Florida Space Grant Consortium
Lead Institution: University of Central Florida
Director: Dr. Jaydeep Mukherjee
Telephone Number: 407-823-6177
Consortium URL: www.floridaspacegrant.org
Grant Number: NNX10AM01H

## 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 Florida Space Grant Consortium is a Designated Consortium funded at a level of $575,000 for fiscal year 2013.

## PROGRAM GOALS

**FELLOWSHIPS & SCHOLARSHIPS**

1. Enable students to pursue careers in the space program – whether through graduate, undergraduate, or Community College technical training.

   **SMART Objective** – On an annual basis, at least 20 undergraduate and/or technical training awards and 3 graduate fellowships will be competitively awarded to students who wish to pursue space/aerospace/aeronautics training. At least six of these awards will be offered to minority candidates and at least 8 to female students. At least 70% of awardees will continue to the next step in their chosen STEM disciplines (academia/NASA/industry).

**This goal positively impacts NASA Objectives: 5.1 and 6.1**

2. Facilitate Space-Related Research Symposia for students, NASA engineers and FSGC awardees

   **SMART Objective** – By March 2014, facilitate at least two Space-Related Research Symposia within the State of Florida that specifically target graduate student participation involving at least 12 students and 10 mentors.

**This goal positively impacts NASA Objectives: 5.1 and 6.1**

**RESEARCH INFRASTRUCTURE**

1. Support NASA related interdisciplinary research projects emphasizing work-force development with undergraduate and graduate students.

    a. **SMART Objective** – On an annual basis, at least 12 research projects will be competitively awarded. At least three of these research project awards will be awarded to a minority serving institution and/or include minority participation. At least 12 undergraduate or graduate students will be supported by the projects, including at least 5 women and 4 under-represented minorities

**This goal positively impacts NASA Objectives: 5.1, and 6.1**

2. Foster collaboration among NASA engineers, Florida university faculty and industry partners.

    a. **SMART Objective** – By March 2014, facilitate at least two Space-Related Research Symposia within the State of Florida that specifically target NASA engineers, Florida university faculty and industry partners.

**This goal positively impacts NASA Objectives: 5.1. and 6.1.**

**HIGHER EDUCATION**

1. Provide undergraduate students with opportunities for interdisciplinary hands-on experiences in team-based student launch activities and student pay-load development programs to better understand STEM concepts as they relate to space exploration.

    a. **SMART Objective** – On an annual basis, involve at least 100 students, representing a minimum of five Florida-based higher education institutions, including at least one minority serving institution, in collaborative space-based interactive learning experiences.

**This goal positively impacts NASA Objectives: 5.1, 6.1, and 6.2.**

**PRE-COLLEGE EDUCATION**

Contribute space-related resources and training to help increase the number of K-12 teachers who:

1. Use space-related curricula resources to motivate more students to pursue advanced math and science courses.

    a. **SMART Objective** – On an annual basis, conduct and/or facilitate space-related pre-service and in-service teacher training opportunities focused on space-related math and/or science curricula. A minimum of 50 Florida teachers per year will attend this training.

**This goal positively impacts NASA Objectives: 5.1, 6.1, and 6.2**

**INFORMAL EDUCATION (GENERAL PUBLIC)**

Contribute space-related resources to help increase the number of citizens who are aware of:

1. How the application of math and science enable or enhance common activities, NASA's contributions to our standard of living (beyond Velcro®), and NASA's mission.

    a. **SMART Objective** – On an annual basis, collaborate with Florida museums and/or science centers to facilitate/conduct engaging space-related learning events held in public venues. A minimum of two events per year will be held. At least 200 members of the public will attend one or more of these events per year.

**This goal positively impacts NASA Education Objective: 6.4**

Progress FSGC is making in achieving our program goals.

- Percentage of students whom have taken their next step and have been successfully tracked though their next step vs last year of SG support.
    - 85% for 2006
    - 71% for 2007
    - 89% for 2008
    - 77% for 2009
    - 94% for 2010
    - 93% for 2011
    - 78% for 2012
    - n/a for 2013 – all participants sill enrolled
    - 83% for 2006-2013
- 81% of students significantly supported by went onto next steps in STEM disciplines

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

The Space Grant program has allowed me to have more time to focus on my research during the last year of my masters and during my first year of full-time PhD work. This has accelerated my education, and I will be advancing to PhD candidate status in January. It has also provided relative financial stability, which has been greatly appreciated in my overall life. (Krista Romita - on 12/03/12, 2011 Space Grant Fellowship, 2013 Space Grant Fellowship, 2013 Space Grant Fellowship, University of Florida - Teaching Assistant) – **Outcome 1**

The Florida Space Grant has helped me pursue a PhD in meteorology and has been a very positive experience for me. I greatly appreciate the funding and I have enjoyed all of the research that the Florida Space Grant has exposed me to. (Aaron Preston - on 03/10/14, 2013 Space Grant Fellowship) – **Outcome 1**

The program helped fund my research project and provided me with experience writing and submitting grants in academia. (Ian Stern - on 02/21/14, 2013 Space Grant Research Award, University of Florida - Research Assistant/Fellow) – **Outcome 1**

## PROGRAM ACCOMPLISHMENTS

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

- 55 students took next step in FY13 (SG participation supported from FY06-FY13 funds)
    - 7 are pursuing advanced degrees in STEM disciplines
    - 1 is seeking a STEM position
    - 13 accepted STEM positions at NASA contractors
    - 12 accepted STEM positions in industry
    - 1 accepted a position at NASA
    - 1 accepted a STEM position in K-12 academia
    - 4 accepted STEM positions in academia
    - 16 went on to positions in non-STEM disciplines

