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## Program Description

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Texas Space Grant Consortium is a Designated Consortium funded at a level of \$730,000 for fiscal year 2008.

## Program Goals

Our first goal is to increase the participation of Texas minorities and underserved populations in consortium activities (consortium operation, scholarships, fellowships, competitive programs, etc.). Our minority involvement efforts are coordinated through our Minority Serving Institutions Activities Council (MSIAC) [Outcome 1]. Our second goal is to fairly distribute scholarships and fellowships among our 36 academic members and to effectively track recipients of these awards along with participants in our other programs [Outcome 1]. Our third goal is to conduct an effective consortium-wide STEM workforce development program and to cooperate in the development of courses that enhance STEM workforce preparation [Outcomes 1,2]. Our fourth goal is support smaller higher education enhancement programs and to support student flight opportunities [Outcomes 1,2]. Our fifth goal is to support small faculty research initiation grants for the development of research expertise by consortium affiliate faculty in areas that support NASA's technical objectives [Outcomes 1,2]. Our sixth goal is to (1) continue our partnership with JSC in the operation of an annual workshop that provides K-12 teachers with standards-coordinated space-related curricula, and (2) to support small grants for affiliates to work with local K-12 schools in the development of STEM and space related curriculum enhancements. [Outcomes 1,2]. Our seventh goal is to create awareness of Space Grant successes through the development and dissemination of "success stories", asking award recipients to write "thank you" letters to members of Congress, and through the NASA Means Business Program [Outcomes 1,3]. Our eighth and final goal is to run an efficient consortium, adding affiliates as appropriate, collaborating and leveraging when possible. [Outcomes 1, 2, 3].

## Program / Project Benefit / Anecdotes

Outcome 1: The benefit of our Fellowships & Scholarships program to NASA's outcomes:

*“As a resident in UTMB's combined aerospace/internal medicine program, I have been able to participate in several NASA research studies and perform clinical duties geared towards becoming a flight surgeon.” (Charles Mathers, 2005 TSGC Scholarship Program-UTMB Galveston)*

*“Since graduating with my undergraduate degree in 2006, I have been employed in the Automatic Flight Control Design group within the Bell Helicopter Engineering Department in Hurst, Texas. During that time, I completed the Masters degree which was also sponsored by the Texas Space Grant Consortium. I have participated in autopilot troubleshooting, flight testing, and design for the UH-1Y, AH-1Z, and new commercial model 429 helicopters. I have most recently been involved in the 429 AFCS certification effort and have seen through to completion several upgrades to the H-1 autopilot system.” (Jayme Tucker, 2006 TSGC Graduate Fellowship Program-University of Texas, Arlington, 2007-2008 TSGC Fellowship-UT Arlington)*

Our Higher Education Workforce programs are designed to enhance student understanding and appreciation of the benefits of space exploration and space based research. The Design Challenge program, in particular, partners with the Exploration Systems Mission Directorate in offering Texas based teams an opportunity for involvement in a real-world NASA project experience. Student and faculty Advisor enthusiasm continues.

*“Thanks so much for the opportunity to comment/evaluate the TSGC Design Challenge Program. The program is fantastic - in general all parts of it are positive and extremely beneficial for the students involved. Strong projects that meet our criteria result in excellent opportunities for our students to learn the process of design from initial concept to final device in a way that truly engages them.” Oshman Kitchen, Rice University.”*

Outcome 2: Our K-12 main goal is to attract and retain STEM disciplines through educational opportunities for students, teachers and faculty. Our LiftOff Professional Development Institute continues to be TSGC’s flagship in-service K-12 teacher development program.

*“This experience not only impacted my class, and the entire 5<sup>th</sup> grade, it impacted our entire school. Teachers and students alike are interested in what we are doing. A 2<sup>nd</sup> grade participates in LiftOff 2008 activities with my class. This learning experience will impact our parents at our Lunar Night we plan to host in February which will showcase what the students have learned about the moon, technology, NASA and moon travel, as well as the Mars Mission.” LiftOff 2008 Evaluation Comment.*

## 2008 Program Accomplishments

Outcome 1- Fellowship and Scholarship Program: In 2008-2009, we awarded \$207,202 dollars in student Scholarship funds including \$10,500 for NASA Academy students. However \$30,000 was not able to be paid because students received other fully funded Federal fellowships.

In 2008, we had 71 significantly funded (equal or greater than \$500.00) F&S students from 26 affiliates. In addition we funded 16 students with small program Scholarships (Design Challenge, Reduced Gravity Flights). Of that 87 total, 28 were females and 59 were males and 23 were minorities. Out of the 23 total minority students, 16 were males and 7 were females. The percentage of students whom have taken their “next step in STEM” and have been successfully tracked though their next step after their last year of SG support was 100% for the last 3 years.

