

Virginia Space Grant Consortium (VSGC)
Lead Institution: Virginia Space Grant Consortium an Affiliate of the
Old Dominion University Research Foundation
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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 Virginia Space Grant Consortium is a Designated Consortium funded at a level of \$785,000 for fiscal year 2009.

PROGRAM GOALS

- Goal 1 - Conduct quality scholarship and fellowship programs including a bridge program for freshmen and sophomore students, research awards for undergraduate and graduate students, community college STEM scholarships and teacher education STEM scholarships.
- Goal 2 - Offer quality higher education programs including internship programs in partnership with our member institutions and partners.
- Goal 3 - Promote diversity in all programs and activities by encouraging participation by underrepresented minority and female students and faculty.
- Goal 4 - Undertake programs that foster research capabilities at our member institutions and serve as a catalyst for linking university researchers to NASA and other opportunities.
- Goal 5 - Provide quality precollege educational opportunities including professional development for precollege and pre-service educators and student-focused programs for students throughout the precollege pipeline.
- Goal 6 - Conduct Informal Science Education programs in partnership with informal education members and partners.
- Goal 7 - Serve as an effective steward of Consortium resources and a strong partner for STEM programs by effectively leveraging NASA Space Grant resources.
- Goal 8 - Support national, regional and crosscutting initiatives that support NASA and Consortium goals as external funding permits.

Goal 9 - The VSGC will maintain its national program recognition for excellence.

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

NASA Education Outcome 1

Cara Campbell, VSGC Graduate Research Fellow from 2007-10 completed her Ph.D. in Applied Science at William and Mary and has been hired by NASA Langley as a research scientist in the Nondestructive Evaluation Sciences Branch. Crystal Bertoncini, VSGC Graduate Research Fellow from 2007-10 also completed her Ph.D. in Applied Science at William and Mary and has been hired by the Naval Research Lab in Washington, as a signal processing scientist. Both students worked on unique research projects using NASA developed technology.

Nathan Akers, a 2009-10 VSGC Community College STEM Scholar graduated with a degree in Mechanical Engineering Technology from Thomas Nelson Community College in 2010. During his senior year, he participated in a LARSS internship. He has been accepted to NASA Langley's Co-op program and will begin working on his B.S. in engineering in fall 2010 at ODU. NASA also continued his LARSS internship during summer 2010. He has volunteered to support many of VSGC's other programs for precollege and college students by serving as an effective role model and inspiration.

VSGC funded Michele Perez, undergraduate student at Virginia Tech, to attend the NASA Academy Internship program at Goddard Space Flight Center in 2008. Following her participation in the Academy, Michele secured a co-op position in the System Safety Division at Goddard for the following summer. Following completion of her co-op and her B.S. in Aerospace Engineering from Virginia Tech, Michele became a full time employee in a civil servant position at Goddard in early 2010. She is now employed as a Flight Systems Safety Engineer at Goddard Space Flight Center.

NASA Education Outcome 2

Through a partnership in the Governor's Academy for Innovation, Technology and Engineering (GAITE), VSGC provided engaging hands-on opportunities for 198 7-8 graders and 145 parents. These sessions were hosted by GAITE partners such as NASA Langley, Canon Virginia, and Thomas Nelson Community College and exposed students and parents to exciting careers in engineering technology. Through follow-up surveys, VSGC has determined that a significant number of students are now more interested in STEM careers and are taking the proper classes earlier in school to prepare for post-secondary education.

PROGRAM ACCOMPLISHMENTS

VSGC actively works with its members and many external partners to accomplish Consortium goals. NASA's funding investment is heavily leveraged by external funding from federal and state agencies and other nongovernmental sources. The external funding enhanced the VSGC's ability to staff and run a wide range of program in concert with NASA goals.

NASA Education Outcome 1

Scholarship/Fellowship/Internships (VSGC Goals 1-3)

VSGC awarded \$354,650 in scholarships and fellowships to students attending Virginia universities. Funds awarded included \$170,000 awarded from matching state funds in addition to the space grant funds.

- \$235,000 went to 47 students for graduate research fellowships
- \$76,150 went to 12 students for undergraduate research scholarships
- \$7,500 went to 5 community college students majoring in STEM
- \$11,000 went to 11 students majoring in education who plan to teach in STEM

All VSGC research students attended and presented at the annual VSGC Student Research Conference and Luncheon hosted by Hampton University in 2009. Hampton University also sponsored a Luncheon in honor of all 2009-10 awardees and VSGC alumni.

VSGC also provided over \$40,000 in funding to nine students for internships:

- Five students to participate in LARSS, including one community college student and three underrepresented minority students.
- Two students for the NASA Academy at Marshall
- Two students for the NASA Robotics Academy at Goddard.

For all student award programs, 33% of awards were provided to underrepresented minority students and 45% of awards were made to female students.

