

District of Columbia Space Grant Consortium
American University, Lead Institution
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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 \$590,000 for fiscal year 2009.

PROGRAM GOALS

The DCSGC proposed the following goals for FY 09-10:

Fellowship/Scholarship Programs

To competitively provide 30 scholarships to undergraduate and graduate students in STEM disciplines, to provide 17 scholarships to female and/or underrepresented minority students, to provide 3 scholarships to students with disabilities, to match students with faculty and NASA mentors on research projects, to retain and graduate 80%-95% of the students in STEM disciplines, to have 95% of the students seek or attain STEM employment, to competitively provide 2 fellowships to faculty in STEM disciplines, to provide 1 fellowship to a female and/or underrepresented minority faculty member, and to integrate NASA's SMD into STEM courses at American University.

Higher Education Programs

To develop and implement a new STEM undergraduate course at a women's university, to develop and implement a new STEM undergraduate course at an HBCU, to provide NASA mission related robotics and ballooning activities for 20 deaf students in physics, earth science, and space science courses, to competitively provide 7 internships to undergraduate and graduate students majoring in STEM disciplines, to recognize 3 DC faculty members who excel in STEM disciplines, to provide 3 internships to female and/or underrepresented minority students, to retain and increase the number of students pursuing STEM degrees, to train faculty in hands-on STEM-related programs, to provide NASA research opportunities to 30 female undergraduate students and 20 deaf students, to expose NASA and STEM research and mentoring opportunities to students and faculty, to collaborate with NASA GSFC and NASA MSFC, to engage students

and faculty in STEM-related research projects, and to bring recognition to DCSGC programs and scholarship opportunities in higher education.

Research Infrastructure Programs

To work with Wolfrum Research to distribute Mathematica licenses to minority STEM faculty members, to distribute ChemDraw software to minority undergraduate and graduate students, to upgrade laboratories with new digital measurement devices and other resources, to support minority faculty members and students, and to attract and retain students in STEM disciplines via improved lab resources.

Precollege Programs

To train 4 DC teachers in space weather, to competitively provide 4 awards to teachers, to recognize 3 teachers who excel in STEM disciplines, to support registration for 2 blind DCPS students to attend a STEM-focused conference, to train teachers (including teachers of deaf students) in hands-on STEM-related projects, to increase the number of K-12 students pursuing degrees in STEM-related fields, to engage K-12 students in hands-on STEM-related projects and coursework, to support minority teacher training in the District, to effectively collaborate with key personnel in the DC Public Schools, to collaborate with 2 NASA Centers, and to bring recognition to DCSGC K-12 opportunities.

Public Outreach Programs

To inform an audience of students, educators, and the general public about NASA and industry career opportunities, to engage the general public in STEM-related technologies, to give DC citizens an opportunity to publish scientific findings in print and online, and to target students and the general public in concentrated minority areas.

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

The following anecdotes highlight students and projects supported so far in FY 09-10:

Outcome 1

The mentors at NASA GSFC were so impressed with the Faculty-Student NASA Summer Fellowship Program that they provided funding for two students on the faculty-student research teams, allowing us to fund two additional faculty members. One of the NASA mentors, Dr. Paul Mahaffy, even requested that we fund a faculty-student research team for him the following summer.

Two of our NASA GSFC student interns, Henry Fingerhut and Raul Garcia-Sanchez, were invited by their mentors at NASA GSFC to return to work on research projects the following summer.

The University of the District of Columbia decided to offer matching tuition scholarships to future graduate students doing research under the DCSGC scholarship program. The faculty member in charge of the program, Dr. Sherali Zeadally, leveraged his DCSGC experience to help secure two highly competitive grants from the National Science Foundation.

A DCSGC student awardee at the University of the District of Columbia, Sean Golash, leveraged his experience to secure a U.S. Department of Energy Internship at Pacific Northwest National Laboratory at Richland, WA during the summer.

Following her DCSGC-sponsored participation in the NASA GSFC Robotics Academy, Ivory Sarceno received a full tuition scholarship for four years to attend Bucknell University in PA, where she is majoring in mechanical engineering and is expected to graduate in 2012.

