

Massachusetts Space Grant Consortium
Massachusetts Institute of Technology (Lead Institution)
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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 Massachusetts Space Grant Consortium (MASGC) is a Designated Consortium funded at a level of \$785,000 for fiscal year 2009.

PROGRAM GOALS

Outcome 1 Goals and Objectives: Contribution to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals.

1.1 Faculty and Research Support – Provide support to faculty, researchers and post-doctoral fellows by supporting students to work with them on research projects.

1.2 Student Support – Provide NASA competency-building education and research opportunities by way of research fellowships to the maximum number of Massachusetts students, as possible, to prepare them for employment at NASA, the aerospace industry, and higher education.

1.3 Student Involvement Higher Education – Provide opportunities for groups of post-secondary students to engage in authentic NASA-related mission-based R&D activities, by recruiting the best students from our consortium to participate in NASA programs.

1.4 Course Development – Develop and put into practice university-level academic course resources at MASGC affiliate institutions.

1.5 Targeted Institution Research and Academic Infrastructure – Leverage research funding in the state to enable institutions to conduct cutting edge research and development work for NASA.

Outcome 2 Goals and Objectives:

Attract and retain students in STEM disciplines through a progression of educational opportunities for students and teachers.

2.1 & 2.2 Educator Professional Development (short- and long-term) – Provide continuing in-service opportunities to help teachers maintain competency in STEM instruction and encourage teachers to incorporate STEM instruction in their classrooms.

2.3 Curricular Support Resources – Ensure that Massachusetts teachers and students know how to access the wealth of available NASA educational materials.

2.4 Student Involvement (K-12) – Encourage and enable students to feel a personal connection with NASA missions.

2.5 Diversity – Extend Space Grant programs and opportunities to the broadest possible cross-section of the Massachusetts

population, particularly encouraging participation by women and minorities.

Outcome 3 Goals and Objectives:

Build strategic partnerships and linkages between STEM formal and informal education providers that promotes STEM literacy and awareness of NASA’s mission.

3.1 Resources – Assist our informal education affiliates in enhancing STEM proficiency, publicizing STEM career opportunities, and educating about NASA’s mission activities.

3.2 Professional Development for Informal Education Providers –Recognize the important role played by informal educators by supporting them as we do teachers in incorporating STEM activities into their programs.

3.3 Informal Education Provider Involvement Opportunities – Help MASGC’s outreach partners present the full breadth and depth of NASA’s missions to Massachusetts informal educators.

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

OUTCOME 1

Higher education is at the top of our priorities and received the largest allocation in our budget. We awarded almost all higher education funding as fellowships, given directly to students, which avoids institutional overhead charges. Although our proposed amount for fellowships is in excess of the mandatory requirements by Space Grant, it is the wisest use of Space Grant resources, given the large higher education establishment in Massachusetts. Further, faculty, researchers and post-doctoral fellows in Massachusetts have traditionally been extremely successful in attracting NASA research funding. Therefore, MASGC has made a major policy decision not to act as an alternate source of direct NASA research funding for faculty. Instead of funding a small number of large research grants (formerly done as sub-contracts to a few MASGC affiliates), MASGC now distributes most of its research and higher education funding as small research fellowship grants to students, each of whom is sponsored by a faculty member or researcher at an affiliate institution.

This helps both faculty and students, meeting the objectives of this outcome as evidenced by a student of one of our member institutions:

The internship funded by the Space Grant gave me the opportunity to work with a great professor on a project that I really enjoyed. I have continued my research throughout the school year as my senior thesis project and I will be presenting my thesis defense on May 6. I am continuing my research this summer to prepare for a publication. Research experience, a good thesis, and a professional publication will help with my graduate school application process which will bring me one step closer to my goal of getting a Ph.D. The Space Grant funding was extremely helpful and I am grateful for the opportunities it gave me. Thank you!!!

Shaina Rogstad, Senior, UMass

MASGC continued to recruit the very best students from the state for NASA programs. On the average, MASGC has supported 3 students each year at the NASA Academies and has provided staff support every year for final academy selections. MASGC continues to make special efforts to attract minority students to these programs.

MASGC has advertised its program opportunities as widely as possible, to attract students from diverse backgrounds from all of our member institutions. The Consortium’s members include Holyoke Community College, which serves a large number of economically disadvantaged students, and Roxbury Community College, the only designated “minority-serving institution” in the state. Attracting community college students to space-related activities is challenging, because space is a field of endeavor most of the students have not thought about. Therefore, MASGC offered fellowships and a STEM seminar series to community college students, to encourage them to enter the aerospace workforce pipeline. It is, in effect, a "Scholarship for Service" program for the inner city minority population in Massachusetts.

