

**Wyoming NASA Space Grant Consortium**  
**University of Wyoming**  
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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 Wyoming NASA Space Grant Consortium is a Capability Enhancement Consortium funded at a level of \$590,000 for fiscal year 2009.

**PROGRAM GOALS**

***Fellowship Program***

**Goal:** Improve opportunities for research experience and internships for graduate and undergraduate students. **Objectives:** Get students involved in actual research projects; build partnerships and improve communication among academic affiliates; maintain effective communication among students, researchers, advisors and SG staff; improve interactions between NASA centers, industry and students.

**Goal:** Encourage and retain college students in STEM majors. **Objectives:** Expose students to available SG opportunities; encourage students studying STEM fields at multiple stages in their education.

**Goal:** Maintain diversity in fellowship/scholarship programs to reflect the diversity demographics of enrolled higher education students in the state of Wyoming (7.3% total minority student enrollment). **Objectives:** Increase awareness of SG opportunities to minority students; provide fellowships and scholarships greater than or equal to state higher education demographics (7.3% in Wyoming).

***Higher Education***

**Goal:** Increase the number of quality applications for competitive higher education programs.

**Objectives:** Publicize and promote available opportunities; improve the quality of proposals submitted.

**Goal:** Increase the quality of STEM education. **Objective:** Increase the quality of curriculum offerings at the University of Wyoming (UW) and community colleges.

**Goal:** Achieve a level of diversity in SG programs that reflects the diversity demographics of Wyoming.

**Objectives:** Offer research infrastructure and higher education faculty grants at a level greater than or equal to institutional percentage; increase awareness of SG opportunities to minority students (this overlaps with the objectives under Fellowship/Scholarships); develop a relationship with one of the Minority Serving Institutions that the UW is affiliated with, which includes four HBCU's.

***Research Infrastructure***

**Goal:** Increase the impact of research infrastructure programs. **Objectives:** Expose researchers to available SG opportunities; expose researchers to external NASA opportunities; offer assistance in writing grant proposals.

**Goal:** Build partnerships between industry and academia. **Objective:** Identify partnership opportunities.

**Goal:** Achieve a level of diversity in SG programs that reflects the diversity demographics of Wyoming.

**Objective:** Offer research infrastructure and higher education faculty grants at a level greater than or equal to institutional percentage.

### *Precollege*

**Goal:** Stimulate interest in STEM careers. **Objectives:** Offer workshops to K-12 teachers; promote NASA programs to students and teachers; provide opportunities for educational programming focusing on STEM disciplines.

### *General Public*

**Goal:** To improve public support of science education and research (this goal crosscuts and combines programs from both our General Public and External Relations categories). **Objectives:** Improve use of media in promoting WSGC events and programs; increase visibility at public events; expand interactive space science exhibits at public locations – most notably libraries and museums.

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

### *OUTCOME 1*

**Graduate Research Fellowships-** For the 2009 budget year, six graduate fellowships were awarded.

**Undergraduate Research Fellowships-** We funded a total of 21 undergraduate research fellowships this year. Of these undergraduates, we would particularly like to highlight Joseph Reed and Heather Talbott. Joe received a Space Grant research fellowship for a second year and is very committed to his research. During lunch meetings he has shared that the Space Grant Fellowship has given him opportunities that he never would have had otherwise. Joe plans to pursue a Ph.D. partly due to his undergraduate research experience, which sparked his interest in higher education. Heather is a first generation college student. She has presented her research at national conferences and plans to continue with a graduate degree as well. Included in this total are 5 students from Winston-Salem State University (WSSU), a HBCU, who completed a summer research fellowship at UW.

**NASA Internships-** There were 5 students at NASA Centers for summer internships in 2009.

**Community College STEM Scholarships-** The number of community college student awardees in FY2009 was 51 total: 27 were women (53%) and 6 were underrepresented minority students (12%).

**Community College Transfer Scholarships-** 5 scholarships were awarded to STEM students transferring to the University of Wyoming (the only 4-year university in the state) from Wyoming community colleges.

