

# Arizona Space Grant Consortium (AZSGC)

## The University of Arizona (Lead Institution)

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### Affiliate members:

Arizona State University, Northern Arizona University, Embry-Riddle Aeronautical University, Dine College, National Undergraduate Research Observatory (NURO), Pima Community College, Arizona Aerospace Foundation, Indigenous Education Institute, International Dark-Sky Association, Arizona Daily Star, NASA Jet Propulsion Laboratory, National Optical Astronomy Observatories, Planetary Science Institute, USDA ARS Southwest Watershed Research Center, US Geological Survey, Flagstaff, Arizona Near Space Research, General Dynamics, Northrop Grumman, Orbital Sciences Corporation, Paragon Space Development Corporation, PM & AM Research, Raytheon Corp, Rincon Research, and SunCat Solar

### 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 Arizona Space Grant Consortium is a Designated Consortium funded at a level of \$590,000 for fiscal year 2007. NASA Space Grant funds are highly leveraged with non-federal dollars, bringing an additional \$811,820 to Arizona student-directed programs in 2007.

### Program Relevance to NASA:

Space Grant consortia build human capital and research expertise to support NASA programs and missions, expand NASA's expertise and educational networks, and bring knowledge and awareness of space to a broad range of constituents in every state. All AZSGC sponsored programs are geared to fulfill NASA education goals by strengthening NASA and the Nation's future workforce, attracting and retaining students in STEM disciplines, and engaging Americans in NASA's mission. AZSGC has become a catalyst for synergy between NASA, industry, and Arizona's education/research efforts. Programs extend the arms of NASA—expanding our universities' capacity to conduct research and doing it in a way that educates our next generation of scientists and engineers, by integrating Fellowships students into the research enterprise and then leveraging student research into outreach designed to promote the understanding of space-

related research to precollege audiences and the public. In 2007 AZSGC Fellowship recipients are directly contributed to the research and EPO of many NASA grants, research and missions including: the Juno Mission, the Mars Astrobiology Research Lab, Mars Reconnaissance Orbiter (HiRISE Camera), NASA EOS, CALIPSO, HST, LEND, the Global Precipitation Measurement Mission, the Lunar Reconnaissance Orbiter Project, the Phoenix Mars Scout Mission the NASA Mars Education Program at ASU, FIRST! Robotics, and to various research/grant programs supported by NASA Adaptive Optics Development grants, Exoplanet Imaging grants, and others.

The Arizona Space Grant Consortium's Lead Institution and home department, the Lunar and Planetary Laboratory, is leading the Phoenix Mars Lander's science mission. Since mission inception, Space Grant has provided over 25 undergraduate research interns, two graduate fellows, and assumed a lead role in Mission EPO involving middle- and high schools across the state (including a NASA Explorer School) in a balloon satellite development and launch program. Space Grant Fellowship Program graduate Rolfe Bode (1994), is the Phoenix Test Engineer and Chris Lewicki (1993), is the Flight Systems Engineer working on the mission from JPL.

#### Program Benefits to the State:

AZSGC has as its nucleus members the three state universities; programs are designed to best capitalize on local strengths and resources to meet local needs of students and communities. Articulated by AZ Governor Napolitano, an overriding state priority is to provide educational opportunities to enable schools and students to keep pace with the knowledge-based economy and ultimately to develop a highly skilled, well-educated workforce. AZSGC has become a valued partner in this effort; to that end, \$753,795 was contributed to AZSGC education programs from state sources in 2007. Exceptional educational opportunities are provided through a broad suite of programs that integrate public and private research/development with education, benefiting our state by productively nourishing the workforce development pipeline by integrating students into the research enterprise, greatly enhancing student education while at the same time benefiting Arizona's research enterprise.

#### Program Goals:

Our mission is to expand opportunities for Americans to learn about and participate in NASA's aeronautics and space programs by supporting and enhancing science, and engineering education, research, and outreach programs. These programs integrate research with education to help build a diverse, scientifically literate citizenry and a well-prepared science, engineering and technology workforce.

