SSEP Student Spaceflight Experiments Program

a program of the

National Center for Earth and Space Science Education

and the Arthur C. Clarke Institute for Space Education

Inspire…then Educate

Revised March 1, 2024

New Spaceflight Opportunity for Communities

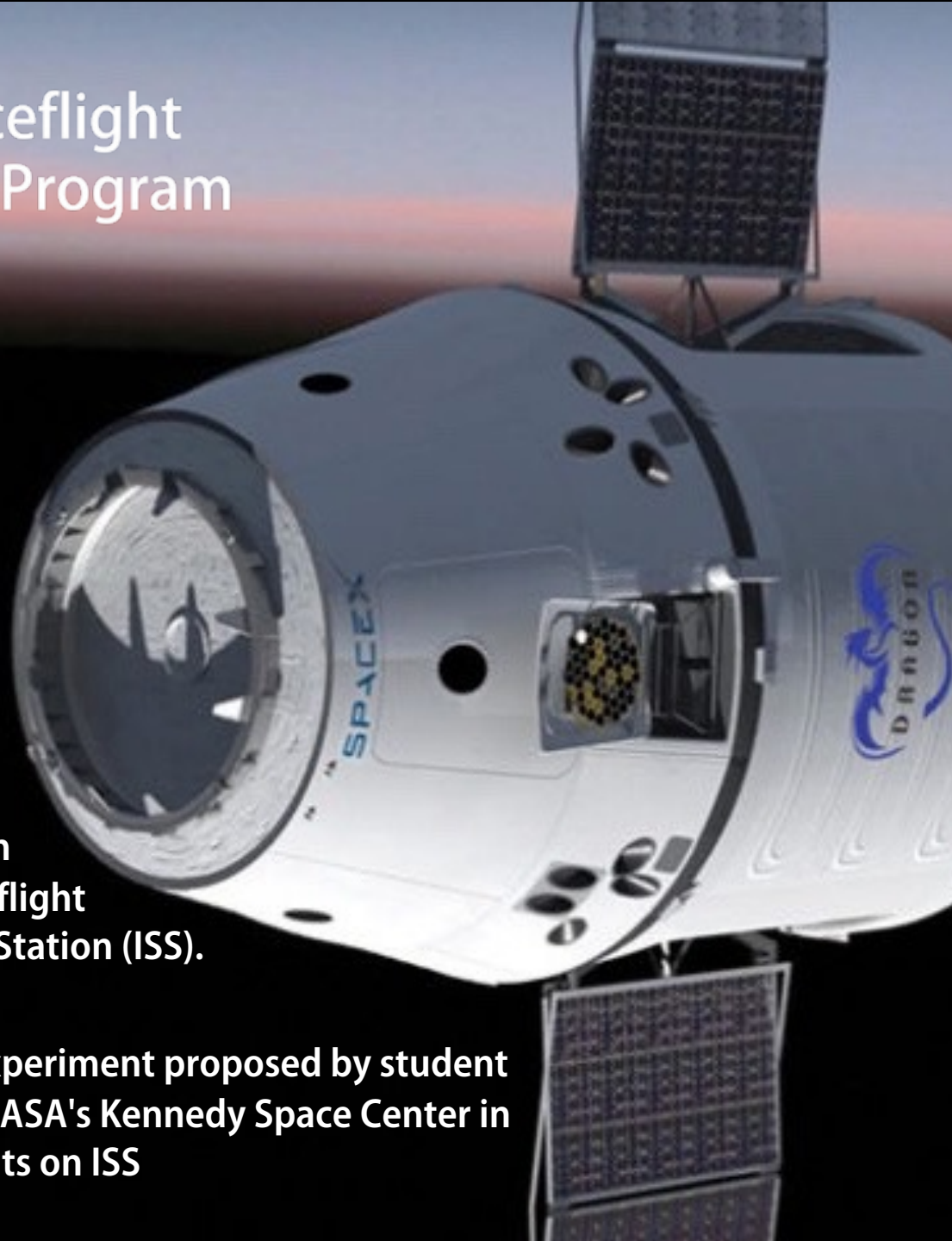
School Districts grades 5-12; 2-Year Community Colleges; 4-Year Colleges and Universities with emphasis on Minority Serving Institutions; and informal education and out-of-school organizations

SSEP Mission 19 to the ISS

Starting September 2024

Student Spaceflight Experiments Program

Inspiring and engaging the next generation of scientists and engineers by providing communities with their own very real space program.



