

# Invitation for Applications for NASA GSFC's Educator Professional Development Institute: Engineering Enabling Science

National Aeronautics and  
Space Administration



*NASA's Goddard Space Flight Center (GSFC) is seeking proposals for participation in NASA's Educator Professional Development Institute: Engineering Enabling Science, June 29- July 2, 2015.*

NASA's Goddard Space Flight Center is home to the nation's largest organization of scientists, engineers and technologists that builds spacecraft, instruments and new technology to study Earth, the sun, our solar system and the universe. NASA's education programs inspire interest in science, technology, engineering and mathematics (STEM) among America's youth and have a positive impact on the number of students who are proficient in STEM and choose to pursue careers in a STEM field. One of the ways NASA is able to achieve this goal is by working with local organizations, groups, programs, and institutions to provide opportunities for engagement with STEM topics and educator professional development. Whether through community-established science tutoring programs, local scout groups, museum afterschool events, county library family groups, and more, communities are engaged and supported in science and learning right where they live. NASA GSFC acknowledges the important role that these diverse opportunities provide and want to support their efforts in bringing NASA-unique content and materials directly to their local communities by offering workshops and institutes that promote educator professional development.

The aim of the 2015 Educator Professional Development Institute: Engineering Enabling Science is to support an ongoing successful, committed, and sustainable relationship among NASA GSFC Engineering, Science and Education divisions and community-based organizations, groups, programs, and institutions throughout the northeastern United States by providing them with the opportunity to explore how they can incorporate the latest in NASA GSFC science, engineering and technology discoveries into their programs through unit design and program development with a focus on middle school-aged audiences. One of the ultimate goals of this program is creating long-term partnerships where informal educators have a pipeline to the latest NASA STEM and educator professional development resources in addition to creating a network of communication between participants.

The 2015 institute will be held **June 29 – July 2** at NASA GSFC in Greenbelt, Maryland with online components before and after the workshop. The theme for this year's workshop is Engineering Enabling Science where the focus will look at how engineering is infused within NASA GSFC's different science missions and how informal educators can incorporate these topics, concepts, and content into experiences for their students and communities (particularly focused on middle school-aged children). Throughout the institute, informal educators will work towards developing an engineering unit focusing on an underserved and underrepresented middle school-aged audience that can be applied to their after-school, museum, or informal learning setting. The institute will follow NASA's BEST (Beginning Engineering, Science, and Technology) as a model and will immerse informal educators in the engineering design cycle using NASA science as content. Informal educators will be prepared to facilitate student engineering experiences based on the engineering design cycle and provide high quality STEM experiences for underrepresented and underserved students that contribute to a positive attitude towards STEM topics. *Additional resources to assist with shaping applications and providing a better understanding on NASA, NASA GSFC, and NASA's BEST can be found in the appendices.*

In addition, successful applicants will receive a \$500 stipend to assist with travel, lodging, and purchase of any additional materials. Limited space may be available for participants who wish to fund their participation and not receive a stipend. Successful applicants will also be provided with one BEST engineering kit of materials after participation in the institute to begin their programming.

### **Participant Eligibility**

This Educator Professional Development Institute defines an informal educator as an educator that provides enrichment and educational opportunities for students and communities in non-traditional classroom settings outside of the normal period of regular instruction. This can include but is not limited to programs, groups, organizations and institutions such as scout groups, libraries, local community-organized programs, county and city-funded community centers, YMCAs, Boys and Girls Clubs, school-based extracurricular programs, and so on.

An applicant's eligibility for the 2015 Educator Professional Development Institute will be based on the criteria listed below and information provided in this invitation in addition to material presented within their proposal. Applications will then be evaluated for those that best match the goals and criteria of the institute as described in this invitation.

The group, program, institution or organization must:

- Be organized with an intent for informal educational opportunities as one of its goals.
- Provide opportunities for underserved and underrepresented middle school-aged audiences.
- Have at least one staff member or volunteer (full or part time, paid or unpaid) that meets this Institute's definition of an informal educator and whose responsibilities and goals relate to informal education or community engagement.
- Be actively functioning as a group, program, organization or institution and provide education services or opportunities related to their community.
- Have a commitment for beginning, supporting or increasing STEM literacy within their community.
- Be located in the U.S., including Puerto Rico, Guam, American Samoa, the Virgin Islands, the Northern Mariana Islands, the Marshall Islands, Micronesia and Palau.
- Participants attending the Institute must be a U.S. Citizen.

Space is limited to 20 participants, preferably teams of 2 informal educators from the same group, program, institution, or organization. Each individual attending the Institute will receive a \$500 stipend. However, only one BEST engineering kit will be provided per group, program, organization, or institution. Preference will be given but is not limited to educators within the Northeastern United States but is open to all areas should space be available. However, additional space may be available for participants who wish to fund their participation.