The following are messages received from undergraduate and graduate students to evidence the impact of space grant funding in a number of ways ranging from continuing graduate research to contacts with NASA with a career in mind:

This funding enabled me to see if astronomy was really a good fit for me. I had done pure physics in my undergraduate studies, but I had developed an interest in astronomy. This program gave me the opportunity to perform some real research, and through this process, confirm my decision to pursue graduate work in astronomy. Now, I am continuing this research as a graduate student at UMass, and I am excited to one day become a professional in the field.
David Welch, Masters, UMass

With the funding provided by the Space Grant, I have been able to focus on research with additional time to attend related group and international conferences. The work performed under the grant has lead to a recently accepted Chandra archival proposal and initial publication of the work is currently in the late draft stages.
Seth Johnson, PhD, UMass

My experience in the program has motivated me to obtain a Masters in Aeronautical Engineering. I will be applying to graduate schools in the summer.
John Gabour, Senior, UMass

It allowed me to conduct a significant amount of the experimental work that was necessary for my aerospace thesis that I was unable to accomplish during the semester (due to TA responsibilities). This work, which focused on testing components of the current NASA space suit, is directly in line with my career goals of working in the human space flight industry.
Brad Holschuh, Masters, MIT

OUTCOME 2

Attract and retain students in STEM disciplines through a progression of educational opportunities for students and teachers.

In order to provide professional development and training opportunities to educators, and to equip them with the skills and knowledge to attract and retain students in STEM disciplines MASGC supported teacher development for both regular and special education teachers. MASGC conducted these workshops in partnership with our informal education and outreach affiliates: the Boston Museum of Science and the Christa McAuliffe Challenger Learning Center.

Each year, MASGC holds Space Day at the Boston Museum of Science for high school students from local and inner-city high schools. The event includes a presentation by an astronaut preceded by presentations from college students who have been funded by MASGC to work at NASA centers.

MASGC cosponsored teacher development workshops at the Perkins School for the Blind, to bring STEM and specifically aerospace-related information and material to visually handicapped students.

OUTCOME 3

Build strategic partnerships and linkages between STEM formal and informal education providers that promotes STEM literacy and awareness of NASA's mission.

In order to provide informal education support resources that use NASA themes and content to enhance participant skills and proficiency in STEM disciplines, inform participants about STEM career opportunities and communicate information to the public about NASA's mission, the consortium has developed a significant pool of qualified presenters of NASA aerospace content to interact with a large number of participants.

The consortium provided numerous opportunities to improve the competency and qualifications of STEM informal educators, enabling informal educators to effectively and accurately communicate information about NASA activities and access NASA data for programs and exhibits through Space Day and the Consortium's participation in the Massachusetts STEM Summit. To increase informal education development in the state the consortium partnered with the Boston Museum of Science (MOS) and the Christa McAuliffe Challenger Learning Center.

PROGRAM ACCOMPLISHMENTS

Specific MASGC accomplishments relating to the Outcome 1, 2 & 3 are as follows:

OUTCOME 1

- Support of 89 students from 15 academic affiliates across the state. 41% of these were female .
- Recruiting and supporting 19 students for summer internships at NASA centers and JPL.
- Supporting 17 students to present papers on their Space Grant supported research at conferences on space science and engineering.
- Holding the “Modern Space Science and Engineering” seminar series open to all member institutions of MASGC. Over 40 students attended the seminars for academic credit or as auditors.
- Co-sponsoring 12-part STEM series at the Roxbury Community College, which was attended on the average by 20 minority students to expose them to various STEM disciplines including aerospace.

OUTCOME 2

- Holding Space Day at the Boston Museum of Science, which was attended by 300 high school students. The students were addressed by Astronaut John Grunsfeld and a number of space grant interns.
- Supporting ballooning activities at the, Kuss Middle School in Fall River, previously a NASA Explorer school, by enabling them to conduct balloon launches
- The Director presented to the Perkins School for the Blind to as a prelude to the students attending NASA’s space camp.

