

Wisconsin Space Grant Consortium
University of Wisconsin-Green Bay
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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 Wisconsin Space Grant Consortium is a Designated Grant Consortium funded at a level of \$845,000 for fiscal year 2010.

PROGRAM GOALS

Base

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Educate and Engage)

Goal 1. Enhance Wisconsin growth in aerospace while supporting the NASA workforce pipeline by (1) supporting workforce development initiatives and (2) testing methods of recruiting students early in their career and retaining top students throughout their schooling.

Objectives

1.1 Use our primary Workforce Development initiative, the Student Satellite Program, to broaden workforce opportunities for science majors by supporting a science-focused and science-driven instrument program to fly on a high-altitude balloon (Instrument Development Program).

1.2 Maintain our ability to recruit students from a wide range of Affiliate Member institutions by supporting and refining our Balloon and Rocket Programs.

1.3 Continue to budget specific money in the Other Student Awards Program to help support at least two students (more if selected) to NASA Academy, at least two students (more if applicable) to NASA Internships and at least one team involved in NASA's Reduced Gravity Program.

1.4 Increase retention of our best and brightest aerospace students by increasing Fellowship awards for our most highly-ranked graduate students (the top 10%) from \$5000 to \$8,000 and investigating raising the ceiling on our Undergraduate awards.

- 1.5 Provide opportunities for our funded students, faculty and other experts to present their research at our twentieth annual Wisconsin Space Conference, to be hosted by one of our two-year colleges, the University of Wisconsin-Sheboygan.
- 1.6 Support and strengthen the national Space Grant program through the Director's elected leadership roles in the national organization.
- 1.7 Continue to press our Affiliate Members to build relationships with the Minority Advancement offices at their campuses, and nurture growing relationships.
- 1.8 Support the explosive growth of aerospace programs at our minority-serving institution, the College of Menominee Nation (CMN), by investing in and being a founding partner of the pilot Tribal College Rocket Consortium.
- 1.9 Continue to recruit Affiliate Members to diversify our reach.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Educate and Engage)

Goal 2. Utilize the limited resources of the Consortium and the success of the current Special Initiatives Program to create a new suite of cohesive, progressive programs that recruit and better retain minority and female students from middle school through high school to our current higher education offerings.

Objectives

- 2.1. Partner with the College of Menominee Nation (CMN) in supporting aerospace-centered research and student activities under a special funding initiative that targets Native American students served by CMN.
- 2.2 Create a High School Rockets program as a partnership with SLI and Rockets 4 Schools, one that injects standards-based STEM curriculum into the already-successful Rockets 4 Schools spring rocket launch and closes the pipeline gap between students served by Rockets 4 Schools and those served by our University Rocket Competition.
- 2.3. Continue to nurture our strong relationships with our two minority-serving Affiliate Members, the College of Menominee Nation and Alverno College (a women's college with a large African-American student population).

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire)

Goal 3. Seek out more effective ways to encourage Wisconsin precollege educators to learn and utilize space-related content in the classroom, and find new, innovative methods of funding those efforts.

Objectives

- 3.1 Continue the current Aerospace Outreach Program, with increased emphasis on reaching out to educators directly.
- 3.2 Create new and expand existing High School-related programs (High School Rockets Competition; High School Partners) to (1) close the gap in our pipeline between K-12 and Higher Education students, and (2) provide direct support to NASA's 2010 Education Priorities.

Augmentation

Goal 1. Focus augmentation funds specifically on the NASA 2010 Education Priorities of authentic, hands-on, student-led flight and other collaborative projects, as these priorities mesh most strongly with the current needs of Wisconsin.

Goal 2. Augment activities that explicitly support the NASA Education operating principles of Content and Diversity.

Objectives

1.1. Use the Student Satellite Program and Research Infrastructure Program to broaden workforce opportunities for science majors

1.2. Support more students to take advantage of high-caliber NASA opportunities such as NASA Academy, NASA Internships and NASA's Reduced Gravity Program.

1.3. Increase retention of our best and brightest aerospace students by offering augmentation awards for our most highly-ranked awardees.

1.4. Support the growth of aerospace programs at our minority-serving institution, the College of Menominee Nation (CMN), by supporting a First Nations Launch .

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

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals (Educate and Engage)

- Rocket activities for Native American students: This program comprises opportunities for Native American students from a range of skills levels to build and launch rockets in a collegial, culturally-relevant environment. It draws from several funding sources, including the WSGC base and augmentation grants. We use WSGC money primarily to fund staff to provide non-technical support to the program, and to support local teams. This year we were able to support a team of students participating in our First Nations Launch. WSGC funds supported a team of students representing three institutions: UW-Green Bay, Lawrence University and the College of Menominee Nation.

