

New York Space Grant Consortium  
Lead Institution: Cornell University  
Director: Yervant Terzian  
Telephone Number: (607) 255-2710  
Consortium URL: <http://astro.cornell.edu/spacegrant/>  
Grant Number: NNX10AI94H

## 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 New York Space Grant Consortium is a Designated Consortium funded at a level of \$575,000 for fiscal year 2012.

## PROGRAM GOALS

The New York Space Grant (NYSG) Consortium aims to inspire, engage, and educate students in science, technology, engineering, and math (STEM) disciplines, and to prepare students across NY State to be the future workforce for NASA and other high-technology industries. The specific SMART objectives tied to the following NYSG consortium goals are listed at the end of the Program Accomplishments section:

***NYSG Goal #1:*** Our NASA Education Outcome 1 programs (Fellowship/Scholarship, Higher Education, and Research Infrastructure) will positively impact the **diversity** of students entering the STEM workforce and pursuing advanced STEM degrees.

***NYSG Goal #2:*** Our NASA Education Outcome 1 programs (Fellowship/Scholarship, Higher Education, and Research Infrastructure) will positively impact the **number** of students entering the STEM workforce and pursuing advanced STEM degrees.

***NYSG Goal #3:*** Our consortium will help build NY State higher education-industry collaborations, while assisting with high technology workforce development to decrease the "brain drain" afflicting NY State.

***NYSG Goal #4:*** Our NASA Education Outcome 2 (Precollege Education) programs will attract and retain students in STEM disciplines through K-12 teacher professional development and K-12 student opportunities.

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

### **Examples of NYSG benefits to Outcome 1 (Fellowship/Scholarship, Research Infrastructure, and Higher Education):**

A NY Space Grant student at Alfred University performed so well on solar activity research during summer 2012, he was asked by his research advisor (the NYSG affiliate director at Alfred, a small university in rural western New York) to accompany him on an observing run at the National Solar Observatory at Sacramento Peak. During this trip, they collaborated with many other researchers including scientists from NASA Goddard working with the Solar Dynamics Observatory. The student is delivering his honors thesis on the research he conducted during the summer and the observing trip, and has been accepted to graduate school.

University of Rochester researchers are part of a team, led by NASA JPL scientist Dr. Amy Mainzer, to help develop infrared arrays for use in the Near Earth Object Camera (NEOCam). Proposed as a NASA Discovery Program mission, NEOCam will detect and study near-Earth asteroids. The NYSG affiliate director at University of Rochester has involved several female students in hands-on research and testing of the infrared arrays. Some of their team's accomplishments were mentioned in the April 15, 2013 NASA Press Release 13-109 titled "NASA Funded Asteroid Tracking Sensor Passes Key Test."

A NYSG-sponsored Hispanic male, mentored by an astrophysicist at the American Museum of Natural History (AMNH), analyzed data from NASA's Kepler telescope during a summer 2012 internship. This student stated: "I really loved this experience because it taught me many things about not just research but also about myself. ... I deeply love astronomy and all sciences. One thing I have truly come to appreciate here at AMNH is the importance of public outreach. I began teaching children (ages 6-14) basic astronomy in local summer programs in my neighborhood in Spanish Harlem for the purpose of spreading the same passion I feel for the sciences. After this internship, I have decided to become an educator, as well as a researcher, and to, hopefully, open an institution in Spanish Harlem that will teach and inspire the youth about science."

### **Example of NYSG benefits to Outcome 2 (Precollege):**

In summer 2012 three students from NYC high schools received training in mechatronics and robotics by students in the Polytechnic Institute of NYU (NYU-Poly) Mechatronics Lab. One of the high school students worked on a research project titled "Expressive Robotic Head," for which he built mechanisms, actuated by servo motors, to turn and nod a robotic head, plus move the robot's eyes. This student returned to the NYU-Poly Mechatronics lab twice a week during the following fall and spring to continue his

research. In spring 2013 he entered a contest, the International Sustainable World Energy Engineering Environment Project Olympiad (I-SWEEEP), and qualified for the next round. Invited and sponsored by the contest organizers, the high school student and his NYSG-supported NYU-Poly graduate student mentor will travel to Houston, TX in May 2013 to showcase the robotic project in person.