The Student Spaceflight Experiments Program (SSEP) immerses students across a community in every facet of authentic scientific research of their own design, using a highly captivating spaceflight opportunity on the International Space Station (ISS).

In each community, one microgravity experiment proposed by student teams will be selected for launch from NASA's Kennedy Space Center in FL, and will be operated by the astronauts on ISS

Pedagogical Approach

SSEP Empowers the Student As Scientist, and Within the Real-World Constraints of Science that is Far More than Exploration through Inquiry

Like professional scientists, SSEP allows students to –

- **Design an experiment with real constraints imposed by the experimental apparatus, current knowledge, and the environment in which the experiment will be conducted**
- **Write a formal research proposal requiring critical written communication skills**
- **Experience a real 2-step science proposal review process**
- **Attend their own science conference – a venue where they are immersed in *their* community of researchers and at which they can communicate their thoughts, ideas, and experimental results to their peers**

Become Part of the Adventure on the High Frontier

Participate in SSEP Mission 19 to the ISS Engaging Grades 5-16 Students in Real Microgravity Experiment Design and Proposal Writing

Important considerations –

- Educators in a participating community will engage typically 300 grade 5-12 students (a minimum of 100 students for grades 5-12 and 30 students for undergraduate participation) over 9 weeks of experiment design and proposal writing spanning September 3 through November 5, 2024.

- In teams of typically 3-5, students across the community design a microgravity experiment in a science discipline of their choice, and through a formal written proposal, make the case for why their experiment should be selected for flight to ISS.

SSEP Student Researchers from Harper Woods, MI (left) and Bellevue, WA (right) designing and testing microgravity experiments for SSEP Mission 14 to ISS

SSEP provides STEM project-based learning through immersion in a fully authentic, high-visibility research experience – an approach that embraces the Next Generation Science Standards

One Student Designed Experiment In Each SSEP Community Selected for Launch to the ISS

- SSEP Mission 19 flight experiments to be ferried to the ISS in a Dragon spacecraft launched atop a SpaceX Falcon 9 rocket launching from Launch Complex 39A (LC-39A), Kennedy Space Center, Florida
- SSEP students and their families, teachers, and other community stakeholders will be given the opportunity to attend the launch

SSEP Mission 19 flight experiments to launch from the same launch pad as all Apollo Missions to the Moon – *historic* Launch Complex 39A

Astronauts Aboard ISS Conduct SSEP Flight Experiments

- ISS Crew Members operate the flight experiments according to Crew Interactions defined by the student flight experiment teams
- Experiments are then returned to Earth on Dragon, splashing down off the coast of Florida
- The payload is retrieved, and flight experiments returned to the community and the student flight experiment team for analysis

SSEP is NOT a simulation – participating communities are truly a part of America's Space Program.

Student Experiments Aboard ISS

SSEP student microgravity experiments have been conducted by 32 ISS Crew Members, including –

- **24 National Aeronautics and Space Administration (NASA) Astronauts**
- **6 European Space Agency (ESA) Astronauts, and**
- **2 Japan Aerospace Exploration Agency (JAXA) Astronauts**

ISS Commander Sunita Williams (USA) activates a student experiment during SSEP Mission 2 to ISS

To view videos of all SSEP launches to date, and for information about and videos of astronauts that have operated SSEP experiment on the ISS, visit: http://ssep.ncesse.org/current-flight-opportunities/launch-and-on-orbit-operations-history/

Flight Engineer Koichi Wakata (Japan) shakes to mix a student flight experiment from SSEP Mission 3b/4 to ISS