- The Elijah High-Altitude Balloon Project: This has grown from a single launch per year to a suite of programs that target students and faculty primarily at our smaller two-year and four-year colleges and universities. The facet of this program piloted this year is a ballooning workshop that instructs faculty how to build and fly balloon payloads that provide authentic science data as part of their curriculum. Students then build and fly the payloads and analyze the data to be utilized in the classroom. The goal is to give faculty at interested affiliates the skills and tools needed to begin a balloon payload program at their home institutions.

- Research Seed grants: Augmentation funds allowed us to fund three \$10,000 grants; these are twice as large as our annual research grants. These grants were directed specifically at research efforts that foster partnerships and support significant student contributions. Projects were funded at three member institutions and include a comprehensive NASA-focused research program at small, liberal-arts teaching institution Carthage College, in partnership with two NASA Centers. This project will provide authentic research experiences for dozens of undergraduates each year who would otherwise never have exposure to NASA experiences.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty (Educate and Engage)

- Stephanie Finnvik, a student at Carthage College, is a prime example of how our model of progressive opportunities has resulted in the recruitment of a high-caliber student into an aerospace career. Stephanie had not thoughts of becoming involved in an aerospace career

until she was recruited into a Reduced Gravity team by a highly-energetic institutional representative. This Reduced Gravity team would not have been started without financial and experiential support from the WSGC; now the College is fielding its third team. After her experience, Stephanie wanted a greater challenge, so we chose her as a member of our Elijah High-Altitude Balloon team. She intends to take the next step, a NASA internship, and hopes to work for NASA some day.

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission (Engage and Inspire)

- Our Aerospace Outreach Program specializes in these partnerships, in which funding often provides the impetus to include NASA-related curriculum where it would otherwise not be included. Examples from this past year include funding for BioPharmaceuticals Technology Corporation Institute to conduct teacher training workshops in technology. Because of support from the WSGC the workshop has a primary focus on NASA resources and projects that incorporate and utilize biotechnology.

PROGRAM ACCOMPLISHMENTS

Outcome 1 associated goals and objectives

Goal 1

Objective 1.1 accomplishments. We found that our Instrument Development Program was not meeting our objective of providing *high-fidelity* NASA-focused experiences for advanced science majors; the experiences were simply not challenging enough. Rather than abandon the objective, we cancelled the program and developed a new science internship for our IDP science students that supports our new Elijah workshop, described above and noted in Objective 1.2. The students are tasked with designing the balloon payloads to be built by faculty in the workshops, using their science expertise to work with faculty to create payloads that may be built easily by undergraduates but still provide authentic data for the classroom. This also feeds into our support for community and teaching colleges (the primary beneficiaries of the workshop).

Objective 1.2 accomplishments. Faculty and staff from two institutions, Carthage College and UW-Sheboygan, attended the pilot Elijah Faculty Workshop, which culminated in a launch. We also funded 10 students from 7 affiliate members in the Elijah High-Altitude Balloon teams, and 50 students in 13 teams from 5 affiliates in the Collegiate Rocket Competition.

Objective 1.3 accomplishments. In FY10 with our Base Grant we funded or will fund 3 NASA Academy students, 5 NASA interns, 3 NASA Reduced Gravity teams with 21 students, and 3 senior design teams with 16 students.

Objective 1.4 accomplishments. We funded 13 students under this objective.

Objective 1.5 accomplishments. The 20th Annual Space Conference, hosted by two-year college UW-Sheboygan, had 114 registered attendees from all over the state.

Objective 1.6 accomplishments. Director R. Aileen Yingst is currently service as an active member of the Space Grant Directors' Executive Committee and the Nominating Committee.

Objective 1.7 accomplishments. Diversity plan compliance covers nearly all private and 20% of public institutions.

Objective 1.8 accomplishments. The Tribal College Rocket Consortium currently has 5 teams participating this year from 4 institutions. As noted earlier, the WSGC budgetary contribution

to this objective is funding for students and staff to provide non-technical support to the program.

Objective 1.9 accomplishments. Our current membership now stands at 39 institutions, including three 2-year colleges; our newest member is UW-Platteville.

Other Progress and Accomplishments under Outcome 1

WSGC Scholarships, Undergraduate Research Awards, and Fellowships: In FY 10 we made awards to 44 students within these three programs using NASA funding. Of those awards, 22 went to Undergraduate Scholars, 8 to Undergraduate Researchers, and 14 to Graduate Fellows, including the winner of the Dr. Laurel Salton Clark Award. Member institutions are supporting 10 additional undergraduate students with internal funding. Students will present their findings at this summer's Wisconsin Space Conference to be held at UW-La Crosse August 18-19.