### **Participant Commitments**

Selected applicants will commit to the following:

- Scheduled performance and progress reporting as well as program follow-up (dates to be provided to selected applicants)
- Participation in pre and post-institute on-line components
- Institute attendance
- Program implementation or full plan for implementation completed by September 21, 2015

### **Proposal Elements**

Proposals should include, but are not limited to, the information listed in the proposal application form. Information and resources to assist in preparation of proposals can be found in the appendices.

### **Proposal Review and Selection**

Proposals will be reviewed and selected based on the following:

- Eligibility based upon the criteria as listed in this invitation
- Proposal components demonstrate a high quality plan and design to incorporate the BEST engineering model and the latest in NASA science, engineering and technology discoveries into their group, program, organization, or institution through unit development or program planning
- Proposal requirements demonstrates sustainability and a long-term partnership for continuing exploration and incorporation of the latest NASA STEM content and education resources.

### **Application Process**

Proposals will be accepted electronically via email or regular mail. Proposals are due by the end of the business day on **June 1st**. Mailed proposals must be postmarked by **June 1st**. Accepted participants will be notified starting **June 8th**.

For additional information and technical assistance, please contact Amanda Harvey via the contact details listed below.

If you would like to submit a proposal and participate in this workshop and need reasonable accommodation, please contact Amanda Harvey via the contact details listed below for assistance.

Proposals submitted to:

Amanda CE Harvey, MA

Education Coordinator, CP4SMP+

NASA Goddard Space Flight Center

8800 Greenbelt Road

Office of Education, Code 160

Greenbelt, MD 20771

Office: 301-286-6242

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<http://www.nasa.gov/centers/goddard>

## **Appendices**

Appendix A: NASA Goddard Space Flight Center and NASA's BEST

Appendix B: NASA and Goddard Space Flight Center Office of Education

Appendix C: NASA Mission Directorates at GSFC

### **Appendix A: NASA Goddard Space Flight Center and Wallops Flight Facility**

#### ***NASA's Goddard Space Flight Center***

NASA's Goddard Space Flight Center is home to the nation's largest organization of combined scientists, engineers and technologists that build spacecraft, instruments and new technology to study Earth, the sun, our solar system and the universe. Named for American rocketry pioneer Dr. Robert H. Goddard, the center was established in 1959 as NASA's first space flight complex.

Goddard and its several facilities (Goddard Institute for Space Studies, Wallops Flight Facility, Independent Verification and Validation Facility, and White Sands Test Facility) are critical in carrying out NASA's missions of space exploration and scientific discovery and technology development. We are the only center capable of completing projects from end to end—meaning that we can design, build, test, and launch from our facilities.

Additional information about Goddard Space Flight Center can be found at:

<https://www.nasa.gov/centers/goddard/home/>

#### ***NASA's BEST (Beginning Engineering, Science, and Technology)***

The NASA BEST Activities Guide has been developed by a team from the NASA Goddard Space Flight Center's Office of Education in support of NASA's Exploration Systems Mission Directorate (ESMD). ESMD develops capabilities and supporting research and technology that will make human and robotic exploration possible. It also makes sure that astronaut explorers are safe, healthy, and can perform their work during long-duration space exploration. ESMD does this by developing robotic precursor missions, human transportation elements, and life-support systems. Ultimately, this Directorate of NASA serves as a stepping stone for the future exploration of Mars and other destinations. The NASA BEST Activities Guides were designed to teach students the Engineering Design Process. The BEST team created three guides to accommodate three grade groups: K-2, 3-5 and 6-8. All follow the same set of activities and teach students about humans' endeavor to return to the Moon. Specifically, how humans investigate the Moon remotely, the modes of transportation to and on the Moon, and how humans will live and work on the Moon.

Additional information about BEST can be found at: <http://www.nasa.gov/audience/foreducators/best/>

## Appendix B: NASA and Goddard Space Flight Center Office of Education

### *NASA Education*

NASA's education programs inspire interest in science, technology, engineering and mathematics (STEM) among America's youth and have a positive impact on the number of students who are proficient in STEM and choose to pursue careers in STEM fields. NASA increases the pool of future STEM workers, thus contributing to the workforce of the future by attracting and retaining students in STEM disciplines. With these efforts in STEM education, NASA helps the United States remain globally competitive and sustain a strong national economy. NASA Education accomplishes its mission through mutually beneficial relationships with over 500 colleges and universities, hundreds of elementary and secondary schools and school districts, and over 400 museums and science centers. NASA works through communities of practice to identify content areas and special events that supplement programming offered by informal education organizations. These relations help provide educational experiences that engage Americans in NASA's mission, while building strategic partnerships that promote STEM literacy.