Higher Education (VSGC Goal 2)

- VSGC supported 15 female students to attend Old Dominion University's Engineering Early Advantage Program which targets females entering into the Engineering program the summer before their freshman year. These students complete engineering-related projects to become familiar the engineering discipline.
- VSGC, in partnership with Colorado Space Grant Consortium offered a RockOn! Workshop in June 2009. This workshop is for faculty and students to build a small sounding rocket payload and launch it on a sounding rocket at NASA's Wallops Flight Facility. The goal is to provide training to enable participating colleges to start their own rocket payload initiatives which can subsequently fly through the RockSat program . VSGC sponsored a follow-on RockSat payload for Virginia Tech and two students and two staff from Hampton University to participate in RockOn!
- VSGC funds supported a workshop led by the Virginia Geospatial Extension Program at Virginia Tech in how to use geospatial technology and geospatial tools to support effective decision making. Participating in the workshop were 40 trainees representing community college faculty and administrators, state and local government staff, and cooperative extension agents, specialists, and other constituents.
- VSGC supported one faculty member, Adem Ibrahim, from Norfolk State University (HBCU) to attend and present an invited paper at the 2009 AIAA conference in Orlando, Florida. His paper was titled, Computers and Fluids: Variational Sensitivity Analysis and Design and Optimization.

Research Infrastructure (VSGC Goal 4)

- VSGC established the New Investigator Program (NIP) to strengthen Virginia's research infrastructure by providing startup funding to early career faculty from member institutions conducting research that is directly aligned with NASA's mission. NIP is available to those who have yet to become established researchers. Five faculty members from VSGC-member institutions received an award of \$10,000 each for their research project related to NASA missions and activities.
- VSGC supported one faculty and one graduate student to attend a CubeFlow workshop conducted by the Air Force Office of Scientific Research on the latest hardware and software concepts for design and fabrication of small satellites. Both teams were given materials and hardware to enable the construction of a small satellite. Follow-on projects are being undertaken.
- VSGC provided support to the Flying InfraRed Experiment for Lunar Investigation (FIREFLI) team from Virginia Tech to fly a proof-of-concept experiment on the High Altitude Student Platform (HASP).
- VSGC continued to support the Bladder Distension Monitor project being built and tested by the Applied Science Laboratory at the College of William and Mary. Human testing began in this Space Grant year and will continue into 2010. The bladder distention monitor, based on NASA ultrasound technology, is intended to quantify the relative distention of the bladder and has application to a large target population for the management of urinary incontinence. The device represents new intellectual property which is being marketed by Old Dominion University.

NASA Education Outcome 2

Precollege Programs (VSGC Goal 5)

- VSGC coordinated three engineering technology-themed Saturday programs for 198 7-8 grade students and 147 parents through the Governor's Academy for Innovation, Technology, and Engineering (GAITE) in partnership with Thomas Nelson Community College, NASA Langley Research Center, Northrop Grumman, and Canon Virginia. VSGC also coordinated a NASA AESP-led workshop for 21 teachers of courses in the GAITE pathways.
- VSGC trained 20 teachers through Offering Virginia Educators Resources in Spatial Practices Across the Curriculum for Excellence (OVERspace) which is a program that teaches teachers how to implement GPS/GIS in the classroom.
- VSGC sponsored the poster prizes for six student winners of the Virginia Geographic Information Systems Conference student poster contest.
- VSGC supported the keynote speaker at the Virginia Association of Science Teachers (VAST) Conference and also provided an exhibit to market VSGC programs.
- VSGC supported eight visually impaired students to attend the National Federation of the Blind Youth Slam event to engage, inspire, and encourage the next generation of blind youth to learn about and consider careers in STEM.

NASA Education Outcome 3

Informal Education Programs (VSGC Goal 6)

- Provided funding to support various Science Camps at the Virginia Air and Space Center (VASC) with themes ranging from global climate change to space travel and

including hands-on experiences. A total of 679 children participated. Also supported Black History Month at the VASC which reached over 1,300 members of the public at large.

- -Co-sponsored the annual Yuri's Night event hosted by the VASC which is an informal education event that celebrates humanity's achievements in space.

Selected VSGC Externally-funded Programs (VSGC Goals 7-9) NASA Education Outcome 1

These projects were funded by proposals competitively won by the VSGC. Projects are briefly summarized below. Participant impact data is reported to the sponsoring organization and not included in the impact data of this report.

Higher Education and Research Infrastructure (VSGC Goals 1-4)

