

The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD – this document) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.

Connecticut Space Grant 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 Space Grant Consortium is a Capability Enhancement Consortium funded at a level of \$430,000 for fiscal year 2014.

PROGRAM GOALS

The NASA Connecticut Space Grant (CTSG) Consortium's goal is to further the efforts started through NASA's Education Strategic Framework by creating program initiatives with five major goals:

CTSG Goal 1: To establish and promote NASA-related research opportunities that draw on the collaborative strength of private, academic and government sectors.

- 1.1 Recruit at least two applicants per year for one or more of the following: NASA Summer Academy; Undergraduate Student Research Opportunity *Project (USRP)*.
- 1.2 Place students from Academic Affiliate Institutions at Industrial Affiliates for student research, projects and industrial internships.
- 1.3 Centralize and disseminate NASA related research opportunities.
- 1.4 Increase the breadth of student and faculty response to Connecticut Space Grant opportunities.
- 1.5 Facilitate the formation of teams to pursue NASA related research opportunities.

CTSG Goal 2: To support education initiatives that will inspire students to pursue careers in science, technology, engineering and mathematics (STEM).

- 2.1 Identify and engage at least six partners to inspire K-12 students.

- 2.2 Identify K-12 outreach sites, to foster diverse experiences for both student presenters and classroom participants. Require outreach of all “significant” award recipients.
- 2.3 Increase the number of higher education students submitting research project proposals in all 4-year Academic Affiliate Institutions. Obtain a minimum of 5 student applications from all research focused Affiliates (UConn, Wesleyan, and Yale) each year, and encourage increased student participation from all other Affiliates.
- 2.4 Maintain an up-to-date website for dissemination of educational and grant opportunities, and other Space Grant and NASA related news and resources.
- 2.5 Place students in industry in mentor/co-op/internship environments.

CTSG Goal 3: To raise the visibility of the Consortium.

- 3.1 Raise the profile of CTSG throughout the state by sharing information through the website, newsletter, and media events.

CTSG Goal 4: To promote workforce development that recognizes the current and future needs of the Connecticut economy.

- 4.1 Develop seminars around emerging technologies.
- 4.2 Work with local industry for career development in the workplace.
- 4.3 Develop courses/programs around workforce needs.

CTSG Goal 5: To develop sufficient resources for strong organizational growth consistent with the target of \$750,000 in total funding by 2015.

- 5.1 Secure sufficient outside funding for a part-time/full-time dedicated staff person.
- 5.2 Research best practices of top state consortiums.
- 5.3 Seek funding from industry, government and foundations.

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

Ms. Amanda Zaleski, University of Connecticut, Graduate Research Fellowship Recipient: “The CT Space Grant Fellowship has been the primary funding mechanism that enabled me to begin my doctoral program at the University of Connecticut. I have been extremely fortunate to be able to expand an exciting research agenda with experts at Hartford Hospital, and also broaden my learning in an academic setting that is truly supportive and rewarding. As a young, female scientist, an opportunity like this is once in a lifetime and I am so grateful to have been awarded this chance!” (Outcome 1: Employ and Educate)

Mr. Jesse Lieman-Sifry, an astronomy and physics double major from Wesleyan College, participates in the Wesleyan Transiting Exoplanet Project (WesTEP), using the Perkin Telescope at Van Vleck Observatory to search for white dwarf exoplanets. He received an Undergraduate Directed Campus scholarship, which was applied to his financial aid package to support his ongoing research in the Astronomy Department. “Middletown weather is quite inconsistent, and it’s only possible to observe when it’s clear. Having a weather dependent job definitely isn’t the best way to earn money, so the scholarship will help,” he said. “I’m excited to receive one of these awards this year!” Mr. Lieman-Sifry is advised by Dr. Meredith Hughes. “Jesse always strikes the right balance between figuring out problems for himself and asking for help when he needs it, and it shows in the impressive progress he’s made this year,” Dr. Hughes said. “He’s really doing cutting-edge work on this beautiful ALMA data

set, and I couldn't be more pleased that the Connecticut Space Grant Consortium has chosen to recognize his impressive contributions!" (Outcome 2: Educate and Engage)

