

New Mexico Space Grant Consortium  
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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 fellowship and scholarship 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 New Mexico Space Grant Consortium (NMSGC) is a Designated Consortium funded at a level of \$730,000 for fiscal year 2008.

PROGRAM GOALS

1. Develop strong collaborative programs that clearly benefit NMSGC members and clients by leveraging the collective resources of the members.
2. Create revenue opportunities by providing professional and educational services to the aerospace industry.
3. NMSGC will be a clearing house for statewide space related expertise, information, facilities, and education.
4. NMSGC will work with commercial and government organizations to leverage time, capabilities, equipment, and funding.
5. NMSGC is part of an existing, larger, broader space related community that can effectively service the interests of academia, industry, education, and the public.
6. NMSGC members will bring in diversified funding to support space related activities that meet identified needs.

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

Outcome #1 - **Internship Program:** Internship programs are instrumental in retaining students through to graduation. Research indicates students who work on real world applications through internships get a better understanding of how their academic work applies in the real world. This proves to be a retention strategy. Internships allow students to work side-by-side with NASA personnel and other interns and learn they can compete in a technical arena.

Outcome #1 - **Scholarship Program:** Funding provided by NMSGC scholarships allow students to do NASA related research with faculty. Brian Lawson, working at the Hubble Space Telescope Science Institute is featured in New Mexico State University's current Research Magazine.

Outcome #1 - **Scholarship Program:** Students agree to 10 hours of community service when receiving their scholarship. The purpose of the service is to get students into the habit of giving back and to promote STEM recruitment, retention, and awareness. Scholarship recipients volunteered 168 hours during the Fall-2008 semester providing service to pre-college students, college students, academic organizations, and the general public.

Outcome #2 - **Gaining Retention and Achievement for Students Program (GRASP):** GRASP is a semester long faculty development program which increases teaching strategies proven to support student learning. The program is structured to engage faculty members on a one-to-one basis, providing individual attention at each step of the evolution away from reliance solely on lecture to an adoption of multiple ways to engage students in a dynamic learning environment, both in and outside the classroom. 118 faculty at New Mexico State University (NMSU) and 45 faculty at Doña Ana Community College (DACC) have participated in this program. There is a 5.5% increase in student achievement at New Mexico State University (NMSU) and 7.9% at DACC. Student achievement is defined as the number of students receiving a final grade of A, B, or C in the course.

Outcome #2: **Spaceport America Student Launch Program:** Students designed, built, and flew payloads launched at Spaceport America. Participating students were from universities, community colleges, and high schools. Payloads were launched on an UP Aerospace SpaceLoft XL rocket on May 2, 2009.

Outcome #3 - **International Symposium for Personal and Commercial Spaceflight (ISPCS-2008):** The purpose of ISPCS to bring together the community involved in all aspects of personal and commercial spaceflight to help grow the commercial spaceflight industry. ISPCS is the industry's leading gathering for visionaries and builders

delivering the promise of spaceflight for mankind. ISPCS features information sessions networking opportunities and provides attendees with the latest news, topics, trends, and best practices that demonstrate personal and commercial spaceflight is a reality.

**Outcome #3: International Symposium for Personal and Commercial Spaceflight (ISPCS-2008):** Drawing attendance and participation for the foremost global thinkers at personal and commercial spaceflight companies, associations, and institutions, attendees hear from the best of the best. The excitement and energy that permeates this young industry is palpable as the latest technologies and brightest ideas come to fruition. Attendees have the opportunity to learn, network, and apply their capabilities to help grow the industry.

**Outcome #3: International Symposium for Personal and Commercial Spaceflight (ISPCS-2008):** The symposium received international press in 2008 including:

- The Space Review (November 3, 2008)
- Space News (October 27, 2008)
- Swedish Space Corporation (October 26, 2008)