### **Example of NYSG benefits to Outcome 3 (Informal Education):**

With support from NYSG funding, the Astronomy & Astrophysics Department at Columbia University held 47 individual outreach events in the NYC area, including a public lecture and stargazing series, film screenings followed by science fiction vs. fact discussions, school visits, sidewalk astronomy, and special activities such as viewing the transit of Venus. For the sidewalk astronomy program, telescopes were brought to a plaza near a state office building in Harlem, allowing direct outreach to members of the community instead of requiring the community members to come to Columbia. The five sidewalk astronomy events attracted nearly 600 passersby – for many it was their first time looking at the night sky through a telescope.

## **PROGRAM ACCOMPLISHMENTS**

**Outcome 1** [Fellowship/Scholarship, Higher Education, and Research Infrastructure programs] – In FY2012 NYSG provided many opportunities to develop the STEM workforce in disciplines needed to achieve NASA’s strategic goals. Undergraduate and graduate students conducted research projects in a wide array of STEM fields (e.g., aeronautical, biomedical, electrical, and mechanical engineering; computer science and engineering; atmospheric sciences; physics; astronomy and space sciences; human factors/telerobotics; mechatronics/robotics; and optics) during the academic year and summer at **all** NYSG colleges/universities plus the American Museum of Natural History. Many students were involved in analyzing data from NASA telescopes/observatories such as Kepler, Fermi, Infrared Telescope Facility (IRTF), and Spitzer. Some students worked on research & development for future missions (e.g., NEOCam, sounding rocket payloads, and ChipSats). NYSG-supported students presented their research at various conferences, including the 2012 Quadrennial Physics Congress, the 65<sup>th</sup> Annual Meeting of the American Physical Society’s Division of Fluid Dynamics, the American Physical Society’s March Meeting 2013, the 15<sup>th</sup> East Coast Gravity Meeting, and the 221<sup>st</sup> Meeting of the American Astronomical Society. NYSG also supported student travel to conduct research (e.g., NASA Infrared Telescope Facility, National Solar Observatory, Kitt Peak National Observatory, and Arecibo Observatory) and participate in various conferences (e.g., National Space Grant meeting).

Medgar Evers College (MEC) continued its CubeSat, high altitude balloon, and ozone monitoring programs which provide immense hands-on research and peer-mentoring experiences for underrepresented minority students at this MSI located in Brooklyn. The MEC CubeSat program, part of NASA’s ELaNa Mission II, is in the final stages with delivery scheduled for May 2013. Six students were sponsored for summer 2012 NASA internships and NASA Academies at Ames, Glenn, Goddard, JPL, and Marshall. Two

undergraduate engineering students conducted NYSG internships at Lockheed Martin in south/central NY and Honeybee Robotics in Manhattan. Four engineering students participated in the summer internship program NYSG established with Moog Space and Defense in western NY, two funded by NYSG and two by Moog.

Several professional colloquia were supported to promote NASA-related research and missions (e.g., Kepler results). Faculty members who won NYSG Research Initiation and Curriculum Enhancement Grants completed their projects in FY2012. The six projects were conducted at five institutions across NY State. Four were research projects (“First Test of the ChipSat Concept: Measuring the Natural Wind as a Function of Height over Wallops Island”, “Fundamental Analysis and Characterization of Finite-Span Synthetic-Jet Actuators in Quiescent and Cross-Flow Conditions”, “Specific Heat Capacity Measurements of Physically Confined Heat Transfer Fluids in Nano Porous Silica”, and “Origins of the Gamma-Ray Emission from Infrared-Luminous Galaxies Observed with Fermi”) while two projects enhanced higher education curricula (“Teaching Modern Computational Physics on Graphics Processing Units at Rensselaer” and “Developing New Labs for Introductory Astronomy at SUNY Geneseo”).

