

FY 2020 Year 5 Extension Annual Performance Document Template

NY_FY20_Year 5Ext_APD

New York Space Grant Consortium Lead Institution: Cornell University

Director: Mason Peck

Consortium URL: 607-255-
2710

Grant Number:

NNX15AK07H

Period of Performance:

A. 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, Program Grant Consortium funded at a level of \$760,000 for the fifth year of funding.

B. PROGRAM GOALS

State the Consortium Goals and Objectives from your base proposal and augmentation proposal. The objectives should express quantitative targets when appropriate.

NYSG aims to improve the diversity and readiness of New York students that pursue advanced STEM degrees or enter the STEM workforce. Our strong affiliate base includes three minority-serving institutions, one women's college, and a direct partnership with a minority-serving program. The New York Space Grant Consortium strives to:

- Offer assistance and training to college students through NIFS and other research opportunities and experiences in science & engineering fields,
- Develop and implement STEM learning for ALL students, including those with an education major or background,

- Encourage, educate, and collaborate with K-12 STEM teachers,
- Provide opportunities for people in higher education (undergraduates, graduates, faculty and staff) to exchange ideas and information in workshops, seminars, and meetings,
- Join with industry to develop training and research opportunities for faculty and students, and
- Implement outreach programs that inform and excite the public about science and technology, particularly NASA missions and advancements.

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

SMART Objective 1 – The percentage of NYSG underrepresented minority student awardees (monetary and non-monetary) shall meet or exceed the minority enrollment percentage in NY higher education institutions. Statistics published in the National Center of Education Statistics (NCES) Digest (NCES Table 306.60: Fall enrollment in degree-granting postsecondary institutions, by race/ethnicity of student and state or jurisdiction: 2018 are used as the benchmark for this objective:

https://nces.ed.gov/programs/digest/d19/tables/dt19_306.60.asp

SMART Objective 2 – The percentage of NYSG female student awardees (monetary and non-monetary) per budget year shall meet or exceed the percentage of bachelor’s degrees awarded in the state of New York in science/engineering. For this benchmark, data from the National Science Foundation, Division of Science Resources Statistics, *Women, Minorities, and Persons with Disabilities in Science and Engineering* Table 5-2 “Bachelor’s degrees awarded, by field and sex: 2006–16” shows that women earned 38.6% of the bachelor’s degrees awarded in engineering and sciences (excluding psychology and social sciences) in 2016:

<https://nces.nsf.gov/pubs/nsf19304/assets/data/tables/wmpd19-sr-tab05-002.pdf>

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

SMART Objective 3 – NYSG shall strive for 90% or more of graduating significant awardees to take the next step to STEM employment or STEM advanced. Our progress toward this objective is measured by data obtained from annual polling of significant student awardees’ current status/progress, based on the NASA HQ guidelines on longitudinal student tracking.

NYSG Goal #3: Our consortium NYSG will build higher education collaborations with industry within NY State to assist with high-technology workforce development.

SMART Objective 4 – NYSG shall add 2-3 more industrial affiliates in New York State by the end of the 2015-20 grant period. Lockheed Martin and Moog Inc. were our only industrial affiliates at the beginning of this grant period. We successfully formed mutually beneficial relationships with two other major science and engineering companies that conduct diverse STEM research & development.

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS

*Provide concise, significant, and meaningful **highlights or anecdotes** (no more than three) that are directly related to work completed in FY 2020, highlighting student and/or project accomplishments. Specify alignment to Space Grant program areas/ elements.*

The Intrepid Sea, Air & Space Museum was able to shift their in-person experiences into the virtual space and engage in astronomy and space science events on Twitch TV and exponentially expanded their audiences from 250 per session to thousands per session from all over the nation. This program increases exposure to thousands of individuals across the nation to NASA and STEM content and therefore aligns with Space Grant programs objective to promote a strong science, mathematics and technology education base from elementary through secondary schools as this is a program designed for individuals of all ages but the Intrepid Museum targets K-12 students specifically as well as the objective to recruit and train U.S. citizens, especially women, underrepresented minorities and persons with disabilities. This aligns with the

New York Space Grant program element implementing outreach programs that inform and excite the public about science and technology, and particularly NASA missions and advancements.