**Fellowships and Scholarships**

Among the students significantly supported and will be supported from FY13 fellowship and scholarships are:

- 5 SLSL interns ( Starting June 2, 2014)
- 8 graduate fellows
- 28 scholars
- 3 Interns at KSC (Starting June 2, 2014)
- 2 NASA Academy interns (Starting May 8, 2014)

Through our fellowship program, graduate students, enrolled in a Ph.D or Masters program, are provided a year-long fellowship. Under this program, we funded 8 graduate fellows (6 women and 1 under-represented minority). – met our fellowship goal for gender equity but did not meet our under-representative goals for the fellowship program. However, we did exceed the minority goals for the total fellowship and scholarship program (see section below)

Through the scholarship program, FSGC funded scholars at Florida universities. 28 students were provided scholarships at our affiliate universities. In addition, 5 students will be interning at NASA centers and 5 students at the Space Life Sciences Lab. Among the scholars and interns, students were under-represented minorities and were women. This was well above our goals for both under-represented minorities and gender.

Internship Program at the Space Life Sciences Building

The NASA Florida Space Grant Consortium (FSGC) and Space Florida (SF) are partnering in an Internship Program at the Space Life Sciences Laboratory (SLSL),

Exploration Park KSC, during summer 2014. The 2014 program will comprise 5 SLSL internships of 10 weeks duration. The 2014 internship program will commence on June 2, and conclude on August 8, 2014. We have not yet made the selection of students and hence do not have their demographics. The goal of the Internship program will be to train and recruit Florida science/engineering students (US citizens only) into the aerospace & aviation workforce as future employees, while encouraging further study and academic achievement. Particular emphasis will be directed towards building and strengthening allegiances between Space Florida, Florida Space Grant Consortium, NASA-KSC, Florida Universities, as well as Space Life Sciences Laboratory & Exploration Park tenants. The organizations at the SLSL building include CASIS, Dynamac Corp., Molecular Power Systems, Cella Energy, Innovative Health Systems, QinetiQ North America, Kentucky Space, University of Florida, Micro Aerospace Solutions, Space Florida and with Bionetics and Lighting Sciences moving in shortly.

Interns at NASA centers

FSGC will be supporting 3 interns at the NASA Kennedy Space Center, 1 intern for the NASA Academy Program at Goddard Space Flight Center and 1 intern for the NASA Academy Program at Langley

***SMART Objective –*** On an annual basis, at least 20 undergraduate and/or technical training awards and 3 graduate fellowships will be competitively awarded to students who wish to pursue space/aerospace/aeronautics training. At least six of these awards will be offered to minority candidates and at least 8 to female students. At least 70% of awardees will continue to the next step in their chosen STEM disciplines (academia/NASA/industry).

*FSGC has awarded 8 graduate fellowships, and 28 scholarships. In addition we will be supporting 10 more students in internship programs starting in May Among the 36 students that we have supported so far, 27 students are under-represented minorities and 26 were women. According to the National Center for Education statistics webpage (http://nces.ed.gov/programs/digest/d11/tables/dt11_239.asp), 42.3% of the students enrolled in degree granting Florida institutions in 2011 are under-represented minorities. For FSGC, 75% of the students supported as scholars or fellows are under-represented minorities. If one takes into account all the students directly supported by FSGC through fellowships, scholarships, and research projects, then the percentage of under-represented minorities is 63% which is above the Florida total student minority distribution. Among the direct funded fellows and scholars, 72% are women.*

## Higher Education

The goal of our Higher Education projects is to provide students the opportunities to engage in hands-on activities that requires working in a group and inter-disciplinary topics. We achieve this by supporting senior design projects and student groups taking part in NASA Competitions like Robotic Mining Competition, Student Launch Initiative, RASC-AL ROBO-OPS Student Competition and Microgravity University. In addition,

FSGC runs 2 competitions for college students. One is the Hybrid Rocket Competition and the other is the Florida University Student Satellite Design Competition. Details of our higher education programs are as follows:

Senior Design Projects; FSGC has supported 10 senior design projects involving 52 students at the Florida State University, Florida International University, University of Central Florida and Embry-Riddle Aeronautical University. Some of the projects supported included (i)Android Mobile Device Controlled Compact Potentiostat for a Portable and Affordable Biosensor Platform (ii) Multi-Purpose UAV, (iii) AUVSI SUAS Seafarer Competition - UAV Platform, (iv) Unmanned Aerial Vehicle With Fire Extinguishing Grenade Release and Inspection System, (v) designing and developing a satellite bus, (vi) developing an electrodynamic tether, (vii) Relay-Assisted Network for Guidance of Exploration Robots, (viii) Construction of a rocket engine that has lower specific impulse, (ix) LED-based sensor for simultaneous, time-resolved measurements of CO and CO2 from hybrid rocket exhausts, (x)SAE Aero design – Heavy Lift

Hybrid Rocket Competition: 121 students in 13 teams from 9 universities (Univ. of Central Florida, Univ. of Florida, Univ. of Miami, Florida Institute of Technology, Univ. of South Florida, Embry-Riddle Aeronautical University, Florida International University, University of West Florida and Daytona State College) took part in this competition. The objective of the competition is to build and launch a hybrid powered rocket. There are two categories in the competition. The first category consists of launching a hybrid rocket to the maximum altitude. The second category challenges the teams to fly their rocket closest to 2000 feet in altitude. The launch day is April 12, 2014 at Bunnell Florida. This program is also supported by the North East Florid Rocket Club. This competition is a stepping stone for students to participate in the University Student Launch Initiative competition. This project is sponsored by FSGC and the Florida Space Institute.

