

Connecticut NASA Space Grant College Consortium
University of Hartford, Lead Institution
Associate Professor Tom Filburn, Director
URL: <http://uhaweb.hartford.edu/ctspgrant/>
Phone: 860/768-4813
Combined GFY08 Final and GFY09 Progress Report

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 Connecticut Consortium is a Capability Enhancement Consortium funded at a level of **\$590,000** for government fiscal year 2009. *Note: Due to the off-cycle nature of the Connecticut Consortium the following report details programs implemented between July 2009 and June 2010 which were funded by both GFY 2008 and GFY 2009 funds.*

PROGRAM GOALS

The mission of the Connecticut Space Grant (CTSG) College Consortium is to further the efforts started through NASA's Education Strategic Framework. The Education group has begun initiatives with three major outcomes:

1. Development of the Science, Technology, Engineering and Math (STEM) workforce in disciplines useful to NASA,
2. Attraction and retention of students in STEM disciplines, and
3. Partnerships which promote STEM literacy and awareness of NASA's mission.

The CTSG Consortium continues to contribute to the success of all three outcomes listed above, albeit with different programs, levels of effort and resources. Variations in resource allocation and the fundamental makeup of consortia (designated state vs. non-designated state) will naturally allow some of these outcomes to be more emphasized and consequently more strongly supported. However, our goal is to produce results that strengthen each outcome.

The CTSG Consortium presently has membership which includes higher education institutions along with aerospace companies and informal educators. Our past funding decisions and future plans demonstrate our commitment to Outcome 1, development of a STEM workforce. We continue to effectively leverage our financial resources with the efforts of a wide range of groups that have complementary interests in our state. Our broad-based efforts in support of Outcome 1 are achieved through an undergraduate and graduate student fellowship program, in which students work on projects related to NASA's mission. STEM workforce development efforts were expanded in 2009-2010 to include other state Consortia (Summer 2009 UTC internship program involving RI and CT was expanded for summer 2010 and we intend to further this growth in summer 2011). Our consortium has just begun to tap the potential available from numerous smaller aerospace supply companies within our border. These companies also provide internship opportunities as well as varied projects for our students.

The CTSG Consortium has continued our existing ties with elementary and secondary education groups in order to strengthen the ability of our consortium to influence Outcome 2, attraction and retention of students in STEM fields. These groups include state-wide science groups, as well as magnet schools. CT magnet schools have seen significant growth in student enrollment over the last decade. A

number of these focus on STEM fields so we have aligned with them since we believe in the importance of supporting creative and innovative programs that reflect our strategic interests. The goal is for our activities to influence students to pursue STEM fields in college. By concentrating on magnet schools, which boast a diverse student population, we hope to increase the diversity of the student population within STEM fields in colleges. We have reached out to individual schools throughout the state (magnet high school and primary school in New London, middle schools in Hartford), and the University High School of Science and Engineering (a city of Hartford High School) located on the campus of the lead institution.

Finally, we have bolstered existing community links within the informal education field (e.g. museums and science centers) and sought out new partnerships in order to impact Outcome 3, promotion of STEM literacy. These include our longstanding affiliation with the New England Air Museum (NEAM) and the Connecticut Science Center which hosted the Connecticut Space Grant Consortium Spring Seminar and an Apollo 13 Anniversary program. As Connecticut is a small state this science center is within 25 miles of most consortium members.

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

Outcome 1 STEM Workforce Development

CSGC initiated the UTC Summer Aerospace Internship program during 2009. This program was expanded in summer 2010 to include internship opportunities open to students of all space grant consortia, nationwide. A total of 20 internship offers were extended to students who applied from 6 state consortia, yielding 15 student intern placements (9 from Connecticut (4 funded by ESMD funds), 4 from Rhode Island, 1 from Minnesota, and 1 from Puerto Rico). Student and company feedback highlight this program as a tremendous success. Students received challenging assignments from their aerospace mentors, and the companies extolled the technical acumen of their student interns. Several interns were invited to stay on as company paid interns during the school year, and there has been two job offers so far (Sikorsky & UTC Power) from these internship assignments.

Outcome 2 Attract and Retain students in STEM disciplines

Our Consortium continued to support the PLAN academy for high school teachers during the 2008-2009 and 2009-2010 academic years. During 2008-2009 this program provided training to 9 (3 male/6 female) high school teachers (2 of who were from underrepresented groups) from 4 public school districts (East Windsor, Enfield, Hartford and South Windsor). The Consortium continued to support PLAN Academy in 2009-2010 and we are awaiting results from our CCAT affiliate. CCAT has primary responsibility for organizing this teacher training Academy. The CT Space Grant has supported this academy through direct financial support, providing classroom space (at no charge) and continuing to identify Master teachers for this Academy. Additionally, CSGC has developed a new summer bridge program at SCSU to introduce incoming underrepresented freshmen students to STEM fields. We will be monitoring these students over the years to determine the success of this program.