Flight Engineer Ricky Arnold (USA) demonstrates weightlessness with a SSEP mini-lab during SSEP Mission 12 to ISS

Live Launch Viewing Opportunities

SSEP students, their families, teachers and other Community constituents *Invited to Attend*

Launch viewing opportunities vary widely from mission to mission due to the factors and fluidity associated with spaceflight, but there is one thing that is certain about viewing a rocket launch – especially one carrying something you designed, held in your hands, or personally made possible – *There is nothing else like it on Earth!*

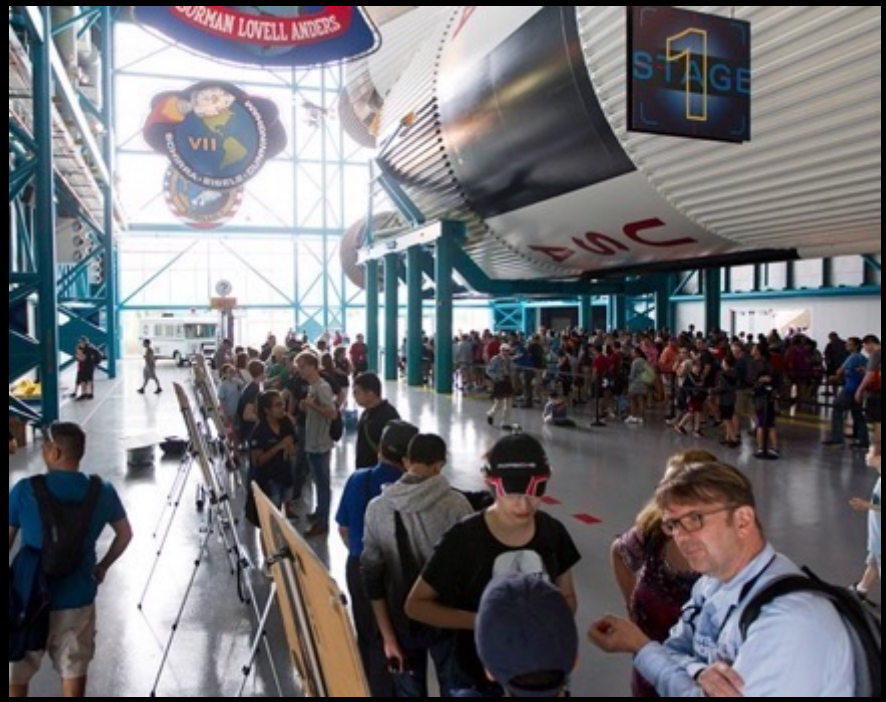
SSEP launch viewing opportunities have included –

- A mini-science conference held at the Astronaut's Memorial Foundation's Center for Space Education located at the Kennedy Space Center Visitor's Center (KSC-VC) followed by launch viewing at Sandy Point Park
- Complimentary launch viewing from the KSC Visitor's Center's (KSC-VC) Banana Creek/Saturn V Center
- Complimentary tickets to tour the KSC-VC.
- Opportunities for students to conduct oral and poster presentations for the general visitorship at the KSC-VC and NASA's Wallops Visitor's Center
- Behind the scenes tours of NASA Facilities
- A private viewing party in the Milestones of Flight Gallery at the Smithsonian National Air and Space Museum
- A SSEP press conference held at NASA's Wallops Visitor's Center in advance of launch viewing

