

Oregon Space Grant Consortium  
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Consortium URL: <http://spacegrant.oregonstate.edu>  
Grant Number: NNX10AK68H

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

## PROGRAM GOALS

The Oregon Space Grant Consortium (OSGC) focuses on interdisciplinary and inter-institutional collaborations among the OSGC member institutions to strengthen the statewide STEM-based educational infrastructure and increase science literacy for Oregon students with an emphasis on authentic, hands-on student/mentor projects. OSGC relies on the strength of its community college, university, and informal education partners to provide a diverse pool of students, educators, researchers, and administrators to sustain a Consortium that continually and effectively contributes to the National Space Grant Program.

Oregon Space Grant's Diversity Plan goals include the following: 1) Maintain diverse Consortium management, members, and projects; 2) Award undergraduate scholarships to underrepresented minorities congruent with the state demographics of 12.9%; 3) Increase female participation in the scholarship program applicant pool by 5% from FY11.

Scholarship/Fellowship Program goals include: 1) Administer the OSGC scholarship/fellowship call and payment processing of the awards; 2) Competitively make awards for the Undergraduate Scholarship Awards Program congruent with the state demographics of 12.9% of underrepresented minorities in the STEM disciplines; 3) Maintain up to 5 graduate fellowship awards; 3) Increase female participation in the FY11-12 Scholarships Program applicant pool by 5% over FY09.

Research Infrastructure goals: 1) Administer the OSGC Faculty Research Award Program call and award at least two faculty research grants with an emphasis on hands-on authentic science inquiry with at least one awarded to a female and/or underrepresented minority; 2) Host the annual OSGC Student Symposium to highlight OSGC-supported student research projects.

Higher Education goals: 1) Provide support for two pre-service educators who are working towards STEM teaching certification at an OSGC affiliate institution; 2) As part of the Undergraduate Research Award Program, support up to six awards for university teams participating in hands-on, STEM based research projects leading to participation in national and/or international competitions. Potential projects include but are not limited to the NASA Great Moonbuggy Race, NASA University Launch Initiative, International Aerial Robotics Competition, NASA Lunabotics Mining Competition, Mars Society University Rover Challenge, NASA Microgravity University, and the SEDS High Power Rocketry Competition. Teams are encouraged to conduct K-12 outreach activities associated with their research projects; 3) Award one STEM Course Development Award to an OSGC affiliate faculty to encourage development of interdisciplinary courses designed around NASA research areas of interest as defined by the Mission Directorates; 5) Provide web hosting and promotion of Volcano World, an online volcano information resource for students and educators; 6) Disseminate information and provide financial support for NASA center internship and academy opportunities with at least one award provided to a female or underrepresented minority student.

Pre-College Program goals: 1) Administer the call for the Informal Education Awards Program for institutions providing informal educational opportunities to the pre-college community; 2) Disseminate information for teacher professional development opportunities that incorporate hands-on, science inquiry and award at least one opportunity to an in-service STEM educator.

Public Outreach Program goal: 1) Disseminate NASA material, resources, and professional development opportunities via the OSGC website, the online educator blog, and via social media including Facebook, Twitter, Pinterest, Dig, LinkedIn, and Google +.

Consortium Management FY2012 goals: 1) Host the OSGC Annual Affiliate Meeting at The Salem Municipal Airport in Salem, OR in September 2012; 2) Attend the Western Regional Meeting and Spring National Council of Space Grant Directors Meeting; 4) Disseminate information and opportunities from NASA Headquarters and the National Space Grant Program network directly to affiliate representatives; 5) Maintain the OSGC website with current OSGC and NASA program information, research and education opportunity announcements, resources for students and educators, and other general OSGC and NASA news and updates; 6) Make annual affiliate site visits as permitted; 7) Complete NASA contract reporting in a timely manner; 8) Provide contact information for OSGC student awardees for the longitudinal tracking program.

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

Student comments gathered through longitudinal tracking are below:

The Oregon space grant has helped me work towards my goals of transferring to a four year institution and eventually attaining a PhD in materials chemistry. (Jordan Blaser-Mohrhardt - on 07/03/12, 2011 Community College Scholarship, Lane Community College - Math and Science Tutor). This opportunity is linked to Outcome 1 and 2 by contributing directly to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals and by offering a student a progression of educational opportunities in the STEM disciplines.

The Undergraduate Student Research Program allowed myself and several other students the opportunity to design and build a Martian rover vehicle and an underwater research vehicle and to gain the experience of working on a team. I have personally gained experience in leadership, project management, and financial responsibility as the team lead of the underwater research vehicle project. (Raven Dorr - on 04/05/12, 2010 OSU Robotics Team, 2012 OSU ROV team, Dynamic Robotics Laboratory, Oregon State University - CAD/CAM Designer). This opportunity is linked to Outcome 1 and 2 by contributing directly to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals and by offering a student a progression of educational opportunities in the STEM disciplines.

