

Maryland 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 Maryland Space Grant Consortium (MDSGC) Consortium is a Designated Consortium funded at a level of \$785,000 for fiscal year 2009.

PROGRAM GOALS

SCHOLARSHIPS AND FELLOWSHIP

GOAL I: To offer financial support to those higher education students enrolled in Maryland Institutions that wish to pursue a career in space-related STEM fields. Objective #1: The MDSG Scholarship Committee will continue to recruit qualified students for scholarships among the six degree-granting institutions in the consortium, *viz.*, JHU, MSU, UMCP, TU, UMES, and HCC. Objective #2: The Scholarship Committee will continue to emphasize the recruitment of students from groups underrepresented in STEM disciplines. Objective #3: Continue to use the MDSGC Observatory, which is located on the roof of the Bloomberg Center for Physics & Astronomy on the Homewood campus of JHU, for student training and public outreach.

HIGHER EDUCATION

GOAL II: Provide Higher education students with opportunities to enhance their education in STEM areas and to promote their entry into aerospace related disciplines. Programs that provide relevant hands-on experience will be given high priority. Objective #1: Continue to support and enhance the MDSGC Balloon Payload Program (BPP) that provides students with access to near-space. Objective #2: Provide strong support to internships programs for undergraduate and graduate students on an ongoing basis, either through direct funding or through partnerships with organizations such as GSFC. Objective #3: Support a portfolio of programs that recruits students to STEM related studies and retains their interest to the point that it eventually carries over into employment in STEM careers in general, and especially careers needed by NASA and the aerospace community. Objective #4: Continue to develop MDSGC capabilities and

procedures to conduct longitudinal tracking of students who have received significant support from MDSGC, in order to determine the efficacy of our programs.

RESEARCH INFRASTRUCTURE

GOAL III: Support projects that provide opportunities for students to participate in aerospace-related research. Objective #1: Provide funding for programs that directly support students in gaining aerospace-related research experience. Objective #2: Ensure that research opportunities are made available to a diverse group of highly qualified students.

PRE-COLLEGE

GOAL IV: Support programs that provide substantive training to Maryland teachers that allow them to incorporate NASA-related content into effective teaching strategies. Objective #1: Facilitate the delivery of training that develops teacher's skills in the use of, and access to, earth and space science related data and discoveries, which will then inspire students to pursue careers in science, technology, engineering, and mathematics (STEM). Objective #2: Explore concepts for funding new ways of providing teacher training, including new partnering relationships and different delivery mechanisms such as distance learning or online courses. Objective #3: Provide additional opportunities beyond the current earth and space science certification program for providing current content knowledge to in-service and pre-service teachers.

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

Outcome 1: A quote (one of many responses received) from a former student fellowship recipient that was received in the 2009 longitudinal tracking process:

My participation in the Space Grant program allowed me the chance to work for a company in the aerospace world. In doing so, I was able to learn about the industry and gain professional contacts and experience, to apply the knowledge that I was gaining from my education to real world cases, and to get my foot in the door of the aerospace industry. It was also helpful in terms of being able to complete some educational requirements, in that it allowed me a topic for my honors research project. It was good experience and I'm grateful for what it has given me thus far. Not to mention, I received the John Mather Nobel Scholar award, which gave me the chance to meet John Mather. I graduated several months after completing my SAWDRIP project with Honeywell, and have begun working for MIT Lincoln Laboratory in their space systems analysis group. I strongly believe that the work that I had done under Space Grant contributed to me being offered this job. (Pratik Davé, 2008 SAWDRIP fellowship).

Outcome 1: The MDSGC Scholarship Committee awarded scholarships to 34 students in 2009 at 7 of our affiliate institutions. Of these 34, 9 were female, 15 were African-American, 2 were Hispanic, and 2 listed themselves as "other".

Outcome 2: A cohort of 8 Maryland teachers are progressing through the Earth & Space Science Certificate Program offered by the Johns Hopkins University School of Education, with support from MDSGC.

