

Michigan Space Grant Consortium  
University of Michigan  
Professor Alec D. Gallimore  
(734) 764-9508  
www.umich.edu/~msgc

### 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 Michigan Space Grant Consortium is a Designated Program 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. (Employ and Educate)* Higher Education: MSGC Fellowship, Internship, and Seed Grant Programs.

#### **The MSGC Fellowship Program**

**Goal:** Increase the number of proposals that the MSGC Fellowship Program receives.

**Goal:** Improve the longitudinal tracking of the MSGC Fellowship award recipients.

**Goal:** Competitively award graduate and undergraduate fellowships with demographics as specified by NASA of 16.8% underrepresented minority (Department of Education). U. S. citizenship required.

#### **The MSGC Research Seed Grant Program**

**Goal:** Improve participation in the MSGC Research Seed Grant Program across the Consortium.

**Goal:** Increase the diversity in the MSGC Research Seed Grant Program.

**Outcome 2:** *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty. (Educate and Engage)*

Elementary/Secondary Education: MSGC Higher Education, K-12 Educator Incentive, Pre-College, and Augmentation Programs.

#### **The MSGC Precollege Education, Higher Education, K-12 Educator Incentive and Augmentation Programs**

**Goal:** Increase the number of applications coming from outside of the Consortium for the MSGC Precollege Education and K-12 Educator Incentive Programs with augmentation funds available to programs that target underrepresented minorities and women.

**Goal:** Award quality programs that target underrepresented minorities and women.

**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)* Informal Education: MSGC Public Outreach and Augmentation Programs.

#### **The MSGC Public Outreach Program**

**Goal:** Increase the number of applications coming from outside of the Consortium for the MSGC Public Outreach Program with augmentation funds available to programs that target underrepresented minorities, women, and persons with disabilities.

**Goal:** Award quality programs that target underrepresented minorities and women.

**Goal:** Award quality programs that encourage Science, Technology, Engineering, and Mathematics education in informal settings (e.g., museums science centers, boy and girl scouts, etc.)

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

#### **Outcome 1:**

Bryan Reid graduated with his Ph.D. in December 2008. Prior to accepting employment at MIT's Lincoln Laboratory, he evaluated several offers from the aerospace industry, consulting firms, Federally Funded Research and Development Centers, and NASA Agencies. "All of the employment opportunities are directly related to my degree in Aerospace Engineering," says Brian. "The funding and project experience provided through the Space Grant Program helped to make this dream a reality."

"The Space Grant program provided a means for me to work as a research assistant, both as an undergraduate and graduate student," says Meghan McGee, a MTU Ph.D. candidate. "Consequently, I was exposed to the experience of full-time research, and found that I absolutely loved it! This realization helped me choose my future career because it gave me the opportunity and confidence to discover that I wanted to pursue a career in academics and research."

"As a Space Grant award recipient, I was able to perform research that enriched my background by exposing me to science and the interface between science and engineering," says Bogdan Oaida. "I believe that this experience ultimately led me to employment at NASA Jet Propulsion Laboratory as a Systems Engineer."

Brittany Drenkow is a senior in Michigan's Department of Aerospace Engineering and is graduating in May 2009. Following graduation, she will be working at Lockheed Martin on satellite systems. Over the past two years, she has been involved in research of the Nanoparticle Field Extraction Thruster and is currently leading a microgravity team as part of this effort. "The Space Grant Program has not only allowed me to further my research, but has provided me with invaluable experiences and opportunities beyond the classroom," says Brittany.