Additional information about NASA education programs can be found at:  
<http://www.nasa.gov/audience/foreducators/>

### *GSFC's Office of Education*

The Office of Education at GSFC takes NASA content and uses the interest that people have in space as a motivation toward learning the science. We are focused on a continuum of development for students from Pre-K to Post-doctoral fellows that begins with inspiration then engagement then education and moves towards workforce development.

GSFC Education is driven by the NASA agency Education Vision "To advance high quality Science, Technology, Engineering, and Mathematics (STEM) education using NASA's unique capabilities." This vision ensures that GSFC education is thoroughly grounded in the work of NASA through its Mission Directorates and its unique missions, projects, engineering, and IT providing unique educational experiences to learners, educators, and institutions through **four lines of businesses (LOB)**:

- **NASA Internships, Fellowships and Scholarships (NIFS):** Investing in NASA's workforce of tomorrow through competitive awards and financial assistance that provides students pursuing STEM careers real world learning opportunities today.
- **Educator Professional Development (EPD):** Training and supporting educators who play a key role in nurturing NASA's future STEM pipeline through face to face weeklong institutes, partner delivered workshops, on-line and distance learning opportunities, and community responsive programs that shows GSFC also exists within a community—local, state, and regional.
- **STEM Engagement (SE):** Opportunities that are designed to increase learners' of all ages involvement and interest in NASA STEM, educate them on the value of STEM in their lives by connecting them to NASA-unique resources through public events in collaboration with the Office of Communications, experiential learning opportunities and NASA challenges.
- **Institutional Engagement (IE):** Building the academic and NASA-related STEM research capacity of institutions as prime partners with NASA to support and sustain STEM education efforts focused on increasing minorities and underrepresented communities participation in the future work of NASA.

Additional information about Goddard's education programs can be found at:  
<http://www.nasa.gov/centers/goddard/education/>

## Appendix C: NASA Mission Directorates at GSFC

NASA's four mission directorates work to advance global understanding of the systems and processes on our planet, in our atmosphere, and in the cosmos. The core tenet of NASA's existence is to spread our accumulated information for the benefit of humankind. As we work towards making our processes even more open, we are striving to create even more opportunities for public participation and collaboration.

A basic understanding of the goals and objectives of each NASA mission directorate are as follows:

### **Aeronautics Research**

NASA's Aeronautics Research Mission Directorate works to solve the challenges that still exist in our nation's air transportation system: air traffic congestion, safety and environmental impacts.

### **Human Exploration and Operations Mission Directorate**

The Human Exploration and Operations Mission Directorate provides the Agency with leadership and management of NASA space operations related to human exploration in and beyond low-Earth orbit.

### **Science**

NASA's Science Mission Directorate and the nation's science community use space observatories to conduct scientific studies of the Earth from space to visit and return samples from other bodies in the solar system, and to peer out into our Galaxy and beyond.

### **Space Technology**

The Space Technology Mission Directorate is responsible for developing the crosscutting, pioneering, new technologies and capabilities needed to achieve NASA's current and future

Additional information about each of NASA Mission Directorates can be found at:  
NASA Mission Directorates Homepage <http://www.nasa.gov/about/directorates/>

Of NASA's four main mission directorates, GSFC works primarily within the **Science Mission Directorate (SMD)** focusing on **Sciences & Exploration** (Astrophysics, Heliophysics, Earth Science, and Planetary Science) and **Applied Engineering & Technology**. Within these directorates are many different avenues of research all relating back to the Science Mission Directorate from which they stem.

Additional information on the Science Mission Directorate can be found at: <http://science.nasa.gov/>.

### **Engineering**

NASA's Goddard Space Flight Center is home to the nation's largest organization of combined scientists, engineers and technologists that build spacecraft, instruments and new technology to study the Earth, the sun, our solar system, and the universe. The largest organization at Goddard is the Applied Engineering and Technology Directorate (AETD). AETD is home to approximately 1,300 engineers who provide multidiscipline engineering expertise to our many missions. Goddard is a major laboratory for developing and operating unmanned scientific spacecraft. Goddard provides end-to-end science mission operation. At Goddard and within Engineering, we design missions, build satellites and instruments, operate and control spacecraft, and acquire and distribute data to the world-wide science community. Our data products are used to conduct research in Earth and Space Sciences that benefit both the nation and the world.