**Outcome 2** [Precollege] –NYSG funds supported the Buffalo Engineering Awareness for Minorities (BEAM) summer program, in which twenty post-11th grade minority students took mini-courses in math, engineering, and computer science. BEAM students also visited many SUNY Buffalo research labs, and seven of them conducted research projects with guidance from SUNY Buffalo engineering and computer science professors. The 2012 Central NY Rocket Team Challenge, run by the Museum of Science and Technology (MOST) and Syracuse University, included workshops for teachers and students and rocket science lectures. This program culminated in launch day on June 2, 2012 in which 95 rocket teams participated, representing 42 different schools. MOST and Syracuse also ran their annual Bridge Build’em and Bust’em event, in which 220 teams of 4<sup>th</sup> through 12<sup>th</sup> grade students built bridge structures that underwent stress testing by science/engineering professionals. A total of 160 students from Central NY competed in the second annual Syracuse Regional VEX Robotics competition, held at MOST in February 2013. NYSG and MOST also supported the Central NY Science & Engineering Fair (CNYSEF) in which 219 middle and high school students participated (March 2013). Three NYC high school students conducted mechatronics and robotics research projects, mentored by NYSG-supported college students, in the NYU-Poly Mechatronics Lab during summer 2012. Another ten students spent one week in the NYU-Poly Mechatronics Lab as part of the NYU Steinhardt environmental program “SYSTEM” for NYC high school students. The SYSTEM students developed a prototype garden sensor to monitor environmental factors such as air humidity, temperature, and soil moisture levels. NYSG provided funding to the New Explorations into Science Technology + Math (NEST+m) school in NYC to support their participation in the Student Spaceflight Experiment Program (SSEP) Mission 3. They engaged 317 middle school students in experimental design. Of the 106 experiments the students submitted, the winning experiment that will be launched/implemented aboard the International Space Station in fall 2013 is titled “Mammalian Milk in Microgravity.” NYSG also provided funding to the NYC Dept. of Education’s Children First Network 201

(CFN201) to support their participation in SSEP Mission 4. CFN201 is involving thirty-two NYC public high schools, including the specialized schools Stuyvesant HS, Bronx HS of Science, Brooklyn Technical HS, and Queens HS for Sciences.

Columbia ran a special workshop for teachers in the Rooftop Variables (RV) program. RV is designed to help teachers start astronomy clubs at NYC public schools, providing equipment and support for the clubs. The workshop was held at a dark-sky site; participating teachers and their partner Columbia graduate students shared curricular materials and best practices. Five teams of high school teachers and students from the NY Capital District and Long Island attended Union College's Physics Constants Workshop in December 2012, working on physics experiments that utilized instrumentation and techniques not available in high schools. In July 2012 at the request of NASA, the NYSG Director and York College NYSG affiliate director gave teacher training workshops and lectures during "SpaceFest," celebrating the grand opening of the space shuttle *Enterprise* pavilion at the Intrepid Sea, Air & Space Museum in NYC.

**Outcome 3** [Informal Education] – Alfred University's Space Grant students conducted summer outreach events at Stull Observatory, including programming planetarium software for engaging audiences in astronomy. Columbia University continued its very active astronomy outreach programs in the NYC area, including a widely attended public lecture and stargazing series, science fiction movie screenings accompanied by discussions of accurate & inaccurate science portrayed in the films, *Family Astro* events, school group visits, a *Sidewalk Astronomy* program in Harlem, and special viewing events during the transit of Venus. More than 5,000 members of the public attended Columbia's various outreach events. The NYSG affiliate director at NYU-Poly was selected and invited by the NSF to showcase activities at the 2<sup>nd</sup> US National Science and Engineering Expo in Washington, DC (April 27-29, 2012). He and two NYSG-supported students presented a "Mobile Apps for Robotics" exhibit at this event, teaching over 3,000 Expo attendees about advances in human-robot interaction technology through the use of iDevices intuitively interacting with robots. In June 2012 this same team presented a Mechatronics Mania exhibit at an event held at NYU-Poly as part of the *World Science Festival*. The Sciencenter ran five Community Science Nights at five different schools and community centers, bringing hands-on earth and space science activities to over 700 students and their families in Ithaca and surrounding areas. The schools visited had high percentages of minority and/or underserved students. Each family was provided with a take-home activity and free passes to the Sciencenter. New programs for the Sciencenter's Star Lab Portable Planetarium were developed that focused on citizen science and the life cycle of stars; Star Lab activities were presented at school and community centers in the region.

