Georgia Space Grant Consortium Lead Institution: Georgia Institute of Technology Director: Dr. Stephen Ruffin Telephone Number: 404-894-0521 Consortium URL: http://gasgc.org Grant Number: NNX15AP85H

Lines of Business (LOBs): NASA Internships, Fellowships, and Scholarships; Stem Engagement; Institutional Engagement; Educator Professional Development

A. 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 Consortium funded at a level of \$760,000 for fiscal year 2016.

B. PROGRAM GOALS

Fellowships/Scholarships

GOAL: Deliver a competitive scholarship/fellowship program that promotes STEM excellence in areas of relevance to NASA for students and faculty.

- Objectives:
 - Ensure competitive distribution of scholarship/fellowship funds.
 - Create partnerships among student fellowships awardees and mentors involved in NASA's missions and at NASA centers
- Targets: 45 total direct impact (41.3% underrepresented groups, 58.8% female.)
- Metrics: Number of students receiving fellowships and percentage of underrepresented groups and women receiving fellowships
- Time Frame: one year
- Budget (NASA funds):

- o Year 1: \$192,360
- o Year 2: \$227,302
- Year 3: \$256,656

Research Infrastructure

GOAL: Support customer-focused research activities that develop innovative technologies, knowledge and infrastructures to advance NASA's space and aeronautics objectives.

- Objectives:
 - Integrate research efforts with those of NASA and other stakeholders, with emphasis on research with direct applications to the state of Georgia.
 - Provide authentic experiences for students to identify current and potential uses of NASA technologies.
 - o Emphasize support for Space Grant Fellows opportunities.
 - Ensure competitive distribution of research funds.
 - o Disseminate research results to NASA, stakeholders, and national audience.
- Targets: 12 Research Personnel direct impact (41.3% underrepresented groups, 58.8% female)
- Metrics: Number of participants and percentage of underrepresented groups and women in programs.
- Time Frame: one year
- Budget (NASA funds):
 - o Year 1: \$16,000
 - Year 2: \$22,600
 - o Year 3: \$24,600

Higher Education

GOAL: Support customer-focused research activities that develop innovative technologies, knowledge and infrastructures to advance NASA's space and aeronautics objectives.

- Objectives:
 - Provide mentoring opportunities to increase the enrollment and retention of undergraduate STEM students and to increase the number of students in STEM graduate programs.
 - Provide higher education and post secondary education students with enriched STEM-related resources and activities.
 - Maximize opportunities for underrepresented groups pursuing higher education.
 - Collaborate with private industry to maximize and integrate resources into GSGC higher education and postsecondary education efforts in order to address the STEM workforce needs of Georgia.
 - Recruit technical and community colleges for the GSGC.

- Increase the number of collaborations between colleges and universities through cross-institutional projects.
- Target: 8 teachers, 268 students direct impact (41.3% underrepresented groups, 58.8% female)
- Metrics: Number of teachers and, students and the percentage of underrepresented groups and women in programs.
- Time frame: one year
- Budget (NASA funds):
 - o Year 1: \$72,000
 - o Year 2: \$134,200
 - o Year 3: \$144,200

Precollege

GOAL: Provide opportunities for students and educators in STEM disciplines through a progression of programs that immerse them in authentic science and engineering experiences to support the NASA mission and its human capital goals.