## PROGRAM ACCOMPLISHMENTS

**Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals.**

- **Research Enhancement Program**
  - Statewide online proposal process competitively awards faculty research projects for up to \$25,000
  - 5 undergraduate students and 5 graduate students were supported through this program
  - 2 female, 8 male; 4 minority, 6 non-minority
  - All proposals are externally reviewed before selection for funding
  - Must show alignment and/or collaboration with NASA's Mission Directorates and or field centers
  - Must have significant student involvement
  - All NMSGC partners are eligible to participate
  - Only US citizens receive support. This includes both faculty and students
  - 6 research projects supported by Space Grant in 2008:
    - New Mexico State University - Hydrogen Storage in Metal-Doped Ordered Mesoporous Carbons for Fuel Cell
    - University of New Mexico - Predicting Failure Behavior of Polymeric Composites in Space Vehicles Using a Unified Constitutive.
    - University of New Mexico - Growth of Carbonaceous Materials for Enhanced Material Properties
    - New Mexico Institute of Mining & Technology - Investigation of High-Mass Protostars Using SPITZER and NASA-IRTF
    - New Mexico Institute of Mining & Technology - Sensitive Fast Selective Tunable High Temperature Infrared Photodetectors for Space Research, Human Health & Structural Monitoring of Aerospace Structures -
    - New Mexico Institute of Mining & Technology - High Performance Turbojet Engine Nano-Lubricant
- **Statewide Research Scholarship/Fellowship Program**
  - On-line statewide competition open to students enrolled in STEM at New Mexico State University, the University of New Mexico, and New Mexico Institute of Mining and Technology.
  - NMSGC campus directors facilitate the awards on their campuses
  - 47 applications for research scholarships were received
  - 17 Graduate Students awarded fellowships
  - 6 Undergraduate Students awarded scholarships
  - 4 Education Majors award scholarships
  - 11 female, 16 male; 5 minority, 22 non-minority
  - Scholarships funded were in diverse disciplines
- **NASA Academies and Summer Internships**
  - Eligible institutions: New Mexico State University, the University of New Mexico, New Mexico Institute of Mining and Technology, & Southwestern Indian Polytechnic Institute.
  - 4 Student Placements:
    - 1 student at JPL; 3 students at NASA Academy: 3 males, 1 female; 2 minority, 2 non-minority
- **International Symposium for Personal Spaceflight (ISPCS) Scholarship/Internship Program**
  - Proceeds from ISPCS were used to award summer internships to 7 undergraduate students:
    - 5 male, 2 female; 2 minority, 5 non-minority; 3 NMSU, 1 SIPI

- 18 faculty and staff and 30 students attended ISPCS
- **Reduced Gravity Student Flight Opportunity Program**
  - 10 undergraduate students participated with two team experiments
- **NMSGC Student Research Colloquium**
  - Held on October 31, 2008 during NMSU Homecoming
  - 19 Space Grant scholars presented their research
- **Spaceport America Student Launch Project**
  - NMSGC sent 4 faculty and staff to the RockOn workshop at Wallops Summer-2008
  - New Mexico student teams launched electronic payloads from Spaceport America on May 2, 2009.
  - 2 universities NMSU and UNM (10 students) designed, tested, and build separate payloads in senior design courses to collect engineering & science data from a flight characterization payload.
  - 3 community colleges built the RockOn payload in their courses.
- **Education Enhancement Program**
  - Supports project based STEM course development.
  - Statewide online proposal process competitively awards projects for up to \$15,000
  - Projects must indicate alignment with NASA's Education Portfolio Strategic
  - 2 Education Enhancement Programs funded in 2008:
    - New Mexico State University - Renewable Energy Technology Curriculum.
    - Dona Ana Community College - Digital Imaging and Design Technologies (DIDT) Aerospace Curriculum Enhancement Program