As a big picture, the Applied Engineering and Technology Directorate (Code 500) is made up of 5 divisions that support the mission lifecycle of all Goddard missions. The Divisions are:

- 540 - Mechanical Systems Division
- 550 - Instrument Systems and Technology Division
- 560 - Electrical Engineering Division
- 580 - Software Engineering Division
- 590 - Mission Engineering and Systems Analysis Division

Additional information about Goddard's Applied Engineering and Technology Directorate (AETD) can be found at: <http://aetd.gsfc.nasa.gov/about.html>

### **Heliophysics**

The Heliophysics Science Division conducts research on the Sun, its extended solar-system environment (the heliosphere), and interactions of Earth, other planets, small bodies, and interstellar gas with the heliosphere. Division research also encompasses geospace -- Earth's uppermost atmosphere, the ionosphere, and the magnetosphere -- and the changing environmental conditions throughout the coupled heliosphere (solar system weather).

Scientists in the Heliophysics Science Division develop models, spacecraft missions and instruments, and systems to manage and disseminate heliophysical data. They interpret and evaluate data gathered from instruments, draw comparisons with computer simulations and theoretical models, and publish the results. The Division also conducts education and public outreach programs to communicate the excitement and social value of NASA heliophysics.

The Heliophysics Science Division at Goddard has the highest concentration of content, data, and subject matter experts to study this connected sun-Earth-heliosphere system. It also has a modeling center that detects and predicts space weather to protect NASA assets. Missions and research projects include, but not limited to, the Van Allen Probes, the Solar Dynamics Observatory (SDO), Magnetospheric Multiscale Satellites (MMS), sounding rockets, and CubeSats. Sample informal education programs include Sun-Earth Days, Sunday Experiment, Aurorasaurus, and the 2017 total solar eclipse.

Additional information about Goddard's Heliophysics Science Division can be found at: [http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=670&navTab=nav\\_about\\_us](http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=670&navTab=nav_about_us)

### **Earth Science**

The Earth Sciences Division at NASA Goddard Space Flight Center plans, organizes, evaluates, and implements a broad program of research on our planet's natural systems and processes. Major focus areas include climate change, severe weather, the atmosphere, the oceans, sea ice and glaciers, and the land surface. To study the planet from the unique perspective of space, the Earth Science Division develops and operates remote-sensing satellites and instruments. Researchers analyze observational data from these spacecraft and make it available to the world's scientists. Current missions include, but are not limited to, Global Precipitation Measurement, Soil Moisture Active Passive, Aura, ICESat 2, IceBridge, Aquarius, Hurricane and Severe Storm Sentinel, and many more.

Additional information about Goddard's Earth Sciences Division can be found at: [http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=610&navTab=nav\\_about\\_us](http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=610&navTab=nav_about_us)

## Planetary Science

The Solar System Exploration Division conducts theoretical and experimental research to explore the solar system and understand the formation and evolution of planetary systems. Laboratories within the Division investigate areas as diverse as astrochemistry, planetary atmospheres, extrasolar planetary systems, earth science, planetary geodynamics, space geodesy, and comparative planetary studies. The researchers participate in planetary and earth science missions; collect, interpret, and evaluate measurements; and publish conclusions based on this research. The Division archives and disseminates the data, provides expert user support, and offers education and public outreach programs about the Division's science missions and services. Current missions include, but are not limited to, the Lunar Reconnaissance Orbiter, MAVEN, Mars rover Curiosity, OSIRIS-REx, Cassini, and Juno.

Additional information about Solar System Exploration Division can be found at:

[http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=690&navTab=nav\\_about\\_us](http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=690&navTab=nav_about_us)

## Astrophysics

NASA Goddard's Astrophysics Science Division (ASD) conducts a multi-messenger program of astrophysics research that includes nearly the entire electromagnetic spectrum along with the study of cosmic rays and gravitational radiation. Our researchers participate in all phases of the cycle of technology development and scientific pursuits as they relate to studying the universe beyond our Solar System. This includes technology design and testing, mission planning and development, data archiving and processing, and scientific studies and publications.

Researchers within the ASD study a wide range of objects near and far. Nearby objects include stars at all stages in their lifecycle, from star-forming regions to stars in the height of their life, from planetary nebulae and the white dwarf at their center to supernova explosions and the resulting neutron star or black hole. Members of our division research galaxies of all sizes at all distances, the nature of dark matter, dark energy, and even space time itself. Others are looking for planets outside our solar system that may harbor life.

In addition to these scientific and engineering pursuits, the ASD also offers a variety of resources to help students, educators, and the public get a behind-the-scenes look at how and why NASA studies the universe. The Imagine the Universe website provides background information and standards-aligned curricula for classroom educators about a variety of astrophysics topics. The ASD also provides a variety of informal education curricula geared towards different audiences - Afterschool Universe (for middle school students), NASA Family Science Night (for entirely families to learn together), and Big Explosion and Strong Gravity (for scouts or other community groups).

Additional information about Goddard's Astrophysics Science Division can be found at:

[http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=660&navTab=nav\\_about\\_us](http://science.gsfc.nasa.gov/sed/index.cfm?fuseAction=home.main&navOrgCode=660&navTab=nav_about_us)