

District of Columbia 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 District of Columbia Space Grant Consortium (DCSGC) is a Program Grant Consortium funded at a level of \$410,000 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. The DCSGC supports Outcome I of the NASA Education Framework through its fellowship/scholarship, higher education, and research infrastructure programs, which are aimed at educating students in STEM disciplines at the university level, encouraging them to enter into or maintain a major or minor in a STEM discipline, assisting them in pursuing employment at NASA or aerospace, and supporting university faculty who can mentor students and involve them in NASA-related research. The DCSGC supports Outcome II of the NASA Education Framework through its precollege programs, which are aimed at attracting K-12 students to the STEM disciplines, retaining them through elementary, middle, and high school, and supporting teacher training opportunities so that teachers can pass the excitement of STEM disciplines on to their students. The DCSGC supports Outcome III of the NASA Education Framework through its public outreach programs, which are aimed at engaging and inspiring D.C. citizens in NASA's mission, and increasing public knowledge of and participation in NASA-related activities. Through programs such as the DCSGC's NASA Academic Year Internship Program, which pairs competitively selected university students with mentors at NASA Goddard Space Flight Center (GSFC) to work on specific, hands-on research projects in various science disciplines, NASA's workforce development needs are being directly addressed. Some of the interns that have completed this program have gone on to work for NASA or aerospace related industries. The DCSGC often works directly with NASA GSFC, the nearest NASA Center, on various projects.

Program Benefits to Washington, D.C.:

The DCSGC benefits the District of Columbia in a variety of innovative ways, and many DCSGC programs boast high levels of participation by women, minorities, and persons with disabilities. The

DCSGC supports programs at all nine universities in the District, as well as at four local science education organizations. Tangible results, such as increased educational opportunities for minority students, a better-trained technical workforce, and improved academic and public resources, benefit the District's residents and diverse student population. For university faculty and students, benefits include meaningful research opportunities, fellowship, scholarship, and internship programs, improved lab and research infrastructure resources, and numerous STEM-related programs and activities. For K-12 public school teachers and students, benefits include teacher-training courses and programs that in turn support astronomy, math, and science classes for middle and high schools, and extracurricular robotics and engineering programs. For the general public, benefits include programs at museums, observatories, and universities that provide hands-on learning opportunities about NASA's missions. In one unique case, learning is brought right to the city's neighborhoods. The DCSGC sponsors the NanoExpress, a large trailer that travels around the District and appears at public events as well as public schools. The NanoExpress allows visitors to board the trailer, which is a mobile nano science and technology laboratory. Visitors are educated on nano science based technologies, and are encouraged to participate in hands-on activities and experiments.

Program Goals:

The three main goals of the DCSGC, in support of the NASA Education Framework, are to:

1. Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals, through a portfolio of investments (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 linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire).

The DCSGC supports these three goals through its fellowship/scholarship, higher education, research infrastructure, precollege, and public outreach programs. All programs are designed to meet the DCSGC's minimum diversity target levels, which are based on the 2000 U.S. Census Data and National Center of Education Statistics Digest enrollment data for Washington, D.C.

Program Accomplishments:

The DCSGC supported eleven fellowship/scholarship programs, five higher education programs, three research infrastructure programs, five precollege programs, and five public outreach programs in the past year. Three major highlights include:

The DCSGC has had major success with the Astronaut Jones/Robotics program at Howard University. The program focuses on challenging, engaging, and retaining students in STEM disciplines with exciting hands-on activities. The program has led to the development of a new course at the university in robotics programming at the advanced undergraduate and graduate levels. The course was developed in interdisciplinary collaboration with the university's Department of Systems and Computer Science.

The DCSGC supported one faculty member and two undergraduate students at Georgetown University on research in the field of microelectromechanical systems, with a goal of understanding the effects of space environment on human performance, and testing new technologies and

countermeasures for long-duration human space exploration. The faculty member has provided hands-on research training and mentoring to the students. In addition, the research has led to a collaborative project regarding bone loss studies with a researcher at the university's Medical Center. The DCSGC plans to support opportunities for the research to be presented at professional conferences, and to facilitate technology transfer discussions between NASA and the university faculty member so that practical applications can be developed utilizing the research.

The DCSGC supported satellite ballooning activities for deaf students at Gallaudet University through the undergraduate course "Earth Systems and Processes." Eighteen students, many of whom have not yet chosen a major, participated in the course, and the faculty member who taught the course reported that even the liberal arts students became very interested in the hands-on science laboratory activities such as soldering and constructing working wireless circuits for their balloon transmitters. The DCSGC hopes that the exposure to ballooning will recruit some of the students into STEM majors or minors. The incorporation of ballooning into the course was a direct result of having sent the faculty member to the Starting Student Space Hardware Program Workshop hosted by the Colorado Space Grant Consortium. The follow-up course, "Space and Astronomical Science," was then taught to twenty-four students (some of whom also took the Earth Systems and Processes course), and incorporated balloon activities as well. Many of the laboratories engaged students with mission planning and work aligned with NASA's DEPTHX Mission. As part of this course, a student team participated in the 2008 Midatlantic MATE ROV Competition that was held at NASA Langley Research Center in April 2008, and won the award for Best Presentation.

Student Accomplishments:

The following three anecdotes illustrate accomplishments by students sponsored by the DCSGC in the past year:

The DCSGC supported a talented student who recently graduated with a PhD in chemistry from Howard University, an HBCU. The DCSGC supported this student in an internship at NASA GSFC. During the student's internship, he so impressed his NASA mentor with his outstanding research contributions and his ability to quickly grasp the infrared heterodyne technique, that his mentor offered him a job at NASA GSFC immediately upon his graduation. He accepted the mentor's offer and is now employed in an NRC Post-Doctorial position at NASA GSFC.

The DCSGC supported an undergraduate student majoring in computer science at George Washington University. The student was one of 150 students chosen out of 850 applicants to participate in the NASA Student Internship Program (NSIP) at NASA GSFC. The student worked closely with NASA mentors in the Microelectronics Signal Processing Branch at NASA GSFC. His project involved the development of an air or space borne position sensor platform, and his NASA GSFC mentors were so impressed with his contributions to the team and his enthusiastic demeanor, that they offered him the opportunity to continue working at NASA GSFC throughout the school year and summer 2008. The student accepted the offer and is currently working on a remote sensor relay project at NASA GSFC. He hopes to continue working at NASA GSFC upon graduation.

The DCSGC has supported a deaf student at Gallaudet University for the past several years that will soon graduate with a PhD in physics. He plans to teach in the Department of Chemistry and Physics at the university upon graduation. If his plans succeed, he will be the fourth DCSGC fellowship recipient to join the STEM faculty at the university and go on to inspire other deaf students to pursue careers in the sciences.