Helen Charov, Executive Director of Connecticut Invention Convention (CIC): "The CTSG funding of the CIC 2014 project to create new Curricular Resources for our classroom-based program in inventing, innovation and entrepreneurship was invaluable to our efforts to provide a breakthrough, NGSS-aligned resource for enhancing the teaching of STEM in grades K-8. We can now give our more than 500 state-wide teachers, in almost 200 schools, an online source of 80+ lesson plans, differentiated by k-2, 3-5, 6-8, including activities, templates for Inventor's Logs, (English and Spanish), and parental guidance. The CIC's new Curricular Resources are a groundbreaking achievement for the teaching of STEM innovation in K-12 and will form the basis of CIC's classroom-based instruction going forward with expanding our reach to more schools. Entire school districts are now adopting this content-rich STEM program. We can't thank the CTSG enough for making this possible!" (Outcome 3: Engage and Inspire)

PROGRAM ACCOMPLISHMENTS

1. The CTSG Consortium presently has membership composed of higher education and research institutions along with industrial partners, and informal education organizations. With 18 member schools, up from 15 last year, we are clearly committed to support Outcome 1, 'Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals'. As a means to meet our Consortium strategic goal of promoting NASA-related research opportunities (CTSG Goal 1) and workforce development that recognizes the needs of the CT economy (CTSG Goal 4), we leverage our financial resources by partnering with a wide range of groups that have complementary interests in our state. Our broad-based efforts in support of Outcome 1 are listed below.
 - 1.1 Undergraduate and graduate student research fellowship grants were awarded, in which students work on projects related to NASA's mission. To date, 3 research fellowships have been awarded (1 graduate, 2 undergraduate).
 - 1.2 Project grants, which provide funding for project materials and supplies, are available for both graduate and undergraduate students. To date, 8 of these grants have been awarded.
 - 1.3 Capstone/Senior Design Project grants, which provide funding for material and supplies to support senior projects, are available for undergraduate students. To date, 2 have been awarded.
 - 1.4 Seven travel grants were awarded (1 graduate, 6 undergraduate) for student travel to conferences, NASA competitions, or visits to NASA Centers.
 - 1.5 Student opportunities also exist in the form of participation in NASA Academy internships (2 summer interns participated), the Rock-On Workshop, and the Helicopter/UAV/Aircraft Readiness Workshop (3 CT student participants, 1 faculty member).
 - 1.6 Summer internships are available within numerous local aerospace companies. The internships are divided into two categories: one for 4-year undergraduate college students and one for community college students enrolled at the states' only MSI – Capital Community College. During FY 2014, 6 students participated in industrial internships at Dymotek, United Technology Aerospace Systems, and CT Invention Convention. Three spring semester MSI internships were awarded for community college students at UConn Health Center, University of Hartford Human Performance Research Laboratory, and Mount Sinai Rehabilitation Hospital's Mandell Center for Multiple Sclerosis.
 - 1.7 Faculty research grants provide important student research assistant opportunities, as well as expand the body of scientific knowledge within STEM. Five different faculty grants are available, including research grants, seed research grants, faculty collaboration grants, STEM education

research grants, and curriculum development grants. Faculty travel awards are also available. To date, 4 research grants, 3 seed research grants, 3 collaboration grants, 3 curriculum development grants, 4 travel grants, and 2 STEM education research grants have been awarded.

2. The CTSG Consortium continues to work with elementary and secondary education groups, in addition to our collegiate affiliates, in order to strengthen the ability of our consortium to influence Outcome 2, 'attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty'. The goal for the activities described below is to inspire students to pursue STEM in college (CTSG Goal 2).
 - 2.1. Higher education initiatives to Educate and Engage
 - 2.1.1. An undergraduate scholarship is awarded for students studying in fields of interest to NASA. Nine scholarships were awarded.
 - 2.1.2. Scholarships were available to students from each participating community college to support students studying STEM fields, and for those with a desire to continue their education at a four-year college. Seven scholarships were awarded.
 - 2.1.3. CT Space Grant continues to support the Helicopter/UAS Workshop - Aircraft Readiness Engineering Workshop. The workshop was successfully completed during Summer 2014. CTSG supported 3 student participants in the workshop which was held at Craven Community College in Havelock, NC this year. One of the students is a community college student. Additionally, one faculty from CT was supported to teach at the workshop.
 - 2.2. K-12 initiatives to Educate and Engage
 - 2.2.1. K-12 initiatives to Educate and Engage include support of CPEP (CT Pre-Engineering Program, a summer program for middle and high-school students), support of various K-12 initiatives, and required outreach of our student fellowship awardees. One K-12 activity was support of CT Tech Savvy, a 1-day STEM conference for middle school girls, and their parents.
 - 2.2.2. A summer program for middle school girls (Mad About Science) was supported. The two-week program is designed to inspire girls to pursue their love of science, technology, engineering and math (STEM) and to encourage them to prepare for careers in the STEM fields. 16 students attended.
 - 2.2.3. CTSG will support Annie Fisher STEM Magnet School in participation with an SSEP project, slated for a spring 2015 launch aboard Mission 7 to the International Space Station. Annie Fisher is a K-8 STEM magnet school located in Hartford, CT.
 - 2.3. K-12 teacher initiatives to Educate and Engage
 - 2.3.1. CTSG sponsored a teacher training workshop called FOCUS: Engineering, which provided instruction for middle/high school science teachers. This three-day program partners 17 middle school science teachers with college faculty, allowing them an opportunity to develop new curricular activities that meet state education standards, along with providing them materials and lesson plans to implement the activities. It is estimated that 1700 students will have direct or indirect impact by those teachers. This year, Connecticut teachers were joined by teachers supported by Northeast Regional Space Grant Consortia, including New Hampshire (1), Vermont (2), and New York (2).
3. The Consortium continues to maintain existing community links within the informal education field (e.g. museums and science centers) and seeks new partnerships in order to impact both NASA Education Outcome 3, 'build strategic partnerships and linkages between STEM formal and informal

