Maine Space Grant Consortium (Lead Institution)
Executive Director-Dr. Terry Shehata
207-622-4688, 1-877-397-7223
www.msgc.org
Affiliate Members:

University of Maine
University of Southern Maine
University of New England
Bates College
Bowdoin College
Colby College
College of the Atlantic
Maine Maritime Academy
BioAnalyte, Inc.
Applied Thermal Sciences, Inc.
Bigelow Laboratory for Ocean Sciences
Challenger Learning Center of Maine
Gulf of Maine Research Institute
Island Astronomy Institute
Lockheed Martin
Maine Manufacturing Extension Partnership
Maine Mathematics and Science Alliance

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 Maine Space Grant Consortium is a Capability Enhancement Consortium funded at a level of $410,000 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. The Maine Space Grant Consortium provides student and faculty support to conduct research primarily applicable to NASA's Exploration Systems and Science Mission Directorates as well as to most NASA research centers. Some of the projects awarded in this year in specific areas include wireless sensors, astrobiology, toxicology of lunar particles, climate change, novel rigidizable space structures, supermassive black holes in the center of galaxies, advanced photodetectors, supercomputing, development of three dimensional artificial muscles, wind turbine construction and design, mathematic modeling, Neutron Star Seismology, and Micro-Electro-Mechanical-Systems (MEMS) Gas Sensors.

Program Benefits to the State of Maine:
The Maine Space Grant Consortium provides faculty and students the opportunity, many for the first time, to reach out to NASA and integrate themselves into the research activities at NASA that align with the universities' and state's priorities in science and engineering. This support

has resulted in new relationships with NASA personnel that are expected to strengthen the state's aerospace research and education infrastructure.

Program Goals:
The mission of MSGC is to develop and maintain a statewide program that is mutually beneficial to the State and NASA that effectively leverages NASA and state resources to (1) improve Maine's research infrastructure in areas consistent with the needs of the mission directorates and in alignment with the state of Maine Science and Technology Plan; (2) encourage more students to consider careers in fields of science, technology, engineering, and mathematics (STEM); and (3) enhance NASA's presence throughout the State of Maine

Program Accomplishments:

Our Workforce Development Program has been very successful since its conception. In this program outstanding undergraduate students are awarded 10-week research experiences at NASA field centers. To date, three students have received full time positions at NASA, and two others have a good chance, and are excited about the prospect of receiving full time offers at NASA when they graduate from their undergraduate program. Out of the 42 undergraduate students funded under this program in the past five years, the majority of students are still enrolled in either their undergraduate program or has advanced to a graduate program (total 26). In addition, six are employed in a science, technology, engineering or mathematics (STEM), field, one is employed as an aerospace contractor, two are employed in a STEM academic field, two are recently graduated and are seeking STEM employment, two are employed in a non-STEM field, and three students are now working at NASA full time.

Recently, a new interdisciplinary course in Micro-Electro-Mechanical-Systems has been developed and offered at the University of Southern Maine (USM). The course included a design of acceleration sensors which were fabricated for testing. This type of course is the first of its kind at USM and one of few throughout the United States, in which students actually design MEMS devices, have it put on Silicon and also have a chance to test it.

Data is still being collected for 2007 scholarship and fellowship program. The initial count of funded undergraduate and graduate students, to date is 36, from five affiliate academic institutions in Maine. Students along with faculty mentors, identify a NASA mentor for their project. NASA mentors have been identified from six of the ten field centers so far. MSGC has been tracking students who receive a significant award since 2005, the majority of those students are either still in their undergraduate/graduate program, or have advanced to a higher degree program since they were awarded. In addition, three students are now employed in a STEM field, one is employed in a STEM Academic field and one has recently graduated and is seeking employment in a STEM field.

Student Accomplishments:
A student group led by freshmen, John Wise, Jr. from the University of Southern Maine (lead) and the University of Maine submitted a proposal to the NASA Reduced Gravity Student Flight Opportunities Program. The proposal "Effects of Hypergravity and Microgravity on DNA

Damage, Repair and Cellular Uptake in Lung Cells" was awarded. This is the first time a team from Maine has participated in this program.

William Sneed, Jr. graduated with a Masters degree in Quaternary and Climate studies at the University of Maine, and is now continuing an interdisciplinary Ph.D. program with a focus in Remote Sensing. He has been an author in two papers, presented at multiple conferences, including the 37th Annual International Arctic Workshop in Skaftafell, Iceland, sponsored by the Institute of Earth Sciences, University of Iceland. This conference aims at presenting work conducted by undergraduate, graduate students and post-docs. He continues to refine the techniques from his work on the project "Determining Surface Meltwater Pond Volume using Satellite Imagery" in which he was awarded through our program

David Paul participated in our Aerospace Workforce Development Program at the Marshall Space Flight Center in 2003. After completing his undergraduate degree at the University of Maine in Engineering Physics, he continued his studies in a Masters program in Engineering Physics. David recently accepted a full time position with Northrop Grumman, Newport News Shipyard in Newport News, Virginia. David is working as a mechanical engineer in the Engineering Components Division, where he supports the design and construction of the new Gerald R. Ford class of Navy Super carriers.

Keith Matera, a senior at Bowdoin College worked under Dr. Thomas Baumgarte on a project in numerical relativity, which aims at solving the equations of Einstein's general relativity on the computer to construct models of astrophysical objects with very strong gravitational fields, including black holes and neutron stars. In solving these equations one encounters some conceptional issues. When modeling black holes, for example, so-called boundary conditions appear on the surface of the black hole (the "event horizon") that, from a mathematical point of view, can be chosen arbitrarily. From a physical point of view, however, we would like to know how different possible choices for these boundary conditions affect the resulting solution. In his project, Keith studied a simple example problem - of certain particles in orbit about a black hole - to analyze the effect of these choices. He found that they do not have any effect on the physical properties of the solution, which is re-assuring. More broadly, his results help us understand and calibrate numerical models of more interesting objects, including binary black holes. This work resulted in a publication in the Physical Review, of which Keith was a co-author. Keith has accepted a position to teach high school physics next year.