The graduate awards at Gallaudet University have been a very productive way to bring in new, young tenure-track faculty to the science departments at the university. Four DCSGC student awardees have gone on to become faculty at Gallaudet University in the Biology, Chemistry, and Physics Departments. Three of them have received tenure, and the fourth just started in 2008 and is on a tenure track. Dr. Caroline Solomon, a DCSGC student awardee, is featured in the campus Viewbook (<http://admissions.gallaudet.edu> or <http://admissions.gallaudet.edu/viewbook/viewbookenglish1.pdf>). The value of these four young faculty as role models to the institution and the students cannot be overstated. Before they arrived, most of the science faculty was made up of academics from the hearing population. Lack of young, deaf faculty in the ranks sends a very negative message to the students about their career prospects, but thanks to the DCSGC scholarship program at Gallaudet University, this is starting to change.

Outcome 2

After participating in the Space Camp for Precollege Educators Program, one educator implemented numerous teaching mechanisms in three area schools, has given numerous presentations to other D.C. educators on teaching science with an enthusiastic attitude, and gave a presentation to students, teachers and parents at the State Department. The article she presented can be found at:

<http://theinspireproject.org/uploads/2010/INSPIRE%20Space%20Camp%20Testimonial%20WEB.pdf>.

At the 2010 Greater D.C. Regional Botball Tournament, when recognition was given to one of the DCSGC-sponsored teams of deaf students in the final awards presentation, the crowd, comprised mostly of hearing students and adults, indicated their applause for the students using the "applause" gesture in sign language.

Outcome 3

The DCSGC-sponsored Young Women's Conference on Non-Traditional Careers - "STEM Towards the Future" was extremely popular. Attendees included 229 precollege students, 32 postsecondary students, 55 parents/guardians, and 42 volunteer presenters and exhibitors. 74% of the attendees completed conference evaluation forms, with 99% giving an overall rating of "GREAT." Links to newspaper articles about the conference include:

<http://www.examiner.com/x-27387-Fauquier-County-Nonpartisan-Examiner>,
<http://www.examiner.com/x-27387-Fauquier-County-Nonpartisan-Examiner~y2010m3d12-OSSE-empowers-teens-who-pursue-nontraditional-careers-celebrating-National-Womens-History-Month>, and <http://www.examiner.com/dc>.

PROGRAM ACCOMPLISHMENTS

Some activities are still in progress, but the DCSGC has made the following advancement so far on its FY 09-10 goals:

Fellowship/Scholarship Programs

Sixteen scholarships were awarded to undergraduate students at American University, Catholic University, Gallaudet University, Georgetown University, Howard University, and the University of the District of Columbia. Nine scholarships were awarded to graduate students at Catholic University, Gallaudet University, George Washington University, Howard University, and VA Polytechnic Institute. Fifteen scholarships were awarded to female and/or underrepresented minority students, including four students with disabilities. Twenty-five students from American University, Catholic University, Gallaudet University, Georgetown University, George Washington University, Howard University, the University of the District of Columbia, and VA Polytechnic Institute were matched with faculty and NASA mentors on various research projects. It is too early to tell what percentage of this year's students will be retained and graduated in STEM disciplines or what percentage will seek or attain STEM employment, but the students have been added to the DCSGC longitudinal tracking database for annual follow-up.