education providers’, and CTSG Goal 2 (to support education initiatives that will inspire students to pursue careers in STEM) and CTSG Goal 3 (to raise the visibility of CTSG).

- 3.1. CTSG sponsored a state-wide ‘NASA Space Week’ March 29-April 5, 2014, where both academic and non-academic affiliate institutions held special NASA-related events. Multiple museums and organizations around Connecticut joined together to offer Space Week activities for people of all ages, families and students alike. The 2014 ‘festivities’ included the following:
 - 3.1.1. New England Air Museum: Over 1,611 visitors attended Space Expo 2014. Special guests at Space Expo 2014 included NASA Astronaut Daniel Burbank, a CT native. The theme was: Discover New England's Aerospace Industry and today's partnerships in space exploration. Additionally, several hands-on activities were included.
 - 3.1.2. Connecticut Science Center: More than 2,000 people attended the event. Activities for children of all ages took place throughout the Science Center building in celebration of Space Day.
 - 3.1.3. The Discovery Museum and Planetarium: Over 1,000 people attended the event. Open free to the public in celebration of Connecticut’s NASA Space Day 2014.
 - 3.1.4. Wesleyan University: The Sturm Memorial Lecture, offered a lecture entitled “Black Holes, Galaxies, and the Evolution of the Universe”. The lecture was open to the public.
- 3.2. CTSG held a Career & Grants Expo on October 30th, a networking event that brought together students, researchers, and industry representatives at the Pratt & Whitney Museum Hangar. Previous Space Grant supported projects were on display. In total, 175 people attended.
- 3.3. One Aerospace Educator was sponsored at the New England Air Museum. The person acts to lead museum activities, and helps to develop new exhibits and hands-on activities.
- 3.4. The CT Invention Convention (CIC) is a supported event which encourages children to explore STEM fields. In 2014, 6,009 student inventors participated, from 165 elementary and middle schools across the state. It is expected that another 1,272 students will be influenced indirectly by this event.
- 3.5. CT Space Grant supported an Internship that worked with CIC Educator Staff to create a Lesson Plan format for current CIC curriculum activities, and aligning current CIC curriculum activities with Next Generation Science Standards (NGSS) and Common Core standards.
- 3.6. CT Space Grant supported the University of Hartford Celebration of the 50th Anniversary of the Signing of the Civil Rights Act. Dr. Guion S. Bluford, Jr., the first African American to travel in space was the guest speaker. The event attracted about 135 faculty, staff, students, high school students, and visitors.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

The following data illustrate Connecticut’s success in contributing to the NASA PART measures at this half-way point in our programmatic cycle.

- **Diversity of institutions, faculty, and student participants:**
 - Institutional Diversity: The affiliate distribution of the student awards was: CCSU 8 (11%), ECSU 7 (10%), Fairfield University 0 (0%), SCSU 2 (3%), Trinity College 2 (3%), University of Bridgeport 5 (7%), UCONN/UCONN Health Center 18 (18%), University of Hartford 8 (11%), University of New Haven 2 (3%), Wesleyan 7 (10%), Yale 6 (8%), Capital CC 5 (7%), Housatonic CC 0 (0%), Gateway CC 2 (3%), Naugatuck Valley CC 4 (6), Tunxis CC 0 (0%), Three Rivers CC 0 (0%).