Higher Education Program: In 2008-2009, we awarded three higher education proposals at \$15K each. They are: 1) Texas State University San Marcos, “Redesign Development of Undergraduate Astronomy Laboratory Course.” 2) Lamar University, “Space Radiation Effects

on Technology and Human Biology and Proper Mitigation Techniques." 3) Rice University, "Undergraduate Summer Research Program in Nanotechnology".

In 2008 we also supported the NASA Johnson Space Center's Reduced Gravity Student Flight Program. For 2008, this program hosted seven flight teams from 3 universities (Lamar University, Texas A&M University and University of Texas at Austin) that are members of the Texas Space Grant Consortium. Of the seven flight teams, 5 received financial support from the Texas Space Grant Consortium in the total amount of \$8,500 (as reported by the student team leads).

Research Program: New Investigator Program (NIP), is designed to assist in professional development of faculty members or researchers who strive to begin a career in research. In 2008-2009, we awarded 4 new NIP proposals at \$10K each. They are: 1) University of Texas at Dallas, "New Tests for Cosmic Acceleration: Dark Energy or Modification to Gravity at Cosmological Scales?" 2) Lamar University, "Effect of Shape Irregularity of Lunar Dust on its Migration and Control inside Multi-Scale Confined Space" 3.) Texas A&M University "Validation of a spatial-constraint optimization model for oceanic Hyperspectral remote-sensing inversion in Case 2 coastal waters" 4) University of Texas at Arlington, "Exploiting Conformal Wireless Patch Antenna for Integrated Vehicle Health Monitoring (IVHM)."

Workforce Development: Our Design Challenge program, partnered with NASA JSC continues to be highly successful. 83 students participated in 2008. Out of the 83 total 60 were male, 23 were female and 26 were minorities. Individual student participation in this program averages greater than 160 hours.

EPO Outreach activities undertaken by Design Challenge teams promote STEM studies and promote both NASA and TSGC student opportunities.

One longtime Design Challenge NASA/JSC mentor was awarded a NASA Administrator Fellowship, and is assigned at the University of San Antonio, MSI.

Outcome 2 – K-12: Liftoff 2008's theme was "Space Travel – Out of This World" It was a seamless journey through the past, into the present, and touching on the future of NASA's space exploration program. There were 44 Teachers selected to attend. Out of the 44 that were selected, 10% were from NASA Explorer Schools, 20% were from underrepresented areas, and 25% teach in underserved areas of the state. Liftoff continues to be rated as the best professional development workshop participants have ever attended. 98% of those attending rated it as excellent. 6 months after Liftoff, the 44 participants reported they have used materials with almost 5300 students and have trained over 1700 additional teachers how to utilize the materials. Also, in 2008 we awarded three K-12 proposals at \$15K each.

Outcome 3 – Outreach / General Public: In 2008, We hosted Ten K-12 professional development workshops excluding Liftoff.

## Program Contributions To Part Measures

*Longitudinal Tracking:* For those students that were significantly supported from FY 08 funds, all 71 of them have not yet received the degree that they were pursuing while they received their Space Grant award.

For all students that were significantly supported in the period spanning FY06-FY08, 13 students graduated and are pursuing advanced STEM degrees, 7 students are working for NASA contractors, 7 students accepted STEM positions in industry, 1 is working at a NASA center, 1 is working in a STEM position at a K-12 academic institution, 4 are working in STEM positions at non-K-12 academic institutions, and 2 are working in non STEM fields. The remaining students have not yet received the degree that they were pursuing while they received their Space Grant award.

*Course Development:* In 2007-2008, Texas Space Grant has sponsored or participated in the development of 5 courses at its member campuses. These are: 1) Texas State University San Marcos - "Redesign Development of Undergraduate Astronomy Laboratory Course." 2) Lamar University - "Space Radiation Effects on Technology and Human Biology and Proper Mitigation Techniques." 3) Texas State University San Marcos - "Correlated Space Science & Math." 4) U of Texas at Austin - "Space Exploration." 5) U of Texas at Austin, - "Systems Engineering Design." 6). UT El Paso, "Design Challenge MSI Pilot Course. In addition to new courses, features from the Design Challenge program have been incorporated into courses at Rice University, Texas A&M, and Lamar.

*Matching Funds:* In 2008 we received a total of \$555,480 matching funds from our membership dues and our in-kind support from our affiliate members. This match comes in part from membership cash annual dues, in-kind support letters and awarded proposal match from varying institutions. Additionally, we received \$105,000 in matching funds to support Liftoff Summer Institute.