OUTCOME 3

- Participating in the Massachusetts STEM Summit. The Co-Director serves on the planning committee for future summits.
- Partnering with NASA contractors and a number of aerospace companies to obtain industry internships for students in the summer. This is critical both for practical education for our students and for the workforce needs of the aerospace industry. MASGC advertises internship opportunities and helps recruit students. The Co-Director oversees the internships and makes visits to the industry partners during the summer to ensure that the students are having meaningful research experiences.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Longitudinal Tracking:**
Longitudinal Tracking: So far, most of our awardees are still in school. However, we have been tracking our students’ career plans to get an estimate of whether they have plans for research, education or employment in space-related areas. Of the 105 Space Grant students who have graduated, 42 are pursuing advanced STEM-related degrees, 4 are actively seeking STEM employment, 34 are employed by aerospace contractors, 3 are employed in non-aerospace STEM positions, 5 are employed by NASA or JPL, 1 is employed in K-12 STEM Academic field, 14 are working in STEM-related academic positions, and 2 are pursuing a non-STEM academic degree.
- **Course Development:**
The consortium helped develop and provided speakers and funding for a 12 part STEM series at the Roxbury Community College which was attended on the average by 30 minority students to expose them to various STEM disciplines including aerospace.
- **Matching Funds:**
Almost all of MASGC’s Higher Education and Research support takes the form of research fellowships. The total fellowship amount in our budget therefore significantly exceeded the \$238,000 referred to in the guidelines as not requiring matching. The Consortium has received \$693,897 in matching. It should be noted that for the last three years, non-federal matching funds for MASGC have exceeded our requirements by ~20%.
- **Minority-Serving Institutions:**
The Consortium’s members include Roxbury Community College, the state’s only designated “minority-serving

institution”. Attracting community college students to space-related activities is challenging, because space is a field of endeavor most of the students have not thought about. Therefore, MASGC offered fellowships and a STEM seminar series to community college students, to encourage them to enter the aerospace workforce pipeline. It is, in effect, a "Scholarship for Service" program for the inner city minority population in Massachusetts. Holyoke Community College, which serves a large number of economically disadvantaged students.

IMPROVEMENTS MADE IN THE PAST YEAR

MASGC initiated a program of special summer internships for community college students. We funded a student from Roxbury Community College to spend the summer at MIT working in the Space Systems Laboratory’s TALARIS research project. The student said that this experience convinced him to go on for a 4-year BA program.

PROGRAM PARTNERS AND ROLE IN PROJECT EXECUTION

Currently, the Massachusetts Space Grant Consortium has 17 academic affiliates and 3 institutional (outreach) affiliates, covering the entire state. Members are listed below, together with the name of each affiliate’s representative to MASGC:

Academic Affiliates

Massachusetts Institute of Technology, Lead	Professor Jeffrey Hoffman
Amherst College (Amherst)	Professor George Greenstein*
Boston University (Boston)	Professor Supriya Chakrabarti
College of the Holy Cross (Worcester)	Professor Matthew Koss
Harvard University (Cambridge)	Professor Jonathan Grindlay
Holyoke Community College (Springfield)	Professor X.Ran Duan
Mount Holyoke College (South Hadley)	Professor Darby Dyar
Northeastern University (Boston)	Professor Al Sacco
Olin College (Needham)	Professor Steve Holt
Roxbury Community College (Boston)	Dr. Kyrsis Rodriguez
Tufts University (Somerville)	Professors Marianne Vestergaard and Chris Rogers
University of Massachusetts (Amherst)	Professor Robert Hyers
University of Massachusetts (Dartmouth)	Professor Robert Fisher
Wellesley College (Wellesley)	Professor Richard French
Williams College (Williamstown)	Professor Jay Pasachoff
Worcester Polytechnic Institute (Worcester)	Professor Nikolaos Gatsonis
Worcester State College (Worcester)	Professor Sudha Swaminathan

*Professor Greenstein also represents the Five-College Astronomy Department, which in addition to Amherst, Mount Holyoke and UMass, also includes Hampshire and Smith Colleges. MASGC’s long-term goal is to make Hampshire and Smith full affiliate members in their own right, but this has not yet occurred.

Institutional Affiliates (Outreach)

Museum of Science (Boston)	Mr. Paul Fontaine
Christa McAuliffe Center (Framingham)	Dr. Mary Liscombe
Clay Center Observatory (Brookline)	Mr. Ronald Dantowitz

The representative of each organization acts as a liaison for MASGC at their institution, which includes publicizing Space Grant activities and helping to screen and nominate students and programs for MASGC funding.