

Alaska 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 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 Alaska Space Grant Consortium is a Program Grant Consortium funded at a level of \$430,000 for fiscal year 2012.

PROGRAM GOALS

Outcome 1: Contribute to the Development of the STEM Workforce (Employ and Educate)

Diversity:

Goal: Encourage participation of female and underrepresented minority students and faculty in Alaska Space Grant Programs.

Objectives:

1. Work to engage our minority population at the Affiliate institutions through American Indian Science and Engineering Society (AISES), Alaska Native Science and Engineering Program (ANSEP) and our Affiliate representatives. Add at least one additional minority fellowship/scholarship application per year until we reach or exceed our stated minority goal.
2. Expand our affiliate organization to include the minority serving rural campuses within the UA system and Ilisagvik College, Barrow, AK. Add one new minority affiliate/year until all Higher Ed campuses in Alaska are represented.
3. Recruit at our rural campuses for summer fellowships to NASA and to our main campus's. Obtain at least one minority student application from a rural campus/year.

Fellowship/Scholarship Program:

Goal: Provide a program that supports workforce development by pumping the STEM "pipeline" through offering a sequence of competitive scholarship (to engage students early in their career) and fellowship (to provide "authentic" research and engineering experiences) opportunities to Alaskan students from diverse populations in STEM, and related education disciplines at Affiliate member institutions. Fellowship/scholarships will be provided equitably across the state with an emphasis on achieving and maintaining diversity in numbers of applicants and awardees.

Objectives:

1. Recruit at least one applicant per year for an internship or summer program at a NASA center. By 2011 recruit at least one applicant per 4 yr affiliate institution per year.
2. By spring 2011 the “Student Opportunities in Alaska” webpage connecting students to NASA “relevant” research projects and faculty will identify opportunities at every 4 yr institution.
3. Each year, at least one early career scholarship will be awarded at each affiliate institution to a freshman, sophomore or a student transitioning from a rural campus to a 4 yr degree program.
4. Every year, at least one fellowship will be awarded at each affiliate institution that has a 4 yr STEM degree program or to a rural student performing summer research at an affiliate 4 yr degree institution.
5. At least one additional fellowship/scholarship will be awarded per year to an appropriate minority applicant until we reach or exceed our stated minority goal.

Research Infrastructure Program:

Goal: Provide research initiation grants in strategic areas to improve collaboration between Alaska and NASA researchers and to improve the ability of Alaskan researchers to compete for NASA research and development work.

Objectives:

1. At each Affiliate institution identify and support expertise in areas of interest to NASA. By 2012 at least one strategic area of interest will be identified at every Affiliate institution with a 4 year STEM degree program.
2. Build capacity and expertise in the aerospace program at UAF to successfully respond to NSF and NASA solicitations for small satellite missions. By 2012 a small satellite proposal will be submitted.
3. Provide a venue for researchers across the state to meet and develop inter-institutional collaborations. The Alaska Space Grant first annual symposium will be held in May 2010. At least one collaborative research infrastructure project will be awarded by 2012.

Higher Education Program:

Goal: Provide support for interdisciplinary team activities and events that act to synthesis a student’s degree program and connect students to NASA higher education programs. Provide support for curriculum development/modification for the inclusion of NASA relevant topics.

Objectives:

1. By 2012 create an “Alaska Space Grant Grand Challenge” competition with teams at each of our rural affiliate institutions to provide “authentic” research and/or engineering experiences on our minority serving campuses.
2. In 2010, Alaska Space Grant will host their first annual symposium where students may present their research projects. In 2010, 50% of all students receiving fellowship awards or participating in Alaska Space Grant supported higher education activities will present their work either at the Alaska Space Grant Symposium or at some other professional conference. By 2015 over 90% of these students will be presenting their work.
3. Promote NASA higher education programs at our affiliate institutions. At least one student or team will participate in a NASA higher education program every year.
4. Continue to support NASA relevant Higher Education programs at each Affiliate institution that contribute to the overall employment rate in STEM fields. 90% of all students participating in Higher Education programs will continue to graduate school, a career in STEM field, or pre-college teacher training.