Outcome 3 Build strategic partnerships that promote STEM literacy and awareness of NASA's mission

We have partnered with the CT Science Center, University High School and UCONN to present three Apollo 13 anniversary events that featured retired senior engineers from Hamilton Sundstrand who were involved in the rescue of the Apollo 13 crew 40 years ago. This programming introduced over 500 students, from grade school through college age, to this important historical moment and inspired them to learn more about NASA and STEM fields. Local media coverage of these talks included both newspaper and television segments.

PROGRAM ACCOMPLISHMENTS

OUTCOME 1 Development of STEM workforce in disciplines useful to NASA

2009 OUTCOME 1 SMART Goals

- 1. Place at least 6 CTSG students into aerospace internship positions (including NASA centers).**

2. Place students into 3 different aerospace internship sites.
3. Award at least 6 undergraduate fellowships in fields useful to NASA.
4. Award at least 1 graduate fellowship in a field of use to NASA.
5. Fund 12 students (at least 8 diverse students) in summer Bridge program.
6. Host 1 week Helicopter training for at least 10 UG students.

Our Consortium met all six of Outcome 1 SMART goals for GFY 2009 funds.

1. **Our Consortium** generated 6 offers (5 UTC, 1 Belcan) yielding 5 student interns during the summer of 2010. (*5 additional aerospace internship placements were secured for CSGC students using ESMD funding for a total of 10 summer internships.*)
2. These students worked at four different corporate sites (*Sikorsky, Hamilton Sundstrand, Otis and Belcan*).
3. We awarded 8 undergraduate fellowships in technical fields useful to NASA, and 15 undergraduate scholarships through the Connecticut Community Colleges – College of Technologies program to students continuing the pursuit of STEM majors at 4-year affiliate institutions.
4. We awarded 2 graduate fellowships in technical fields useful to NASA.
5. We funded 12 students within the SCSU summer 2010 Bridge program. (*We are awaiting the final report from the program director, but know that 2 of the 12 students were women, and 9 of the students are from underrepresented groups.*)
6. We hosted a successful Spin On It! Helicopter Workshop with a total of 26 registered participants (*3 doctoral, 2 graduate, 18 undergraduate, and 3 high school students*) from 12 states (*CT, PR, IL, ID, WA, NE, WI, OR, WV, AR, NH, and MA*) with 23% (6) women and 11.5% (3) participants who are underrepresented in STEM.

In addition to meeting all six SMART goals, this summer (2010) our consortium expanded the UTC Aerospace Internship Program to include student applicants from throughout the nation. Connecticut extended offers to 20 students (pool of 35 applicants) for challenging internship positions at aerospace firms which yielded 15 ultimate intern placements (12 funded with Space Grant funds, 3 funded with ESMD funds). CSGC also arranged low-cost housing for 7 interns.

OUTCOME 2 Attraction and Retention of Students in STEM disciplines

2009 OUTCOME 2 SMART Goals

1. Fund at least 8 MS/HS teachers through PLAN summer academy.
2. Quantify HS student selection of STEM fields for higher ed. study within CT.

Our consortium met the first goal again this year and is continuing efforts toward goal #2.

1. In conjunction with CCAT we provided a summer academy for 9 High School teachers during the summer of 2009 and continued support in summer 2010 (*awaiting results report from CCAT*).
2. We continued efforts toward the second goal. We have not yet found the right administrator/contact within the Connecticut Office of Education for this information.

OUTCOME 3 Build strategic partnerships that promote STEM literacy and awareness of NASA's mission

2008 OUTCOME 3 SMART Goals

1. Formalize linkages with in-state education groups; complete a MOU with at least 1 new group.
2. Support the New England Air Museum by either:
 - a. Supporting at least 1 proposal activity
 - b. Financially through small grants (< \$5,000)
 - c. or introduction of new exhibits

Our consortium achieved the first Outcome 3 SMART goal and anticipates achieving the second in the coming 2010-2011 academic year.

1. We completed MOUs with the CT Science Center and the CT Center for Advanced Technologies, and received a non-binding letter of support (and funds) from Pratt & Whitney. We are in negotiations with NEAM. These relationships provide critically needed non-federal funds to the CT Space Grant Consortium.
2. We hosted our Spring Affiliate Retreat at the new Connecticut Science Center in Summer 2009 and in April 2010 co-hosted a successful Apollo 13 anniversary event “*Houston, we’ve had a problem*” at the CT Science Center that received positive press (Hartford Courant and Channel 30 News) and broadened the public’s awareness of CT-based Hamilton Sundstrand’s involvement in the rescue mission. The program was replicated at UCONN and University High School to provide students with an opportunity to meet the engineers who were involved.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Target Underrepresented Groups:** We have developed strategies to improve outreach to students from groups traditionally underrepresented in STEM, with the goal of better matching our student awarding more closely to state of CT higher education population gender/diversity statistics (57% women/21% minority per NCES Digest of Education Statistics: 2009).