At Union College, four women students were supported in the Summer of 2020, all working with women advisors to work remotely in research roles. One student, Georgia Mraz, initiated a new collaboration between the Union College Observatory and the Follow-up team for NASA's TESS satellite to follow-up exoplanet candidates with the Union College Observatory. Georgia Mraz was then invited with Professor Wilkin to join the Key Project Team in analyzing observations from the Las Campanas Observatories. The work done at Union College aligns with the Space Grant programs objective to recruit and train U.S. citizens, especially women and underrepresented minorities and persons with disabilities by providing opportunities to young women and having them paired with women mentors. This aligns with the New York Space Grant program goal of our Fellowship/Scholarship, Higher Education, and Research Infrastructure programs will positively impact the **diversity** of students entering the STEM workforce and pursuing advanced STEM degrees.

Finally, the Space Grant Industry Internship program was able to partner with Lockheed Martin to provide summer undergraduate internship opportunities. The selected summer 2020 interns from Binghamton University, Cornell University and the University of Rochester designed, developed and tested a functioning smart greenhouse, all remotely, that was then used this academic year by Lockheed Martin's Engineering Explorers program to provide high school students gain a better understanding of career opportunities in engineering through project-based learning. This connects to many of the Space Grant program elements such as encouraging interdisciplinary education, research and public service programs as well as promoting a strong science, mathematics and technology education base from elementary through secondary levels. This aligns with the New York Space Grant program goal of our Fellowship/Scholarship, Higher Education, and Research Infrastructure programs will positively impact the **number** of students entering the STEM workforce and pursuing advanced STEM degrees by increasing the impact of the students involved in this project beyond the interns, and to high schoolers as well.

D. PROGRAM ACCOMPLISHMENTS

Refer directly to the specific consortium goals and SMART objectives in your base and augmentation proposals when describing your accomplishments. Describe the accomplishments as referenced to each of the five Space Grant Program Areas. The accomplishments should be a summary of the accomplishments rather than a specific description of each individual activity.

- a) NASA Internships, Fellowships, and Scholarships:
- b) Higher Education Projects:
- c) Research Infrastructure Projects:
- d) Precollege Projects:
- e) Informal Education Projects:

- A) NASA Internships, Fellowships, and Scholarships: NYSG awarded graduate and undergraduate fellowships to 10 students at City College, Columbia, Medgar Evers, RIT, and the University at Buffalo. 8 undergraduates completed NYSG-funded summer internships at Lockheed Martin, Ursa Space Systems, Cosmoptera Inc and Moog. All opportunities were virtual due to COVID-19.
- B) Higher Education Projects: Additional cycles of NYSG's Opportunity Grants program, initiated two

years ago, were administered this year. A student team at Binghamton University is developing and launching a sounding rocket past the Kármán Line into space. Another student team at the University of Buffalo, the Micro-g Next team is working to design an autonomous surface vehicle to compete in the SAVER challenge work with NASA engineers to provide this workable prototype for the upcoming Artemis mission. In addition, one Opportunity Grants were awarded to precollege projects; its activities are described below

- C) **Research Infrastructure Projects:** Our affiliates continually build up research infrastructure through small-scale activities that are part of student support activities and other educational investments. None of our expenditures represent large-scale infrastructure projects. Instead, our goal is to distribute the funding as widely as possible to ensure maximum impact across the state's large student population. Of particular note among these small-scale projects are the following exciting accomplishments. Binghamton University is the home of the AeroBing rocketry project (\$2,000), a student-run research group striving to launch a rocket beyond the Karman Line. NY Space Grant support provided components and purchase of small-scale tools to enable this large group of NY students to realize this exciting experiment in support of their career aspirations. The University at Buffalo used Space Grant funding to support over a dozen students' participation in NASA's Micro-g NExT project through \$2000 in purchases of research supplies. Micro-g Neutral Buoyancy Experiment Design Teams (Micro-g NExT) challenges undergraduate students to design, build, and test a tool or device that addresses an authentic, current space exploration challenge. The overall experience includes hands-on engineering design, test operations, and public outreach. Test operations are conducted in the simulated microgravity environment of the NASA Johnson Space Center Neutral Buoyancy Laboratory (NBL). The 2021 Micro-g NExT challenges focus on aspects of the Artemis mission.
- D) **Precollege Projects:** Lockheed Martin's summer interns were able to design, develop and test a functioning smart greenhouse that was then used for Lockheed Martin's Engineering Explorer's program to educate high school students to gain a better understanding of career opportunities in engineering through project learning.
- E) **Informal Education Projects:** NYSG funding continued to provide valuable support of Columbia University's Department of Astronomy outreach coordinator, who organized various educational events. The Intrepid Sea, Air & Space Museum in Manhattan utilized Space Grant funds to support the Family Astronomy Nights, provided free to the public and virtual. The Intrepid also utilized Space Grant funds to support their Mission to Mars Perseverance Landing view party via Twitch TV. The Sciencenter continued to raise awareness about NASA's missions and increase STEM literacy in Ithaca and surrounding rural areas. The Sciencenter was able to pivot most of their programming to virtual with daily Zoom based STEM activities.