- Objectives:
 - Provide STEM professional development programs using NASA's content and resources to provide preservice and in-service teachers with learning experiences that build critical instructional STEM skills to better prepare their students for STEM careers.
 - Support Georgia's informal STEM education organizations that use NASA content to promote STEM literacy and support the development of innovative programs that help promote NASA's exploration mission.
 - Engage Precollege students in hands-on research and engineering experiences which lead to an increased knowledge of NASA science and technology disciplines, missions, and exploration programs.
 - Recruit students and educators in NASA's missions, research, and innovations by engaging a diverse audience including women, underrepresented minorities, and persons with disabilities through every part of the state of Georgia.
- Targets: 451 educators 750 K-12 students direct impact (41.3% underrepresented groups, 58.8% female)
- Metrics: Impacting target numbers and reflecting the demographics for teachers and students in Georgia.
- Time frame: one year
- Budget (NASA funds):
 - o Year 1: \$48,000
 - o Year 2: \$76,800
 - o Year 3: \$82,800

Informal Education

GOAL: Increase the general public's and students' awareness and knowledge of NASA related technologies through collaborations with informal STEM education providers, NASA, private industry, and consortium members.

- Objectives:
 - Provide unique opportunities to engage students, educators, families, and the general public, in inspiring authentic aerospace experiences that are derived from NASA's exploration plans.
 - Implement public engagement activities by leveraging the infrastructure of the informal education community in the state.
 - Promote public astronomical viewing sessions and planetarium programs that focus on NASA space science activities and missions such as Hubble Space Telescope findings.
- Target: 1300 minimum direct impact
- Metrics: The target number of visitors should be achieved. No demographics are estimated for this target.
- Time frame: one year
- Budget (NASA funds):
 - o Year 1: \$24,000
 - o Year 2: \$26,400
 - o Year 3: \$28,400

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

An annual bridge building competition has been held in Georgia, hosted this year by Chehaw Park, fostering engineering and mathematics principles in middle school students. These youngsters are instructed, guided, and inspired by their teacher Atin Sinha, who is one of the motivating forces in the success of the bridge building competition since its inception fifteen years ago. This year's winning team was comprised of three young ladies from 7th grade in Miller County Middle School who come from families experiencing economic hardship and are headed by single mothers. This is the first year this team attended the competition and they promised to come back next year.

AstroSystems, one of the GSGC's industry affiliates, will be flying a balloon payload through the path of the August 21, 2017 eclipse. This unique opportunity will generate some exciting images of the shadow of the Moon moving across the Earth below with the dark sky and curve of the Earth in the foreground. This flight project has been led by high school students with the purpose of conducting research, and is giving the students valuable experience in leading projects and researching. Robotics teams are currently being recruited to analyze data obtained during this research oriented mission.

Kennesaw State University is conducting a program with high school students from the Cobb County Alternative High School. Students in this program were instructed in a series of introductory university-level laboratories covering a variety of scientific topics, such as physics, chemistry, genetics, microbiology, ecology, human physiology, and anatomy. The labs were held on the Kennesaw State University campus and were led by KSU undergraduates, exposing the high school students not only to STEM ideas and techniques but also to the university environment. In addition, the KSU student-led laboratories provided an opportunity for leadership development and growth for the KSU undergraduates. The undergraduate students introduced each laboratory exercise for the high school students and developed a plan for which instructional goals should be accomplished in each exercise. For most of the undergraduate participants, this was their first experience leading laboratory exercises rather than simply following them.

D. PROGRAM ACCOMPLISHMENTS

- NASA Internships, Fellowships, and Scholarships:
 - Target: 45 total (41.3% underrepresented groups, 58.8% female)
 - Performance: 56 total, 11 underrepresented, 16 female, 1 transgender, 1 gender fluid.
- Higher Education projects:
 - Target: 268 students direct impact, 8 Teachers (41.3% underrepresented groups, 58.8% female)
 - Performance: 433 total, 179 underrepresented, 190 female students, 31 Teachers
- Research Infrastructure projects:
 - Target: 12 research personnel direct impact (41.3% underrepresented groups, 58.8% female)
 - Performance: 14 total, 5 underrepresented, 5 female
- Precollege projects:
 - Target: 451 educators and 750 K-12 students direct impact (41.3% underrepresented groups, 58.8% female)
 - Performance: 905 educators, 1811 students
- Informal Education projects:
 - Target: 1300 minimum direct impact
 - Performance: 2963 total

E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

• **Diversity**: The GSGC has six HBCUs and two all-female institutions as affiliate members. In addition, proposals submitted to the GSGC include demographic targets when possible, and the target population is included in the evaluation.