#### CONNECTION BACK TO CONSORTIUM ANNUAL PERFORMANCE GOALS AND OBJECTIVES

- Student Involvement Metric: All research funded by NMSGC must have significant student involvement. 22 undergraduate students, 2 master students, and 15 Ph.D. 7 undergraduate students & 5 graduate students were funded to work with faculty on their 6 research projects through our Research and Higher Education Programs.
- Retention/Achievement Metric: NMSGC tracks students involved with faculty in research who receive more than \$5,000 support. 68 students have received \$5,000 or more of support 2006-2008. 56 are still enrolled and 10 are working in STEM related fields.
- Student Diversity Metric: NMSGC has been active in the recruitment of women and minorities into our programs. In 2008, 20% of students receiving NMSGC scholarships were from minority populations and 38% were women.
- Minority Serving Institution Metric: New Mexico State University, University of New Mexico, Dona Ana Community College, and Eastern New Mexico University are Hispanic Serving Institutions (HSI). Southwestern Indian Polytechnic Institute is a Tribal College
- Costing Metric: All NMSGC institutions are required to provide timely and accurate costing and reporting. All partners must track and report matching funds through cost-share accounts and each expense report submitted monthly to NMSGC must also include the matching funds report
- Acknowledgment Metric: Students must acknowledge NMSGC support in their presentations, faculty must acknowledge NMSGC support in research publications and presentations. All programs must acknowledge NMSGC support in their newsletters, and in any printed materials promoting or advertising NMSGC events. This requirement is stated in each partner's Statement of Work and is tracked by NMSGC prior to inputting data into CMIS annually.
- Alignment Metric: All programs are reviewed for alignment with NMSGC goals, NASA Mission Directorates, and NASA education outcomes and objectives

#### **Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.**

- **GRASP (Gaining Retention and Achievement for Students Program)**
  - 8 faculty and 151 students from NMSU participated in 2008
  - 20 faculty and 321 students from DACC participated in 2008
  - The purpose of the GRASP program is to retain students in STEM disciplines by improving STEM teaching.
  - Offered to STEM faculty in the Colleges of Engineering, Arts and Sciences, and Agriculture at NMSU
  - With the support of \$148,481 in NSF funding, NMSGC expanded this successful program to a partner institution, Dona Ana Community College.
- **Leadership Academy:** Develops positive individual leadership among NMSU staff and faculty for the purpose

of empowering and supporting the university community and beyond.

- **NSF Advancing Leaders Program:** Supports academic institutional transformation to promote increased participation, retention, and advancement of women scientists and engineers in academe.
- **Statewide Education Scholarship Program:** The purpose of this program is to provide funding & resources to student teachers to prepare NASA curriculum and activities for teaching space related science.
  - All recipients were required to prepare NASA curriculum and use when student teaching.
  - Four students received education scholarships in 2008.
- **America View**
  - We use remotely sensed satellite/aircraft data for research and applications.
  - NMSGC is the founding member of NMView.
- **Southern New Mexico Academies for Young Scientists: Stone Age-to-Space Age**
  - Brings a diverse assortment of out-of-school time science, mathematics, engineering, and technology opportunities
  - 370 fifth, sixth, and seventh graders participated
- **BEST (Boosting Engineering, Science, and Technology)**
  - Challenges students to build a remotely controlled robot for a competitive setting.
  - 29 middle and high school teams competed in this competition
- **Associate Aerospace Degree Program**
  - Dual credit program between local high schools and Dona Ana Community College
  - 5 students participated in the program
- **Pete Conrad Prize**
  - NMSGC is coordinating the effort in the state of New Mexico. Recruiting was done in 2008. The competition was held in spring-2009.
- **Spaceport America Student Launch Project**
  - 8 high school participated

**Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.**

- **International Symposium on Personal Spaceflight (ISPCS)**
  - 220 people attended ISPCS-2008 from NASA, other federal and non-federal agencies, industry and academia. The purpose of ISPCS to bring together the community involved in all aspects of personal and commercial spaceflight to help grow the commercial spaceflight industry.
- **Leonard R Sugerman Public Forum**
  - 75 people appended the Public Forum, held annually to help inform the public about the progress of the business of space. This event is the kick off to the International Symposium for Personal Spaceflight.

#### PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Longitudinal Tracking:**
  - 80 Total awards ; 68 Fellowship/Scholarship/Internship; 12 Higher Education/Research Infrastructure; 10 awards to underrepresented minority students; 7 awards to underrepresented female students; 10 students in working STEM employment ; 68 still enrolled in their STEM program at an NMSGC institution.
- **Course Development:**
  - NMSGC is supporting courses on space hardware at two universities, New Mexico State University and the University of New Mexico
  - NMSGC is supporting courses at three community colleges. NMSGC supported the development of a Renewable Energy Technology Curriculum.
  - NMSGC supported the development DIDT Aerospace
- **Matching Funds:** NMSGC provides 1:1 matching funds.
- **Minority-Serving Institutions:**
  - New Mexico State University (HSI) is the lead institution for NMSGC. NMSU participates in our scholarship and internship program, Research Enhancement Program, Education Enhancement Program, GRASP, Student Launch Project, Reduced Gravity Student Flight Opportunity Program, Leadership Academy, Student Research Colloquium.
  - University of New Mexico (HSI) participates in NMSGC scholarship and internship program, Research Enhancement Program, Education Enhancement program, Student Launch Program, and Reduced Gravity Student Flight Opportunity Program.