#### **Outcome 2:**

A former student illustrates how Space Grant attracts and retains students in STEM disciplines:

"I am just writing to find out how the Rocketry Program is going at Kingsford, and to say thanks for the great program. I personally think that without the Rocketry Program, I wouldn't be as interested in Engineering -- especially my MTU Aerospace Nano-Satellite Enterprise Team that is designing an actual satellite that is going to be in a competition sponsored by the Air Force. You wouldn't believe the components on this thing, Mr. B; it is unreal the ways you can maneuver an object in outer space. I am definitely going to stick with this! I just wrote to fill you in on how your program helped me focus my attention to engineering and the aerospace field. You can tell any of your students that are in the Rocketry Program now that MTU has programs like these. They also have Enterprise Teams that launch rockets at national competitions with payloads that they design themselves. And another thing, Mr. B, I was thinking if you need me to write any letters to show how important rocketry is for high school students, I would be honored to do so."

#### **Outcome 3:**

Senior citizen, Bill Richards has never lost his desire to motivate the community when it comes to NASA and science education. Through the University of Michigan's Outreach Program, Bill makes it possible for rural and underprivileged students and their teachers and parents (and sometimes grandparents!) to come down to the University of Michigan from the Greater Lansing area on Saturdays to build and launch rockets, design and fly balsa wood gliders, tour the wind tunnels and a host of other activities including examining payloads built and flown by UM's Student Space Systems Fabrication Laboratory.

### PROGRAM ACCOMPLISHMENTS

#### **Outcome 1:**

**The MSGC Fellowship Program**

**Goal:** Increase the number of proposals that the MSGC Fellowship Program receives. **Metrics:** Compare the number of proposals received from year-to-year. **Approach:** Provide brochures to all MSGC campus representatives to supplement the other ways (newsletter, website, postings, and e-mails) in which we announce the MSGC Fellowship and Internship opportunities. **Accomplishment:** While applications to the MSGC Fellowship Program fell from 66 to 58 from the 2007 to the 2008 funding interval, a preliminary review shows that we have received over 60 proposals for the 2009 funding interval with more expected.

**Goal:** Improve the longitudinal tracking of the MSGC Fellowship and Internship award recipients. **Metrics:** Track the next steps that students take after they are awarded fellowship funding from the MSGC. **Approach:** Bonnie Bryant, MSGC Program Coordinator, contacts the mentors of Fellowship and Internship award recipients and Mark Fischer, Executive Director of the National Space Grant Foundation, provides us with results from the surveys that he routinely sends to our Fellowship and Internship award recipients. **Accomplishment:** The number of students that received funding from the MSGC Fellowship and Internship Program was 43. Out of the 43 awarded students, 15 took next steps in 2008: 7 are in graduate school in STEM disciplines, 3 are working as NASA contractors, 1 is working in a STEM position for a non-NASA contractor, 1 is working for NASA, and 3 went to work in STEM positions at non K-12 academic institutions.

**Goal:** Competitively award graduate and undergraduate fellowships with demographics as specified by NASA of 16.8% underrepresented minority (National Center of Education Statistics Digest). U. S. citizenship required. **Metrics:** Compare the number of proposals received each year by gender and ethnicity. **Approach:** Offer a fellowship program targeted to underrepresented minority students with lower than 3.0 GPAs into the pipeline. The program will offer \$2,000 from the MSGC and will require a \$2,000 match from the proposal institution for the mentor's salary. Funding in the amount of \$2,500 will be awarded for each underrepresented minority student. Offer a \$500 incentive to mentors of underrepresented students to be used for supplies and materials. **Accomplishment:** During funding interval 2008 we exceeded our goal; 23% of the fellowship and internship award recipients were underrepresented minority students as compared to 8.9% percent in 2007. We met our goal for women; 40% of the fellowship and internship award recipients were women.

#### **The MSGC Research Seed Grant Program**

**Goal:** Improve participation in the Research Seed Grant Program across the MSGC. **Metrics:** Compare the distribution of awards across the institutions within the MSGC. **Approach:** Keep a record of the proposals we received overall as well as the distribution across the Consortium. **Accomplishment:** We received proposals to the MSGC Research Seed Grant Program from 8 of our 10 affiliate universities with awards distributed to 7 as compared to 6 of our 10 affiliate universities in 2007.

