

Michigan Space Grant Consortium

1320 Beal Avenue • Ann Arbor, MI 48109-2140

Website: www.umich.edu/~msgc

Professor Alec D. Gallimore, Director

Bonnie L. Bryant, Administrator

Telephone: (734) 764-9508

Eastern Michigan University • Grand Valley State University • Hope College • Michigan State University • Michigan Technological University • Oakland University • Saginaw Valley State University • University of Michigan (lead) • Wayne State University • Western Michigan University

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 MSGC is a Designated consortium funded at a level of \$590,000 for fiscal year 2007.

Program Relevance to NASA

Space Grant consortia build human capital and research expertise to support NASA programs and missions, expand NASA's expertise and educational networks, and bring knowledge and awareness of space to a broad range of constituents in every state. In 2007, the MSGC funded 32 undergraduate and graduate students as well as 10 research scientists and faculty in their research on topics related to Exploration Systems Mission Directorate (ESMD) needs. That year the MSGC also funded 8 student internships at NASA Centers and 6 student internships at high-tech businesses in Michigan that develop ESMD-related technologies.

Program Benefits to the State

An award recipient and/or a participant of a MSGC program or event lives in every district of the state. MSGC program elements include: Fellowship, Research Seed Grant, Pre-College Education, Public Outreach, Teacher Training, and the K-12 Educator Incentive Program. Augmentation funds are available in the MSGC program category for activities that specifically target underrepresented minorities, females, and the disabled.

The MSGC initiated the Michigan Initiative on Student NASA Exploration Research (MISNER) program in 2007 which consisted of three elements: 1) a 10-week internship program that focused on placing undergraduate and graduate students in small, high-tech businesses that develop ESMD-associated technologies; 2) sponsoring two teams to participate in the ESMD-related CanSAT competition; and 3) supporting two capstone spacecraft design classes over the 2007 - 2008 academic year. The MISNER program dovetails with the State of Michigan strategic goals of retaining a highly educated workforce in Michigan, and business development in the high-technology sector.

Program Goals

The **vision** of the MSGC is to foster awareness of, education in, and research on space-related science and technology in Michigan. The **mission and goals** of the MSGC are to create, develop,

and promote programs that support the MSGC vision and reflect NASA strategic interests, and encourage cooperation between academia, industry, state and local government in space-related science and technology in Michigan.

Program Accomplishments

- *The Math and Science for Minorities Program* was a collaborative effort between the Saginaw Valley State University (SVSU) Departments of Biology and of Mathematics and area high schools. The program, developed by Dr. Ronald Williams and Mr. Curtis Grosse, encouraged high school minority students to succeed in their current classes and to pursue a college degree. Undergraduate student tutors, select underrepresented minority students at SVSU, served as role models. Tutors worked with high school teachers and university faculty in order to help high school students increase their math and science skills, improve their attitudes about mathematics and biology, and introduce the students to the prospects of college after graduation. This program served approximately 300 underrepresented minority students in Saginaw area high schools. The students met regularly after school to work on homework and to solve problems encountered during classroom work. Many of these problems included connections to aerospace, space, and Earth systems science. Special sessions were held monthly to motivate students and to share college and career options. "Through our work with school superintendents and principals, we have expanded our program," reports Curtis Grosse, lecturer in SVSU's Mathematics Department. "Students have increased their aptitude as well as their attitude in mathematics." "I want to personally thank you for bringing the program to Arthur Hill High School," says Principal Kathleen Andros. "The after-school tutoring program is the best thing that has happened at the school with approximately 80% of the participants bringing up their grades in math and science."
- Education continues to be one of NASA's top-level missions. One of these goals is to foster partnerships with tomorrow's educators today. To this end, Professor James Sheerin from Eastern Michigan University developed the entry-level interdisciplinary course, *To the Moon and Beyond*, for pre-service teachers. Designed to meet state K-12 science education and teacher certification requirements, Sheerin integrated NASA resources into each lesson module. The course addressed scientific knowledge of life, and Earth systems science encountered throughout the solar system. By integrating resources from recent and current NASA missions into the course, education students became familiar with NASA's role in Earth and space science, and science education in general.
- "For futuristic space missions, the length of time required for space travelers to be in low gravity situations will increase," reports Professor Ryan Gilbert from Michigan Technological University. "Low gravity conditions affect the viability and matrix environment of knee cartilage." Thus, those individuals are more susceptible to osteoarthritis. Developing new therapies to combat osteoarthritis for these individuals and for those suffering from osteoarthritis in normal gravity situations is imperative. "This study continues to examine how glucosamine and glutathione are released from the hydrogel and how these agents affect viability and matrix production of chondrocytes in culture," added Gilbert. "This work will lead to developing injectable hydrogels that could counteract and heal osteoarthritic conditions."

Student Accomplishments

- 22% of the MSGC Fellowship Award Recipients who have graduated and are pursuing advanced STEM degrees are underrepresented minority students. For example, Brian Reid from the University of Michigan, is pursuing his Ph.D. in Aerospace Engineering.
- 44% of the MSGC Fellowship Award Recipients who have graduated and are pursuing advanced STEM degree are women. For example, Elaine Petrach from Oakland University is pursuing her Ph.D. in Mechanical Engineering.
- 50% of the MSGC Fellowship Award Recipients who are now employed in STEM Aerospace fields are underrepresented students. For example, Steven Sandoval is now working at Lockheed-Martin in Spacecraft Design.
- Alexis Benz was one of the students we supported as an intern at NASA's Jet Propulsion Laboratory (JPL), and she is now working at JPL as an Associate Systems Engineer in the Lunar and Planetary group.
- After receiving his Ph.D. from the University of Michigan, MSGC Fellow Matthew Brown is now the technical director of the Seeker Experimental Systems test facility at MIT's Lincoln Laboratory. His research includes the development of new infrared technologies for air and ballistic missile defense.
- In 2007, MSGC Fellowship award recipient from the University of Michigan, Josh Rovey, became an assistant professor at the Missouri University of Science and Technology in the Department of Mechanical and Aerospace Engineering. MSGC Fellow, Laura Smart, received her Ph.D. from Western Michigan University in 2007 and is now an assistant professor at Grand Valley State University where she teaches a variety of geophysics courses.