• Minority Serving Institution Collaborations:

- **Morehouse College:** All male HBCU whose focus areas are workforce development, research opportunities for students, and collaborations with other institutions. Scholarship funding is provided for Morehouse students pursuing degrees in STEM.
- **Clark Atlanta University:** HBCU whose focus area is collaborative engineering research with majority institutions that lead to NASA careers.
- Savannah State University: HBCU, where the College of Science and Technology will support faculty and students who will travel to conferences in STEM disciplines related to the mission and focus of NASA.
- Albany State University: HBCU with the focus areas of providing research opportunities for undergraduates and collaborating with other HBCUs and majority institutions.
- Fort Valley State University: HBCU, with a focus area of enrichment program for pre-college and undergraduates that encourage them to pursue STEM fields for employment or for advanced degrees.
- **Spelman College:** All-female HBCU whose focus areas are encouraging female students to pursue STEM, hands-on research opportunities, and workforce development.

• All-Female Institutions

- Agnes Scott College: All-female institution with a strong astronomy program that engages undergraduate students and conducts programs that attract K-12 and the general public in the Atlanta metropolitan area.
- **Spelman College:** All-female HBCU whose focus areas are encouraging female students to pursue STEM, hands-on research opportunities, and workforce development.

• Office of Education Annual Performance Indicators:

Many projects and programs are still ongoing, and the below contributions to the NASA APIs are preliminary for the current year.

• API 2.4.1: ED-16-1 29 (Number of NIFS to racially or ethnically underrepresented students, women, and persons with disabilities.)

- o API 2.4.2: ED-16-2 1387 (Number of educators.)
- o API 2.4.4: ED-16-4 542 (Number of informal education events.)
- o API 2.4.5: ED-16-5 9103 (Number of K-12 students.)

F. IMPROVEMENTS MADE IN THE PAST YEAR

The Georgia Space Grant Consortium has made improvements this year with the goal of growing or community involvement and becoming a larger presence in the state of Georgia. In October of 2016 GSGC added a new team member Alysia Watson whose role is program coordinator. As program coordinator she has been increasing the GSGC social media presence and advertising through these venues. She is striving to foster more open communication and a stronger relationship between GSGC, our affiliates, schools systems, and community.

In further effort in communicating with our community GSGC has begun publishing a monthly newsletter. The newsletter features upcoming NASA deadlines for applications, proposals and the like, project achievements from our affiliates, and opportunities for students and educators.

The GSGC has also begun updating our front-facing portion of our website, in an effort to update the overall look and feel of the web page, but to also provide better functionality for the site's visitors. Since we overhauled the administrative functions and back-end tools for our website last year this year we decided to give the public facing portion an update.

G. CURRENT AND PROJECTED CHALLENGES

The GSGC is continually striving to foster long term progress in our strategic goals. In order to achieve these goals over the long term, we have started to put more emphasis on exploring and developing projects that have significant growth potential. These projects may have scalable models that could reach statewide or nationwide in time, or could allow the development and distribution of materials to wider audiences of educators. These projects have their own specific challenges and difficulties, and we strive to ensure not only the short-term success, but their long-term development as well. To achieve the maximum success possible, it will take careful shepherding and attention to help them have the foundation in place to eventually become self-sustaining and continue to grow far into the future.

H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Atlanta Metropolitan Area

• Agnes Scott College: all-female institution with a strong astronomy program that engages undergraduate students and conducts programs that attract K-12 and the general public in the Atlanta metropolitan area; focus area: scholarships and fellowships.

• **Clark Atlanta University:** HBCU; undergraduate and graduate programs; co-director is a former Space Grant Fellow; focus area is collaborative engineering research with majority institutions that lead to NASA careers.