**Faculty Education Enhancement Grants-** 4 grants were provided to support faculty members at the UW and Wyoming community colleges who wish to develop new college courses in STEM fields. Particular interest was given to interdisciplinary courses.

**Student Satellite-building Opportunities-** In 2009, our Director Paul Johnson, hosted a year-long Rocket Science class with 5 enrolled students. Students designed a rocket payload that was launched at Wallops in June 2010.

**Moonbuggy Competition Support-** 4 students from UW participated in the Moonbuggy competition this year. The Moonbuggy was constructed for their Engineering Senior Design class and UW placed in the top ten at the competition in April.

**Student Organization Support-** WSGC gave seminars during the Fall 09 and Spring 10 semester to students in the Multicultural Affairs program. Seminars surrounded opportunities in science and math.

**Minority Serving Institutions-HBCU's-** During FY2009, WSGC developed a partnership with WSSU, a HBCU, and piloted a summer research program using funds from the no-cost extension.

**Faculty Research Initiation Grants-** 5 grants were awarded to faculty at the university or community college level to conduct new research.

**UW Undergraduate Research Day-** We co-sponsored this campus-wide event held in April 2009 to showcase undergraduate research done at the UW and Wyoming community colleges. Most of our Undergraduate Research Fellows presented their research at the event; 247 students presented in total.

**Speaker Series-** In 2009 we sponsored a research colloquium at the UW Department of Physics & Astronomy. Barbara Whitney from the Space Science Institute in Boulder, CO was the invited speaker.

### *OUTCOME 2*

**Teacher Educational Resources-** Space trunks are shipped around the state and are self-contained educational resources for teachers.

**Astro Camps-** We support the Wyoming AstroCamp which is a residential camp held at UW for students completing 6<sup>th</sup>-8<sup>th</sup> grades. This camp grew out of a NASA ROSES E/PO grant to UW astronomy faculty

Daniel Dale and Henry Kobulnicky. The goals of the program for the students are to 1. introduce them to science and science careers (through astronomy and aerospace); 2. familiarize them with the college environment while encouraging them to study STEM fields in high school and college. There is a second AstroCamp held in Casper as a collaboration between Casper College and the Casper Planetarium. Both camps have teacher professional development opportunities for pre-service and in-service middle and high school STEM teachers.

**Women in Science Conferences-** In May 2009, Wyoming NASA Space Grant hosted the tenth annual Women in Science Conference at the UW campus. The conference is designed to increase interest in science and technology careers and promote a positive image of science careers for our youth. It also provides role models for young women and gives them information about going to college.

**NASA Explorer School Collaboration-** In 2009 Arapahoe School in Arapahoe, WY was the explorer school.

**Robotics Competition Support-** In 2009, WSGC supported a team from Casper, WY.

**State Science Fair-** WSGC supports science fair and provides awards to aerospace related projects.

**NASA Educator Resource Center-** Currently, we are improving and developing the WY NASA ERC, so it can be used as a resource for teachers around the state.

### ***OUTCOME 3***

**StarDate Radio Show-** Sponsorship of the public radio program “StarDate,” produced by the University of Texas Observatory, continues to be our most successful method of increasing visibility and reaching the public across the whole state. All of our Fellowship, Grant, Scholarship, and other programs are advertised statewide as part of this underwriting.

**Newsletter/Website-** Summary of programs and awards distributed electronically.

**Museum/Library/Planetarium Education-** In 2009, funding was provided to the F.E. Warren Air Force Base ICBM and Heritage Museum to produce ICBM educational handouts.

## **PROGRAM ACCOMPLISHMENTS**

### ***OUTCOME 1***

**Goal:** Improve opportunities for research experience and internships for graduate/undergraduate students.

- 21 undergraduate students were funded to work on research projects through our Undergraduate Research Fellowship Program (plus 2 from NASA EPSCoR). Six graduate students were given graduate assistant appointments to work on research projects under our Graduate Research Fellowship Program.
- Northwest College will be added as an affiliate in 2010. Have maintained regular monthly contact with affiliates, including two consortium strategic planning meetings, conference calls, and numerous e-mails.
- Regular summer and academic year meetings held with 2009 undergraduate fellows. Meetings held with transfer scholarship recipients (5 students). Individual meetings held with graduate fellows (6 SG funded).
- Four programs widely advertised (NASA Academy, USRP, JPL, and ESMD internships). On request, WSGC staff will read over internship applications for students – several students take advantage of this every year. We had three Space Grant student interns at JPL during summer 2009, one at Glenn, and one at the Goddard Academy. Four student internships were funded through the ESMD grant at local industry (one of whom started grad school at UW in the fall).