- Dona Ana Community College (HSI) participates in NMSGC scholarship program, Education Enhancement Program, Student Launch Program, GRASP, and Aerospace Degree Program.
- Southwestern Indian Polytechnic Institute (tribal college) participates in NMSGC internship program and Student Launch Program.
- Eastern New Mexico University (HSI) participates in our scholarship program and submitted a proposal for the AESP program.
- New Mexico Highlands University (HSI) participates in our scholarship program and America View.

#### IMPROVEMENTS MADE IN THE PAST YEAR

- **International Symposium for Personal and Commercial Spaceflight**
  - After three years of rapid growth as the premier symposium for personal spaceflight opportunities, the symposium was expanded to encompass the growing importance of the commercial aspects of this exciting industry. This change is reflected in a new name, International Symposium for Personal and *Commercial* Spaceflight (ISPCS).
  - Session times were lengthened to accommodate more time for speakers
  - Break times were lengthened to accommodate more networking opportunities
  - Audio, video, and signage were improved to make a better experience
  - Audience “clickers” were added so the audience could answer questions from the chair making the symposium a more audience interactive event
  - After-hours hospitality event was hosted by the City of Las Cruces to create interaction between symposium attendees and local businesses and officials
- **Internship Program**
  - Proceeds from ISPCS were used to support internships in personal and commercial spaceflight businesses and organizations
  - Announcements were distributed through the National Space Grant network
  - 52 applications were submitted from 15 states including: Arizona, Arkansas, California, Georgia, Idaho, Illinois, Massachusetts, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Oregon, Pennsylvania, and West Virginia. We also received 2 applications from students in India, and one application from a student enrolled at the International Space University located in France.
  - 7 internships were awarded to students at: Microgravity Enterprises, Santa Fe Rocket Racking, Spaceport America, Personal Spaceflight Federation, National Space Society, and the Space Foundation.
- **Student Launch Program**
  - NMSGC sent 4 faculty and staff to the RockOn workshop at Wallops Summer-2008 to be trained on building electronic payloads
  - New Mexico student teams launched electronic payloads from Spaceport America on May 2, 2009
  - 2 universities: NMSU and UNM designed, tested, and built separate payloads in 2 senior design courses to collect engineering and science data from a flight characterization payload.
  - 3 community colleges: Dona Ana Community College, Southwestern Indian Polytechnic Institute, and ITT Technical Institute built the RockOn payload in their courses and flew in a sounding rocket.
  - 8 high schools: Las Cruces High School, Mayfield High School, Hatch Valley High School, Hot Springs High School, Cloudcroft High School, Alamogordo High School, Chaparral High School, and Gadsden High School used electronic payloads with accelerometers and pressure sensor to determine rocket flight.
  - All student teams completed their payload by March-2009 for integration into the rocket launched May 2, 2009. NMSU team developed the high school integration system as outreach. Teams attended the launch at Spaceport America on May 2, 2009.
- **Gaining Retention and Achievement for Students Program** (GRASP) was offered at NMSU and DACC. Preliminary work has begun to expand this successfully program to colleges and universities outside NMSGC.

#### PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

- Research Universities: NM State University (HSI); University of New Mexico (HSI); NM Institute of M & T
- Comprehensive Universities: Eastern New Mexico University (HSI); Western New Mexico University (HSI); New Mexico Highlands University (HSI)
- Community Colleges: Dona Ana Community College (HSI); Southwestern Indian Polytechnic Institute (Tribal College); ITT Technical Institute; San Juan Community College (HSI), Central NM Community College (HSI)