Higher Education Programs

A faculty member at Gallaudet University spent one day a week working with a NASA mentor at NASA GSFC on research projects, and maintained data visualizers for the NASA-sponsored website www.oceanmotion.org. Forty-nine students and sixteen staff members from deaf schools all over the country participated in Space Camp in Huntsville, AL (in conjunction with NASA MSFC) alongside hearing students. Five students attended from Gallaudet University's Model Secondary School for the Deaf. Two teams of five deaf students at Gallaudet University participated in fourteen weeks of undergraduate laboratories to build ROVs for the MATE 2010 competition, and plans are underway to continue the program in the 2010-2011 academic year. The DCSGC-developed earth and space science course will continue to be offered at Howard University. In addition, a new course on the Near-Earth and Solar System Space Environment was developed and will be offered at Howard University in the 2010-2011 academic year. An INSPIRE Workshop was held at Gallaudet University in October 2009, with the theme "Teaching Science with an Enthusiastic Attitude" and included lecturers from NASA GSFC, Aries Scientific, and the D.C. State Office of Career and Technical Education. Another INSPIRE Workshop was incorporated into the 2009 International Space University conference held at NASA Ames Research Center in CA. Two INSPIRE presentations were given at the Young Women's Conference on Non-Traditional Careers in March 2010 and the State Department Science Fair in April 2010. Two students served as technical interns for the William Taylor/INSPIRE Memorial Scholarship Program. Four faculty-student research teams from Catholic University and Howard University worked on summer research projects at NASA GSFC with NASA mentors. Additional activities including an undergraduate course in planetology at Trinity Washington University, internship programs at NASA GSFC, and a DCSGC Professor of the Year Faculty Award are in development.

Research Infrastructure Program

The DCSGC sponsored a site license for ChemDraw at Howard University, which was used by 13 faculty members, 20 graduate students, 20 undergraduate research students, and 150 undergraduate students taking chemistry courses. Seven of the faculty members and all of the students are minority. Structures drawn using ChemDraw were used in papers, proposals, and class lectures. Laboratory upgrades included upgrades to experiments in the physical chemistry laboratory which is used in capstone courses for chemistry and chemical engineering majors. A faculty member used the laboratory upgrades to acquire a FTIR spectrometer valued at \$20,000 through a joint NSF proposal with the University of Wisconsin, and the faculty member spent a week at the University of Wisconsin designing experiments to be done in the laboratory at Howard University.

Precollege Programs

Space Explorers, Inc. provided hands-on teacher training in science activities to 40 educators at Maya Angelou Public Charter School, Kimball Elementary School, Orr Elementary School, Powell Elementary School, Cleveland Elementary School, Hamilton Academy, Hendley Elementary School, and River Terrace Elementary School. One educator from the DC Public Schools attended Space Camp in Huntsville, AL (in conjunction with NASA MSFC), and has presented on her experience to other DC educators. She is assisting in recruiting additional teachers to apply for awards to attend Space Camp. One teacher was supported in mentoring two teams of deaf students for the 2010 Greater DC Regional Botball Tournament. The mentoring included two new robotics courses at the Model Secondary School for the Deaf. Out of 52 teams at the tournament, the DCSGC teams took 8th and 10th place overall. The DCSGC sponsored two blind students from Woodrow Wilson High School, Chrichelle Brown and Wallace Dews, in the 2009 Youth Slam in Baltimore, MD. Additional activities including a Howard University earth and space science course and space weather teacher training program for DC teachers and a DCSGC Teacher of the Year Award are in development. This year the DCSGC established a great relationship with the DC Office of the State Superintendent of Education, which has been instrumental in recruiting teachers to participate in precollege programs.

