

Connecticut NASA Space Grant College Consortium  
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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 Connecticut Consortium is a Capability Enhancement Consortium funded at a level of \$590,000 from the 2009 fiscal year.

## 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,
3. Partnerships which promote STEM literacy and awareness of NASA's mission.

The CTSG Consortium will continue 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 plan 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 continue through an undergraduate and graduate student fellowship program, in which students work on projects related to NASA's mission. STEM workforce development efforts have continued and expanded by extramural programs involving other state Consortia. We have firm commitments from numerous local aerospace companies to accept student interns (e.g. Pratt & Whitney, Hamilton Sundstrand, etc.). Our consortium has also 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 continues 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. These magnet schools have seen significant growth in student enrollment over the last decade. A number of magnet schools focus on STEM fields and continue to align 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, and the University High School of Science and Engineering located on the campus of the lead institution.

Finally, we have worked to bolster existing community links within the informal education field (e.g. museums and science centers) and seek new partnerships in order to impact Outcome 3, promotion of STEM literacy. Community involvement links include our longstanding affiliation with the New England Air Museum (NEAM), as well as an opportunity to leverage efforts with the Connecticut Science Center, among others. 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: Development of a STEM workforce in disciplines useful to NASA**

Joseph O'Rourke, a student in the Department of Geology, Geophysics and Astronomy at Yale University has been a past recipient of both Undergraduate Fellowship Awards, and Project Grants. As part of his senior thesis, Mr. O'Rourke has submitted one paper, and another manuscript is in the works. In the fall Mr. O'Rourke will begin pursuing a Ph.D. in planetary science at California Institute of Technology.

As in years past, CTSG has worked to place students as interns in Connecticut based aerospace companies. These positions provide challenging and meaningful opportunities for Connecticut students. One such student, Stacey Connelly, from the University of

Hartford had a summer internship at Hamilton Sundstrand. After graduation this year, Miss Connelly will be working full time as an engineer at Pratt & Whitney.

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

A new informal education partner has been added to our consortium this year, The Discovery Museum and Planetarium, in Bridgeport, CT. Its first event as part of the CT Space Grant Consortium was to participate in the first annual CT Space Day. The Discovery Museum boasted approximately 800 visitors on that one day!

## PROGRAM ACCOMPLISHMENTS

**Outcome 1: Contribute to the development of STEM workforce in disciplines needed to achieve NASA's strategic goals.**

**SMART Goals**

1. Place at least 4 CTSG students into aerospace internship positions (including NASA centers).  
CTSG placed 8 students in part-time academic year industrial internships, and will place an additional 12 in full-time summer industrial internships. Additionally, one student completed an internship at a NASA center.
2. Place students into 3 different aerospace internship sites.  
The sites for industrial internships have continued to expand. This year, students have been placed at the following sites: Doncaster, Dymotek, Hamilton Sundstrand, Pratt & Whitney, Sikorsky, UTC Carrier, UTC Power, Wood Group.
3. Award at least 6 undergraduate fellowships in fields useful to NASA.  
Eight undergraduate fellowships were awarded to Connecticut students.
4. Award at least 1 graduate fellowship in a field of use to NASA.  
Five graduate research fellowships were awarded during the Fall '11 call for applications.
5. Host 1 week Helicopter training for at least 10 UG students.  
The summer Helicopter workshop is planned for June 17<sup>th</sup> – 23<sup>rd</sup> at Eastern Connecticut State University.

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

**SMART Goals**

1. Fund at least 10 MS/HS teachers through summer academy.  
In partnership with CCAT, the FOCUS Energy Teacher Academy will be held at the University of Hartford June 25<sup>th</sup> – 29<sup>th</sup>, for 16 – 20 middle and high school science/engineering teachers.

**Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.**

**SMART Goals**

1. Formalize linkages with in-state education groups; complete a MOU with at least 1 new group.  
A new relationship has been built with the Discovery Museum and Planetarium in Bridgeport, CT. As part of the new relationship, CTSG has helped to support an exhibit. Additionally, the Discovery Museum and Planetarium participated in the states first annual CT Space Day.
2. Support the New England Air Museum by either:
  - a. Supporting at least 1 proposal activity  
CTSG again supported the SOAR program hosted by NEAM. This program brings area elementary students and teachers into the museum to learn about the history of aerospace and to participate in hands-on activities.
  - b. Financially through a small grants (< \$5,000)  
A number of small grants were awarded to our informal education partners to support their participation in the first annual CT Space Day, a state wide day here museums and planetariums highlighted the states contribution to NASA and aerospace milestones. Funds were used to create new hands-on exhibits, bring in guest speakers, and provide discount/free admission. Approximately 3,300 people participated at the three sites.
  - c. or introduction of new exhibits  
New exhibits were supported at the Discovery Museum and Planetarium and the Connecticut Science Center.

**PROGRAM CONTRIBUTIONS TO PART MEASURES**

- Student Data and Longitudinal Tracking:

Total awards = 66; Fellowship/Scholarship = 41, Higher Education = 25; 9 of these awards went to underrepresented minority, and 16 were female. As of this date, 5 students have accepted STEM positions in aerospace industry, and 3 have graduated and are pursuing advanced STEM degrees.

- Diversity

*Diversity of Institution Participants:* Fellowship/Scholarship and Higher Education awards were spread among all 13 of our college consortium members. Additionally, 7 (NEAM, CT Science Center, Discovery Museum & Planetarium, CT Invention

Convention, CT Science Fair, CT Center for Advanced Technology (CCAT), and East Lyme Middle School) informal education partners received support for activities.