The Launch Experience

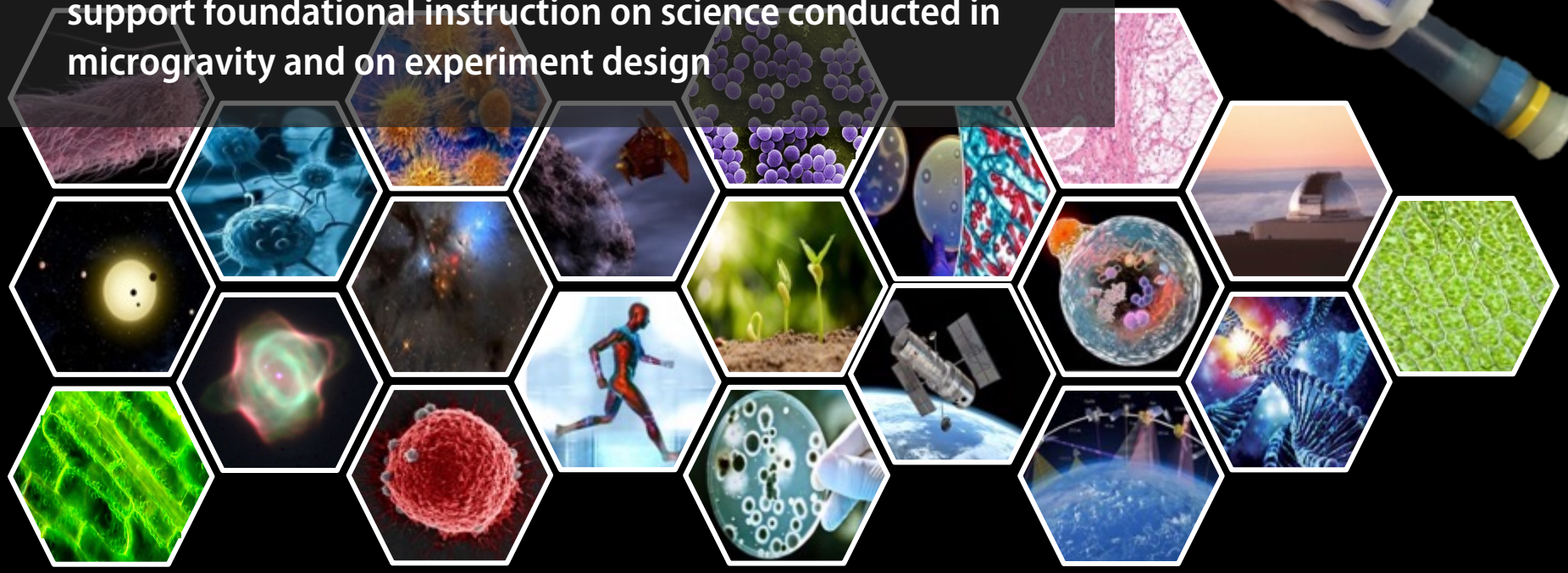
The Launch Experience

The Launch Experience



Resources in Support of Microgravity Science and Experiment Design

- The essential question for design of an experiment – *What physical, chemical, or biological system would I like to explore with gravity seemingly turned off for a period of time, as a means of assessing the role of gravity in that system?*
- Curriculum and content resources for teachers and students support foundational instruction on science conducted in microgravity and on experiment design



Hundreds More Students Engaged in STEAM Initiative – the Mission Patch Art and Design Competitions

- Up to two Mission Patches from each community are selected to fly to the ISS with the flight experiment
- After the flight, the Mission Patches are embossed *'Certified Flown in Space',* returned to the community, and serve as enduring symbols of the community's engagement in SSEP
- The Mission Patch Competition forges interdisciplinary connections between STEM fields and art and design, so that SSEP is a true STEAM (Science, Technology, Education, Art, and Mathematics) initiative
- Mission patches have been part of human spaceflight since the days of Project Mercury in the 1960's – the SSEP Mission Patch Competitions therefore allow communities to engage in another authentic aspect of the space program

Through the first 19 SSEP flight opportunities (through Mission 17 to ISS) – 224, 589 grade preK-16 students took part in the art and design competitions and 195,012 Mission Patch designs have been submitted

National Conference Held Annually in the Nation's Capital

- Student researchers present on their experiment designs, and those with experiments that flew, report on analysis and results
- Feature presentations by nationally recognized space scientists and engineers talking passionately about exploration on the frontier and inspiring students to follow in their footsteps
- Held at the Smithsonian National Air and Space Museum on the National Mall or the Steven F. Udvar-Hazy Center in Chantilly, VA

SSEP is dedicated to letting students step into the shoes of scientists and engineers, so it is fitting that students are immersed in the experience of a science conference

National Conference

Testimonials

SSEP is about introducing real science to our students – if you give them a chance to be scientists, stand back and be amazed.