Participation in the Space Grant program has introduced me to many fellow interns who likely will be my future colleagues in an aerospace position. I have made many important contacts with members of the spacecraft navigation and science communities at JPL. Through my two NASA internship experiences, I have gained a thorough understanding of the development of the scientific goals of a future mission as well as the navigation operations of a current mission. These experiences likely were instrumental in my acceptance into the Boston University Astronomy Ph.D. program. These experiences exposed me to research and work in high-energy astrophysics and orbit determination which I am excited to pursue for my career. (Mason Keck - on 07/21/12, 2012 JPL Internship, NASA Jet Propulsion Laboratory - Summer Intern). This opportunity is linked to Outcome 1 and 2 by contributing directly to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals and by offering a student a progression of educational opportunities in the STEM disciplines.

## PROGRAM ACCOMPLISHMENTS

Diversity Plan: 1) Maintained diverse Consortium management, members, and projects; 2) Awarded 17% internship opportunities to underrepresented minorities in excess of the state demographics of 12.9%; 3) 42% of internship opportunities awarded to female applicants, up from 15% female interns in FY11.

Scholarship/Fellowship Program: Effective March 2013, OSGC has implemented a new online application and review system hosted by Education Programs Support Services. The online system will streamline the application, review, and processing components of the scholarship program by eliminating the inherent duplications that were the result of

the previous paper-based system and will provide a safe, online submission hub for information transfer. A benefit of the conversion is the overall reduction of costs to administer the scholarship/fellowship program, thus allowing a transfer of administrative support to the deepening and expanding of OSGC's linkage of strategic partnerships between NASA related STEM formal and informal education. Expenditure of FY11-12 scholarship funds was delayed as a result of the new application system and both FY11-12 and FY12-13 scholarship funds will be awarded simultaneously and be reported in the next reporting cycle.

Research Infrastructure: 1) Completed the final phase of early career support under the OSGC Faculty Research Award Program for Dr. Vinod Narayanan, Oregon State University, who through previous Space Grant support has focused his research into the area of microgravity assisted fluid and heat transfer. His work has received funding from the NASA Office of the Chief Technologist and involves collaboration with faculty from Auburn University, a member of the Alabama Space Grant Consortium; 2) Continued second-year funding through the Faculty Research Award Program with an emphasis on interdisciplinary collaborations to Dr. Jack Higginbotham, Oregon State University, science project "The Effects of Cosmic Ray Radiation Induced Cataract Formation in Zebra Fish"; 3) Hosted the OSGC Student Symposium to highlight OSGC-supported student research opportunities. Twenty-three students participated in a poster session and made project presentations to an audience of students, faculty, media, and general public with an approximate attendance of sixty. Research Infrastructure accomplishments relate to NASA's Education Priorities and current areas of emphasis through hands-on student experiences in STEM disciplines, environmental science and global climate change research, diversity of institutions, faculty, and student participants, and support of innovative research infrastructure for early career faculty to focus on NASA priorities. (Outcome 1)

Higher Education: 1) Funded two pre-service STEM education students in collaboration with the Increasing Diversity in Earth Sciences (IDES) NSF program; 2) Supported the following four team projects under the Undergraduate Research Program: a) OSU Mars Rover Team; b) OSU Robotics Autonomous Aerial Robotics Team; c) The Oregon State Space Society Supersonic Rocketry Team; and d) OSU AIAA chapter; 3) Supported 15 students to participate in 2013 NASA Academies or NASA Center student internships of which 8 were female/underrepresented; 5) Provided support to OSU physics department for development and implementation of space studies course development project and mentorship of OSU Pico Satellite Team. Higher Education accomplishments relate to NASA's Education Priorities and current areas of emphasis by utilizing hands-on student experiences and engagement with community colleges, by promoting environmental science and global climate change research, and by supporting diversity of institutions, faculty, and student participants. (Outcome 1)

Pre-College Education: 1) Provided support for West Salem High School to participate in the Student Spaceflight Experiments Program (SSEP) in collaboration with NanoRacks to launch a student-designed payload to the International Space Station; 2) Administered an Informal Education Award to The Museum at Warm Springs/Carol Leone/The Seeds of

Discovery Program, a collaborative program between The Museum at Warm Springs tribal museum and the Jefferson County School District; 2) Continued to provide the Educator/GPS Loaner Program to the Oregon K-12 community, supported by the NASA AESP representative; 4) Provided the Education STEM Lending Library to support GPS and NASA content curriculum integration; 5) Provided K-12 community access to the OSGC-supported Higher Education Teams to conduct outreach activities. Pre-College Education accomplishments relate to NASA's Education Priorities and current areas of emphasis through hands-on student experiences and engaging middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. (Outcome 2)