Robotic Mining Competition: NASA's Fifth Annual NASA Robotic Mining Competition is for university-level students to design and build a mining robot that can traverse the simulated Martian chaotic terrain, excavate Martian regolith and deposit the regolith into a Collector Bin within 10 minutes. The competition will be held at the Kennedy Space Center Visitor Complex from May 19-23, 2014. There are 32 US teams participating in the competition and 3 are from Florida. FSGC is partially supporting 3 of the Florida teams. The teams represent Florida Institute of Technology, University of Central Florida and University of Florida. 65 students are participating from these 3 universities

NASA/RASC-AL ROBO-OPS Student Competition: The NASA/RASC-AL Robo-Ops Project Team consists of three senior Mechanical and two senior Electrical Engineering students at the Florida State University and Florida A & M University interested in robotics. Robo-Ops is an annual competition hosted by NASA and organized by the National Institute of Aerospace. The competition is scheduled to be held in June 2014, where undergraduate and graduate students are invited to produce a planetary rover prototype and demonstrate its capabilities to perform a series of competitive tasks during

field tests at the NASA Johnson Space Center's Rock Yard while being operated from the schools home campus. Last year, FAMU-FSU was nationally selected to compete and placed 5th overall. This year the team's goal is to be selected and to place first in the competition overall by utilizing a completely innovative approach to the problem.
The team plans to create something never before seen in the competition which is to have multiple smaller rovers which are all capable of picking up samples. Large rovers have been the only option for past teams which utilize standard wheeled motion. This design is possible by the use of legged locomotion which will allow our smaller rover to step over larger obstacles the same as a large wheeled rover. Last year's design featured the hexipedal platform which handled the course's terrain with ease. By scaling the previous model down, we will not only be able to collect multiple rocks at the same time, but the overall weight will be reduced, allowing us further advantages in the competition.

FUNSAT Competition: The basic FUNSAT (Florida University SATellite) is a pico-satellite with a maximum mass of 1.33 Kg and the size of 10 x 10 x 10 cm3 (i.e. 1U). However, we allow its extension up to 6U (8 kg) though our funding for the construction may be limited to support 1U cost. The main objectives of this competition are promotion of an interdisciplinary project for systems engineering, supporting a test-bed for advanced technologies such as MEMS, and promoting advanced study and career development for Florida students in the field of aerospace.

The eighth annual FUNSAT competition began in the Fall of 2013. This design competition is structured to allow students to have a two-year turnaround on an actual system design project: the detailed design in the first year and the flight model construction in the second year. This competition will allow students to work closely with professionals from the field on a project that will have great significance in the coming years. The competition will include the design, fabrication, and a possible launch into space for the winning design. In the conceptual design (first round), competitors will be provided with technical support by FSGC, NASA and space industries.

10 teams representing 8 universities are taking part in the competition. The universities taking art are Florida Institute of Technology, University of West Florida, Florida International University, University of Miami, University of Central Florida, Florida Gulf Coast University, University of Florida, and the University of North Florida. There are 94 students in these 10 teams. These teams have submitted their progress report and will submit their detailed design mid-April. The judges and referees will choose 3 finalists who will be making presentation at a workshop on May 8, 2014. The winner will be selected at the workshop. The winner will be given the chance to choose sub-contractors from the other university teams to build a subsystem(s). Thus all teams will be making a presentation on May 8$^{th}$.

Air Force's University Nanosatellite Program
The University of Florida's proposal "Precision Time Transfer with CubeSats" was recently selected for the Air Force's University Nanosatellite Program (UNP) for 2013-2014. The UNP is a student-led competition (undergrad and grad) that has two distinct

stages. The first stage is a nanosat design and protoflight build phase, which lasts approximately two years and culminates in the AIAA Student Satellite Flight Competition Review (FCR). During this first phase universities construct a protoflight nanosat while participating in various design reviews and program-sponsored hands-on activities and workshops throughout the two-year period. All universities are evaluated based on several criteria, including Student Participation/Education, Technical Relevance/Excellency, and Flyability.

The second stage of the Program begins after one (or two) university's nanosat is selected for flight integration and test via the FCR. The university-built nanosat is expected to be flight-ready and delivered to AFRL following the FCR. This second phase consists of integration with a separation system and environmental test of the protoflight nanosat in the months following FCR and culminates in a potential launch opportunity.

The UF mission will fly a Chip Scale Atomic Clock on board a CubeSat and use precisely timed laser pulses from the ground to track the timing discrepancy of the orbiting clock and a similar clock on the ground. This nanosat demonstration will enable future low-cost navigation systems, communications and authentication schemes, as well as fundamental physics experiments. The team is composed of 2 students