Research Infrastructure Program: Five Research Infrastructure grants were awarded to provide relatively new faculty or staff the opportunity to establish a space-related research project, or more experienced faculty or staff the opportunity to begin new space-related research programs. Also included in this program is our support of the WIYN Astronomy Consortium, which provides 1-3 observing nights per year to members and students.

Higher Education Incentive Grants: Three new or continuing awards were made to college or university faculty or academic staff interested in developing a new course, minor, major, or curricular area related to any NASA-related discipline.

Industry Awards: We have partnered with our Industry members to fund 2 student interns. In addition, 2 industry staff members were funded to receive additional training important to stay abreast of important changes in the high-technology field of aerospace engineering.

Note: Though not originally listed as an objective, activities reported here significantly supported the NASA 2010 Education Priority 7 — supporting relationships with community colleges.

Outcome 2 associated goals and objectives

Goal 2

Objective 2.1 accomplishments. We have discussed our accomplishments in this area under Outcome 1.4.

Objective 2.2 accomplishments. The High School Rockets program has been a start-stop effort as we have twice lost the personnel we have hired to run this and other special programs made possible through base and especially augmentation funding. However, the preparatory legwork has been done and our partners (Rockets 4 Schools and NASA Student Launch Initiative) are in place. We are in the process of filling this position yet again; see also Objective 3.2.

Objective 2.3 accomplishments. We currently use other funds to support the projects at our two minority-serving institutions.

Other Progress and Accomplishments under Outcome 2

Special Initiatives program: Eight awards were made to faculty, educators or other individuals or groups to develop and conduct innovative programs that target groups traditionally underserved in aerospace. This program rarely funds higher education students directly, but often funds programs proposed by higher education students.

Outcome 3 associated goals and objectives

Goal 3

Objective 3.1 accomplishments. Our Aerospace Outreach Program is designed to fund innovative planning grants and supplemental grants for projects that increase interest, recruitment, experience and training of pre-college students in the pursuit of space- or aerospace-related science, design, or technology, or encourage K-12 students in space-related pursuits. We have funded 5 projects under this program.

Objective 3.2 accomplishments. We currently have 2 schools ready to partner with us to pilot the High School Rocket Competition and three additional schools interested in becoming High School Partner schools. To support these programs we hired a Special Programs Coordinator. This position is meant to be flexible, so that as new programs are piloted to respond to changing needs, the Coordinator can assist in planning and administering them. While the person we originally hired has moved on to a permanent teaching position, we are currently working to secure new personnel.

NASA 2010 Education Priorities (augmentation objectives are reported here)

As noted above, our two goals for augmentation funds were to (1) focus augmentation funds on the NASA 2010 Education Priorities of authentic, hands-on, student-led flight and other collaborative projects; and (2) augment current activities that explicitly support the NASA Education operating principles of Content and Diversity.

Augmentation funding mapping to Outcome 1:

Augmentation Objective 1.1 accomplishments. These have been addressed in Base Grant Objective 1.1 and Outcome 1 points 2 and 3, through our Student Satellite and Research Seed initiatives. *These accomplishments map to Education Priorities 1 and 8.*

Augmentation Objective 1.2 accomplishments. We have supported 33 additional students in high-caliber NASA opportunities above those supported by the Base Grant; these include *all* of our Senior Design awards, *over half* of our Rocket Teams and *nearly half* of our NASA internships. It is here that our augmentation award has been most profoundly useful to our students, *These accomplishments map to Education Priority 1.*

Augmentation Objective 1.3 accomplishments. We were able to augment 13 base awards using augmentation funding. *These accomplishments map to Education Priority 1.*

Augmentation Objective 1.4 accomplishments. The College of Menominee Nation recently lost its driving force for student rocket teams and there is currently no institutional rocket program. However, CMN faculty and staff continue to partner with us in the First Nations Launch activities. We plan to talk with the STEM students next year as well as some faculty to promote and recruit CMN students into all of our programs, not just the rocket program. Additionally, we have supported 1 2-year institution through augmentation funding. *These accomplishments map to Education Priorities 1, 4 and 7.*

Augmentation funding mapping to Outcome 2: All of the programs that map to Outcome 2 are hands-on, authentic experiences that are largely student-driven. *These accomplishments map to Education Priority 1.*

PROGRAM CONTRIBUTIONS TO PART MEASURES

• Longitudinal Tracking: Total awards = 74 awards, 4 students received awards in more than one project; Fellowship/Scholarship = 70; 5 of the total awards represents underrepresented minority F/S funding. Students funded under augmentation Research Seed Grant funding = 6.

We currently cannot report on our Higher Education/Research Infrastructure programs, or the number of students taking the "next step" because tracking is not complete.