The New York Space Grant Consortium made the following progress towards meeting its SMART goals/objectives in FY2012:

**1. The percentage of NYSG underrepresented minority student awardees (monetary and non-monetary) per budget year shall meet or exceed the underrepresented**

**minority enrollment percentage in NY higher education institutions (28%, based on [http://nces.ed.gov/programs/digest/d11/tables/dt11\\_239.asp](http://nces.ed.gov/programs/digest/d11/tables/dt11_239.asp)).** The percentage of underrepresented minority students participating in NYSG fellowship/scholarship, higher education, and research infrastructure programs from FY2012 funds was 31%.

**2. The percentage of NYSG female student awardees (monetary and non-monetary) per budget year shall meet or exceed 38% (based on STEM bachelor's degrees awarded to females nationwide).** The percentage of female students participating in NYSG fellowship/scholarship, higher education, and research infrastructure projects from FY2012 funds was 33%. This may be due to a smaller pool of female applicants. We are taking steps to remedy this.

**3. NYSG shall strive for 90% or more of graduating significant awardees to take the next step to STEM employment or advanced STEM degrees.** Based on longitudinal tracking data, none of the students who received significant awards during FY2012 have taken their next step – all are enrolled in the same degree programs as of April 2013. Among the 56 previous years' significant awardees (FY2006-11) who graduated since the last reporting period, 47 are pursuing advanced STEM degrees or STEM employment, six have taken their next step in non-STEM areas (e.g., law school, investment banking, college counselor, concert violinist), and three are unknown statuses.

**4. NYSG shall add 2-3 more industrial affiliates in New York State by the end of the 2010-2015 grant period.** NY Space Grant Consortium has added Moog, Inc. to our affiliate membership. Moog continues to provide NYSG engineering summer internships at its Space and Defense Group, located in East Aurora, NY.

**5. Following their involvement in NYSG precollege programs, at least 75% of K-12 teachers participating in long-duration ( $\geq 2$  days) training will utilize NASA resources in their classroom instruction.** According to a follow-up survey of K-12 teachers who participated in an astronomy workshop run by Rensselaer and the Dudley Observatory (supported by NYSG and NASA AESP), the teachers are all using some of the activities they learned during the workshop in their classrooms.

**6. Following their involvement in NYSG precollege programs, at least 60% of K-12 teachers participating in short-duration training will utilize NASA resources in their classroom instruction.** Teachers that participated in Union College's Physics Constants Workshop have passed along the excitement and new experiences/knowledge they gained to students in their classrooms, and 100% responded that they are likely to investigate other NASA opportunities as a result of this workshop.

**7. Following their involvement in NYSG precollege programs, at least 50% of K-12 students will express interest in STEM careers.** A majority of the students that participated in precollege programs (e.g., BEAM, Central NY Rocket Team Challenge, Bridge Build'em and Bust'em, VEX Robotics) have shown interest in STEM careers, as tracked by the BEAM program administrators and students' repeated participation in STEM competitions.

## PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student Data and Longitudinal Tracking:** Total student participants in FY2012 = 81 (Fellowship/Scholarship = 38, Higher Education/Research Infrastructure = 43). Out of the total participants, 25 are underrepresented minorities (31%) and 27 are women (33%). Of the total participants, 69 students received significant awards; all of these students are still enrolled in their current degree programs as of April 2013.
- **Minority-Serving Institution Collaborations:** Three NYSG affiliates are minority-serving institutions: CUNY City College of New York, CUNY Medgar Evers College, and CUNY York College. The NYSG affiliate director at York College is now PI of a five-year NSF Partnerships in Astronomy & Astrophysics Research and Education (PAARE) grant to increase minority representation in those fields; the seeds of this project were sown in part with NY Space Grant support. While SUNY Stony Brook is not a minority institution, NYSG is partnered with its Louis Stokes Alliance for Minority Participation (LSAMP) program to provide underrepresented minorities with NASA-related research opportunities with Stony Brook faculty. Additionally, Medgar Evers College has ongoing collaborations with out-of-state minority-serving institutions, such as University of Houston-Downtown and South Carolina State University.
- **NASA Education Priorities:** *Accomplishments related to the “Current Areas of Emphasis” stated in the 2010 Space Grant solicitation. Report on areas that apply to work proposed in your proposal and budget.*
  - *Authentic, hands-on student experiences in science and engineering disciplines:* NY students benefited from STEM research and internship opportunities at all NYSG affiliate institutions, NASA centers, and three aerospace companies within NY State (Honeybee Robotics, Lockheed Martin, and Moog Space and Defense). Medgar Evers College involved predominantly underrepresented minority students in hands-on high altitude balloon and CubeSat projects. Secondary school students gained hands-on experience with STEM projects and research through NYSG-supported programs including BEAM, NYU-Poly Mechatronics Lab, Central NY Rocket Team Challenge, and the Student Spaceflight Experiment Program.
  - *Diversity of institutions, faculty, and student participants (gender, underrepresented, underserved):* The NY Space Grant Consortium involves a wide variety of institutions (public and private, small and large higher education institutions; informal education organizations; and industry), spread throughout upstate NY and the New York City area, with faculty from many different STEM fields serving as affiliate directors. Of the college/university students that participated in NYSG FY2012 programs, 31% were underrepresented minorities and 33% were women.
  - *Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise:* A