*Minority-Serving Institutions:* Texas Space Grant has 12 Minority Serving Institutions (MSIs) among its 35 academic members. We have a Minority Serving Institutions Activities Council (MSIAC) made up of representatives from our 12 MSIs to help us identify additional ways to attract / involve minority students and MSI faculty in consortium activities. Representatives from our MSIs make up 2/3 of our Fellowship & Scholarship selection committee. Minority students received 25% of our Fellowship and Scholarship awards (23 out of 87) and students from Nine MSIs received awards (See Table A.2). MSI representatives serve on all of our proposal review committees for our New Investigator Program, our Higher Education AO, and our K-12 AO. Our upcoming spring business meeting will be on an MSI campus, U of Houston - Downtown and other MSIs have hosted in the past. We also seek valuable help from our MSIs to provide meaningful feedback on current projects, and planning for future programs.

## Improvements Made in the Past Year

*Workforce Development Program:* During the past year, Johnson Space Center's involvement increased substantively in the Design Challenge Program. Personnel from the Education Office, ISS and other areas served as day-long judges at the Design Challenge Showcase. Dr. Kam Lulla from the JSC Education Office helped secure additional mentors and projects. Bruce Luna,

on assignment to TSGC from the ISS Office, made connections on the behalf of the program that resulted in new volunteer judges and insider student tour of NASA facilities.

Two new Design Challenge student awards were implemented this past year. (1) A Scholarship Award to the Top Design Team and a Design Challenge Forum Favorite award were implemented. The Scholarship Award was provided by Baker Hughes International.

K-12: Six teachers were selected competitively and flew two experiments from Challenger's Lost Lessons. These lessons were found in NASA archives and would have been conducted by Christa McAuliffe had her flight been successful. The teachers, who received continuing education credit, actively engaged students and teachers across the nation in student and teacher patch design contests, lesson plan development, engineering cad drawings, and experiment updates. A website was developed by another LiftOff Alumni teacher to follow the mission, along with pod-casts, videos, and photos. 1,500 lesson plans have been distributed to educators for their use in the classroom.

Consortium Operations: TSGC improvements and/or adjustments made in 2008 include: Tarleton State University and University of Dallas are 2 new consortium members. We have hired an undergraduate student assistant and a graduate student to help with various projects. In 2008, we facilitated a System Engineering curriculum workshop at NASA JSC and presented papers about Texas Space Grant activities at national conferences. We broadened our scholarship eligibility requirements to include second year college students in an effort to attract more minority applicants. We have increased the maximum award for our Higher Education and K-12 programs from \$15K to \$20K and have increased the maximum award for our New Investigator Initiation grants from \$10K to \$30K.

## Program Partners and Role of Partners in Project Execution

In the paragraph below, we have indicated the type and role of our member institutions by the following abbreviations: *Type*: U = University, 4C = 4 year college, CC = community college, MSI = minority serving institution. *Roles*: BOD = Board of Directors, F&S = F&S Committee, PR = Proposal Review Committee, MC = Major Committees (MSIAC), MH = Meeting Host.

The following are the Texas Space Grant 2008 program partners and affiliates: Angelo State ( 4C, BOD, PR,) Baylor (U, PR) Lamar (U, PR,) Prairie View A&M (U, MSI, PR, MC) Rice (U, PR,) Southern Methodist (U, PR) Sul Ross State (U, MSI, MC) Tarleton State (U, PR,) TAMU– ( U, BOD, MH, PR, MC, F&S Mtg H) TAMU Commerce (U, PR,) TAMU Corpus Christi (U, MSI,) TAMU International University (4C, MSI, PR,) TAMU Kingsville (U, MSI, PR, F&S, MC) Texas Christian– (U, PR, MH) Texas Southern (U, MSI, PR, MC) Texas State – San Marcos (4yr, PR,) Texas Tech (U, BOD, F&S, PR,) Trinity (U, PR,) University of Dallas (U, PR,) University of Houston (U, BOD, PR,) University of Houston Downtown (4 yr, MSI, PR, F&S, MC, MH) University of Houston, Clear Lake (U, PR,) UT Pan American (U, MSI, PR, MC) UT Arlington (U, PR,) UT Austin (U, BOD, PR, F&S, MC, MH) University of Texas at Dallas (U, PR,) UT El Paso (U, MSI, BOD, F&S, PR, MC, MH) UT Health Science Center Houston (U, PR,) UT Health Science Center San Antonio (U,) UT Medical Branch Galveston (U, PR, MH,) UT San Antonio (U, MSI, PR, MC) UT Southwestern Medical Center (U) University of Texas at Tyler (U, PR,) Austin Community College (CC,) Houston Community College NW (CC, MSI, PR, F&S, MC,) San Jacinto College (CC, MSI, PR, F&S, MC) Don Harrington Discovery Center (Non-profit,) Lockheed Martin (Industry, BOD, PR, MH) Office of the Governor (Government, BOD) Southwest Research Institute (Non-profit, PR, MH) TX Higher Education Coordinating Board (Government, BOD, F&S, PR, MC) United Space Alliance (Industry, BOD, PR, MH, F&S) University Space Research Association (Non-profit, PR, MH).