The Consortium has made demonstrable progress toward increasing the breadth in the distribution of awards across our affiliates. During 2009-2010, we awarded 58 student grants which were spread among 12 of our 13 affiliates. UCONN Health Center was the only affiliate without a student award. With historic reliance on engineering students for fellowships, we anticipate a three-year path to reach a stage where awards fully represent the ethnic/gender make-up of our higher education population. During 2009-2010 awarding cycle, we exceeded our goal for awarding to underrepresented students (29.31% achieved) but fell short of our diversity goal for awarding to women students (achieved only 34.5% in awards to women). We continued efforts to reach a broader base of students with our outreach initiatives at each campus, relying heavily on the Campus Directors working with their colleagues to get information to students underrepresented in STEM, and adding the new Summer Bridge program at SCSU.

- **Longitudinal Tracking:** We continued to emphasize the importance of Longitudinal Tracking of students and faculty who receive significant Space Grant funding. All of our affiliate campus representatives are required to provide an annual update of the students and faculty from their respective campus who have been awarded grants. This will better enable us to respond to NASA Education’s new reporting requirement of including data for all student award recipients.

Awarding from Fall 2009-Spring 2010 - Final Report (GFY08) Student Data and Longitudinal Tracking: Total student awards = 58; Fellowship/Scholarship = 43, Higher Education/Research Infrastructure = 15; 17 (29.31%) of the total student awards represents underrepresented minority funding; 20 (34.48%) of these awards were granted to female students. 3 (5.17%) of the total awards were received by graduate students, while 55 (94.82%) were granted to undergraduates. 52 students are currently enrolled in their degree program at this time, 1 has graduated and is seeking STEM employment, 3 have graduated and are currently employed within a STEM aerospace contractor, and 2 have graduated and are working in STEM (non aerospace). The affiliate distribution of the 58 student awards was: CCSU 6 (10.34%), ECSU 2 (3.44%), Fairfield University 1 (1.7%), SCSU 13 (22.41%), Trinity College 1 (1.7%), University of Bridgeport 1 (1.7%), UCONN 2 (3.44%), UCONN Health Center 0, UHart 5 (8.62%), UNH 2 (3.44%), Wesleyan 2 (3.44%), Yale 7 (12.06%), CCC-COT 16 (27.58%- these were distributed as follows: Asnuntuck CC – 1, Capitol CC – 1), MCC – 2, QVCC – 3, Naugatuck CC – 5, Northwestern CC – 2, and Tunxis CC – 2).

The combined student applicant to award ratio achieved for the year was 3.29:1 (191 applicants to 58 student award recipients).

Note: Because CTSG Consortium lags its peers by one year in funding, we still have a call for applications scheduled for fall 2010 related to GFY09 funds. We will provide an update after December 2010.

- **Course Development:** The CTSG Consortium funded one Curriculum Development grant for a faculty member at University of Hartford. Mako Haruta from Uhart's Mathematics Department was funded to significantly expand the current exercise sets for all six chapters of the textbook, Differential Equations by V.W. Noonburg and R. Decker, with an emphasis on introducing applications specific to a range of engineering disciplines.
- **Matching Funds:** Our consortium uses several techniques to achieve the matching funds required by NASA. The lead institution has allowed the director and associate director to have three course releases each year. This contribution accounts for 50% of their teaching time, producing a 50% salary match. Each affiliate provides 10% of the time for their campus director, also producing match. Each of our faculty research grants requires match funding. Our internship program is also operated with in-kind matching from our Industrial partners.
- **Minority-Serving Institutions:** We have an agreement with the sole minority serving institution in Connecticut, (Capitol Community College) to run a seminar series for their students on technical topics (at least 2 seminars in the aerospace field). These seminars seek to engage Capitol students into the Space Grant process. The seminars run on the Capitol Community College campus along with Trinity, University of Hartford and Central Connecticut State University. Rotating the seminar series among these closely grouped schools (20 minute drive time for the two furthest apart) is designed to give the 2-year COT students comfort and familiarity with the local 4-year affiliates with the ultimate goal of inspiring these students to further their pursuit of STEM studies at a 4-year institution. Additionally, we are collaborating with United Technologies Corporation to award two summer 2011 internships to students from Howard University (MSI). We have begun preliminary discussions with the DC Space Grant consortium and expect to have interns in-place within UTC divisions by summer 2011.