#### Program Accomplishments:

- In 2007, Fellowship programs support 163 students--19 graduate fellows and 144 Undergraduate Research Interns work in mentor-guided research programs. Over 20% are from underrepresented minorities including 3 disabled students and 47% are women. 86 researchers including NASA PI's, and internationally renowned scientists/engineers from fields representing the broad scope of NASA's Mission Directorates from university faculty,

industry, national laboratories and the private sector, applied competitively to work with AZSGC Undergraduate Research Interns and to involve them in their research enterprises.

- All 19 AZSGC graduate fellows designed and carried out outreach programs designed to promote the understanding of space-related research to the public. ASU undergraduate research interns contributed more than 860 hours to public service activities including outreach events, peer tutoring and designing and leading outreach programs that serve reservation schools/communities, the general public, industry, higher education and precollege audiences.
- 115 Undergraduate Research Interns from across Arizona made oral presentations at a statewide Undergraduate Research Internship Symposium. At the symposium, Arizona Congresswoman Gabrielle Giffords, a member of the House Committee on Science and Technology, congratulated students on their impressive research accomplishments and challenged them to develop “The Next Great Ideas” to benefit America.
- AZSGC fellowship/scholarship awards serve as catalysts for students to continue into advanced STEM degree programs, and into America’s STEM workforce. AZSGC has awarded 1562 Fellowship/Scholarship awards since the 1989 grant inception; 1313 of these awardees have graduated/completed degree programs. Tracking data is complete for 1067 (82%) of these. 196 (18%) are pursuing advanced STEM degrees, 180 (14%) work for aerospace contractors, 17 (2%) work for NASA, 397 (37%) have entered America’s STEM workforce, 179 (17%) work in STEM academic fields, and only 98 (9%) program graduates work in non-STEM-related fields.
- AZSGC sponsors five Research programs that involve students across AZ in space science/engineering focused R&D, with opportunities to apply classroom learning to real-world problems. One example, ASCEND, is a statewide Balloon Satellite program where over 30 undergraduates from five colleges and universities (including two minority serving colleges) design, build, launch, recover and analyze data from payloads launched via high altitude weather balloons to about 100,000 feet—the edge of space. Four successful launches/recoveries were accomplished in 2007.
- AZSGC sponsors 10 precollege programs serving 641 teachers, 8869 students, 1059 parents and 305 administrators. The majority of programs are directed to schools with high percentages of students from underrepresented minority groups in underserved areas such as tribal lands.
- AZSGC integrates Land and Space Grant missions in Arizona through an active Earth Grant program with strong ties to the NASA Science Mission Directorate’s Applied Sciences Program, that bridges the gulf between geospatial scientific research and technology and its use by government planners, natural resource managers, ranchers, farmers, and others involved in agriculture, natural resource management, and rural development to solve pressing real-world problems,
- AZSGC hosted two workshops for STEM students from Dine Tribal College geared to provide information on academics, financial aid, housing, internship opportunities, and special programs and support for Native American students looking to transition from their two-year college into a four year college or university.

## Student Accomplishments:

- In 2007, research efforts of AZSGC Fellowships/Scholarships students/mentors resulted in 31 publications/presentations at professional meetings--seven of these refereed;
- AZSGC helps prepare students for careers in communicating science by placing Undergraduate Research Interns as Student Science Reporters at the Arizona Daily Star, the state's second largest newspaper with a circulation of 116,345 daily and 168,861 Sunday. In 2007 three Arizona Space Grant Interns compiled a total of 67 bylines, including front-page packages; The Associated Press picked up a number of their stories.
- Two AZSGC students were awarded NASA MUST grants and three students were admitted to NASA Academy programs.
- A University of Arizona Space Grant Intern, Mary Anne Peters, received the College of Science excellence in Undergraduate Research Award for 2008 for her work with Astronomy Professor Laird Close on BESSEL, an instrument for the Steward Observatory telescope. She was subsequently invited to attend the 2008 SPIE Astronomical Telescopes and Instrumentation Conference in Marseille, France.