

North Dakota 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 North Dakota Space Grant Consortium is a Capability Enhancement Consortium funded at a level of \$590,000 for fiscal year 2009.

PROGRAM GOALS

North Dakota Space Grant explicitly stated the following SMART goals in its FY 2009 proposal and budget:

1. Fund five Summer Faculty Fellowships that will allow college faculty to revise or create a NASA-/STEM-relevant college course to be taught in a North Dakota institution of higher education.
2. Fund two M.S. students in the University of North Dakota (UND) Department of Space Studies to conduct M.S. thesis research that is NASA- and STEM-relevant.
3. Fund two NASA-relevant Research Focus Area (RFA) research projects that will promote the ultimate development of independently-funded NASA research clusters in North Dakota.
4. Fund at least three North Dakota colleges and universities to attend national, hands-on, NASA-relevant workshops such as RockOn, RockSat, and the High Altitude Student Payload (HASP) programs.
5. Fund at least five students to intern at a NASA field center.
6. Conduct the Teacher Space Education Initiative (TSEI) workshop and teach at least 30 teachers fundamental space knowledge that will be useful in their K-12 classrooms.
7. Fund at least 25 K-12 teachers to participate in the Spaceward Bound workshop.
8. Fund four North Dakota FIRST Robotics teams to participate in regional and national team competitions.

9. Provide funding to the North Dakota Heritage Center to develop and build two educational, NASA-relevant trunks that can be used in K-12 classrooms across North Dakota.

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

No students from North Dakota were awarded summer internships at NASA Centers in 2009. Thus Space Grant decided to award Space on the Prairie summer internships at colleges and universities within the state. Nineteen such internships were awarded. Space Grant was especially pleased that internships were given to three undergraduate students at two non-research universities and one internship was given to a student at a two year community college in North Dakota. Six students were given research fellowships for fall semester so that they could continue their research.

2009 found a greater number of research fellowships and scholarships being awarded to minority students.

The Gateway to Science Center and the North Dakota State Historical Society were added as Space Grant affiliates. That means that our informal education programs will continue to improve.

PROGRAM ACCOMPLISHMENTS

Outcome 1 programs

Undergraduate scholarships/fellowships. The NDSGC provided 128 undergraduate students with scholarships at its affiliate institutions where 63 awardees were female and 65 awardees were male. Forty of these students were Native American.

In addition, 30 significant awards were also provided, of which 24 were male, six were female, and two are classified as underrepresented minorities. Fourteen of the significant awards went to undergraduate students while 16 of the awards went to M.S./Ph.D. students.

Research Focus Area (RFA) research. Dr. Eric Brevik, Dickinson State University, received funding for the first RFA project in North Dakota, titled, "Undergraduate research collaboration with NASA Goddard Space Flight Center". This project, which involved a female undergraduate student from DSU, has the goal of using Landsat data to detect cover crops in North Dakota. Dr. Brevik and student are working with a NASA Goddard collaborator, Eric Brown de Colstoun, at Goddard in January 2010 to develop an implementation plan for the project. This is the first RFA-funded project and is an important step forward in developing NASA research in North Dakota.

UND Observatory/Space Grant Internet Telescope Network (SGITN). Improvements at the UND Observatory continued in FY 2009 with two of the site's remotely-controllable telescopes becoming fully operational. Internet Observatory #1 and #2 at the UND Observatory, along with the Badlands Observatory, supported 16 users. This included one

faculty, 11 graduate students, and four undergraduate students. One of the graduate students was Native American.

Summer Faculty Fellowships. Nineteen Summer Faculty Fellowships were awarded for North Dakota college and university faculty to revise or create NASA-relevant courses at each faculty's respective institution. Course topics spanned the disciplines from biology and materials science to space systems engineering and land remote sensing.

National Space Grant workshops. During FY 2009, seven faculty and five students (three graduate students, two undergraduate students) participated in the RockSat workshop and built a payload to measure mesospheric gases in the atmosphere. The payload was launched on a two-stage sounding rocket from the Wallops Flight Facility in June 2009.

This year also saw five faculty and three students (two undergraduate, one graduate) build a multi-gas sensor payload for a zero-pressure balloon that was launched in September 2009 as part of the High Altitude Student Payload (HASP) project. The North Dakota High Altitude Balloon (HAB) program was also active in FY 2009 with a balloon launch in November 2009 that carried a tracking system as a primary payload and a biological experiment as a secondary payload. HAB program participants included three faculty, three graduate students, and one undergraduate student.

Graduate Research Assistantship/Tuition Waivers. The UND Department of Space Studies funded Eric O'Dea, an M.S. student in the program. O'Dea is responsible for assisting with the operations and maintenance of the UND Observatory under the guidance of Dr. Paul Hardersen. O'Dea is also pursuing an M.S. thesis and is conducting a study of two S-type asteroids in the main asteroid belt. He will be reducing the near-infrared reflectance spectra of these asteroids, obtained from the NASA Infrared Telescope Facility (IRTF) in Hawaii, and constraining the surface mineralogy and possible meteorite analogs for these asteroids.