• **Center for Sustainable Communities:** non-profit partner; community-based collaborative initiative; focus areas: STEM outreach and mentorship of underrepresented minorities in aviation.

• **Georgia Institute of Technology:** GSGC lead institution; undergraduate and graduate; focus areas: funding students for advanced degrees in STEM, collaborative research with HBCUs, providing workforce development opportunities for students.

• **Georgia State University:** undergraduate and graduate; focus area: funding students for PhDs in Astronomy.

• **Generation Orbit:** An industrial affiliate that provides workforce development opportunities. GO serves micro- and nano-satellite developers struggling to find dedicated and cost-effective space access by offering fast, flexible, and affordable primary launch manifesting through GOLauncher, and air-launched space transportation system specifically designed for small payloads.

• **Kennesaw State University:** undergraduate and graduate; focus areas: providing scholarships and funding undergraduate students to work in STEM outreach programs with K-12 students, and mentoring programs for students in STEM to help develop leadership.

• **Morehouse College:** HBCU; all-male; undergraduate only; co-director is a former Space Grant Fellow; focus areas: workforce development, research opportunities for students, pre-college enrichment and outreach.

• **SpaceWorks Engineering, Inc.:** industrial affiliate; provides internship opportunities and workforce development.

• **Spelman College:** HBCU; all-female; undergraduate only; acting co-director is a former Space Grant Fellow; focus areas: encouraging female students to pursue STEM, hands-on research opportunities, and workforce development.

Central Georgia

• Fort Valley State University: HBCU; Land Grant; focus area: enrichment programs for precollege and undergraduates that encourage them to pursue STEM fields for employment or for advanced degrees.

• **Mercer University:** undergraduate and graduate programs; focus areas: open robotics laboratory, autonomous vehicle research, high altitude ballooning, and large project

development.

• **Museum of Aviation:** non-profit organization that provides workshops with NASA content for teachers and students. MOA is a NASA regional educator resource center, one of the largest aviation museums in the United States and a major Air Force Heritage, Exhibit, and Education Center in the Southeast. The Museum is the second largest museum in the US Air Force. It is only one of ten aviation museums in the U.S. to be accredited by the American Alliance of Museums. Focus areas: public outreach, educator professional development, and NASA resource dissemination.

• **Pink STEM:** non-profit partner; specializes in empowering girls and women in STEM in order to close achievement gaps; focus area: STEM education for girls.

North Georgia

• University of North Georgia: undergraduate and graduate; has a public observatory and planetarium; focus area is astronomy, observatory programs, and providing astronomy research fellowships.

East Georgia

• University of Georgia: largest institution; Land Grant; undergraduate and graduate programs; focus area is using NASA technology in agricultural applications, agricultural engineering, chemistry, geology.

Southeast Georgia

• Albany State University: HBCU; undergraduate and graduate programs; focus areas: providing research opportunities for undergrads, collaborating with other HBCUs and majority institutions, pre-college outreach.

• Armstrong State University: undergraduate only; co-director is a former Space Grant Fellow; focus areas: undergraduate research, mentoring for pre-college, workforce development for students, collaborative research, leadership development.

• **Savannah State University:** HBCU; undergraduate only; co-director is a former Space Grant Fellow, focus area is providing research opportunities and scholarships for students as well as collaborative programs.

• **Georgia Southern University:** undergraduate and graduate, focus area is informal education via the university operated observatory.

West Georgia

• **AstroSystems:** industry partner; focus area: advanced STEM education and high-altitude ballooning.

• Columbus State University: undergraduate and graduate; works in conjunction with the

Coca Cola Space Science Center; provides hands-on research and promotes undergraduate engagement in STEM; focus areas: astronomy, space and earth sciences.

• University of West Georgia: undergraduate and graduate; focus areas: undergraduate physics research, and planetarium shows for precollege and informal educators.