- Faculty Diversity: Nineteen (19) awards were granted in 2014, 7 (37%) were female, and 3 (16%) were underrepresented minority. Faculty awards were spread over 8 different affiliate institutions.
 - Student Diversity: For 2014, the directly funded student participant diversity for awards report 18 (34.6%) of the total student awards were awarded to underrepresented students; 19 (36.5%) of the total awards were awarded to women.
- **Minority-Serving Institution Collaborations:** The CTSG office is working with Capital Community College, Connecticut's only officially recognized MSI, to continue a health science/engineering research internship opportunity. Three internships were awarded in Spring/Summer 2014, where students participated in research projects at University of Connecticut Health Center, Mount Sinai Rehabilitation Hospital, and University of Hartford.
 - **NASA Education Priorities:**
 - **Authentic, hands-on student experiences in science and engineering disciplines:** The following is a summary of the graduate and undergraduate fellowships awarded by CTSG during FY 2014:
 - Graduate Research Fellowship – Students engage in research related to space/aerospace science or engineering under the guidance of a faculty member or a mentor from industry.
 - Undergraduate Research Fellowship – Students engage in research related to space/aerospace science or engineering under the guidance of a faculty member or mentor from industry.
 - Student Project Grants – This award allows students, or groups of students, to purchase items needed for projects that are beyond the normal funds allocated by departments, colleges and universities. These awards may also be used in preparation for NASA sponsored design competitions.
 - Travel Grants – Students may apply for travel grants to visit NASA centers to use unique facilities, to present their NASA related work at professional meetings, to visit NASA researchers for collaboration purposes, and/or to participate in NASA sponsored competitions and events.
 - Industrial Internship – Students are matched with CT industry partners in space/aerospace science or engineering fields, under the guidance of a mentor from industry. Students participated in a 10-week full-time summer internships.
 - MSI Internship - Students from Capital Community College are matched with research projects in the fields of health sciences and engineering. This opportunity allows community college students to participate in meaningful research.
 - Helicopter/UAS Workshop - Students from CT and around the nation work together to study, design, and build both helicopter and UAV models. This workshop is a collaboration with NC Space Grant
 - **Engage middle school teachers in hands-on curriculum enhancement:** In partnerships with CCAT, the 3-day FOCUS: Engineering Teacher Workshop was successfully administered during the summer of 2014. The workshop was opened to all Northeastern Space Grant affiliates. Seventeen in-service HS/MS teachers attended the workshop from Connecticut (12), New Hampshire (1), Vermont (2) and New York (2). A number of “student hands-on”

activities were supported, and approximately 1,700 students will indirectly benefit from this program.

- **Summer opportunities for secondary students on college campuses:**
 - Mad About Science, University of Hartford: CTSG funded 6 scholarships for middle school girls to attend a two-week long summer camp where they spent the afternoon participating in hands on STEM activities.
 - Connecticut Pre-Engineering Program (CPEP) Summer Math Gaming Challenge: CTSG helped to support this summer program that enables 66 middle school students and 10 in-service teachers to improve their math proficiencies by engaging in fun and challenging activities.
- **Develop and sustain Community College relationships:** The CTSG is transitioning from a previous relationship with the Colleges of Technology in the CT State Community College System, to relationships with each individual college. Thus far we have established agreements with 6 of the 12 Connecticut Community Colleges (Capital Community College (MSI), Housatonic Community College, Gateway Community College, Naugatuck Valley Community College, Three Rivers Community College, and Tunxis Community College, with more in process.
- **Aeronautics research:** Three faculty research projects/programs with a primary focus on aeronautics were supported by CTSG.
- **Environmental Science and Global Climate Change research:** Two of the faculty research grants supported by CTSG focused on environmental science.
- **Enhance and support innovative research activities by early career faculty:** CTSG ranks junior faculty research proposals at a higher level than senior faculty proposals in an effort to foster innovative research in early career faculty. Nine (9) of the faculty awards went to junior Faculty at affiliate institutions.

IMPROVEMENTS MADE IN THE PAST YEAR

The Connecticut Space Grant College Consortium has made a number of changes in the past year that will provide improvements in its operation and improve the diversity of its award recipients. These improvements include a change to a three person administrative team (vs the past two person team), increased participation from community colleges, two new internship programs, an emphasis on recruiting students from outside engineering, and collaborative projects with Space Grant Consortia in other states.