Public Outreach Programs

The DCSGC sponsored the Young Women's Conference on Non-Traditional Careers – “STEM Towards The Future” – at American University in March 2010. The conference program was written as a resource guide, providing information on presenters, STEM career opportunities, mentoring opportunities, and networking information. It included 17 interactive exhibits and 25 workshops. Attendees included 229 precollege students, 32 postsecondary students, 55 parents/guardians, and 42 volunteer presenters and exhibitors. The DCSGC assisted in the publishing of the 48-page 20th Anniversary INSPIRE Journal in December 2009 and maintaining the INSPIRE website, which was redesigned in late 2008. Twenty-two contributors were featured in the INSPIRE Journal, the content of which is also shared on the website. The journal and website feature program information, scientific submissions, VLF observations and research, and by its very nature, accepts and publishes submissions from the general public as well as faculty, students, and others. Additional activities including public astronomical viewings and special STEM-related events in concentrated minority communities are in development.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Longitudinal Tracking:** Since 2006, the DCSGC has awarded scholarships to seventy-eight students in the fellowship/scholarship category and one student in the higher education category (including current year awardees). Forty-four of the awards went to underrepresented minority students and students with disabilities. Thirty-three of the awards went to female students. Thirty-five of the students are still enrolled in their current degree program, fifteen have graduated and are pursuing advanced STEM degrees, three have graduated and are seeking STEM employment, two are employed in STEM as aerospace contractors, seventeen are employed in STEM in non-aerospace positions, one is employed by NASA, one is employed in a STEM higher education academic field, and four are employed in a non-STEM field. All of the students we support with direct scholarship funding or who participate in higher education or research infrastructure programs for 160 hours or more are in the DCSGC longitudinal tracking database and are monitored for progress through an annual survey.
- **Course Development:** The DCSGC supported the development and/or revision of four higher education courses targeted at the STEM skills needed by NASA. The courses include an undergraduate physics course that incorporates ROV activities in the laboratory at Gallaudet University; an undergraduate earth and space science course at Howard University; an undergraduate course in Near-Earth and Solar System Space Environment at Howard University; and an undergraduate planetology course at Trinity Washington University. In addition, the DCSGC supported Botball activities that involved two new robotics courses on the precollege level.
- **Matching Funds:** The DCSGC leveraged \$459,667 in matching funds, for a ratio of .78:1, or 78 cents for every NASA dollar.
- **Minority-Serving Institutions:** Four out of five of DC's minority-serving institutions are affiliates of the DCSGC: Gallaudet University, Howard University, Trinity Washington University, and the University of the District of Columbia. The fifth, Southeastern University, was a former affiliate, but it has lost its accreditation. If its situation changes, we will include Southeastern University as an affiliate again. All five universities have received support over the years, and so far in FY 09-10, the DCSGC supported students and activities at Gallaudet University, Howard University and the University of the District of Columbia. The DCSGC also is in discussions with the Connecticut Space Grant Consortium to facilitate relationships between the CTSGC and African-American students at Howard University.

IMPROVEMENTS MADE IN THE PAST YEAR

The DCSGC made several improvements and adjustments over the past year, including: an increase of 37% in the number of student awards; updating its Strategic Plan with input from all affiliate members; moving into a bigger office with room for a student assistant; designing and implementing new consortium-wide program reporting forms; designing a DCSGC FaceBook page; and collaborating with new affiliates the National Center for Earth and Space Science Education, PathEVO, and the DC Office of the State Superintendent of Education.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

In addition to working with various organizations on particular aspects of certain programs, the following eighteen institutions are DCSGC affiliates and partners:

- American University (Lead Institution): private university – supports scholarship, higher education, precollege, and public outreach programs, as well as managing the consortium
- Aries Scientific: nonprofit – supports higher education and precollege programs
- Catholic University: private university – supports scholarship programs
- Gallaudet University: minority institution/federally chartered/quasi-governmental university for the deaf and hard of hearing – supports scholarship, precollege, research infrastructure, and higher education programs
- Georgetown University: private university – supports scholarship programs
- George Washington University: private university – supports scholarship programs
- Howard University: HBCU/private university – supports scholarship, higher education, and research infrastructure programs
- NASA Goddard Space Flight Center: government – supports scholarship and higher education programs
- NASA Headquarters: government – supports scholarship programs
- NASA Marshall Space Flight Center: government – supports scholarship and higher education programs
- National Center for Earth and Space Science Education: science center – supports precollege programs
- Office of the D.C. State Superintendent of Education: government – supports public outreach programs
- PathEVO: industry – supports higher education programs
- S.M.A.R.T., Inc.: nonprofit – supports precollege, higher education, and public outreach programs
- Space Explorers, Inc.: nonprofit – supports precollege programs
- The INSPIRE Project, Inc.: nonprofit – supports scholarship, research infrastructure, precollege, higher education, and public outreach programs
- Trinity Washington University: minority institution/private university for women – supports scholarship and higher education programs
- University of the District of Columbia: HBCU/public university – supports scholarship programs