

Georgia Space Grant Consortium
Georgia Institute of Technology
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URL: www.ae.gatech.edu/organizations/gsgc/

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 **Georgia Space Grant Consortium** is a Designated/Program Grant (select funded at a level of **\$575,000.** for fiscal year 2008.

PROGRAM GOALS

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Employ and Educate)

GSGC pilot Program on Low Cost Access to Near Space (LCANS)- The GSGC proposes a pilot program which represents the next step in the national space grant student balloon program; namely, the design built and fly of high Altitude balloons and/or airships.

Research Activity in 3D Scanning and Reverse Engineering- Establishing a reverse engineering capability in Albany State University's (HBCU) Engineering Laboratory.

Development of an Educational Radio Telescope- North Georgia College and State University plans to take a 17ft satellite dish and make it into an instrument suitable for undergraduate education and research.

A Study of Confocal X-ray Fluorescence and its potential use on Martian Landers-Confocal x-ray fluorescence is a technique that can be used to detect and quantify the elements within collected samples. An undergraduate research component is proposed working in the X-Ray lab under the direction of Dr. Sarah Formica at NGCSU.

Spelman College/Georgia Tech Black Graduate Student Association Tutoring and Mentorship- Spelman College (an 100% female, HBCU), in partnership with the Georgia Tech Black Graduate Student Association (BGSA) proposed to increase the number of students who become scientists and engineers by exposing students to opportunities in science, mathematics and engineering fields, tutoring and mentoring programs.

Collaborative HBCU Research Programs (Savannah State University and the Maine Space Grant Consortium)- A proposed research and education between the GSGC and the Maine Space Grant Consortium for the purpose of establishing programs between majority and minority institutions.

NASA-sponsored University Student Launch Initiative (USLI)- Student competition to design and successfully launch a model, high-powered rocket to a target altitude of one mile.

SpaceWorks Engineering Inc., Workforce Development- SEI proposed to support and develop student design competitions that help promote and encourage undergraduate and graduate students to pursue a career in aerospace fields.

Astronomy Training for Students- Columbus State University (CSU) program proposed to provide training for students in the NASA-related disciplines of astronomy and space science, and also opportunities for students to participate in education and public outreach activities associated with these disciplines.
Metrics: Research opportunities for 5 students

Engineering Studies Program- Armstrong Atlantic State University (AASU) proposed to increase the number of undergraduates engaged in undergraduate engineering.

Morehouse Undergraduate Research- Undergraduate student research projects in the Physics Department at Morehouse (HBCU): the design and fabrication of amplitude and phase optical elements (gratings and lenses) for visible extreme ultraviolet imaging systems; continued development of micro-optical elements for a terahertz imaging system; and initial characterization of nanostructures.

NASA Technology for Georgia Agriculture (Precision Farming)- The University of Georgia Space Grant Program proposed to continue its research with an emphasis on working with the cooperative extension service to address problems specific to Georgia NASA technology and research to solve problems specific to Georgia agriculture.

NASA Space Academies- The GSGC will provide funding for 3 students to attend NASA Space Academies.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Educate and Engage).

Teacher Training - Professional Development- A series of professional development for classroom math, science, and technology teachers. The programs offered are in support of NASA activities.

Southwest Georgia Regional Model Bridge Building Competition- High school students in Southwest Georgia propose to solve realistic engineering problems by designing and building a structurally efficient balsa wood bridge according to very demanding specifications.

Engineering Workshops- Weekend engineering workshops to train selected high school students in laboratory experiments on robotics and computer controlled testing and manufacturing equipment.

Annual Botball Tournaments- Mercer University hosts the annual Botball Tournament and pre tournament workshop.

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire)

Personnel Support for the George E. Coleman, Sr. Planetarium- The NGCSU OPEN program (Observatory-Planetarium Public Education Nights) presents shows to approximately 3900 visitors.
Metrics: Comparison in the number of attendees on an annual basis The Georgia Southern University Planetarium wants to continue its public outreach in astronomy and space science in Southern Georgia through its viewing, workshops and lectures.

Regional Science Education Center (Informal Education Center)- The Regional Science Education Center (University of West Georgia) is in the final design-proposal stage of this 250 seat lecture-demonstration-planetarium hall with a NASA astronomy and space science emphasis.

Management Strategy- The GSGC has set goals of stricter management and control of programs including: 90 day progress and budget reports; mandatory review of website information on a monthly basis (updates will be ongoing), submission of information to produce newsletters on a monthly basis and fund raising in support of GSGC programs.

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

Outcome 1 and 2.

Columbus State University student, Michael Johnson (Chemistry) worked primarily on software improvements and session monitoring for the Solar Observatory. The observatory's control system now facilitates camera control, telescope control, and remote control of the telescope and cameras via the Internet. These improvements have streamlined remote logins and provided ease of control for the cameras for external users. In addition, the software has also made possible the streaming of live solar images to our website. With this improvement, not only can scheduled observers view live solar images, but anyone with an Internet connection see them as well.

Outcome 1, 2, and 3

Columbus State University student, Jodie Hood has continued taking images of solar phenomenon and creating time-lapse animations of features on the Sun. The website <http://www.ccsc.org/observatory.html> shows excellent examples of her work. She continues to develop image enhancement techniques using Maxim DL, which have greatly improved the quality of the images captured by the CSU observatory. Jodie will present an update of her latest work with the observatory at the CSU Student Colloquium in spring of 2009. As Jodie approaches her graduation in December 2009, she is exploring a career in teaching science to hearing-impaired students. Being hearing-impaired herself, she has an intimate understanding of the difficulties students with disabilities face when learning science in traditional settings. She credits her work with the Solar Observatory, and the training opportunity provided by Space Grant, in steering her toward seeking a career in a STEM-related field.