LISA Symposium

LISA Symposia are held every two years starting in 1996 to discuss the science, mission designs and prospects and the advances and challenges in data analysis and technology for Laser Interferometric Space Antenna (LISA)-type future space missions.
LISA-type space missions have the goal to measure for the first time gravitational waves in the 10 μHz to 1 Hz frequency range. In the last decade, LISA-proper was a joint NASA/ESA space mission. NASA's financial constrains made this joint mission impossible in this decade and ESA and NASA ended their collaboration in 2011. Since then, the European eLISA Consortium has proposed a smaller mission, eLISA, for L2, the next large mission opportunity in Europe. In the US, the Gravitational Wave Science Analysis Group (GW-SAG), chaired by Guido Mueller (University of Florida), and the former LISA project teams at GSFC and JPL, work with NASA HQ and their European colleagues on a potential US contribution to eLISA and, in parallel, on a potential submission for the next decadal review process in the US. The 2014 LISA Symposium will be critical for the community; it is likely the last symposium before the launch of LPF and the last one to gather the entire interested scientific community before the requirements for eLISA will be finalized and both space agencies will start detailed discussions about a potential collaboration on eLISA. The University of Florida and with it, the State of Florida, are in a very strong position to play a leading role in the US in eLISA. Hosting this symposium is a manifestation of this role. FSGC is one of the sponsors of this symposium. The funds will be used to pay the registration costs of US students. The 10$^{th}$ LISA Symposium will be hosted by the University of Florida from May 18-25, 2014. So far 155 participants have registered for the symposium

***SMART Objective*** – On an annual basis, involve at least 100 students, representing a minimum of five Florida-based higher education institutions, including at least one minority serving institution, in collaborative space-based interactive learning experiences. 345 students from 13 universities, including 1 Hispanic serving institution and 1 HBCU are participating in Higher Education Projects. Among the participating students are 59 women and 84 under-represented minorities.

**Research Infrastructure**

Florida Space Research Program: In 2013, FSGC has funded 13 space research and education grants under the Florida Space Research Program (FSRP) totaling of $265K which includes $100K from Space Florida. Matching funds totaled $307K. The FSRP combines both Federal and State funds for projects that diversify Florida's space industry and research efforts, while also supporting aerospace workforce development statewide. The program is comprised of three categories – The Space Education & Training Program, Space Exploration & Spaceport Technical Development, and Space-Based Research and Payload Development. The State of Florida and Space Florida have been significant contributors to the Florida Space Research Program for five years. The FSRP 2013 awardees include 9 Florida universities: the University of Florida, University of Central Florida, Florida Institute of Technology, Bethune-Cookman University, University of South Florida, University of North Florida, University of Miami, Embry-Riddle Aeronautical University and Florida Gulf Coast University. A total of 34 proposals were received. Each submission was independently evaluated by a team of experienced professionals from Kennedy Space Center and other universities and NASA centers. In 2013, 8 students were directly funded through research grants. 2 students were under-represented minorities and 2 female students. Please note that some of the awards were made a month ago as we did not receive our matching funds from Space Florida until the beginning of this year. We will have all the required information before the OEPM submission date

**SMART Objective** – On an annual basis, at least 12 research projects will be competitively awarded. At least three of these research project awards will be awarded to a minority serving institution and/or include minority participation. At least 12 undergraduate or graduate students will be supported by the projects, including at least 5 women and 4 under-represented minorities

14 awards were made to 9 universities involving 8 undergraduate and graduate students. 2 students were under-represented minorities and 2 female students.(incomplete data and will be updated by end of May.)

**Outcome 2:** Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty: (Discussion of achievements primarily focused on your Higher Education programs not discussed in Outcome 1 and your Precollege programs). (Educate and Engage)

## Pre-college

### 2014 Florida Engineering Education Conference (FEEC)

For the past seven years, the University of Central Florida via its College of Engineering and Computer Science (CECS) has hosted the Florida Engineering Education Conference (FEEC). This event is one of the only "engineering education" conferences of its kind in Florida. Working with the conference partners, the goals continue to be to highlight the importance of pre-college engineering education in Florida, to showcase successful formal and informal pre-college engineering education programs and share the information with STEM educators and administrators. The conference also provides a venue for the conference partners (comprised of industry, government and professional organizations) to present and showcase what they are doing in the field of engineering. This enables them to link engineering relevance to formal and informal STEM curricula.

The 2014 conference, that will be held on April 25, 2014 will remain a single day event with the agenda addressing "Biomedical and Bio-engineering education". There will three panel presentations and three workshops in the afternoon. The panel presentations will include:

- Session One: Engineering Education: An overview from Industry Partners regarding the importance of STEM to the Future Workforce
- Session Two: Integrating medical and health science and engineering into the K12 classroom: An elementary, middle and high school perspective.
- Session Three: Informal science and engineering programs offered by Industry Partners and community organizations

The 2014 FEEC keynote speakers include the 2013-14 FES President, Glenn Forrest and his co-presenter will be Ken Church, President and CEO nScrypt, a locally based engineering company. The 2014 conference partners will include the Florida Engineering Foundation, Harris Corporation, the Florida Space Grant Consortium, and the Central Florida STEM Education Council. As of March 26, 2014 96 teachers had registered for the workshop

**Girls in Engineering, Math and Science (GEMS):** In its seventh year, Girls in Engineering, Math and Science (GEMS) was launched in 2006 to address our nation's shortage of women professionals in the fields of math, science and engineering. The GEMS program provides 6th, 7th, and 8th grade girls from public schools the opportunity to participate in STEM related activities on the Florida Gulf Coast University (FGCU) campus. GEMS provides creative hands-on science workshops for middle school female students from Lee and Collier counties. This year Dr. Zanna Beharry from FGCU, was awarded a grant from NASA Florida Space Grant Consortium to conduct 3 workshops. One workshop was held on March 26, 2013, the other 2 will be held on April 26$^{th}$ and September 13$^{th}$. For the March26th workshop, the activities held were (i) Building and testing different paper rocket designs, (II) Constructing and testing a robotic arm and (iii) Creating a UV detector. There were a total of 4 faculty and 16 undergraduate students involved in hosting the March event. 75 middle school girls participated in the workshop