The first improvement is our change to a three person administrative team that took place on 6/1/2014. Our new Director (Alnajjar) is joined by the Associate Director (Arico), and a new Assistant Director (Taylor). The third member of the administrative team, Dr. Beth Taylor, is an assistant professor in Health Sciences and Nursing, has access to the health care fields, and students within that area, and has already begun to widen opportunities for female students in the CT Space Grant Consortium.

The second improvement is direct participation by individual Community Colleges. In the past, the CT Space Grant relied on the CT Colleges of Technology to represent all twelve (12) of Connecticut's Community Colleges. Currently we have added 6 Community Colleges (including 1 MSI) as academic affiliates, with more partnerships in the process. We implemented the first three community college internships for a MSI (Capital Community College) to engage and inform community college students in STEM/health fields in Spring and Summer 2014. These included placements at University of Hartford, University of Connecticut Health Center, and Mt.

Sinai. We continued to expand this opportunity by increasing the number of internship spots available to 5 for Spring 2015.

We expanded our industrial internships, which typically are limited to engineers, to the inclusion of two new placements with Connecticut Invention Convention for students in education. As a result, two graduate students from the NEAG School of Education at University of Connecticut, created new curriculum for a classroom-based program in inventing, innovation and entrepreneurship in order to provide a NGSS-aligned resource for enhancing the teaching of STEM in grades K-8. An outcome of this internship is the online resource of 80+ lesson plans, differentiated by k-2, 3-5, 6-8, including activities, templates for Inventor's Logs, (English and Spanish), and parental guidance, available to 500 state-wide teachers, in almost 200 schools.

Another improvement is our emphasis on recruiting female and diverse undergraduate students to our program. In addition to the internship program in place with Capital Community College, we have placed an added weight to recruiting female and diverse students. Our campus directors have been notified of this emphasis. Our efforts have shown to improve our diversity statistics. Female participants increased from 27.5% in 2013 to 36.5% in 2014. Underrepresented participation has increased from 32.5% in 2013 to 34.6% in 2014.

We also implemented STEM education research grants to stimulate research in STEM education, related to topics such as: K-12 Curriculum Development, K-12 or Higher Education STEM Outcomes, STEM Education Outreach Programs, or Social/Psychological Influences on STEM Education (e.g., gender disparities, educational access, and career trajectories).

In terms of Space Grant collaboration, we expanded our regularly held teacher training workshop to include teachers sponsored by states in the Northeast Regional Space Grant Consortium, such that our summer teacher training workshop (FOCUS Engineering, sponsored by CCAT) included 5 non-CT teachers (2 from Vermont, 1 from New Hampshire, and 2 from New York).

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Academic Affiliates: CT has 18 academic affiliates (Capital Community College, Central Connecticut State University, Eastern Connecticut State University, Fairfield University, Gateway Community College, Housatonic Community College, Naugatuck Valley Community College, Southern Connecticut State University, Three Rivers Community College, Trinity College, Tunxis Community College, University of Bridgeport, University of Connecticut, University of Connecticut Health Center, University of Hartford (Lead Institution), University of New Haven, Wesleyan University, and Yale University). These affiliates play an active role in A) project development and implementation, increasingly taking the lead on conceptualization and implementation of Consortium-funded new initiatives, such as the Community College scholarship program, the Helicopter/UAS Workshop, Space Day Activities (University of Bridgeport collaborating with the Discovery Museum and Wesleyan University presenting a Planetarium Show) and K-12 summer opportunities, and B) providing a Campus Director to continually expand campus engagement, providing leadership and membership on the grant selection committee, and serving as a conduit for faculty and students to connect with NASA centers and other STEM researchers. (Outcomes 1, 2 and 3)

Industrial Affiliates: CT has six industrial affiliates (Pratt & Whitney Aircraft, United Technology Aerospace Systems, UTC Research Center, Sikorsky Aircraft, UTC Corporate and Dymotek). These affiliates provide important internship and research opportunities for CT's students and faculty. They also provide leadership guidance on an external advisory board, helping to ensure that the Consortium remains aware of industry trends and future hiring need projections related to STEM careers. (Outcomes 1 and 2)

Non-Academic Affiliates: CT presently has eight non-academic affiliates (Board of Regents at the State of Connecticut, Connecticut Invention Convention, CT Science Museum, CT Corsair Project, New England Air Museum, Connecticut Center for Advanced Technology, the Discovery Museum and Connecticut Pre-Engineering Program). The role of these affiliates is to help us promote STEM literacy throughout the state and to provide important internship and faculty research opportunities for affiliates within our state. (Outcomes 2 and 3)