E. MILESTONES

Refer directly to the Milestones chart included in your 5th year funding extension proposal.

- a. Include a summary of your proposed milestones and describe the extent to which each milestone has been met. If there have been significant deviations from your proposed milestones that will affect your initial period of performance, please provide a justification for those deviations.
- b. If there have been significant deviations from your proposed milestones that will affect your

initial period of, please provide a revised list of milestones.

Cornell Graduate Fellowships: Awarded in August and December for research to be done in the following semester. All proposed fellowships were awarded this year.

NASA Undergraduate Internships: Awarded in March and April for summer 2020 internships at NASA Centers. All proposed NASA Internships were awarded this year.

NY Industry Undergraduate Internships: Awarded in March and April for summer 2020 internships at NY Industry partners. All proposed Industry Internships were awarded this year.

NYSG Opportunity Grants: Most of our Opportunity Grants were awarded this year. The award cycle for April 2020 was cancelled due to lack of interest but we were able to fund more opportunities in the Fall of 2020.

NYSG Informal Education Projects: The proposed NYSG radio/podcast pilot program is currently on hold due to COVID-19 restrictions. We would like to move milestones that were rescheduled for late fall 2020/early spring 2021 to early fall 2021 as we continue to plan for remote access to our recording studio.

Affiliate Undergraduate Fellowships: Our undergraduate fellowships at City College, Columbia, Medgar Evers and RIT were able to move their fellowships to virtual/remote research fellowships or a hybrid approach. However many of our other undergraduate fellowships at Alfred University, Barnard College, New York University, Syracuse University, and University at Buffalo were unable to conduct their fellowships in a remote capacity but hope to do so if awarded a No Cost Extension.

Affiliate Graduate Fellowships: Graduate fellowships at City College, RIT and University at Buffalo were awarded to students in the summer and fall of 2020. These were originally scheduled for the Spring of 2020 but were postponed due to COVID-19.

Affiliate Higher Education Projects: Spring higher education events at NYU have been postponed due to COVID-19. NYU was planning to offer the events in the Fall of 2020 and Spring of 2021 but have not yet been able to do so.

Affiliate Research Infrastructure Projects: Two research initiation grants awarded in June 2019 for research taking place in June-December, 2019. All grants were awarded and activities completed by January 2020.

Affiliate Precollege Projects: All precollege projects took place as scheduled.

Affiliate Informal Education Projects: Informal education events at Intrepid were able to shift to virtual space and engage in astronomy and space science on Twitch TV and exponentially expand the audience from 250 per session to thousands. Informal education opportunities by Sciencenter moved to virtual as they provided daily Zoom based STEM activities and other virtual programming, they have also incorporated more space content to their rural outreach programs to surrounding communities.

F. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS

Include summary data for the bulleted list below:

- **Diversity:** Describe the diversity of institutions, faculty, and student participants (gender, underrepresented, underserved)
- **Minority Serving Institution Collaborations:** Summarize interactions with MSIs within the consortium and describe projects/activities.
- **Office of Education Annual Performance Indicators (APIs):** Provide numerical values for consortium contributions to API's.

Refer to Table 1: *Annual Performance Plan: FY20 Performance Goals and Annual Performance Indicators* on page 5. Note the explanation above the table.

- API 3.3.3
- API 3.3.5

Diversity: Diverse institutions comprise the NY Space Grant Consortium: higher education institutions that are public and private, small and large; informal education/non-profit organizations; and industry. Space Grant programs at affiliate institutions, spread throughout upstate NY and the New York City area, are led by affiliate directors (faculty and professionals) from many different STEM fields, including Astronomy, Aerospace Engineering, Biomedical Engineering, Electrical Engineering, Materials Science, and Physics. While only three of our Affiliate Directors are underserved or underrepresented minorities, eleven of the twenty-four (46%) NYSG affiliate directors are women (not including the associate director at the lead institution). Diversity of student participants is the primary aim of SMART Objectives #1 and #2, and we achieved our target goals for student participants this year.