teacher training program run by Rensselaer and the Dudley Observatory, titled “Planetary Science and Astronomy for the Next Generation of Science Standards,” was aimed primarily at middle school Earth Science teachers. This workshop showed how to compare planetary geology with Earth geology, and included training in astronomy concepts included in the NYS curriculum for Earth Science.

- *Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers:* The Buffalo-area Engineering Awareness for Minorities (BEAM) program engaged post-11th grade minority students in faculty-mentored engineering and computer science projects at SUNY Buffalo. Three NYC high school students conducted mechatronics and robotics research projects, mentored by NYSG-supported college students, in the NYU-Poly Mechatronics Lab during summer 2012. Led by an NYSG-supported NYU-Poly student, ten other NYC high school students spent one week learning about mechatronics and developing a prototype garden sensor device.
- *Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.* Nearby CUNY community colleges are involved with the CubeSat program led by Medgar Evers College. York College’s NYSG affiliate director continues to strengthen relationships with LaGuardia Community College through astronomy presentations and other interactions.
- *Aeronautics research – research in traditional aeronautics disciplines, areas appropriate to NASA’s unique capabilities, and needs of the Next Generation Air Transportation System (NextGen):* Space Grant-supported projects at Clarkson included unsteady aerodynamics research plus design, fabrication, and wind tunnel testing of an unmanned aerial vehicle. Space Grant students at SUNY Stony Brook researched jet engine noise and hypersonic flight propulsion. A NASA Glenn summer intern sponsored by NYSG worked on advanced engine health monitoring techniques for NextGen air transportation.
- *Environmental Science and Global Climate Change – research and activities to better understand Earth’s environments:* Students running Medgar Evers College’s ozone monitoring program calibrate and test the ozonesondes, launch them at the National Weather Service sounding facility in Brookhaven, NY, and retrieve/analyze the data. A NYSG summer intern conducted research on ice formation in the atmosphere; a better understanding of this process can reduce uncertainties in cloud and climate models. A wind turbine blade laboratory was recently established to support renewable energy research at Clarkson University; a Space Grant-supported graduate student is a lead researcher in this new lab. A Union College undergraduate analyzed soil samples from Schoharie County farms to check for industrial contaminants from pesticides and other stored chemicals that might have leaked into the soil due to Hurricane Irene flooding.
- *Enhance the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.* Faculty who won NYSG Research Initiation Grants

completed projects in FY2012 on the following topics: exploring the use of chip-based satellites to measure neutral winds in the upper atmosphere, investigating synthetic-jet actuators to apply active flow control in NASA-relevant applications, studying the specific heat capacity of materials to develop better renewable energy storage technologies, and examining origins of gamma-ray emission from infrared-luminous galaxies observed with NASA's Fermi telescope. The NYSG grant was especially helpful to a Union College underrepresented minority faculty member, as it allowed him to expand the scope of his thermodynamics research to include thermal energy storage. His research from this grant enabled him to give an invited talk at an American Chemical Society meeting, and to complete two proposals to the NSF's Faculty Early Career Development Program.

## IMPROVEMENTS MADE IN THE PAST YEAR

NYSG has successfully added a new industry affiliate: Moog Inc. We continue to seek collaborative opportunities with aerospace and high-tech firms within NY State.

