

Wisconsin 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 Wisconsin Space Grant Consortium is a Designated Consortium funded at a level of \$730,000 for fiscal year 2008.

## PROGRAM GOALS

### **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 supporting workforce development initiatives and testing methods of improving recruitment of students early in their career and retaining of top students through their schooling.

#### **Objectives**

- 1.1 Use our primary Workforce Development initiative, the Student Satellite Program, to broaden workforce opportunities for science majors by instituting a science-focused and science-driven balloon project.
- 1.2 Maintain our ability to recruit students from a wide range of Affiliate Member institutions. by keeping our Balloon and Rocket Programs well-funded and mentored, open to students of all experience levels.
- 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 or another NASA Internship and at least one team involved in NASA's Reduced Gravity Program.
- 1.4 Increase retention of our best and brightest aerospace students and respond to comments from the 15-year review by increasing 1-2 Fellowship awards for our most highly-ranked graduate students from \$5000 to \$10,000.
- 1.5 Provide opportunities for our funded students, faculty and other experts to present their research at our eighteenth annual Wisconsin Space Conference, to be hosted in FY 2008 by one of our newer members, the two-year University of Wisconsin-Fox Valley.
- 1.6 Create and strengthen partnerships between the WSGC and other Space Grants in the Great Midwestern Region by administering and helping to fund the 2008 multi-state remote sensing proposal opportunity to be submitted to a larger organization such as NSF.
- 1.7 Continue to press our Affiliate Members to build relationships with the Minority Advancement offices at their campuses, and nurture the relationships that are already growing.
- 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.

*Metrics: Start a science-driven facet of our balloon program, with a first flight goal of 2009. Maintain the number of Affiliate Members represented in our Higher Education programs. Complete administration of the 2008 multi-state opportunity. Have 100% compliance with all academic affiliates in submitting diversity plans. Identify at least three funding agencies for a Tribal College Rocket Consortium project. Bring in at least one new Affiliate member.*

### **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 in designing a new Rocket/Balloon research course to target underrepresented groups for recruitment and retention into aerospace fields, specifically Native American students served by CMN. This program will involve Higher Education and Precollege students in a synergistic "feeder" program that develops the research strength of the College in Sustainable Development. As such, it also crosses over to Outcome 1.

2.2 Explore a partnership with SLI and Rockets for Schools in a High School Rockets program that injects standards-based STEM curriculum into the already-successful Rockets for Schools spring rocket launch and closes the pipeline gap between students served by Rockets for Schools and those served by our Rocket Competition.

2.3. Continue to nurture our strong relationships with our two minority-serving Affiliate Members, the College of Menominee Nation (CMN) and Alverno College (a women's college with a large African-American student population).

*Metrics: Design a new CMN-based Rocket/Balloon research program, with a potential starting date of summer 2009. Have a High School Rockets program outline ready to test at the 2009 rocket launch.*

## **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 Discontinue the Education Liaison position. In its place, explore a new initiative to recruit high school students and rising freshman, the High School Partners program. This program would bring interested high schools into a working partnership with the WSGC, to support space science-focused STEM education and to recruit high-quality students into WSGC programs. This objective also crosses over to Outcome 2.

*Metrics: Support only those Outreach programs with an educator training focus. Recruit three high schools for a pilot High School Partners program.*

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

### **Outcome 1**

- Our Student Satellite Program is a multi-pronged effort to increase the number of aerospace-experienced scientists and engineers in Wisconsin. It includes our annual Rocket Competition and the Elijah High-Altitude Balloon program, both open to all students attending member institutions. This year we have added a third prong, a science-driven instrument development program, in which students conceptualize, design, build, fly and analyze data from a multispectral imager flown on our Elijah High-Altitude Balloon.

- Rocket Competition non-engineering award: This award is part of the annual Rocket Competition. All students attending member institutions are eligible to form teams that compete to meet an engineering challenge that changes every year. The goal of this non-engineering category and prize is to draw more non-engineering majors into the program. This year, 3 teams chose this option. The winning team was the Winter Hawk Clan from CMN.

### **Outcome 2**

- Directed workshops: This year the WSGC instituted two workshops. The first, the keystone of our High School Partners program, is designed to provide students with a bridge between opportunities available as secondary students and as undergraduates. The second, affectionately known as "So You Want to Work for NASA?", gives undergraduates the tools they need to discover how their interests match with individual NASA-funded researchers or those of NASA Centers.

### **Outcome 3**

- High School Partnership program: In the place of the Education Liaison position that we were struggling to fund, this year we began a new initiative to recruit high school students and rising freshman, the High School Partners program. The goal of this program is to bring interested high schools into a working partnership with the WSGC, to support space science-focused STEM education in Wisconsin high schools.