*Diversity of Student and Faculty Participants:* 14% of students and 20% of faculty are considered underrepresented; 24% of students and 20% of faculty were female. Data for underserved participants have not been collected in the past.

- **Minority-Serving Institutions:**

There were no specific interactions with Capitol Community College (the sole MSI in the state) during this grant cycle, as funding was not set aside for activities in this particular grant year. However, as part of the Colleges of Technology system, students at Capitol Community College are eligible for scholarships that will be awarded at the end of the academic year.

- **NASA Education Priorities:**

*Authentic Hands-on student experiences:* CT students are afforded incredible opportunities to gain meaningful hands-on experience as Industrial Interns in the state's expansive aerospace industry. These academic year (part-time) and summer (full-time) positions place students in research groups and industrial settings where they perform cutting edge research and work – an experience that would not be affording in the traditional academic setting. The state also hosts a week long Helicopter Workshop, where participants learn the basics of rotary aircraft and UAV flight dynamics, design, and manufacturing. Participants (composed of graduate, undergraduate, and select high school students) build and operate remotely piloted aircrafts, tour Kaman and Sikorsky facilities, and experience a flight in a helicopter.

*Engage Middle School Teachers:* To help attract and retain student interest in STEM fields, CTSG partners with CCAT to hold a teacher academy which introduces and educates MS/HS teachers in areas of STEM (this summer's program will focus on Energy). By training teachers and providing follow-up (lesson plans and classroom materials) we will indirectly increase the pipeline of students in STEM fields. Additionally, CTSG supported the UConn chapter of SHPE (Society of Hispanic Professional Engineers) in sponsoring NASA Space Science Day in October. The event was a success, and we hope to continue supporting it in the future.

*Summer opportunities for secondary students on college campuses:* The Bridge program at Southern Connecticut State University is a program which targets predominately urban students who will be entering college in the fall, and have a weakness in specific education foundation areas. This 5-week program reinforces the educational foundation (math, English, study skills, etc.) allowing these students to succeed in college. CTSG helps to support this program and arranges for guest speakers and support to illustrate the (technical, financial, and intellectual) benefits of STEM majors and careers.

*Community Colleges:* Partnership with the Community College network in CT has continued to grow. At the end of the academic year, the Colleges of Technology (CoT) will award 12 scholarships to students whom illustrate interest and potential in STEM fields and areas of study. Additionally, a Faculty Seed Research Grant was awarded this year to a CoT faculty member. This research grant will help to foster interest in STEM in the participating students, and collaboration opportunities with four-year institutions in the state.

*Aeronautics and Environmental Science Research:* Through our undergraduate and graduate fellowships and faculty research grants, cutting edge research is being performed in the fields of both aeronautics and environmental and earth sciences.

*Diversity:* The institutions that make up the CT consortia cover a large array of educational and informal educational diversity. Each of the 13 colleges that are part of the consortia received funding through either Fellowships/Scholarships, Higher Education, or Research Infrastructure grants. Increasing the diversity of the participants is a constant goal of this consortium.

*Enhance research capability of early career faculty:* The CTSG offers two different incentives to invite early career faculty to apply for faculty research grants. The first is a smaller Seed Research Grant. The second is in the rating system of proposal review process, where pre-tenure faculty receive ‘bonus points’ in their application.

## IMPROVEMENTS MADE IN THE PAST YEAR

Improvements have been made to the Industrial Intern program in the addition of participating companies. We have expanded the internship program to ‘2<sup>nd</sup> tier’ suppliers in the state. This expansion has been widely accepted by the industry participants, and allows us to place more students in these meaningful positions.

A second improvement made in the past year was to continue to improve our fall ‘kick-off’ event. The purpose of this event is to publicize the upcoming call for student applications, to introduce some participating companies, and to inform students about the Space Grant program. The event this year was held at the Pratt & Whitney Museum, and had a larger number of industrial participants. Also, buses were rented in order to provide transportation to student, which proved to be great idea to get students at the event, and greatly increased student attendance.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The role of the academic affiliates is to share NASA opportunities with their student body. The following are descriptions of the CT Space Grant Consortium's Academic Affiliates:

**Fairfield University** is a four-year Arts and Sciences University with 4,000 undergraduates and 1,000 students in graduate programs.

**Wesleyan University** is a four-year Arts and Sciences University with 2,700 undergraduate students and a graduate enrollment of 600.

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

**The Connecticut Colleges of Technology** are two-year science colleges, with an average enrollment of 13,000 students.

**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 undergraduate students and 6,400 graduate students.

**The University of Connecticut Health Center** is a vibrant organization (CT's 16<sup>th</sup> 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. where 320 students work toward their medical doctor's degree and 160 students pursuing doctor of medical dentistry, and it provides postgraduate training for more than 550 newly graduated M.D.s each year within its residency program.

**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 students enrolled in undergraduate programs.

**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 undergraduate students and 6,169 graduate students.

The role of the Industrial Affiliates is to provide opportunities for consortium students, as well as support work-force development efforts. Following are descriptions of the CTSG Consortium's Industrial Affiliates:

**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 role of the Non-Industrial Affiliates is to support non-traditional educational opportunities. Following are descriptions of the CTSG Consortium's Non-Industrial Affiliates:

**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.

**Discovery Museum and Planetarium** is an interactive museum featuring hands-on science activities and planetarium shows.

**Connecticut Science Center** houses over 150 hands-on exhibits and education labs.