IMPROVEMENTS MADE IN THE PAST YEAR

1. **Affiliate Engagement/Satisfaction** Our affiliates are much more engaged in the Space Grant effort, definitely replacing the dissatisfaction noted in the 20 year PPR results. We have several campus directors leading key initiatives in our program. Al Gates from CCSU is the program lead for Spin On It! our new helicopter training program that piloted summer 2010. Karen Birch (COT campus director) is the leader for the Capitol Community College Speaker program (MSI initiative). John DaPonte (campus director SCSU) is the program leader for the Summer Bridge program which we also piloted in summer 2010. We have implemented an annual affiliate retreat (the first took place at the CT Science Center in June 2009 and 2010's retreat is scheduled for August 24th) to help our affiliates understand their specific roles and provide an opportunity for program review and affiliate involvement. Finally we have regular contact with affiliates through our program coordinator.
2. **National Network Collaboration** We have dramatically increased our collaboration with the National Space Grant Network as well as collaborations with individual Space Grant Consortia. Our director is now the Operations Mission Directorate Working Group chair. This group is seeking to find ways to work with NASA's Operations Mission Directorate, similar to the linkages established with the Exploration Systems Mission Directorate (e.g. Senior Design Projects, Curriculum Development, Internships, Projects, etc.). We have an on-going effort with the North Dakota Space Grant to develop a Space Suit. Finally, our state has offered industrial internships to students through the national network of consortia for the summer of 2010, as well as opportunity to register for the Spin On It! Helicopter Workshop which we piloted August 1-6, 2010. Our Space Grant Administrative team continues to support the National network. Our team attends and contributes to both National meetings. Our administrative team has successfully visited and coordinated with the

Puerto Rico SG to insure PRSG interns can take part in our UTC internship and Spin On It! programs. Our director visited the Johnson Space Center during 2010 to continue that linkage for Connecticut students.

3. **Minority Serving Institutions** We successfully ran a program in spring 2010 that directly involved the sole MSI in Connecticut (Capital Community College). We are working with Capital and its geographically closest affiliates (CCSU, Trinity and University of Hartford) to create greater involvement opportunities in Space Grant activities for Capital students. Additionally, in the coming year we plan to offer two paid internships at CT-based Pratt & Whitney for students from North Carolina A&T, a historically black college to help further our efforts to award to traditionally underrepresented students in STEM fields.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Our ACADEMIC AFFILIATES see their role as encompassing all three of NASA's desired Outcomes, but devote most of their efforts toward Outcomes 1 and 2.

Fairfield University is a four-year Arts and Sciences University with 4,000 UG and 1,000 grad students.

Wesleyan University is a four-year Arts and Sciences University with 2,700 UG and 600 grad students.

Trinity College is a four-year Arts and Sciences College, with an undergraduate enrollment of 2,250.

The University of Hartford is the lead institution for the CT Space Grant Consortium; it is a four-year Arts and Sciences University with 4,600 undergraduates and 1,600 graduate students.

The University of Connecticut is a Tier 1 Research University with 16,300 UG students and 6,400 grad students.

The University of Connecticut Health Center is a vibrant organization (CT's 16th largest employer) composed of the School of Medicine, School of Dental Medicine, John Dempsey Hospital, the UConn Medical Group, UConn Health Partners and University Dentists. 320 students work toward their medical doctor's degree and 160 students pursuing doctor of medical dentistry, postgraduate residency training for 550+ newly graduated M.D.s each year.

The University of Bridgeport is a four-year Arts and Sciences University enrolling 5,000 undergraduate students.

The University of New Haven is a four-year Arts and Sciences University with 2,400 UG students.

Eastern Connecticut State University, Central Connecticut State University and Southern Connecticut State University are four-year Schools of Arts and Sciences. Their combined undergraduate enrollment is 21,000 students, with an additional 4,500 students enrolled in graduate programs.

Yale University a large private, independent research university with a wide array of programs, departments, schools, centers, museums, and affiliated organizations. It has 5,247 UG students and 6,169 grad students.

The Connecticut Colleges of Technology CT's network of two-year science colleges, with 13,000 students.

The primary role of our INDUSTRIAL AFFILIATES is to provide hands-on work and research opportunities for consortium students (Outcome 1).

Pratt & Whitney Aircraft, a gas turbine manufacturer with >10,000 employees in Connecticut.

Hamilton Sundstrand, a diverse aerospace subsystem supplier with >5,000 employees in Connecticut.

Sikorsky Aircraft, a helicopter manufacturer, with > 7,000 employees in Connecticut.

Kaman, a helicopter and aerospace component manufacturer with > 600 employees in Connecticut.

The primary role of our NON-INDUSTRIAL AFFILIATES is to support non-traditional educational opportunities (Outcome 3).

Connecticut Science Center, a non-profit STEM-focused museum.

Connecticut Center for Advanced Technology, a non-profit technology support organization.

New England Air Museum, a non-profit museum housing over 125 aircraft representing nearly 100 years of flight.