

Hawaii Space Grant Consortium  
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<http://www.spacegrant.hawaii.edu>  
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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 Hawaii Space Grant Consortium is a Designated Consortium funded at a level of \$575,000 for fiscal year 2011.

### PROGRAM GOALS

The Hawaii Space Grant Consortium (HSGC) inspires, nurtures, and trains space scientists, space settlers, and aerospace engineers of the future. HSGC's strategy and programs are dynamic and reviewed annually to reflect State as well as NASA program needs and include development and maintenance of the HiSTEM Pipelines of activities (undergraduate/graduate opportunities supported by pre-college activities in the areas of space science, engineering, and remote sensing), enhancing undergraduate education through research (fellowships, traineeships, and internships that **must** have a NASA focus) and course curricula, improving research infrastructure (Hawaii Space Flight Laboratory (HSFL)), training pre-service and in-service teachers (Future Flight Hawaii and Families Exploring Science Together (FESTival) Nights Programs), and educating the public about new NASA discoveries (Windward Community College Aerospace Lab, Planetary Science Research Discoveries), helping to strengthen the State economy (HSFL, supporting Hawaii initiatives in robotics).

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

**Michael Andonian – Outcome 1** – Michael Andonian, a former HSGC Fellow who is currently pursuing a Master's degree in Mathematics, received funds during the summer 2011 as an intern at the Jet Propulsion Laboratory. Michael developed a graphical user interface (GUI) designed to simplify the data analysis from a radio science experiment. Michael made quite an impression with his work as he was invited back to JPL again for the summer of 2012.

**Zachary Lee-Ho and Reid Yamura – Outcome 1** – Zachary Lee-Ho, an HSGC Master’s Apprentice recipient from 2009-2011, and Reid Yamura, an HSFL funded graduate, were also former undergraduate HSGC Fellows, who have worked on the HawaiiSat-1 microsatellite (80 kg mass) for HSFL. In December 2011, Zachary, a native Hawaiian student, received his Master’s Degree in Mechanical Engineering having designed and experimented with the HawaiiSat-1 Attitude Determination and Control Subsystem in conjunction with NASA Ames Research Center. Zachary, a former linebacker on the University of Hawaii football team who had a 2.0 GPA when entering the HSGC Fellowship Program, is now working in Sunspot, New Mexico on an internship in mechanical engineering design of telescopes. Reid Yamura graduated in December with a Master’s Degree in Electrical Engineering and helped to design the HawaiiSat-1 Electrical Power Subsystem in conjunction with NASA Ames. As part of the project, Reid helped to develop and document a low-cost method for constructing solar panels that is now used by HSFL and NASA Ames.

## PROGRAM ACCOMPLISHMENTS

- **Outcome 1:** *Hawaii Space Flight Lab (HSFL)* – The HSFL is an HSGC Research Infrastructure program that is leveraging State, Federal (including NASA), and corporate partners to provide student and workforce training opportunities to design, build, launch, and operate small spacecraft. The State of Hawaii signed an agreement with NASA Ames to help with HawaiiSat-1. LEONDAS is HSFL’s two-launch demonstration project. HawaiiSat-1 has been redesigned to HiakaSat, which is a 40-kg microsatellite that has an infrared hyperspectral imager developed by University of Hawaii faculty and will be launched to a 450-km orbit from Hawaii in August, 2013 on the Operationally Responsive Space-4 Mission. *Honolulu Community College Interns* – Honolulu CC is in the process of installing an X-band ground station that will be used to collect National Weather Service (NWS) data and also will be used to collect HSFL microsatellite data. While the X-band antenna is being funded by NWS, student training is being provided with NASA Space Grant traineeships.
- **Outcome 2:** *Science Professional Development Partnership* - HSGC have been fortunate to collaborate with two K-12 school complexes to receive science professional development partnership funds for the past six years to provide content workshops for elementary and middle school teachers to help develop contextually based curriculum to engage their students in addressing the new science standards. Coordinated by education specialists, Art and Rene Kimura, the sessions have included a NASA Digital Learning Network event from NASA Ames Research Center and Kennedy Space Center, and covered science content in geology, volcanology, oceanography, physics, chemistry, and astronomy provided by Space Grant affiliated scientists and instructors from the University of Hawaii at Manoa’s Hawaii Institute of Geophysics and Planetology, the Honolulu Community College, the Windward Community College, and the Leeward Community College. Parent and child engagement programs in the evening, along with individual assistance to teachers and grade levels are provided by the HSGC.
- **Outcome 3:** *Windward Aerospace Lab* – Windward CC is constantly expanding the offerings of its Aerospace Lab that includes flight simulators, a planetarium, radio telescopes, and soon, the HSFL education and public outreach center to track HSFL

missions. Windward CC's Dr. Jake Hudson is also helping with the Kauai CC rocketry program. *Astronaut Days of Discovery* – These days celebrate Hawaii's astronauts and remain overwhelmingly popular. They showcase NASA and STEM presentations and hands-on activities. HSGC coordinates the events but Hawaiian Electric Company, the Chatlos Foundation and American Savings Bank donate funds and volunteers to make the events successful.

## PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Student data and Longitudinal Tracking:** Total Fellowship/Scholarship awards in FY2011 = 79; 41 of the total awards represents underrepresented minority F/S funding including 28 awards to women. Of the total participants, 69 students are still currently in their degree program as undergraduates or graduates pursuing an advance degree, with 95% of these students pursuing STEM degrees. Improvements made are the number of underrepresented students reached and an increase in students funded.
- **Diversity -** HSGC increased support for underrepresented students. Forty-one of the 79 Fellowship/Scholarship awardees were minority students and funding included 28 awards to women. Underrepresented students received 52% of 2011 awards. Six of the college and university affiliates are Minority Serving Institutions.
- **Minority-Serving Institutions:** UH-Hilo as well as all of the UH System Community Colleges are minority serving institutions. The HSGC maintains strong ties with its affiliates through dedicated associate directors. Windward, Honolulu, Kapiolani, Kauai, and UH Maui College receive HSGC support for CanSat programs. Windward CC is also supported for the Aerospace Lab and for providing education and outreach for HSFL. Kauai CC has installed a UHF/VHF ground station for the HSFL and new research experiments. Honolulu CC will complete installation of an X-band antenna in Summer 2012.
- **NASA Education Priorities:** The HSGC has partnered with the State of Hawaii and others to host hands-on robotics programs (FIRST, Botball, MicroRobots) at the elementary and intermediate school levels. HSGC has a rich history of teacher training using hands-on NASA-related science content through Families Experiencing Science Together (FESTival Nights) that include a minimum of 8 science teachers and 100 student-parent teams in an evening hands-on workshop, Future Flight Hawaii summer program that is a weekend long activity using related hands-on activities to replicate science missions to other planets, and the two Astronaut Days of Discovery where teachers help to run up to 20 hands-on activities for 600 students and parents during a day-long science fest. HSGC partners with Kapiolani Community College to sponsor an all-native Hawaiian CanSat team to the Texas CanSat competition to get entering freshman students interested in engineering and NASA careers. HSGC enjoys strong partnerships with many of the community colleges which in turn are now successful in attracting NASA funding on their own. In 2011, HSGC granted over \$100K to Windward and Honolulu Community Colleges, which are minority serving institutions, to encourage development of new NASA programs. HSGC encourages the career development of young faculty by providing mini-grants and travel awards as appropriate in order to further NASA research interests.

## IMPROVEMENTS MADE IN THE PAST YEAR

With 68% of the overall budget available from last year (\$845,000 in 2010 versus \$575,000 in 2011), HSGC has tried to maintain as many programs as possible, but has focused on quality internship experiences. HSGC co-funded four interns to work at a high-tech firm – NovaSol. Two HSGC students finished their Master’s degrees in engineering.

HSFL – HSFL supports many of NASA’s OCT goals including the development of a small spacecraft (HiakaSat), small launch vehicle (Super-Strypi, Sandia National Lab), and mission operations architecture for controlling small spacecraft (COSMOS). Installation of a UHF/VHF ground station at Kauai CC and an X-band ground station at Honolulu CC have also been focal points of the year.

Percentage of Underrepresented Students Served – HSGC maintained support for underrepresented students who received 52% of 2011 awards, 46% of 2010 awards and 45% of 2009 awards.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

UNIVERSITY OF HAWAII AT MANOA – 4-year university with graduate programs – Director Luke Flynn; Program Coordinator Marcia Rei Sistros; Headquarters of HSGC and HSFL; majority of graduate and undergraduate fellows, interns, and trainees perform research in CubeSat and small satellite design, astronomy, planetary science, geology, engineering, marine science, remote sensing, and computer science.

UNIVERSITY OF HAWAII AT HILO – 4-year university with graduate programs – Associate Director Ken Hon; undergraduate fellows and trainees have focused research on the strong astronomy, geology, and remote sensing programs. UH-Hilo along with American Savings Bank hosts the Astronaut Ellison Onizuka Day public science program annually in January.

UNIVERSITY OF HAWAII MAUI COLLEGE – 4-year university with graduate programs – Associate Director John Pye; undergraduate fellows and trainees have focused research in astronomy, optics, and STEM. The Akamai Internship Program gives students opportunities for internships through the Center for Adaptive Optics.

HAWAII COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Joseph Wilcox; undergraduate focus on STEM and astronomy.

HONOLULU COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Gregory Witteman; undergraduate fellows and trainees have focused research on CanSat design. HCC assists with Astronaut Lacy Veach Day which is a festival of science activities held on Oahu in October.

KAPIOLANI COMMUNITY COLLEGE – Associate degree granting community college – Associate Director John Rand; undergraduate fellows and trainees have focused research on CanSat design and competitions, and engineering. KCC receives Federal funding to attract underrepresented students to STEM careers and HSGC programs.

KAUAI COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Liaison/Industry Affiliate Stewart Burley (Strategic Theories Unlimited, Inc.); undergraduate fellows, interns, and trainees have focused research on STEM including satellite telemetry with a new ground station, rocketry, CanSat, meteorology, and optics.

LEEWARD COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Roger Kwok; undergraduate fellows and trainees have focused research on astronomy. LCC assists with Astronaut Lacy Veach Day which is a festival of science activities held on Oahu in October.

WINDWARD COMMUNITY COLLEGE – Associate degree granting community college – Associate Director Joseph Ciotti; Rocketry Coordinator/CanSat Liaison Jacob Hudson; undergraduate fellows and trainees have focused research in astronomy, CanSat design and competition, and rocketry. WCC hosts the Aerospace Lab, serves as outreach for HSFL, and offers an aerospace certificate.

UNIVERSITY OF GUAM – 4-year university with graduate programs – Associate Director Mark Lander, undergraduate focus on STEM.

HAWAIIAN ELECTRIC COMPANY – industrial affiliate – Associate Director Paul Fetherland; HECO supports Astronaut Lacy Veach Day and other HSGC programs both with funding and volunteers.