**Teach the Teacher, Stimulate the Student**:
This project provides three, eight-hour professional development workshops for twelve middle school teachers, curriculum and equipment kits for classroom instruction and an opportunity for the students of the teachers attending the workshops to demonstrate their knowledge and excitement for space exploration by conducting a simulated NASA space mission at the Challenger Learning Center (CLC). The workshops and kits are to increase teachers' content knowledge regarding space exploration, physical and earth/space science. The purpose of the simulated NASA space mission is for students to participate and immerse themselves in simulated future NASA space missions. Curriculum, activities and teaching kits will use NASA education resources and be compiled and taught by CLC educators.

The goal of this program is to increase STEM content knowledge of pedagogically strong teachers so that they can inspire their students to pursue higher education and careers in the STEM subject areas. In order to accomplish this task for their students, these teachers must have a working knowledge of current and future space missions, science principles behind the missions, tools and resources to provide these lessons to their students, as well as a platform to engage student imagination and excitement of their students.

**SMART Objective** – On an annual basis, conduct and/or facilitate space-related pre-service and in-service teacher training opportunities focused on space-related math and/or science curricula. A minimum of 50 Florida teachers per year will attend this training. So far, 4 faculty, 16 undergraduate students, 75 middle school girls and 12 middle school teachers have been involved in pre-college projects. In addition, 96 teachers and administrators have registered for the Eighth Annual Florida Engineering Education Conference to be held on April 25.

**Outcome 3:** Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission: (Achievements and progress of Informal Education programs). (Engage and Inspire)

**Student Spaceflight Experiments Program**
Hillsborough County Public Schools (HCPS) are one of 15 communities participating in the Student Spaceflight Experiments Program (SSEP) Mission 5 to the International Space Station (ISS). The Student Spaceflight Experiments Program (SSEP) was launched in June 2010 by the National Center for Earth and Space Science Education in strategic partnership with NanoRacks, LLC. It is a remarkable U.S. national Science, Technology, Engineering, and Mathematics (STEM) education initiative that gives typically 300+ students across a community – upper elementary, middle, or high school students (grades 5-12), or undergraduates at 2-year or 4-year colleges and universities (grades 13-16) – the ability to design and propose real microgravity experiments to fly in low Earth orbit, first aboard the final flights of the Space Shuttle, and then on the International Space Station (ISS)—America's newest national laboratory.

825 5th grade students were involved in real microgravity experiment design and proposal writing. A total of 221 proposals were submitted by the students. 3 finalists were chosen and their proposals were submitted to SSEP. The experiment selected for flight was submitted by 3 students from FishHawk Creek Elementary titled "How many seeds will germinate in microgravity vs. on Earth?" In addition, for their Mission Patch Art and Design Competitions (one at grades K-2 and another at 3-5) 652 patch designs were received, one chosen to fly with experiment from each of the two patch competitions.

Florida-Spain Small Satellites Educational Program

This project will allow high school students and teachers from Spain and Florida to interact on hands-on engineering projects that will be launched from Florida to an altitude of 100,000 feet. This joint program between Satlantis, NASA Florida Space Grant Consortium, University of Florida and Telefonica will allow future young scientists and engineers to be involved in projects that will make use of the creative talents of the students. The cultural exchange of this international program combined with the educational knowledge in state-of-the-art space technology makes this program very unique. Telefonica is providing the funding for the Spain students and the funding for the development of the curriculum and lesson plans. FSGC is providing the funding for the Florida students. The Project involves a three-stage process that will introduce joint teams of high school students of 15 to 16 years old in Spain and Florida and their teachers to the small satellite technology, and will culminate with a prestigious Summer School in Florida. Each team will comprise of 3 high school students from Florida and 3 high school students from Spain. There are 5 teams in this pilot program. The students will design their payloads and submit their designs to FSGC. The winning team will then meet at the University of Florida and the Center for Space Education at the Kennedy Space Center Visitor Complex in July for a 2 week summer school and will build and integrate the payload for launch in a weather balloon

15 students from Eastside High School and Bucholtz High school in Gainesville are participating in the projects. In addition, 15 students from Spain have teamed up with the Florida students

**SMART Objective** - On an annual basis, collaborate with Florida museums and/or science centers to facilitate/conduct engaging space-related learning events held in public venues. A minimum of two events per year will be held. At least 200 members of the public will attend one or more of these events per year. *This year, FSGC supported 2 events targeting middle and high school students. A total of 840 students participated in the 2 events.*

## PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Number of program student participants employed by NASA, aerospace contractors, universities, and other educational institutions; Number of undergraduate students who move on to advanced education

in NASA-related disciplines; Number of underrepresented and underserved students participating.

Student Data and Longitudinal Tracking: Total awards = 44; Fellowship/Scholarship = 36, Higher Education/Research Infrastructure = 8; 26 of the total award represent underrepresented minority F/S funding. During the FY13 program year 7 students are pursuing advanced degrees in STEM disciplines, 1 is seeking a STEM position, 13 accepted STEM positions at NASA contractors, 12 accepted STEM positions in industry, 1 accepted a position at NASA, 1 accepted a STEM position in K-12 academia, 4 accepted STEM positions in academia, and 16 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing while the received their Space Grant award.