Public Outreach Programs: 1) Disseminated NASA material, information, resources, and professional development opportunities via the OSGC website, educator blog, social media including Facebook, Twitter, Pinterest, Dig, LinkedIn, and Google +; 2) Provided organizational and promotional support for NASA initiatives including NES and AESP; 3) Co-hosted with the OSU College of Forestry and Facility Services, the NASA Moon Tree dedication to commemorate the seeds that was taken to space by Astronaut and Oregon Smoke Jumper Stuart Roosa, as part of the Apollo 14 lunar mission. The event was well attended by students, staff, faculty, media, and general public. Public Outreach accomplishments relate to NASA's Education Priorities and current areas of emphasis by engaging middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. (Outcome 3)

Consortium Management: 1) Hosted annual affiliate meeting at The Salem Municipal Airport in Salem, OR in September 2012 attended by OSGC affiliates, NASA initiative representatives, OSGC scholars, and OSGC administration; 2) Voted Toby Dittrich, Portland Community College physics professor, to hold the 2-year term of OSGC Associate Director for the affiliates utilizing the voting process outlined in the Consortium bylaws; 3) Attended Western Regional and Spring National Council of Space Grant Directors Meeting; 4) The OSGC Director served on National Space Grant Program boards as nominated/elected; 5) The OSGC Director served as a technical reviewer for three other Space Grant Consortia; 6) The OSGC Assistant Director served on the NASA OEPM Task Force to assist with the implementation of the OEPM reporting system; 7) The OSGC Assistant Director served on the Space Grant National Distinguished Service Selection Committee; 8) Disseminated NASA information and opportunities via the OSGC website, Educator Resource Blog, and via social media resources; 9) Maintained the OSGC website and educator blog to be compliant with 508 accessibility codes; 10) Completed NASA contract reporting in a timely manner; 11) Collected demographics and information of OSGC student awardees for longitudinal tracking.

- Percentage of students whom have taken their next step and have been successfully tracked though their next step versus last year of SG support.
  - 84% for 2006
  - 88% for 2007
  - 100% for 2008

- 96% for 2009
- 100% for 2010
- 100% for 2011
- n/a for 2012 – all participants still enrolled
- 94% for 2006-2012
- 92% of students significantly supported by SG went on to next steps in STEM disciplines

Outcome #1 (employ and educate)

- 32 students took next step in FY12 (SG participation supported from FY06-FY12 funds)
  - 18 are pursuing advanced degrees in STEM disciplines
  - 2 accepted a STEM position at a NASA contractor
  - 7 accepted STEM positions in industry
  - 2 accepted STEM positions in academia
  - 3 went on to positions in non-STEM disciplines

## PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- Student Data and Longitudinal Tracking: Total awards = 48; Fellowship/Scholarship = 0, Higher Education/Research Infrastructure = 48; 0 of the total award represent underrepresented minority F/S funding. During the FY12 program year 18 students are pursuing advanced degrees in STEM disciplines, 2 accepted a STEM position at a NASA contractor, 7 accepted STEM positions in industry, 2 accepted STEM positions in academia, 3 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing while the received their Space Grant award.
- Diversity: OSGC strives to maintain a diverse Consortium management, faculty, institutions, student participants, and projects within the Consortium portfolio. Of 19 affiliate institutions, 10 are four-year institutions, 5 are community colleges, and 4 are informal education institutions. Consortium management consists of program office staff (2 females and 1 male) and affiliate representatives (2 females and 17 males). OSGC has continued to increase the number of female awardees in the Higher Education Internship program over the past two years and has been successful in making awards to underrepresented minorities congruent with or in excess of the state demographics.
- Minority-Serving Institutions: Recently, Pacific University in Forest Grove, Oregon, was designated as a minority serving institution. Strategic planning that best utilizes this MSI in underway.
- NASA Education Priorities: OSGC's program portfolio was designed specifically to focus on the current areas of emphasis of NASA's education priorities as stated in the

