real interests: system analysis and system engineering in general. I know now that I really enjoy dealing with the overall aspects of analysis, design, development and testing of systems. Being involved in a real project is a great motivator factor which, on a personal level, gave even more meaning to my thesis work. (Valerie Mistoco, 2003 LionSat, 2004 LionSat, 2005 LionSat)

Space Grant was responsible for first introducing me to the Aerospace industry through its sponsorship of the SPIRIT sounding rocket program. Its support of many of the student space projects at Penn State has enabled me to achieve many of my goals, including a fellowship with the Jet Propulsion Laboratory. (Brian Schratz, 2003 SPIRIT Sounding Rocket Project, 2004 SPIRIT Sounding Rocket Project, 2004 NASA Space

Grant Scholarship, 2005 LionSat, 2005 Sylvia Stein Memorial Space Grant Scholarship, 2005 MIMIC, 2005 SPIRIT Sounding Rocket Project, 2006 Space Grant Fellow, 2007 Nittany Satellite, 2007 Space Grant Fellowship)