**Goal:** Encourage and retain college students in STEM majors.

- Information was distributed to encourage new students to apply in the student newspaper, e-mails, website, public radio announcements, posters, and career fairs.
- One FY2009 undergraduate research fellow previously received an undergraduate fellowship in our FY2008 competition. One of our graduate research fellows previously received an undergraduate research fellowship in FY2008 and one helped with Wyoming AstroCamp in FY2008. Lori Sandberg participated in both a NASA internship and in the Moonbuggy team. Chris MacLellan participated in both a NASA internship and an undergraduate research fellowship. One of our 2009 NASA internship recipients participated in a NASA internship in FY2008. One FY2009 CC Transfer Scholarship recipient previously received a CC STEM Scholarship.

**Goal:** Maintain diversity in fellowship/scholarship programs to reflect the diversity demographics of enrolled higher education students in the state of Wyoming (7.3% total minority student enrollment).

- The Office of Multicultural Affairs routinely publicizes our opportunities in their newsletter and we have started a seminar series through their office. We have attempted to contact general minority student organizations to encourage them to consider STEM speakers, activities, and to publicize our opportunities, however we have received minimal response.
- Out of 88 recipients, 38 were female (43%) and 14 underrepresented students have received awards (including one disabled student) or 16% of the total awards (15% of all awards considering ethnic minority students only, 1% considering only disabled students).
- Of the 20 Faculty Education and Research grant proposals we received, 4 were from female faculty members (20%), 3 were Asian (15%), and one was Jewish (5%). Of the nine recipients of the Faculty Education and Research grants there was 1 female faculty member (11%), 2 Asian faculty members (22%), and 2 community college faculty members (22%).

**Goal:** Increase the impact of research infrastructure programs.

- Research grant opportunities were publicized through a variety of means, including: e-mail, webpage, posters, and public radio announcements. Nine proposals were received in our FY2009 competition, 5 awards were made.
- NASA Research Opportunities were publicized as we received them.
- Office staff offers assistance with proposal writing for national grants. In FY2010 funding for proposal writing seminars will be discontinued because it is not used widely. Travel grants to scientific conferences will replace this.

**Goal:** Build partnerships between industry and academia.

- We have had success in arranging ESMD internships with a small Laramie-based aerospace company, Firehole Technologies, Inc. We hope to be able to involve them in future Space Grant programs, and possibly join as an industry affiliate.

**Goal:** Increase the number of quality applications for competitive higher education programs.

- WSGC and NASA funding opportunities publicized through the website and affiliate representatives. We continue to explore matching and funding sources. Northwest College will become a full affiliate member in FY2010. With this addition, all community colleges in Wyoming will be part of the WSGC.
- Information sessions were held to give proposal-writing tips. Some pre-review of proposals was offered, specifically in relation to budgetary requirements (where the most difficulties seem to be encountered by proposers).

**Goal:** Increase the quality of STEM education.

- Four education development grants were awarded, including one to a faculty member at a community college. With this funding 2 new courses were created and 4 were revamped.

## ***OUTCOME 2***

**Goal:** Stimulate interest in STEM careers.

- We presented workshops at the 2010 Wyoming Science Teacher's Conference on the opportunities available through WSGC and NASA. Several teachers attended the workshops, and many more stopped by our display to talk about our programs. Opportunities have also been publicized through our newsletter, website, posters, by teacher/researcher e-mail list serves, at the State Science Fair, through affiliates, WSGC Multicultural Affairs seminars, and at Women in Science Conferences.
- Materials and handouts distributed, numbers not recorded. Information on the NASA Educator Resource Center was distributed.
- Attendance at the Laramie Women in Science event was 332 students (16% underrepresented minorities; 93% women) and 48 teachers. Riverton also held a Women in Science event with approximately 300 students and teachers (estimated 25% ethnically underrepresented).