Outcome 2: Attract and Retain Students in STEM Disciplines (Educate and Engage)

Precollege Program:

Goal: Provide support for Alaska pre-college STEM education with emphases on NASA content, teacher training, and delivery to underrepresented group.

Objectives:

1. Increase the STEM content knowledge of Alaska’s pre-college teachers through teacher professional development. All ASGP sponsored professional development programs will show increased STEM content knowledge.
2. Support rural teacher professional development with summer programs and/or distance delivery programs. At least one professional development project/class targeting rural teachers will be supported each year.
3. Support standards based curriculum development in STEM fields connecting NASA relevant materials to the classroom. All curricula will be standards based and be freely available through the ASGP and/or our affiliate’s website.
4. Provide limited support for student involvement activities to inspire interest in STEM fields and careers that specifically target underrepresented students. Each student involvement activity will show increased interest in pursuing STEM education and/or careers.

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers (Engage and Inspire)

Informal Education Program

Goal: Provide support for professional development of informal education providers and informal education programs that use NASA themes and content and/or Alaska Native “ways of knowing” to enhance participant awareness and knowledge of NASA mission activities, STEM disciplines and career opportunities.

Objectives:

1. Connect informal education providers to NASA relevant research conducted in Alaska through the Alaska Space Grant Symposium to collaboratively develop Alaska/NASA specific informal education programs and professional development opportunities. Identify at least one new informal education activity each year.
2. Facilitate at least one annual training session to equip informal science educators with the knowledge and skills needed to deliver NASA aerospace content that will effectively engage large numbers of participants.

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

Outcome 1: Contribute to the Development of the STEM Workforce (Employ and Educate)

NASA Internship Student Highlights (story by Jeremia Schrock): Last summer, students from the University of Alaska participated in an internship at the National Aeronautics and Space Administration (NASA). One of those students was Marcus Jackson, an athlete and engineering student at UAA. Jackson spent his summer break at the Goddard Space Flight Center in Maryland. For as long as he could remember, Jackson had been fascinated by space. The internship at NASA was the perfect opportunity for him to further explore that passion. “When you think of space, you think of NASA,” Jackson said. One of the more unique aspects of his internship was his appreciation for the process each NASA project undergoes. While attending monthly project status updates at the center, Jackson saw first-hand how space projects develop. “I saw how science, engineering, and business each have an important impact on a project’s success,” he said. “This allowed me to have a greater appreciation for the complexities and

diversity of the work related to spaceflight,” he said. Jackson added that seeing the development of numerous scientific projects got him thinking about how what he learned in college could impact his future career. He was fortunate enough to be invited to a Maryland Space Business luncheon, while gave him the opportunity to expand his professional contacts in the field. Back at the center, Jackson learned about NASA’s testing and design standards which not only expanded his engineering vocabulary, but helped him appreciate the problems inherent to launching anything into space. “All this renewed my enthusiasm for my studies,” Jackson said. While he used to attend class in order to eke out a decent grade, that’s all changed since returning from the internship. “Now I am motivated to really immerse myself in my engineering studies and I have sought out additional opportunities outside of the classroom to expand my knowledge and skills,” he said. “I have realized that with the same focus and dedication with which I have pursued basketball excellence, spending extra hours training and constantly striving to improve, I must now also channel into becoming an engineer,” Jackson added. What’s the biggest lesson he learned working for NASA? “I really do not ‘know everything’ and I have a lot to learn,” he said. “I am more motivated going back to school so I can dive into my studies,” he added. “This summer at NASA was an invaluable learning and growing experience,” Jackson said. “I had a great time working there and I know looking back, it will be an important milestone in my life.” Jackson is continuing his education at the University of Wisconsin-Platteville.

PROGRAM ACCOMPLISHMENTS

Outcome 1: Contribute to the Development of the STEM Workforce (Employ and Educate)

Diversity: 33% of total fellowship/scholarship awards were given to women (40% scholarships, 30% fellowships). 15% of total fellowship/scholarship awards were given to minority students (20% scholarship, 13% fellowship). 17% of total awards to NASA interns were minority students.