- **Minority-Serving Institution Collaborations:** Summarize interactions. Reference the names of projects with MSI collaborations.

We are continuing our partnership with Bethune Cookman University in partly sponsoring their scholarship program. A total of 23 students are partially supported by FSGC with the rest of the scholarship funding coming from Bethune Cookman. The students are majoring in Biology, Chemistry, Mathematics, and Computer Engineering. We are also supporting Dr, Valentina David on a project titled :Physics: Promoting Understanding of all Disciplines". The goal is to provide assistance to physical sciences, general physics, and chemistry students to develop and enhance physics problem solving skills. 2 students are awarded funds as tutors. In addition, we are supporting 1 faculty from Bethune Cookman on a $25,000 research project titled "HICO Satellite Data Model for Seagrass Mapping in Indian River Lagoon, FL. This award was under our Florida Space Research program and was competitively selected from a pool of 36 proposals. Dr. Poorandi, also from Bethune-Cookman University was awarded a grant for a project titled "Strengthening Bethune Cookman students understanding of mathematics leading to increased enrollment and retention in STEM disciplines". This involves tutoring students in the Mathematics Tutoring Lab and supporting the Student Chapter of the Mathematical Association of America.

We are supporting 4 senior design projects at the Florida International University. The advisors are Dr. Pala and Dr. Ibrahim Tansel. The projects are

(i) Android Mobile Device Controlled Compact Potentiostat for a Portable and Affordable Biosensor Platform
(ii) Multi-Purpose UAV
(iii) AUVSI SUAS Seafarer Competition - UAV Platform
(iv) Unmanned Aerial Vehicle With Fire Extinguishing Grenade Release and Inspection System

Finally, we are sponsoring a joint team from Florida Agricultural and Mechanical University and Florida State University on a project under the NASA/RASC-AL ROBO-OPS Student Competition. The NASA/RASC-AL Robo-Ops Project Team consists of three senior Mechanical and two senior Electrical Engineering students at

the Florida State University and Florida A & M University interested in robotics. Robo-Ops is an annual competition hosted by NASA and organized by the National Institute of Aerospace. The competition is scheduled to be held in June 2014, where undergraduate and graduate students are invited to produce a planetary rover prototype and demonstrate its capabilities to perform a series of competitive tasks during field tests at the NASA Johnson Space Center's Rock Yard while being operated from the schools home campus

- **NASA Education Priorities:** Accomplishments related to the "Current Areas of Emphasis" stated in the 2010 Space Grant solicitation. Report on areas that apply to work proposed in your proposal and budget.

  - Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.

    FSGC conducts a couple of programs involving hands-on student participation. One is the Hybrid Rocket Competition where students design and build hybrid rockets over 2 semesters and then launch their rockets in a competition at the end of the spring semester.13 teams from 9 universities are participating in this year's competition. The other design competition managed by FSGC is the Florida University nanosatellite design competition.94 students representing 10 teams from 8 universities are designing a cubesat with a final design to be selected in May. In addition, FSGC supports senior design projects in Florida universities and partly sponsors student teams to NASA competition like Robotic Mining and Student Launch Initiative. FSGC is also partially supporting the team from University of Florida that was selected to participate in this year's Airforce Nano satellite Design Competition

  - Diversity of institutions, faculty, and student participants (gender, underrepresented, underserved).

    FSGC has been directly supporting 44 students from 8 institutions, including 1 HBCU. Among the students are 28 women and 29 under-represented minorities. 20 university faculty (6 women and 2 under-represented minorities) are involved in these projects involving directly funded students. In addition, 345 students from 13 universities, including 1 Hispanic serving institution and 1 HBCU, are participating in Higher Education Projects. Among the participating students are 59 women and 84 under-represented minorities.

  - Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise.

Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines (see above).

The Challenger Center in Tallahassee is conducting 3 professional development workshops for middle school teachers from Title 1 schools. The topics are "Space Program: Past, Present, and Future", "Physical Science Concepts related to the Space industry", and "Earth Science concepts related to the Space Industry". 12 middle school teachers are participating in these workshops which include the development of curriculum and equipment kits for classroom instruction and an opportunity for the students to demonstrate their new knowledge and excitement for space exploration by conducting a simulated NASA space mission at the Challenger Learning Center (CLC).

- Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.

Florida-Spain Small Satellites Educational Program: This project will allow high school students and teachers from Spain and Florida to interact on hands-on engineering projects that will be launched from Florida to an altitude of 100,000 feet. This joint program between Satlantis, NASA Florida Space Grant Consortium, University of Florida and Telefonica will allow future young scientists and engineers to be involved in projects that will make use of the creative talents of the students. The cultural exchange of this international program combined with the educational knowledge in state-of-the-art space technology makes this program very unique. Telefonica is providing the funding for the Spain students and the funding for the development of the curriculum and lesson plans. FSGC is providing the funding for the Florida students. The Project involves a three-stage process that will introduce joint teams of high school students of 15 to 16 years old in Spain and Florida and their teachers to the small satellite technology, and will culminate with a prestigious Summer School in Florida. Each team will comprise of 3 high school students from Florida and 3 high school students from Spain. There are 5 teams in this pilot program. The students will design their payloads and submit their designs to FSGC. The winning team will then meet at the University of Florida and the Center for Space Education at the Kennedy Space Center Visitor Complex in July for a 2 week summer school and will build and integrate the payload for launch in a weather balloon

15 students from Eastside High School and Bucholtz High school in Gainesville are participating in the projects. In addition, 15 students from Spain have teamed up with the Florida students