Minority Serving Institution Collaborations: Three NYSG affiliates are minority-serving intuitions: City College of New York, Medgar Evers College, and York College. City College runs a Graduate fellowship and undergraduate research program in Biomedical Engineering, Medgar Evers runs an undergraduate research program in Computer Science and high-altitude balloon research, and York College runs a summer research internship program that places students at York and community colleges in the City University of New York system at research institutions like the American Museum of Natural History and the Flatiron Institute.

While Stony Brook University is not a minority serving institution, NYSG is partnered with its Louis Stokes Alliance for Minority Participation (LSAMP) program to support NASA-related research opportunities for minority students.

Office of Education Annual Performance:

- API 3.3.3: STEM 9 (Number of higher education students receiving significant, direct awards who are racially or ethnically underrepresented, women, persons with disabilities, or veterans so far, out of 10 significant awardees this year)
- API 3.3.5: STEM 19-5: 3 (Number of paper presentations and peer-reviewed research so far this

year)

G. IMPROVEMENTS MADE IN THE PAST YEAR

Succinctly describe improvements and/or adjustments made last year that demonstrate significant change(s) within the consortium. The improvements and/or adjustments that brought about change may have been in management, resource allocation, project design, project evaluation, etc.

Virtual Accessibility: We have moved most of our fellowships, internships, projects and outreach programs to virtual experiences which has allowed a greater impact on individuals on a state and national level. The virtual access to these operations also created opportunities for a more diverse group of participants. Our affiliates have also been able to connect virtually with more experts to improve their programming in regard to NASA-related and STEM fields such as astronauts and scientists who were previously unable to contribute due to time or location constraints.

H. CURRENT AND PROJECTED CHALLENGES

*Identify any current or projected challenges in the implementation or execution of activities. Discuss how COVID-19 has impacted the award's execution. Explain how the management team is working to address the challenges identified and/or how National Program Staff can assist. **If this is your close-out report, please skip this section.***

Due to shutdowns relating to the COVID-19 pandemic, all our consortium institutions are either closed to the public, offering virtual instruction, or offering hybrid instruction. Pandemic related restrictions continue to limit in person research and internship opportunities for our affiliates.

Several of our affiliate programs have indicated that the progress of ongoing programming and research has been impacted greatly by COVID-19 and have requested to postpone student awards to the Summer and Fall of 2021. This includes programs at Alfred University, Barnard College, Binghamton University, City College of New York, Rensselaer Polytechnic University, Rochester Institute of Technology, Stony Brook University, University of Buffalo and Union College. Therefore, our affiliates would like to use these unexpended funds to fund similar programs throughout the summer and next academic year.

One of our industry partners, Cosmoptera Inc, has dissolved within the past year. We are looking for additional industry partners while we reallocate the funding for internships to other industry partners.

I. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

List the institutions that comprise the consortium; include the name, type of institution, key characteristics, and role in consortium activities/operations. A listing of affiliates with no description of characteristics or roles is not sufficient.

Higher Education Institutions:

Cornell University, Ithaca, NY (Lead Institution): [Four-year, large, highly residential, private and public (land grant)] Cornell runs a graduate research fellowship program for students in Astronomy and Mechanical and Aerospace Engineering, and various consortium-wide projects in higher education and research infrastructure.

Alfred University, Alfred, NY: [Four-year, small, highly residential, private] Alfred runs a summer research program for undergraduates in Astronomy and Physics, and delivers public outreach events at the Stull Observatory on its campus.

Barnard College, New York, NY [Four-year, small, highly residential, private] Barnard is a liberal arts college for women, and they run undergraduate summer research opportunities in astronomy and physics.

Clarkson University, Potsdam, NY [Four-year, medium, highly residential, private] Clarkson offers graduate and undergraduate research fellowships in engineering and technology.

Colgate University, Hamilton, NY [Four-year, small, highly residential, private] Colgate offers undergraduate research fellowships in astronomy, astrophysics and planetary science, as well as public outreach events in astronomy and visualization.

Columbia University, New York, NY [Four-year, large, highly residential, private] Columbia offers research fellowships in astronomy, as well as a robust astronomy outreach program in New York City.

CUNY City College of NY, New York, NY [Four-year, large, primarily nonresidential, public] City College is a Minority Serving Institution, and offers research fellowships to graduate and undergraduate students in biomedical engineering.