Outcome 2 programs

NASA center internships. No North Dakota students were selected in FY 2009 for NASA field center internship, so no funding was provided in this category.

Teacher Space Education Initiative (TSEI). The TSEI took place in three locations: Grand Forks, Fargo, and Bismarck, in June 2010, and delivered educational talks to 30 K-12 teachers from across the state. Five faculty from the UND Department of Space Studies: Dr. David Whalen, Dr. Michael Gaffey, Dr. Vadim Rygalov, Dr. Ronald Fevig, and Dr. Paul Hardersen gave introductory presentations on rockets, orbital mechanics, asteroids and meteorites, the Sun, space psychology, and space life sciences to the teachers.

Spaceward Bound teacher workshop. A week-long teacher workshop with seven teachers and seven faculty studied the geology of eastern North Dakota. The goal of this workshop is to explore local North Dakota geology that can be analogous to Martian geological features, past or present.

FIRST Robotics. Six teams from three North Dakota high schools were supported for regional and national competitions in the FIRST Robotics program in FY 2009. Of particular note is the team from Northwood-Hatton High Schools, which did advance to the national competition during this year.

Outcome 3 programs

Heritage Center. A project with the North Dakota Heritage Center was begun to develop two educational trunks that will be available for K-12 classrooms across North Dakota. The themes for the trunks center around aurorae, meteorites, and other direct connections between North Dakota and NASA. The trunks will be stocked with objects that can be handled by students, such as meteorite samples, space suit materials, and other tactile objects.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking: The North Dakota Space Grant Consortium has contracted with the Space Grant Foundation to conduct longitudinal tracking of our fellowship recipients who receive more than \$2500 in funding. Thirty such awards were given in 2009.
- Course Development:
 - Revised: “Advanced Inorganic Chemistry”
 - Dr. Paula Martin, Dickinson State University
 - Revised: “Polymers and Coatings Environmental Course”
 - Dr. Vicki Johnston Gelling, North Dakota State University
 - Revised: “Laboratory Manual for Anatomy”
 - Ms. Shannon King, North Dakota State College of Science
 - Revised: “Identifying Animal Cells at the Undergraduate Level”
 - Dr. Kevin Gyolai, North Dakota State College of Science
 - Revised Two Education Courses: SCNC 321 and EDUC 301
 - Ms. Laurie Berry and Mr. Jeff Sieg, Mayville State University
 - Revised: Biology 150L
 - Dr. Kevin Gyolai, North Dakota State College of Science
- Matching Funds: The North Dakota Legislature appropriated \$300,000 in cash match for the North Dakota Space Grant Consortium for the 2009-2011 biennium. The University of North Dakota provided the remaining match.
- Minority-Serving Institutions: Additional scholarship money was provided for students at our affiliate tribal colleges.

IMPROVEMENTS MADE IN THE PAST YEAR

- Funding was continued for multi-disciplinary projects such as RockSat, HASP, USLI and NDX-2.

- Focus Research Areas were implemented and a proposal accepted from Dickinson State University.
- Stronger ties were established with affiliates resulting in largest turn out over for our annual meeting.
- Scholarship dollars were increased for tribal college students.
- The NDX-2 project was enhanced with additional funding from NASA EPSCoR to design and construct a lunar rover and habitation module that is compatible with the space suit.
- Efforts to promote and award research fellowships to community college students were successful.
- North Dakota Heritage Center began to develop traveling space trunks for K-12 classrooms through funding from Space Grant.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Institutions that comprise the North Dakota Space Grant Consortium include the following:

	Total Population			Non Asian	
Name	Population	% Female	% Male	% Minority	Type
UND	13,172	48	52	5.4	4 yr/doc
NDSU	13,498	45	55	4.9	4 yr/doc
MaSU	832	50	50	9	4yr
NDSCS	2,493	42	58	3.6	2yr
VCSU	1,037	N/A	N/A	4.7	4yr
LRSC	1,058	N/A	N/A	4.1	2yr
MiSU	3,712	N/A	N/A	2.9	2yr
DCB	650	N/A	N/A	N/A	2yr
WSC	949	N/A	N/A	N/A	4yr
DSU	2,670	N/A	N/A	4.4	4yr
BSC	4,000	N/A	N/A	3	2yr
TMCC	928	N/A	N/A	100	2yr
UTTC	950	N/A	N/A	100	2yr
SBC	307	N/A	N/A	100	2yr
CCCC	250	N/A	N/A	100	2yr
FBCC	290	N/A	N/A	100	2yr