## **PROGRAM ACCOMPLISHMENTS**

### **Outcome 1 associated goals and objectives**

**Objective 1.1 accomplishments.** As noted above, we have broadened workforce opportunities for science majors by instituting a science-focused and science-driven balloon project, the Instrument Development Program. We have a

core group of four science Co-Investigators from three different affiliate members, and four engineering students as our engineering team. Our first joint meeting to map out the schedule for construction is slated for February and we are currently on-track for a 2009 launch date (our metric for this objective).

Objective 1.2 accomplishments. Our Student Satellite programs (described above) continue to run smoothly, providing students throughout the consortium with opportunities to design, build and fly their own rocket or near-space balloon payloads. In FY08 we funded 11 students from 4 affiliate members as members of our Elijah High-Altitude Balloon launch and payload teams, and 15 students in 4 teams from 3 affiliates as part of the Rocket Competition.

Objective 1.3 accomplishments. In FY08 we funded 2 NASA Academy students, 2 NASA interns and 2 Reduced Gravity experiments.

Objective 1.4 accomplishments. This year increased funding allowed us to implement this objective as we were able to award an \$8,000 fellowship to a UW-Madison student, Valerie Bennington.

Objective 1.5 accomplishments. Every year the WSGC runs the Wisconsin Space Conference, a two-day conference co-hosted by one or more Affiliate Members. In FY 2008 the 18th annual Wisconsin Space Conference was hosted by UW-Fox Valley (Menasha, WI), a two-year college and recently-added member. 29 presentations were made by 31 undergraduate students, 12 graduate students, and 2 faculty members on their research supported by WSGC grants and 10 presentations were made by K-12 and general outreach and minority outreach program grant recipients. We also ran an undergraduate student workshop in conjunction with the conference, as described above.

Objective 1.6 accomplishments. The Great Midwestern Space Grants have debated for the last 3-4 years the concept of holding a regional workshop (rather than our traditional regional conference), one that would focus on a specific challenge facing our region. As the Regional Director, the WSGC Director conducted such a workshop at Purdue University in September 2007, hosted by the Indiana Space Grant Consortium. The goal of this workshop and subsequent call for proposals was to support and enhance the study of land use in the Midwest using remote sensing. The objective was to fund one or more one-year pilot projects that address one or more of the following major themes in land use: (1) land use patterns; (2) water quality and availability; and (3) the health and sustainability of agricultural systems. The opportunity was opened to organizations that are members of any of the eight Space Grant Consortia in the Great Midwestern Region (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin). Projects were required to include meaningful collaboration among Space Grant affiliate institutions and partners from multiple states in the region. Funded student participation was also mandatory. Over the past two years, the Great Midwestern Space Grant Consortium has funded and run a grant competition that was the product of this workshop. The awardee (Dr. Okan Ersoy of Purdue University) presented at our Great Midwestern Space Grant Consortium conference in October of 2008; he plans to deliver his final report at the Space Grant Directors' meeting in the fall of 2009.

Objective 1.7 accomplishments. Last year it was made a requirement for each Institutional Representative of an academic institution to provide the WSGC with a summary of the demographics of their institution and a diversity plan to enhance the recruitment and retention of underrepresented students into our programs. Our goal this fiscal year was to have 100% compliance with all academic affiliates submitting diversity plans. We are currently at 30%. We will continue our efforts and revise our objective for the next fiscal year.

Objective 1.8 accomplishments. The College of Menominee Nation has expressed great interest in piloting a Tribal College Rocket Consortium, with an annual competition modeled on the one held by the WSGC each year. We have been working to find and secure funding for such a project. We have technically met our metric for this objective, in that we have approached at least three agencies as potential funding sources. However, we have had limited success in securing funds, because of the current poor state of the economy.

Objective 1.9 accomplishments. We have reached our stated goal by adding 4 new members this fiscal year. We are pleased to welcome the Experimental Aircraft Association (EAA) and St. Norbert College, UW-River Falls and UW-Stout to the WSGC family.

#### ***Other Progress and Accomplishments under Outcome 1***

**WSGC Scholarships, Undergraduate Research Awards, and Fellowship Program:** In FY 2008 we made awards to 32 students within these three programs with NASA funding. Of those awards, 14 went to Undergraduate Scholars, 8 to Undergraduate Research Awards and 10 to Graduate Fellows. Additionally, we awarded the Dr. Laurel Salton Clark Memorial Graduate Fellowship to a student from UW-Madison. Member institutions are supporting 11 additional undergraduate students with internal funding. Students have not finished their funding year, with final reports and papers due in May. Students also present their findings at this summer's Wisconsin Space Conference to be held at UW-Whitewater in August 13-14, 2009.