PROGRAM ACCOMPLISHMENTS

Outcome 1: MDSGC again supported the senior capstone design class in aerospace engineering at UMCP. They undertook two major new initiatives this year, the first of which was to team with the School of Earth and Space Exploration at Arizona State University to try to get a higher fidelity experience for the students. Engineers need to understand how to interact and work with scientists who frequently will be providing the high-level mission specifications. The class project for this year was an astronaut assistance rover for lunar exploration, and the Arizona State students served in the roles of science investigators, performing the mission planning roles and defining the science payloads for the rover. Some of the MDSGC money went to support this interaction. For example, the major design reviews were jointly held between UMCP and ASU. MDSGC funds paid the necessary costs to use the UMCP Distance Education system for live two-way video interactions between UMCP and ASU, as both classes presented to our group of outside reviewers (including the MDSGC Assistant Director).

The second innovation was the further emphasis on the design/build/test/evaluate portion of the class, in which they moved beyond mockups for human factors evaluation to the goal of developing a fully functional vehicle for Earth analog testing. MDSGC supported this effort. which resulted in a functional vehicle in time for the Critical Design Review.

The joint project was entered into the NASA ESMD Moontasks competition and the NASA Revolutionary Aerospace Systems Concepts - Academic Linkage (RASC-AL) space design competition. The UMCP team and their project took first place in both. For the Moontasks win, one UMCP and two ASU students were hired as summer interns for NASA groups preparing systems for the next round of Desert Research and Technology Studies (Desert RATS) analog field tests.

Outcome 1: The UMCP CanSat Team won first place in the 2009 International CanSat design competition held in Amarillo, TX. Students on this team were drawn from previously supported MDSGC programs, including the Balloon Payload Program and the Minority Serving Institutions Partnership Development program.

Outcome 1: The Balloon Payload Program set a high altitude record for amateur ballooning of 128,300 feet. The main goal of this effort was to demonstrate the effectiveness of a new low mass transmitter.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking: Total awards = 44; Fellowship/Scholarship = 41, Higher Education/Research Infrastructure = 3; 18 of the total award represent

underrepresented minority F/S funding. During the FY09 program year 2 graduated and are pursuing advanced STEM degrees, 1 accepted a STEM position at a NASA contractor, 1 accepted a position at NASA, 2 accepted STEM positions in academia, and 3 went on to non-STEM disciplines. 15% of the awardees were female and 44% were from underrepresented groups.

- **Course Development:** No new courses were established in 2009, however, continued support of the Balloon Payload Program has continued to make student launches an integral part of the freshman aerospace engineering curriculum at the University of Maryland College Park. In addition, MDSGC has continued to support the senior capstone design course in aerospace engineering (ENAE 483/484) at UMCP (see accomplishment above for some details).
- **Matching Funds:** In 2009 MDSGC received \$815,781 in non-federal matching funds.
- **Minority-Serving Institutions:** Two of the ten members of MDSGC are HBCUs. They are both fully engaged members of MDSGC, as are all affiliates. The University of Maryland Eastern Shore successfully proposed two research infrastructures projects, one being the ongoing AIRSPACES program and another using robotic water craft to sample water pollution in the Chesapeake Bay. Morgan State University continued to be a regular contributor to the Balloon Payload Program.

IMPROVEMENTS MADE IN THE PAST YEAR

A new affiliate member was brought on board in 2009: The University of Maryland Baltimore County. This university has strong programs in engineering and computer sciences, and substantial NASA related interests. It became a fully active member, with participation in the Program Committee, Oversight Committee, and Scholarship Committee.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Johns Hopkins University – Lead Institution
Hagerstown Community College
Johns Hopkins University Applied Physics Laboratory
Morgan State University
Space Telescope Science Institute
Towson University
United States Naval Academy
University of Maryland Baltimore County
University of Maryland College Park
University of Maryland Eastern Shore

All members are actively involved with MDSGC. Each institution has a member on the Program Committee, which reviews proposals for funding and advises the program. Each institution provides a senior staff member who serves on the Oversight Committee, which meets annually with the Director to review the program. Scholarships are provided to students at JHU, HCC, MSU, TU, UMBC, UMCP, and UMES, all of which have one or more members on the Scholarship Committee who are actively engaged in recruiting and selecting students.

MDSGC works closely with NASA GSFC on many programs, including internships such as the NASA Academy, SIP, APL, and SAWDRIP (which MDSGC supported at the program level, as well). Representatives from GSFC's Education Office participate in the Program Committee.