- Management of NASA Langley Aerospace Research Summer Scholars Program for the fourth year. A total of 216 students were placed in mentored research in FY09 with 32% percent female and 21% minority. Twenty-six state Space Grants sponsored 49 LARSS students in 2009.
- Management of the VSGC-NASA Langley GIS Internship Program. Forty-two interns were placed in FY09.
- VSGC received a National Science Foundation Advanced Technology Education (NSF-ATE) grant to partner with three Virginia Community Colleges, the Virginia Community College System and Virginia Tech to develop geospatial technical career pathways and provide faculty and teacher training in using geospatial technology. Four community college and one higher education faculty are co-leading the grant.
- Management of the FAA University Design Competition for the FAA which engages college students nationwide in safety and operational issues facing our nation's airports. The Competition is now in its third year. A total of 29 submissions from sixteen different colleges and 23 faculty were received.
- VSGC is funded by NASA to support NASA's Global Climate Change Education program by providing program integration, building a national community of climate change educators, and providing climate change resources for educators and links to climate data and information. VSGC also represents the project and NASA at conferences.
- VSGC is partnering with Old Dominion University for a Teacher Immersion Residency program providing teachers with accelerated master degrees, classroom teaching experience, and internships in their discipline to prepare them to teach in an urban school setting. VSGC's roles is to provide internships for the teacher residents. Planning is underway for 2011 internships.
- VSGC partnered with Old Dominion University on a Ralph Steckler/Space Grant Space Colonization Research and Technology Development project. The VSGC/ODU Exploration Rover design is intended to provide a safety-enhanced, comfortable, efficient work environment in a vehicle that will carry out scientifically effective and efficient research and sample gathering on extraterrestrial surfaces. Project supports a revised senior design project course at ODU. The Virginia

Modeling Analysis and Simulation Center and NASA Langley are also partners. Eighteen students and four faculty from ODU are participating in the project.

NASA Education Outcome 2

Precollege Programs (VSGC Goal 5)

- Virginia Aerospace Science and Technology Scholars (VASTS) program in partnership with NASA Langley Research Center is a one-semester, interactive, exploration-themed, online course for high school juniors led by master teachers. One-hundred eighteen high school juniors participated in the successful. Seventy-four of the students participated in a week-long residential summer academy at NASA LaRC.
- VSGC is a partner with Hampton City Schools on a U.S. DOE-funded GEAR UP project to provide students with engaging and hands-on experiences in STEM through Saturday programs and college-hosted summer camps. Students participating in this six-year project targeting two urban underperforming schools will be tracked through to graduation. A total of 221 students and 38 parents participated in STEM Saturday events and 91 students and 15 parents participated in a STEM summer camp hosted by Old Dominion University.
- VSGC partnered with Virginia Tech to competitively propose to become one of three hosts for the NASA INSPIRE Collegiae Tier 2A experiences for high juniors participating in INSPIRE. Fifty high-school juniors from across the U.S. participating in the first annual INSPIRE collegiate experience.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Longitudinal Tracking Since 2006:** Total awards= 386 significant awards (289 unique students); Fellowship/Scholarship= 239; Higher Education/Research Infrastructure= 50; 28.3% of the total awards represent minority funding. Eighty-five students have graduated and are pursuing advanced STEM degree; eighteen students are employed in STEM with aerospace contractor; and four students are now working with NASA.
- **Course Development:** No new or revised courses were developed in FY09.
- **Matching Funds:** VSGC received a total of \$1,861,604 in non-federal matching funds for FY09. This represents a leveraging of 2.37 to 1 for each NASA space grant dollar. In addition, VSGC received \$2,462,853 through external funding primarily through competitive grants.
- **Minority-Serving Institutions:** Hampton University hosted the annual VSGC Student Research Conference and sponsored the Luncheon during the event. VSGC awarded 10 HU students with scholarships and fellowships and supported two interns through the LARSS program. VSGC sponsored a faculty member from Norfolk State University (HBCU) for research at NASA Langley and provided travel costs for him to present at the AIAA national conference.

IMPROVEMENTS MADE IN THE PAST YEAR

- VSGC increased staff during the FY09 year through external resources won through competitive proposals. FY09 was an excellent year for VSGC externally funded programs with 14 proposals won out of 21 submitted resulting in over \$7.5 million received in external funding (represents total amount awarded for several multi-year projects).
- VSGC awarded a record number of scholarships and fellowships providing over \$350,000 to 100 students. This was due to a significant increase in the Undergraduate STEM Bridge program.
- The Consortium's Host Institution, ODU, provided additional office space to accommodate the growth in the Consortium's staff.
- Continued to enhance state government engagement in Consortium programs.
- Significant growth in industry partnerships to support VSGC programs and projects.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

VSGC members and partners play active roles in project development and implementation. In some cases, VSGC provides funding directly to member institutions for projects and the member institution has the lead. In other projects, VSGC staff may take the lead for project coordination working closely with partners for project execution. For competitive opportunities, the VSGC uses a panel of member representatives to make selections of which students or faculty to fund.

VSGC Affiliate members include: College of William and Mary, Hampton University, Old Dominion University, University of Virginia, Virginia Polytechnic Institute and State University, NASA Langley Research Center, NASA Goddard Space Flight Center's Wallops Flight Facility, Science Museum of Virginia, State Council of High Education for Virginia, Virginia Community College System, Virginia Department of Education, MathScience Innovation Center, Virginia Air and Space Center, Virginia's Center for Innovation Technology.

VSGC scholarships and fellowships are open only to students attending affiliate institutions including all 23 community colleges. Internship support is available to students attending any Virginia higher education institution. VSGC partners not only with affiliates but many other organizations and institutions including industry and NASA Centers on projects. NASA Langley was a key partner in several of VSGC's external proposals won during FY09.