Girls in Engineering, Math and Science (GEMS): In its seventh year, Girls in Engineering, Math and Science (GEMS) was launched in 2006 to address our nation's shortage of women professionals in the fields of math, science and engineering. The GEMS program provides 6th, 7th, and 8th grade girls from public schools the opportunity to participate in STEM related activities on the

Florida Gulf Coast University (FGCU) campus. GEMS provides creative hands-on science workshops for middle school female students from Lee and Collier counties. This year Dr. Zanna Beharry from FGCU, was awarded a grant from NASA Florida Space Grant Consortium to conduct 3 workshops. One workshop was held on March 26, 2013, the other 2 will be held on April 26th and September 13th. For the March26th workshop, the activities held were (i) Building and testing different paper rocket designs, (II) Constructing and testing a robotic arm and (iii) Creating a UV detector. There were a total of 4 faculty and 16 undergraduate students involved in hosting the March event. 75 middle school girls participated in the workshop

- Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.
  Most of the community colleges in Florida have been converted 2 4 year colleges. From an original list of 22 colleges, only 4 are community college. We have relationship with 3 community colleges which have now become 4 year colleges. Brevard Community College has become Eastern Florida State College, Santa Fe Community College has become Santa Fe College and Boward Community College has become Broward College. Broward College and Eastern Florida State College are our affiliates.

- Enhance the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.
  FSGC has a research program called Florida Space Research Program whose main objective is to provide seed funding to faculty to conduct research in their institution so that they are able to use the results to get further funding from other sources. The projects have to be aligned with NASA's priorities (included in the Request for Proposal). This program is co-sponsored by Space Florida (quasi state government entity). In FY2013, we supported 13 projects in 9 universities

## IMPROVEMENTS MADE IN THE PAST YEAR

One major improvement last year was the restructuring of our satellite design competition. Initially, the design competition was a 1 year competition. This year we changed it to a 2 year competition and structured it in such a way that the winning team has to work with 2 or 3 other universities in building the satellite. We wanted some of the universities without an aerospace department to be a part of the competition. As a result of the changes, this year we have 10 teams representing 8 universities taking part in the competition. In previous years we never had more than 4 teams. We also made an effort to work closely with the non-research schools and universities without aerospace

departments. As a result, we have had 119 students in 13 teams from 9 universities taking part in our Hybrid Rocket Competition

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

List the institutions that comprise the consortium; include the name, type of institution, key characteristics, and role.

Listed below are all of FSGC's affiliates. Funds are not provided directly to affiliates for implementation of programs. FSGC awards are all competitive and awards are given to the respective PI's in their institution. The affiliate institution is responsible for sending final reports and all other relevant documentation to the FSGC offices. The only roles the affiliates have is to ensure that information from the FSGC office is being sent to all interested faculty and students and to ensure timely technical and financial reports to the FSGC office. In addition, the FSGC advisory Board, comprising of representatives from all 21 affiliates meet twice a year to approve the budget and FSGC programs.

**Bethune-Cookman University** (4-year college awarding exclusively baccalaureate degrees): Bethune-Cookman University is a historically Black, United Methodist Church-related college offering baccalaureate degrees.

**Broward College** (4-year college Bachelor of Science degrees in addition to their 2-year degree programs) Broward College is a Hispanic serving institute. Broward College offers Associate & Bachelor degrees & certificate programs at many locations in the Greater Fort Lauderdale /Broward County community. Specialized programs include online degrees, Health Sciences and Continuing Education.

**Embry-Riddle Aeronautical University** (University awarding baccalaureate and master's degrees): Embry-Riddle Aeronautical University, a private university, teaches the science, practice, and business of the world of aviation and aerospace.

**Eckerd College** (4-year college awarding exclusively baccalaureate degrees): Eckerd College is a private, coeducational college of liberal arts and sciences. Eckerd College is one of only 40 schools listed in Loren Pope's Colleges That Change Lives. In 2003, Eckerd was named one of 13 Institutions of Excellence in the First College Year by the Policy Center on the First Year of College. Eckerd College is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the Bachelor of Arts and Bachelor of Science degrees.

**Florida Atlantic University** (University awarding degrees up through the Ph.D.): Florida Atlantic University is the first public university in southeast Florida and the first in America designed for upper division students only. FAU is earning a reputation as a top research institution in areas ranging from biomedicine and biotechnology to ocean engineering and coastline security.

**Brevard Community College** (Community/Junior College awarding associate degrees): Situated on Florida's Space Coast, BCC has four integrated campuses – in Cocoa,

Melbourne, Palm Bay and Titusville – an aerospace program at the Kennedy Space Center and a Virtual campus. An accredited institution, BCC is recognized as one of America's leading community colleges for quality in instruction, organization, and its innovative and leading-edge programs. It was one of the first community colleges in the country to offer the AA degree online.

**Florida Gulf Coast University** (4-year college awarding baccalaureate and graduate degrees): FGCU, a member of the State University System of Florida, is a comprehensive university created to address the educational needs of the rapidly growing Southwest Florida population. Florida Gulf Coast University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award associate, baccalaureate, master's, and doctoral degrees. In addition, the university is actively seeking accreditation for the undergraduate engineering programs in the U.A. Whitaker School of Engineering, its Bachelor of Science in Social Work, its Bachelor of Science in Resort and Hospitality Management, and its Bachelor of Science in Clinical Laboratory Science.