**Research Infrastructure Program:** Six Research Seed 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 observing nights to members. We have been able to fund a professor for 1-3 observing nights per year. Our Research Seed Grant program, as is the case with our Higher Education Program, funds faculty or staff members. If their budget includes students (as it often does in this program), the faculty or staff member selects the student after receiving funding.

**Higher Education Incentive Grants:** Four 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 space science, aerospace engineering, or any other space-related discipline.

**Industry Awards:** We have partnered with our Industry members to fund five student interns. Original funding is a 1:1 match, but many times students continue as interns or are hired at the industries after their initial intern period is over. In addition, three industry staff members were funded to receive additional training important to stay abreast of important changes in the high-technology field of aerospace engineering.

### **Outcome 2 associated goals and objectives**

**Objective 2.1 accomplishments.** These have been addressed in the section "Improvements Made in the Past Year" below. The associated program is still in the development stage.

**Objective 2.2 accomplishments.** The pilot program was set in motion, but was released late and no teams signed up to participate. The program is ready to run starting in the Fall of 2009 for a 2010 launch. This includes partnerships with the NASA Student Launch Initiative and Wisconsin Rockets for Schools.

**Objective 2.3 accomplishments.** The various programs we currently support or are pursuing with these colleges, as noted in other sections herein, bears testament to our continuing active partnership with our minority-serving institutions.

#### ***Other Progress and Accomplishments under Outcome 2***

**Special Initiatives program:** In addition to the unique award made to CMN under this program, five other awards were made to faculty, educators or other individuals or groups to develop and conduct innovative programs that directly target groups traditionally underserved in aerospace. Though any member or group may propose to this program, it tends to draw projects that serve predominantly precollege groups. This program does not usually fund higher education students directly, though we often fund programs proposed by higher education students.

### **Outcome 3 associated goals and objectives**

**Objective 3.1 accomplishments.** Our main thrust for Outcome 3 continues to be our successful Aerospace Outreach program. This 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. As proposed last year, we now place our emphasis on projects that focus on educators, both before and during their service.

**Objective 3.2 accomplishments.** As outlined in the section "Program Benefit to Outcomes", we piloted the High School Partners (HSP) program this year. We chose to recruit only one school for our HSP program, rather than the three stated in our proposal, because of the number of other programs we piloted this fiscal year. We intend to add two more and adjust, based on the resulting change in workload on the Director and staff.

### **PROGRAM CONTRIBUTIONS TO PART MEASURES**

- Longitudinal Tracking: Total awards: Fellowship/Scholarship = 106; Higher Education/Research Infrastructure – Because we do not fund students directly we do not report on these statistics; nine of the total awards represents underrepresented minority F/S funding. One student has accepted a STEM position in an aerospace industry, while 14 have graduated and are pursuing advanced STEM degrees.
- Course Development: We have four new or revised courses targeted at the STEM skills needed by NASA that are developed with NASA support.
- Matching Funds: Intended match is \$573,490 plus match for individual programs. Intended match is used rather than actual match because the FY does not end until March 31, 2009 and actual match will not be collected until that time.
- 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). Interactions with Alverno College include the funding of one Higher Education grant and, as in years past, participation in our Rocket Competition. Interactions with CMN include continued participation in our Rocket

Competition, support of the technology courses developed at CMN that support the participation of students in the Rocket Competition, and a recent special initiatives award to better solidify these courses and give them permanence in the curriculum. This award additionally supports the outreach work of students enrolled in these courses in K-12 tribal schools. Most importantly, interaction with our minority-serving institutions can be summarized as an ongoing working partnership in which the institutions and the WSGC communicate as equals to define and meet the needs of the underserved communities to which we are responsible.

**IMPROVEMENTS MADE IN THE PAST YEAR**

The most significant improvements from the past year can be summarized as those changes designed to shepherd students from secondary to higher education to graduate and career paths, keeping them in the NASA pipeline. This collection of changes thus crosses all three outcomes. Four pilot projects under this umbrella were begun this fiscal year: the High School Partners project, the High School Rocket project, the Special Initiatives award to CMN for a Rocket/Balloon research course, and the bridging workshops discussed above.

As reported in our FY 09 proposal, our intent is not to turn each of these programs into a permanently-funded, full-blown Program. Instead, we intend to use the momentum gained from our strategic planning sessions and our increased funding level to pursue several new directives born from our planning discussions. Our expectation is that one or more of these pilot programs will grow into the kind of powerful, long-term programs that address Wisconsin's needs and answers NASA's Education Outcomes.

**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-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
KT Engineering	Industry	Aerospace
Orbital Technologies Corporation	Industry	Aerospace
PLANET LLC	Industry	Aerospace
Space Explorers, Inc.	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 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.*