NASA Education Strategic Coordination Framework: A Portfolio Approach. The OSGC proposal emphasizes the following areas: 1) Authentic hands-on student experiences - OSGC increased support for student team experiences, resulting in increased significant student involvement. Teams include: a) OSU Mars Rover Team, b) OSU Robotics Autonomous Aerial Team, c) Oregon State Space Society Supersonic Rocketry Team, d) OSU AIAA Chapter. OSGC continues to promote and support student involvement in NASA Center internships and academies that provide quality, authentic, hands-on mentorship opportunities; 2) Engaging K-12 educators - OSGC's role in achieving the national objective of producing an additional 100,000 STEM teachers by 2025 is to focus efforts to a limited region of the state that is experiencing both the largest growth rate for underserved students in Oregon and the highest demand for STEM graduates to support Oregon high tech industrial growth. These efforts will build on a decade of OSGC success of using NASA inspired, hands on learning experiences to captivate students and mentors and engage STEM teachers with "real life" experiences that mold their academic curriculum. Over the past year, the foundation has been laid to form the South Metro-Salem STEM Partnership, a group of 13 regional school districts, 2 community colleges, 3 universities, 5 community programs like FIRST Robotics, Evergreen Aviation & Space Museum, and 10 technology companies including Garmin AT, Intel, Mentor Graphics, and Autodesk. OSGC will use this partnership to insure the broadest distribution of NASA content and develop the partnership's mission, organizational structure and funding streams to be self-sustaining within three years. With success this model will be replicated and scaled to different regions within Oregon; 3) Supporting innovative research infrastructure activities - in response to greater NASA emphasis on STEM teacher engagement and opening NASA related opportunities for underserved/underrepresented students, OSGC is redirecting funding and effort from the Faculty Research Award Program towards the Undergraduate Research Award Program, STEM teacher continuing engagement, STEM aerospace curriculum development, and expanded STEM student research and engagement through the development of new local strategic STEM partnerships. The Faculty Research Award Program will be focused on the mentorship component between faculty and undergraduate students, thereby increasing the student research focus.

## IMPROVEMENTS MADE IN THE PAST YEAR

The Oregon Space Grant Consortium reports the following improvements in the past year: 1) Shifted focus to higher education and research projects that offer authentic, hands-on student/mentor opportunities in the STEM disciplines by supporting more student team opportunities and requiring a mentorship component to faculty research, resulting in increased student involvement; 2) Utilized social media to increase the visibility of Space Grant leading to greater participation in national and international competitions by OSGC-supported student teams; 3) Demonstrated an increase in the percentage of students going into STEM fields as reported in the longitudinal tracking data from FY06-FY12; 4) Implementing the EPPS Application and Review system for the Scholarship and Fellowship program; 5) Started development of South Metro-Salem STEM Partnership.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

### **Higher Education Affiliate Institutions:**

- Eastern Oregon University (EOU) - Focus on teacher education. Affiliate representative: Chemistry.
- George Fox University (GFU) - Focus on liberal arts and science education. Affiliate representative: Mathematics and Physics.
- Lane Community College (LCC) Aviation Academy - Offers Flight Technology and Aviation Maintenance Technology programs and a pilot certification program. The main campus focuses on technology, continuing education, math and science. Affiliate representatives: Aviation and physics/astronomy.
- Linn Benton Community College (LBCC) - Focus on robotics, mechatronics, and pre-engineering. Affiliate Representative: Engineering.
- Oregon Institute of Technology (OIT) - Focus on technical and health related fields. Affiliate representative: Computer Systems Engineering.
- Oregon State University (OSU) - Lead Institution - Focus on engineering. Programs in mechanical and electrical engineering, radiation biology, ecology, biochemistry, oceanography, and pharmacy have been recognized nationally as top tier programs. Affiliate representative: Space Studies/science.
- Pacific University (PU) - Focus on math and science education. Affiliate representative: Science Education.
- Portland Community College Cascade Campus (PCC) - Focus on adult education. Affiliate representative: Portland Teachers Program (PTP)
- Portland Community College Rock Creek Campus (PCC) - Focus on adult education. Affiliate representative: Science and geology.
- Portland Community College Sylvania Campus (PCC) - Affiliate representative: Physics.
- Portland State University (PSU) - Drop tower research and geophysics. Affiliate representative: Geology.
- Southern Oregon University (SOU) - Focus on liberal arts including criminology, natural sciences, and environmental science. Affiliate representative: Physics.
- University of Oregon (UO) - Manages the Pine Mountain Observatory in Bend OR. Affiliate representative: Physics.
- University of Portland (UP) - Small private institution with a focus on education and engineering. Affiliate Representative: Mechanical Engineering.
- Western Oregon University (WOU) - Focus on science and math education. Affiliate representative: Physics.

### **Informal Education Affiliates:**

- Evergreen Aviation & Space Museum - aviation and space museum and aviation education programs.

- Oregon Museum of Science and Industry (OMSI) - hands-on science museum, the Oregon NASA Education Resource Center, and Science on a Sphere.
- ScienceWorks Hands-On Museum - Science center with educational programs for both students and educators including workshops, lectures, and science camps.
- The Museum at Warm Springs - Tribal museum that partners with the local school district to offer hands-on science education utilizing expertise from within the community and around the state.

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