These two students also hosted a web-cast of the February 20, 2008 total eclipse of the moon using the same software interface written for use with the Solar Observatory. CSU announced participation in this web-cast through NASA's *Spaceweather.com* web site, and fielded over 600,000 hits from more than 30,000 unique viewers worldwide.

PROGRAM ACCOMPLISHMENTS

Outcome 1:

- Albany State is able to scan most 3D objects with a laser scanner and create a digital definition in the computer. Results will be presented at the American Society for Engineering Education, southeastern regional conference in April 2009, and for the national conference in June 2009. One student assistant has been hired with space grant funds to conduct research.
- University Student Launch Initiative – Design of a high powered rocket is 85% complete, and the team will participate in the first competition for the GSGC in spring of 2009. Fourteen undergraduate and two undergraduate students from Georgia Tech are conducting all research and responsible for design and launch.
- SpaceWorks Engineering, Inc. successfully sponsored 2 student design competitions and provided 4 internships.
- The University of Georgia precision farming yielded results which were presented online at www.agroclimate.org.
- Five students were sent to NASA Space Academies.
- Georgia Tech co-sponsored the annual GT squared competition for graduate students from underrepresented groups. There were recruiters from 8 companies and/or government agencies, and 61 student presenters.
- 37 publications from GSGC
- Three collaborative proposals. Last proposal submitted as an augmentation to the Space Grant includes Georgia Tech and 3 HBCUS

Goals and Objectives not achieved

- GSGC pilot program on Low Cost Access to Near Space (LCANS)
- Collaborative HBCU Research Program between Savannah State and the MSGC
- Fundraising to provide additional cost sharing funds

- Monthly review and update of the website

Goals and Objectives started January of 2009. Not enough data to report

- Spelman College/Georgia Tech Black Graduate Student Association Tutoring and Mentorship
- Development of an Education Radio Telescope began in January of 2009.
- Study of Confocal X-ray Fluorescence and its potential use on Martian Landers
- Results from Morehouse undergraduate research.

Outcome 2:

- 15 teacher training workshops were provided by affiliate Orbit Education.
- Albany State's annual participation in Model Bridge Building is February 28 2009. There are 47 students scheduled to participate.
- Dr. Charles Drew Summer Enrichment Cap and an Afterschool Academy provided in-service and pre-service workshops for 42 teachers and 129 students from underrepresented groups.
- Fort Valley State hosted the annual Cooperative Development Energy Program for thirty-four, 9th grade student and teachers in a summer enrichment program.

Goals and Objectives not yet achieved

- No data for the annual Botball competition hosted by Mercer University

Goals and Objectives started in January of 2009. Not enough data to report

- Engineering Workshops at Albany State. No workshops were held in 2008.

Outcome 3:

Goals and Objective achieved

- Georgia Southern welcomed approximately 10,000 school children to the Planetarium in FY 2008. They hosted 10 public viewing events; provided lab space for approximately 1,000 students, provided 8 planetarium internship courses; and hosted 3 special event shows, including viewing of NASA launches.
- West Georgia continues to work with industry and local government on the design and funding of the Regional Science Center.

Goals and Objectives started January of 2009. Not enough data to report

- Personnel support for the George E. Coleman, Sr., Planetarium will start in 2009
- Sponsorship for 5 underrepresented minority students from the Federation of the Blind to attend an annual engineering camp at Johns Hopkins.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking: Total of 117 students funded, 44 students (37.6%) from HBCUs (of the two reporting to date). Seventy awards given to students from underrepresented groups (57.3% - HBCUs and majority institutions). Sixty-four awards given to females students (54.7%). All undergraduates are still enrolled and funded. Two Ph.D. students have graduated (as of December 2008); one is employed with an aerospace contractor and the other at the Jet Propulsion labs.
- Course Development: University of Georgia – Undergraduate Course on Geospatial technologies was enhanced by the Space Grant which resulted in improved learning outcomes for students mastering how to use remotely sensed imagery for land characterization studies.
- Matching Funds: There was a 1:1 match on all funds for all GSGC member institutions. No other significant matching above the required match has been achieved as of December 2008.
- Minority-Serving Institutions: 2008 only - Total awards for HBCUs is 44 (August 2008 – December 2008). One student is employed at NASA JPL. One is pursuing an Advanced STEM Degree. Data unavailable for Spelman and Morehouse.

IMPROVEMENTS MADE IN THE PAST YEAR

Management - Guidelines were developed to address affiliates who fail to submit reports, and do not make progress towards their proposed goals and objectives. Also, the guidelines include procedures to adjust, or eliminate programs that have not met GSGC goals and objectives.

Fort Valley – Curriculum for the Cooperative Development Energy Program, a pre-college program, has been changed to increase the number of contact hours (from 7 – 10) for instruction in mathematics.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

All of the affiliates listed below comprise the Georgia Space Grant Consortium. North Georgia College and State University are the newest members of the consortium.

1. Georgia Institute of Technology (lead institution)
2. Albany State University (HBCU)
3. Armstrong Atlantic State University
4. Columbus State University
5. Fort Valley State University (HBCU)
6. Georgia Southern University
7. Georgia State University
8. Kennesaw State University
9. Mercer University
10. Morehouse College (HBCU)
11. Orbit Education, INC (non-profit, informal STEM education)
12. SpaceWorks Engineering, Inc. (Industry Affiliate)
13. Savannah State University (HCBU)
14. Spelman College (HBCU/100% female)
15. University of West Georgia
16. University of Georgia
17. North Georgia College & State University