Due to increased visibility and news of Columbia University's astronomy outreach programs in the NYC area, the department was asked by several cultural organizations (e.g., Lincoln Center Film Society, Atlas Obscura Society, and Brooklyn Academy of Music) to complement their own events with astronomy lectures or stargazing sessions. These partnerships present avenues of engaging previously untapped communities in science/astronomy education. A new departmental outreach coordinator, partially supported by NYSG, will continue to expand Columbia's partnerships and network of speakers, plus work on evaluation efforts.

The NYSG Director was elected Chair of the National Council of Space Grant Directors for a two-year term beginning July 2012. As part of his responsibilities to the national Space Grant network, he works directly with other consortia directors, develops agendas and presides over the national meetings, and communicates regularly with NASA HQ.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

1. **Alfred University**, Alfred, NY [*highly residential, Master's I, private*] undergraduate research and F/S, informal education
2. **Barnard College**, New York, NY [*highly residential, Baccalaureate - Liberal Arts, private*] **liberal arts college for women**, undergraduate research and F/S
3. **CUNY City College of NY**, New York, NY [*primarily nonresidential, Master's I, public*] **Minority Serving Institution**, graduate research and F/S
4. **CUNY Medgar Evers College**, Brooklyn, NY [*primarily nonresidential, Baccalaureate - General, public*] **Minority Serving Institution**, undergraduate research and F/S, student balloon (MECSAT) and CubeSat (CUNYSAT) programs

5. **CUNY York College**, Jamaica, NY [*primarily nonresidential, Baccalaureate - General, public*] **Minority Serving Institution**, undergrad and grad research and F/S
6. **Clarkson University**, Potsdam, NY [*highly residential, Doctoral/Research - Intensive, private*] undergraduate and graduate research and F/S
7. **Colgate University**, Hamilton, NY [*highly residential, Baccalaureate - Liberal Arts, private*] undergraduate research and F/S, informal education
8. **Columbia University**, New York, NY [*highly residential, Doctoral/Research - Extensive, private*] graduate research and F/S, precollege, informal education
9. **Cornell University**, Ithaca, NY [*primarily residential, Doctoral/Research - Extensive, private and public (land grant)*] **NYSG lead institution**, undergraduate and graduate research and F/S, other consortium-wide projects such as summer internship programs, precollege, and informal education
10. **Lockheed Martin**, Owego, NY – Aerospace industry affiliate providing student internships.
11. **Moog, Inc.**, East Aurora, NY – Aerospace industry affiliate providing student internships.
12. **Polytechnic Institute of New York University (NYU-Poly)**, Brooklyn, NY [*primarily nonresidential, Doctoral/Research - Intensive, private*] undergraduate and graduate research and F/S, precollege, informal education
13. **Rensselaer Polytechnic Institute**, Troy, NY [*highly residential, Doctoral/Research - Extensive, private*] undergraduate and graduate research and F/S, precollege
14. **Rochester Institute of Technology**, Rochester, NY [*highly residential, Master's I, private*] graduate research and F/S
15. **Sciencenter**, Ithaca, NY – Non-profit informal education affiliate, precollege, informal education
16. **SUNY Binghamton**, Binghamton, NY [*highly residential, Doctoral/Research – Extensive, public*] undergraduate research and F/S
17. **SUNY Buffalo**, Buffalo, NY [*primarily residential, Doctoral/Research - Extensive, public*] undergraduate and graduate research and F/S, precollege
18. **SUNY Geneseo**, Geneseo, NY [*highly residential, Master's I, public*] undergraduate research and F/S
19. **SUNY Stony Brook**, Stony Brook, NY [*highly residential, Doctoral/Research - Extensive, public*] **NYSG is partnered with the LSAMP program which runs minority-focused projects**, undergraduate research and F/S
20. **Syracuse University**, Syracuse, NY [*highly residential, Doctoral/Research - Extensive, private*] undergraduate research and F/S, precollege and informal education projects with the Museum of Science and Technology (MOST) in Syracuse
21. **Union College**, Schenectady, NY [*highly residential, Baccalaureate - Liberal Arts, private*] undergraduate research and F/S, precollege
22. **University of Rochester**, Rochester, NY [*highly residential, Doctoral/Research - Extensive, private*] undergraduate and graduate research and F/S

**The National Space Grant Office requires two annual reports, this Annual Performance Data Report (APD) 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.**