Fellowship/Scholarship Program: 12 NASA internship applications, 6 selected by NASA (5 from UAF, 1 from UAA), 33% female, 17% minority. Awarded: fellowships 26 applications (APU, UAA, UAF, UAS) 15 awards, 33% female, 13% minority; scholarships 20 applicants (APU, UAA, UAF, UAS) 10 awards, 40% female, 20% minority. Cumulative rate of awards in underrepresented minorities in FY2012 is 15% (compared to 24% in FY11, 29% in FY10, 17% in FY09, 8% in FY08)

Research Infrastructure: 4rd annual Alaska Space Grant/NASA EPSCoR Education and Research Symposium held in Anchorage May 2013. Awarded 2 Research Infrastructure mini-grants (UAF) to 2 female PI’s (0 minority). One undergraduate students (male, non-minority), and one post-doc (female, non-minority), were provided support under these mini-grants. Final demographics for these projects will be available after June 1, 2013.

Higher Education: 4rd annual Alaska Space Grant/NASA EPSCoR Education and Research Symposium held in Fairbanks May 2012, 60% of funded fellowships presented. Sponsored one student team to participate in NASA Lunabotics Mining Competition (UAF). Longitudinal tracking of Higher Education students will be compiled this summer after graduation. Three affiliates (APU, UAF, UAS) conducted hands-on authentic research and/or engineering experiences that include NASA relevant topics either through revised/developed courses or extra-curricular programs. One new course was developed at APU.

Outcome 2: Attract and Retain Students in STEM Disciplines (Educate and Engage)

Precollege Program: Provided support for afterschool programs at a high school, title 1 elementary school and Boys and Girls Club (participation 33% minority) (UAF). Funded two projects for K-12 educator training: CryoConn 2013 and A Collaborative Approach to STEM Education & Workforce Development. Both projects provided multi-day educator training with specific goals to increase competence and confidence in teaching STEM disciplines with a focus on providing hands-on experiences. CryoConn 2013 was a three day “teacher as scientist” cryosphere science focused professional development workshop for Alaska teachers. A Collaborative Approach focused on place based learning specifically in biology, geology, and physics.

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers (Engage and Inspire)

Informal Education Program: Did not fund a dedicated informal education program this fiscal year. However, multiple funded higher education and precollege programs have an informal education component. Students in the UAF Space Systems Engineering Program provided hands-on activities (rocket building) to families attending the 2012 Engineering Open House, and presented their design challenges in local public school classrooms and the Boys and Girls Club. New discoveries by students attending the UAS Juneau Icefield Research Program field course are provided to Park Rangers for dissemination to cruise ship tourists who visit the South East glaciers.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Fellowship/Scholarship: 62 applicants, 33 awards (FY11: 10 scholarships; 14 research fellowships: 8 undergrad, 6 grad; 1 education research fellowship; 2 industry summer internship; 6 NASA summer internships). All but the scholarships are longitudinally tracked and represent 22 individual students (one student received a NASA summer internship and a research fellowship in the subsequent academic year). Statistics on students supported through the Research Infrastructure and Higher Education program and employment longitudinal tracking is accomplished at the end of the semester and is not yet available for this report.
- **Minority-Serving Institutions:** College of Rural and Community Development (CRCDD) is an Alaska Native minority serving college within UAF, that acts as the umbrella College for multiple rural campuses. No proposals were received from CRCDD in FY12.
- **NASA Education Priorities:**
 - Authentic, hands-on student experiences:** APU, UAF, and UAS each conduct hands-on authentic research and/or engineering experiences that include NASA relevant topics through space grant funded higher education projects.
 - Marine Epidemiology: students investigating the marine ecosystem using parasite loads in Alaska groundfish (APU):** This project developed a new course for undergraduate and graduate students which covers the fundamentals of Epidemiology, Disease Ecology, and Parasitology in the context of using fish diseases and parasite loads as assessors of marine ecosystem health and change.
 - Space Systems Engineering Program (UAF):** provides interdisciplinary students with hands-on experience in all aspects of space systems engineering through a design, build, launch paradigm applied to balloon and rocket payloads and small satellites. This year we worked on two projects:

- NASA Lunabotics Mining Competition
(<http://spacegrant.alaska.edu/content/nasa-lunabotics-mining-competition>)
- Alaska Research CubeSat
(<http://spacegrant.alaska.edu/content/alaska-research-cubesat-arc-selected-launch>)

2012 Undergraduate Geoscience Field Studies Support (UAS): provides continued support for students to participate in a summer semester glaciology field course on the Juneau Ice Field (JIRP) and a 3 day field experience with the Friends of the Pleistocene (FOP). Both of these experiences explore, conduct, and showcase research in active surface processes, glaciation, and climate science in Alaska, the Yukon, and northern British Columbia.

Diversity of institutions, faculty, and student participants: Alaska Space Grant Program is comprised of affiliate institutions, which includes all major campuses in Alaska (APU, UAA, UAF, UAS) plus five Alaska native serving campuses (CRCDC), that represent 90% of the students in the state of Alaska. We now have programs from Juneau to Nome. We have achieved gender diversity (50% female averaged FY10-FY12) of PI's in our mini-grant awards; and fluctuate in gender (45% female averaged FY08-FY12) and ethnic (17.3% minority averaged FY08-FY12) diversity in our student fellowship/scholarship awards.

Engage middle school teachers in hands-on curriculum enhancement: Two educator training project were supported. Both engaged middle school teachers in (JEDC, UAA).

Community Colleges: ASGP affiliate, the college of Rural and Community Development (CRCDC) acts as an umbrella institution for five Alaska Native minority serving rural campuses and one community campus in Fairbanks. No projects were supported at CRCDC this year.

Environmental Science and Global Climate Change: Most of the research infrastructure and higher education projects supported by Alaska Space Grant touch on issues surrounding Environmental Science and Global Climate Change. These are important topics for the state of Alaska as the rapid climatic change in the arctic is intimately apparent. This year's topics include: Thermal Signature of Blood Falls: A Supraglacial Link to the Subglacial Environment, Marine Epidemiology: students investigating the marine ecosystem using parasite loads in Alaska groundfish, 2012 Undergraduate Geoscience Field Studies Support, 2012 CryoConn.

Enhance capacity of institutions to support innovative research infrastructure: Alaska Space Grant Program continues to work with CRCDC, UAA, and UAS to increase their proposal submission rate.

IMPROVEMENTS MADE IN THE PAST YEAR

- Created a new Graduate Research Fellowship program separate from the Undergraduate Research Fellowship Program.
- Developed a newsletter that was sent to all Alaska legislators, NASA, and others.
- Reinvigorated contact to UAA and Challenger Center with the appointment of new and energetic affiliates.
- Attended OEPM training and are working at modifying our report template to reflect the changes in report requirements to NASA.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

- **University of Alaska Fairbanks (UAF)** – Lead institution, research center for the statewide university system, and only PhD granting institution in the state of Alaska. *Participates in fellowship/scholarship, research infrastructure, higher education, and precollege programs.*
- **University of Alaska Anchorage (UAA)** – urban 4-year University serving the population center of Alaska. *Participates in fellowship/scholarship, research infrastructure, and precollege programs.*
- **University of Alaska Southeast (UAS)** – regional 4-year University serving southeast Alaska. *Participates in fellowship/scholarship, and higher education programs.*
- **Alaska Pacific University (APU)** – Private 4-year University focusing on inquiry based learning in environmental sciences. *Participates in fellowship/scholarship and higher education programs.*
- **College of Rural and Community Development** – community college serving Alaska Native students in rural Alaska. *No applicants from CRCDC for any programs.*
- **Challenger Learning Center of Alaska** – non-profit corporation focusing on hands-on precollege science programs. *No applicants from Challenger Learning Center for any programs.*
- **Anchorage Museum** – non-profit organization focuses on hands-on exhibits and inquiry-based programs in Space and Earth Science and Aerospace technology. *Participates in pre-college.*
- **Juneau Economic Development Council (JEDC)** – non-profit corporation supporting K12 STEM education programs. *Participates in pre-college programs.*

The National Space Grant Office requires two annual reports, this Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPMS) 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. OEPMS data are used for official reporting.