CUNY Medgar Evers College, Brooklyn, NY [Four-year, medium, primarily nonresidential, public] Medgar Evers is a Minority Serving Institution, and offers internships and scholarships to undergraduates working on flight projects and numerical modeling.

CUNY York College, Jamaica, NY [Four-year, medium, primarily nonresidential, public] York College is Minority Serving Institution, and offers research internships to undergraduate and community college students.

New York University (formerly NYU-Poly), Brooklyn, NY [Four-year, large, primarily residential, private] NYU offers research fellowships in robotics, and STEM education workshops for middle school and high school teachers.

Rensselaer Polytechnic Institute, Troy, NY [Four-year, medium, highly residential, private] Rensselaer offered both a graduate and an undergraduate research fellowship in astrophysics.

Rochester Institute of Technology, Rochester, NY [Four-year, large, highly residential, private] Rochester offers undergraduate and graduate research fellowships in astrophysics, computational relativity, and detector design and instrumentation.

SUNY - Binghamton University, Binghamton, NY [Four-year, large, highly residential, public] Binghamton offered a graduate research fellowship in materials engineering.

SUNY Geneseo, Geneseo, NY [Four-year, medium, highly residential, public] Geneseo offers undergraduate summer research scholarships in astrophysics (photometry and sensor design).

SUNY - Stony Brook University, Stony Brook, NY [Four-year, large, highly residential, public] Stony Brook offers scholarships in NASA-related research as a part of the Louis Stokes Alliance for Minority Participation (LSAMP) program. Scholarships are offered for the academic year or summer.

SUNY - University at Buffalo, Buffalo, NY [Four-year, large, primarily residential, public] Buffalo offers research fellowships to undergraduate and graduate students in fields of interest to NASA, as well as various outreach and informal education events.

Syracuse University, Syracuse, NY [Four-year, large, highly residential, private] Syracuse offers undergraduate summer research internships in Science and Climate Studies, as well as precollege and informal education projects with partner Museum of Science and Technology (MOST) in Syracuse.

Union College, Schenectady, NY [Four-year, small, highly residential, private] Union College offers a robust undergraduate summer research program in physics and astrophysics, as well as a workshop for high school

physics teachers and students.

University of Rochester, Rochester, NY [Four-year, medium, highly residential, private] University of Rochester offers fellowships and scholarships for undergraduate and graduate research, as well as research infrastructure projects in astrophysics.

Museum Partners:

Intrepid Sea, Air & Space Museum, New York, NY: [Non-profit informal education affiliate (science museum)] Intrepid offers live and virtual astronomy and Space industry-themed public outreach events.

Sciencenter, Ithaca, NY: [Non-profit informal education affiliate (science museum)] Sciencenter runs summer space camps for K-6 students, as well as science events and workshops for middle and high schools in central New York.

Industry Partners:

Lockheed Martin, Owego, NY: [Aerospace industry affiliate] Lockheed Martin runs a summer undergraduate internship program in multiple STEM disciplines, as well as a robotics design program for K-12 students.

Moog, Inc., East Aurora, NY: [Aerospace industry affiliate] Moog runs a summer undergraduate internship program in engineering.

Ursa Space Systems, Ithaca, NY: [Aerospace industry affiliate] Ursa runs a summer undergraduate internship program in computer science.

Record your contributions in Section F of the APD report.

Table 1: Annual Performance Plan FY20 Annual Performance Goals and Performance Indicators

Performance Goal	FY20 API
<p>3.3.3: Provide opportunities for students to engage with NASA’s aeronautics, space, and science people, content, and facilities in support of a diverse future NASA and aerospace industry workforce.</p>	<p>Provide significant, direct student awards in higher education to (1) students across all institutional categories and levels (as defined by the U.S. Department of Education), (2) racially or ethnically underrepresented students (Hispanics and Latinos, African Americans, American Indians, Alaska Native, Native Hawaiians and Pacific Islanders), (3) women, and (4) persons with disabilities, at percentages that meet or exceeded at the national percentages for the science and engineering graduates, as determined by the most recent, publicly available data from the U.S. Department of Education’s National Center for Education Statistics for a minimum of two of the four categories.</p>

<p>3.3.5: Provide opportunities for students to contribute to NASA's aeronautics, space, and science missions and work in exploration and discovery.</p>	<p>Contribute to American technical capability by supporting the release of at least 1,300 paper presentations and peer-reviewed research publications through STEM engagement investments.</p>
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