—Dr. Jeff Goldstein, creator of SSEP and NCESSE Center Director

SSEP is designed to empower the student as scientist, and within the real-world context of science. Student teams design a real experiment, propose for a real flight opportunity, experience a formal proposal review, and go through a NASA flight safety review. They even have their own science conference at the Smithsonian National Air and Space Museum, where they are immersed in their own community of researchers.

—Dr. Jeff Goldstein, creator of SSEP and NCESSE Center Director

Testimonials

This is real, practical learning at its best and we at Crystal Lake Middle School in South Florida are happy to be apart of it.

— Lenecia McCrary, Magnet Coordinator
Crystal Lake Middle School
SSEP Community Program Director
Broward County, Florida

Erin Burnley [student researcher, SSEP Mission 12] just got accepted into medical school at McMasters University and after only 3 years of undergraduate studies. She says that the SSEP project was formative for her in so many ways as it opened doors and fueled a drive and passion for science. She has been studying at the University of Ottawa with summer jobs in a research lab. Last summer she was even assisting a researcher who had done zero gravity research. This summer she received a National Council of Education Research and Training grant to top it off. Your program has an impact.

— David Dutton, Land Based Learning/
Science Department Co-Leader
Dover Bay Secondary School
SSEP Community Program Director
Nanaimo, British Columbia, Canada

Testimonials

SSEP is the best real life application program that my students have ever experienced!

—Alison Thammovongsa, 7th grade science teacher,
SSEP Community Program Director
Peoria Unified School District Peoria, Arizona

This whole thing is so unbelievable. We are doing real science research that really matters. What we design will really fly in space aboard the very last space shuttle mission. This could be a life-changer for me. It is something that I will someday tell my grandkids about. How cool!

—Isaac Jepsen, Senior
Ridge View High School Galva-Holstein, Iowa

Providing this kind of life-changing opportunity to students is what keeps us energized to come to work every morning . . .

—Terry Teays, PhD., Assistant Director
Maryland Space Grant Consortium

Testimonials

[SSEP] may be the most important development for the future of the U.S. space program.

– J.R. Dailey, (now Former) Director of the Smithsonian National Air and Space Museum
AirSpaceMag.com, January 01, 2014

Testimonials

. . . it was also a game changer as far as college admissions are concerned. SSEP team members of the class of 2018 & 2019 have turned out outstandingly good college admissions decisions. There were several Columbia University acceptances from 2018 . . . Alejandro was awarded a Wilson Fellowship to study Physics at Johns Hopkins . . . his Fellowship application was about a continuation of the work developed from the student spaceflight experiment [program], meaning that we can speak with 100% certainty that he was awarded the fellowship (and his acceptance to Johns Hopkins) directly because of his work at Stamford High School on the spaceflight team.

—John Ross, Alejandro's Father
Stamford, CT

SSEP Student Researchers, stand directly under Space Shuttle Discovery at the Stephen F. Udvar-Hazy Center, while giving an oral presentation at the 2019 SSEP National Conference

Testimonials

It is not often that an opportunity like SSEP comes along, with such an opportunity to create a lasting legacy for students, communities, and the nation. As the Director of the Indiana Space Grant Consortium, I am honored and humbled to support this worthy addition to Indiana's legacy of spaceflight and exploration; as someone who has had a passion for space since I was six, I am excited for, and in awe of, what the students from Avicenna Academy in Crown Point are accomplishing so early in their lives.

— Barrett S. Caldwell, Ph.D., Director,
Indiana Space Grant Consortium

SSEP Student Spaceflight Experiments Program

A program of the National Center for Earth and Space Science Education in the U.S., and the Arthur C. Clarke Institute for Space Education internationally. It is enabled through a strategic partnership with Nanoracks, LLC working with NASA under a Space Act Agreement as part of the utilization of the International Space Station as a National Laboratory.

NCESSE
Inspire . . . Then Educate

Nanoracks