**Florida Institute of Technology** (University awarding degrees up through the Ph.D.): Florida Institute of Technology is an independent technological university that provides quality education, furthers knowledge through basic and applied research, and serves the diverse needs of our local, state, national and international constituencies. FIT is the only independent, technological university in the Southeast, A Barron's Guide "Best Buy" in College Education, listed among America's best colleges in U.S. News & World Report and named one of the nation's top 13 technological institutions in the Fiske Guide to Colleges.

**Florida International University** (University awarding baccalaureate and master's degrees, Hispanic Serving Institute): Florida International University is Miami-Dade County's first public, four-year university. FIU is ranked first in the nation among four-year colleges for awarding bachelor's and master's degrees to Hispanic students in the 2008 survey conducted by the Hispanic Outlook in Higher Education Magazine. FIU is the youngest university to have been awarded a chapter of Phi Beta Kappa, the nation's oldest and most distinguished academic honor society.

**Florida State University** (University awarding degrees up through the Ph.D.): Florida State University's 16 colleges offer more than 300 undergraduate, graduate, doctoral, professional and specialist degree programs, including medicine and law, covering a vast array of disciplines critical to society today. FSU is a comprehensive, residential and coeducational institution of over 33,000 students located in Tallahassee, Florida.

**Florida A&M University** (University awarding degrees up through the Ph.D.; Historically Black College or University). Florida A&M University offers 108 undergraduate degrees in 64 undergraduate programs and 60 graduate degrees in 32 graduate programs (includes 1 professional and 7 doctoral degrees) within its 12 Schools and Colleges. The doctor of philosophy is offered in the College of Pharmacy and Pharmaceutical Sciences, College of Education and FAMU/FSU College of Engineering.

**University of Central Florida – Lead University**: (University awarding degrees up through the Ph.D.). UCF has 12 colleges, including the newly established College of Medicine, and College of Graduate Studies. More than 50,000 students attend classes on UCF's main campus and its 11 regional campuses located throughout Central Florida. UCF offers 223 degree programs, it has become an academic and research leader in numerous fields, such as optics, modeling and simulation, engineering and computer science, business administration, education, science, hospitality management and digital media

**University of Florida**: (University awarding degrees up through the Ph.D.): The University of Florida is a major, public, comprehensive, land-grant, research university. The state's oldest, largest and most comprehensive university, Florida is among the nation's most academically diverse public universities. With more than 51,000 students, Florida is now one of the five largest universities in the nation. It is one of only 17 public, land-grant universities that belongs to the Association of American Universities.

**University of Miami** (University awarding degrees up through the Ph.D.): The University of Miami is the largest, most comprehensive private research university in the southeastern United States with a well-earned reputation for academic excellence. Nearly 15,000 undergraduate and graduate students from every state and more than 140 nations around the world call UM home during the academic semester. With more than 9,400 full- and part-time faculty and staff, UM is the second largest private employer in Miami-Dade County. The University's 12 colleges and schools, along with the Division of Continuing and International Education, offer 114 bachelor's, 104 master's, 57 doctoral and four professional areas of study.

**University of North Florida**: (University awarding baccalaureate and master's degrees): The University of North Florida is a comprehensive public urban university whose mission is to educate students through a broad array of undergraduate and select graduate programs. UNF cultivates a learning environment that supports intellectual curiosity, academic achievement, and personal growth. This goal is supported by a strong academic curriculum comprised of 56 undergraduate, 27 masters, and 3 doctoral degree programs in the liberal arts and professional fields.

**University of South Florida**: (University awarding degrees up through the Ph.D.): The University of South Florida is the second largest university in the southeast and among the top 20 largest in the nation. It is one of the nation's top 63 public research universities and one of 39 community engaged public universities as designated by the Carnegie Foundation for the Advancement of Teaching. The University offers 219 degree programs at the undergraduate, graduate, specialist and doctoral levels, including the doctor of medicine.

**University of West Florida:** (University awarding baccalaureate and master's degrees): UWF is a member of the State University System of Florida. The university offers undergraduate degrees in 50 different areas with 107 specializations, master's degrees in 24 different areas with 56 specializations, two specialist degrees and a doctorate in education with seven specializations. Long celebrated for its caring, nurturing approach to helping

**Astronauts Memorial Foundation** (Private 501(c)(3) not-for-profit organization): The Astronauts Memorial Foundation honors and memorializes those astronauts who have sacrificed their lives for the nation and the space program by sponsoring the national Space Mirror Memorial, and by implementing innovative educational technology programs. AMF is a private, not-for-profit organization approved by NASA to build and maintain two major facilities at the John F. Kennedy Space Center's Visitor Complex.

**Kennedy Space Center** (Federal Center): KSC is the NASA center of excellence for launch and payload processing systems as well as the lead center for acquisition and management of expendable launch vehicle services and payload carriers. Located at the Cape Canaveral Spaceport in Florida, KSC handles the checkout, launch and landing of the Space Shuttle and its payloads.

**Orlando Science Center** (Science Museum): Orlando Science Center offers hands-on fun for all ages through engaging interactive exhibits, live programming, giant-screen films, school field trips and school-break camps. The science Center conducts the Informal Science program for FSGC

**Space Florida** (State/Local Government): Space Florida is the public-private partnership responsible for promoting and developing Florida's aerospace industry. Space Florida was created by the Florida Legislature to sustain Florida's position as the global space leader. As declared in its mission statement, Space Florida drives State economic development across the global aerospace enterprise. Space Florida provides $100K for the FSGC research program and $10K for the internship program at the Space Life Sciences Lab

**The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.**