**Goal:** Increase the diversity (underrepresented minorities and women) in the MSGC Research Seed Grant Program. **Metrics:** Record the number of applicants each year by gender, ethnicity, and persons with disabilities. **Approach:** Target announcements to college and university groups using e-mail, group meetings, and invitations from the director and campus representatives. **Accomplishment:** We received proposals from 1 woman and 1 underrepresented minority (Hispanic) and funded both of them as compared to the 2007 funding interval where we received proposals from 5 women and 1 underrepresented minority (African-American) and funded 2 of the women.

#### **Outcome 2&3:**

##### **The MSGC Precollege Education, Higher Education, and K-12 Educator Incentive Programs/MSGC Outreach Programs**

**Goal:** Increase the number of applications coming from outside of the Consortium for the Precollege Education, K-12 Educator Incentive, and Augmentation Programs. Only faculty and administrators from MSGC affiliate and lead institutions are eligible to apply to the Higher Education Program while the Precollege Education (with augmentation available) and K-12 Educator Incentive Programs are open statewide. **Metrics:** Record the number of applications that the MSGC receives from outside of the Consortium. **Approach:** Some 8,000 brochures are sent to public and intermediate school districts, along with the Boy and Girls Scouts, museums and after-school clubs. **Accomplishment:** During the 2008 funding interval, we received 6 proposals from outside of the MSGC (3 of the 6 were funded). We

received just 4 proposals from outside of the MSGC in 2007 (2 of the 4 were funded). Ten teachers were awarded from the MSGC K-12 Educator Incentive Program as compared to 8 in 2007.

**Goal:** Encourage quality programs that target underrepresented minorities and women. **Metrics:** Record the number of programs targeted to underrepresented minorities and women. **Approach:** Announce that augmented support will be available to those programs that target underrepresented minorities and women. Within the announcement add that to be considered for augmented support, an additional page describing in detail why added funds are necessary to assure the success of program targeting underrepresented minorities and/or women. **Accomplishment:** During the 2008 funding interval, we received 8 proposals that directly targeted underrepresented minorities and/or women and all were of high quality and funded.

**Goal:** Encourage programs that include Science, Technology, Engineering, and Mathematics in informal settings (e.g., museums, science centers, boys and girl club, etc.). **Metrics:** Record the number of applications that come from libraries, museums, planetariums, and others that offer STEM education in informal settings. **Approach:** Some 8,000 brochures are sent to public and intermediate school districts, including high, middle, elementary, charter along with the Boy and Girls Scouts, museums and after-school clubs. We also encourage MSGC campus representatives to reach out to these establishments in their communities. **Accomplishment:** During the 2008 funding interval, 75% of programs awarded offered STEM education in informal settings with highly trained staff that provided supplemental materials as compared to 65% in 2007.

### PROGRAM CONTRIBUTIONS TO PART MEASURES

- Student Data and Longitudinal Tracking: For those students who were supported from FY08 funds, 2 students graduated and are pursuing advanced STEM degrees, 1 is working for a NASA contractor, 1 is working for NASA and 2 are working in STEM positions at non-K-12 academic institutions. The remaining 31 students are still enrolled in the degree program that they were in when they received their Space Grant award.
- Course Development: Dr. Jacqueline Huntoon designed *The Geology of Utah's National Parks* course for the in-service and pre-service teacher with little or no Earth science background. Huntoon reports that she expects to receive certification for this course in early 2009.
- Matching Funds: This information cannot be determined until reporting has been completed in the Office of Education Performance Measurement. A match of at least one-to-one is required of all programs with the exception of fellowships. Historically, the MSGC augmented NASA funding by a ratio of nearly 2-to-1 overall as reported in CMIS (2003 – 2007).
- Minority-Serving Institutions: The underrepresented minority enrollment Wayne State University and Eastern Michigan University is 36% and 20%, respectively, as compared to 4% - 13% at other MSGC-affiliated universities and colleges. The only historically black college that we have in the state of Michigan is Lewis College, a non-accredited business college in Detroit. Bay Mills Community College and Keweenaw Bay Ojibwa Community College are the two tribal colleges located in Michigan but at this time, no science programs are offered on either campus. Our focus remains to recruit minority students and junior faculty members from MSGC institutions.