### **OUTCOME 3**

**Goal:** To improve public support of science education and research (this goal crosscuts and combines programs from both our General Public and External Relations categories).

- Number of contacts through media is stable.
- WSGC has a presence at many public events, including: State Science Fair, career fairs, teacher conferences/workshops, Women in Science Conferences, and seminars through the UW Multicultural Affairs Office.

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

- **Student Data and Longitudinal Tracking:** Total awards = 116 (FY2006-2009); Fellowship/Scholarship = 103, Higher Education/Research Infrastructure = 13; 12 of the total awards represent underrepresented minority (10) or disabled (2) F/S funding. Two students have accepted STEM positions in an aerospace industry, 28 students have accepted STEM positions in non-aerospace fields (including academic fields), while 25 have graduated and are pursuing advanced STEM degrees.
- **Course Development:** During 2009, we funded four Education Enhancement Grants to faculty developing new STEM courses.
- **Matching Funds:** Currently, WSGC has more than met the required \$440,000 in matching funds. The departmental match contribution is currently close to \$53,000 and is generally our hardest category to collect. As for the remainder of the categories, graduate tuition, affiliate and nonprofit matches, we are right on track or have exceeded the required amounts. Both of the indirect costs are also within normal ranges. Based on the current amount of match collected, \$470,995, WSGC has collected the required balance of matching funds for FY2009.
- **Minority-Serving Institutions:** There are no minority serving institutions within the state, so we have started a partnership with WSSU in North Carolina, a HBCU. During FY2009 we developed relationships with key personnel at the college and using funds from our no-cost extension, we piloted a summer undergraduate research program between WSSU and UW.

### **IMPROVEMENTS MADE IN THE PAST YEAR**

We have continued to develop our ground-up management strategy and we will expand our network by adding another affiliate community college to the consortium in Fall 2010. Half-way through the year, we rearranged our main-office staff to ensure future continuity and growth within our office by adding a half-time Project Coordinator to the staff. This year we began communications with Winston-Salem State University (a HBCU) and piloted a summer student research program, which will enable us to partner with a Minority Serving Institution. We have also revamped the NASA ERC facility at UW with the help of their staff to provide more NASA materials to K-12 teachers in the state. Additionally, Wyoming was selected as one of four states to receive a 2010 Summer of Innovation grant. With this opportunity we provided wind energy science camps for middle school students and teachers at 10 sites around the state of Wyoming that were very successful.

### **PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION**

- **University of Wyoming:** 4-year university. Location of the WSGC offices. Involved in Undergraduate and Graduate Fellowships, Faculty Research and Education Grants, NASA internships, and community college transfer scholarships;
- **Casper College:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Central Wyoming College:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Eastern Wyoming College:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.

- **Laramie County Community College – Laramie County Campus:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Laramie County Community College – Albany County Campus:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Northern Wyoming Community College District – Sheridan College:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Northern Wyoming Community College District – Gillette College:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Western Wyoming Community College:** 2-year community college. Involved in Undergraduate Fellowships, Faculty Research and Education Grants, community college transfer scholarships, and offer locally-run community college STEM scholarships.
- **Embry-Riddle Aeronautical University:** military college, offers some undergraduate classes and some master’s level classes. Involved in Faculty Research and Education Grants.
- **90<sup>th</sup> Space Wing, F.E. Warren Air Force Base:** air force command located in Wyoming, includes the Inter-Continental Ballistic Missile Museum and interest in rocketry informal education programs.
- **Wickman Spacecraft and Propulsion, Co.:** industry affiliate, they design and produce small solid rocket motors used in some defense missiles and other satellite programs.
- **Casper Planetarium:** informal education affiliate, associated with the K-12 school district in Casper, WY, hold astronomy events for the general public, workshops for teachers and students.