- Course Development: Four new courses targeted at the STEM skills needed by NASA developed with NASA support.
- Matching Funds: \$515,000 or ratio of 0.78:1 match:NASA funding.
- Minority-Serving Institutions: Wisconsin has two tribal colleges and one primarily female college. Of these three institutions, two are members of the WSGC: Alverno College and the College of Menominee Nation (CMN). Both are active members and have received competitively awarded grants nearly every year.

IMPROVEMENTS MADE IN THE PAST YEAR

- With the help of a special ESMD grant, we participated in the American Indian Science and Engineering Society (AISES) National Conference last November with a booth manned (personned) by several Native Americans and their rockets. This attention led directly to AISES teams participating in our First Nations Launch. We do not have the final numbers as we are still in the process of recruiting teams and students, but at this time we have 3 teams with the possibility of a fourth; the number of students this represents has not been collected as of yet.
- As noted above, this year we instituted a ballooning workshop that instructs faculty in how to build and fly balloon payloads that provide authentic science data as part of their curriculum. Students then build and fly the payloads and analyze the data to be utilized in the classroom. The goal is to give faculty at interested affiliates the skills and tools needed to begin a balloon payload program at their home institutions. This workshop has already resulted in the beginnings of a balloon program at Carthage College, a small liberal-arts affiliate institution that has a strong teaching focus.
- The support of the ESMD has been invaluable in bringing in new faculty at our engineering schools who are interested in NASA-related Senior Design courses. This year, we have had our first request for funding for a NASA-related Senior Design course at the Milwaukee School of Engineering that did not require a specific call because of availability of ESMD funds. That is, this year, we are responding to MSOE's desire for NASA-related courses, rather than the school responding to our funding initiative. This program now has a life of its own at MSOE.
- As noted earlier, our consortium continues to grow, and we are pleased to welcome another University of Wisconsin school, UW-Platteville, as our newest member. This institution has a strong engineering program and a student population that has shown interest every year in NASA internships, so we are pleased to have made this connection.
- For many years our Program Manager has done double duty as the Associate Director for our Aerospace Outreach program. We are very pleased to have convinced our representative from the Department of Public Instruction, Shelley Lee, to assume this role. Her expertise in K-12 STEM education is extensive and her connections at DPI represent what we hope to be the seeds for a stronger partnership with this state agency.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Wisconsin Space Grant Consortium Members

Alverno College	Academic	4yr bac
Carroll University	Academic	4yr bac
Lawrence University	Academic	4yr bac
Ripon College	Academic	4yr bac
St Norbert College	Academic	4yr bac
University of Wisconsin-Oshkosh	Academic	4yr bac
University of Wisconsin-River Falls	Academic	4yr bac
Wisconsin Lutheran College	Academic	4yr bac
Carthage College	Academic	4yr bac/Grad
University of Wisconsin-Green Bay	Academic	4yr bac/Grad
University of Wisconsin-La Crosse	Academic	4yr bac/Grad
University of Wisconsin-Parkside	Academic	4yr bac/Grad
University of Wisconsin-Platteville	Academic	4yr bac/Grad
University of Wisconsin-Stout	Academic	4yr bac/Grad
University of Wisconsin-Superior	Academic	4yr bac/Grad
University of Wisconsin-Whitewater	Academic	4yr bac/Grad
Milwaukee School of Engineering	Academic	Bac/Master
College of the Menominee Nation	Academic	Tribal
University of Wisconsin-Fox Valley	Academic	Com/Jr
University of Wisconsin-Sheboygan	Academic	Com/Jr
Western Technical College	Academic	Com/Jr
Marquette University	Academic	PhD
University of Wisconsin-Madison	Academic	PhD
University of Wisconsin-Milwaukee	Academic	PhD
Aerogel Technologies, LLC	Industry	Aerospace
Astronautics Corporation of America	Industry	Aerospace
Orbital Technologies Corporation	Industry	Aerospace
Space Explorers, Inc.	Industry	Education
Space Education Initiatives	Industry	Education
Spaceflight Fundamentals, LLC	Industry	Education
Experimental Aircraft Association (EAA)	Not-for-Profit	Aviation
Medical College of Wisconsin	Academic	Medical
AIAA – Wisconsin Section	Not-for-Profit	Engineering
BioPharmaceutical Technology Center Institute	Not-for-Profit	Parent is Promega
Great Lakes Spaceport Education Fnd, Inc.	Not-for-Profit	Rockets for Schools
Wisconsin Association of CESA Administrators	Not-for-Profit	Education
Wisconsin Aerospace Authority	Government	State/Local Gov
Wisconsin Department of Public Instruction	Government	State/Local Gov
Wisconsin Department of Transportation	Government	State/Local Gov

All WSGC members have equal status and equal representation on our Advisory Board regardless of their size.