### IMPROVEMENTS MADE IN THE PAST YEAR

In February 2008, Dr. Aurles Wiggins joined the MSGC Board. Dr. Wiggins is the director of the Office of Support Services (OSS) at Michigan State University. In addition to directing the OSS, Dr. Wiggins is a key element in the management team of the NSF-funded *Louis Stokes Alliance for Minority Participation* (LSAMP). This program is engaged in recruiting underrepresented minorities into STEM fields. production of Ph.D.'s in STEM fields with an emphasis on entry into faculty positions. MSGC director, Dr. Gallimore also plays a key role with the NSF-funded *Alliances for Graduate Education and the Professorate* (AGEP). Last winter, he played an important role in organizing the first annual MEGA Midwest AGEP Conference. Nearly 200 underrepresented minority students in STEM fields attended this conference with the theme, *Elements of Success*.

The Great Midwestern Regional Space Grant Consortia collaborated to provide a research opportunity in remote sensing: *Land Use in the Midwest*. The objective was to fund one or more one-year pilot projects

that addressed one or more major themes: land use patterns, waste quality and availability, and the health and sustainability of agricultural systems. Professor Okan Ersoy from Purdue University was awarded for his proposal, *Innovative Remote Sensing Techniques for Harmful Algal Bloom Monitoring*.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

### Eastern Michigan University

Public Ph.D.-granting university

James Sheerin is Professor of Physics and Astronomy and is very active in space physics research and in developing science courses for non-majors and pre-service teachers.

### Emerson School

Private middle school

Mr. Timothy Wilson is the science department chair and teacher.

### Grand Valley State University

Public Master's-granting university

Ms. Mary Ann Sheline is the director of the Regional Math and Science Center. As a former school teacher, she is an expert in K-12 matters.

### Hope College

Private four-year liberal arts college

Peter Gonthier is an astronomer and Professor of Physics.

### Michigan State University

Public Ph.D. granting university

Dr. Aurles Wiggins is director of the Office of Support Services (OSS). In addition to directing the OSS, Dr. Wiggins is a key element in the management team of the NSF-funded *Louis Stokes Alliance for Minority Participation* (LSAMP). This program is engaged in recruiting underrepresented minorities into STEM fields. The MI-LSAMP facilitates the long-term goal of increasing the production of Ph.D.'s in STEM fields with an emphasis on entry into faculty positions.

### Michigan Technological University

Public Ph.D. granting university

Ms. Shalini Suryanarayana is the director of Educational Opportunity and specializes on the recruitment of women and underrepresented minorities into engineering.

### Oakland University

Public Ph.D. granting university

Bhushan Bhatt is Associate Dean of Engineering and Professor of Mechanical Engineering.

### Saginaw Valley State University

Public Master's-granting University

Garry Johns is Professor of Mathematics at Saginaw Valley State University.

### University of Michigan (lead institution)

Public Ph.D. granting university

Alec Gallimore is the MSGC director, Arthur F. Thurnau Professor of Aerospace Engineering, and an Associate Dean in UM's Rackham Graduate School. Professor Gallimore is an expert in advanced spacecraft propulsion systems and an avid supporter of diversity initiatives in higher education.

Professor Gallimore plays a key role in the NSF-funded *Louis Stokes Alliance for Minority Participation* (LSAMP) and the NSF-funded *Alliances for Graduate Education and the Professorate* (AGEP).

Dr. Cinda Davis is the director of UM's Women in Science and Engineering Program.

### Wayne State University

Public Ph.D. granting university

Gerald Thompkins is Associate Dean of Engineering and Associate Professor of Engineering who has been very active in minority student recruitment throughout the Detroit metropolitan area.

### Western Michigan University

Public Ph.D. granting university

Frank Severance is Professor of Electrical Engineering and the author of textbooks on controls and robotics.