ENGAGEMENT OPPORTUNITIES IN NASA STEM FY2024 (EONS-2024)

NOTICE OF FUNDING OPPORTUNITY (NOFO)

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EXECUTIVE SUMMARY

This National Aeronautics and Space Administration (NASA) Notice of Funding Opportunity (NOFO), entitled Engagement Opportunities in NASA STEM (EONS) – 2024, solicits proposals for competitive funding opportunities in support of NASA’s Office of STEM Engagement (OSTEM). EONS 2024 is an omnibus announcement that includes a wide range of NASA science, technology, engineering, and mathematics (STEM) engagement opportunities for basic and applied science and technology research and education. Specific opportunities will be issued periodically throughout the year as appendices to this Notice of Funding Opportunity (NOFO) with individual requirements and milestones.

NASA’s journeys have propelled technological breakthroughs, pushed the frontiers of scientific research, and expanded our understanding of the universe. These accomplishments, and those to come, share a common genesis: education in STEM. The Agency’s OSTEM delivers tools for young Americans and educators to learn and succeed.

NASA seeks to:

● create unique opportunities for students and the public to contribute to NASA’s work in exploration and discovery;

● build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA people, content, and facilities; and

● strengthen public understanding by enabling powerful connections to NASA’s mission and work.

To achieve these goals, OSTEM strives to increase K-12 involvement in Agency projects, enhance higher education, support underrepresented/underserved communities, strengthen online education, and boost NASA’s contribution to informal education. The intended outcome is a generation prepared to code, calculate, design, and discover its way to a new era of American innovation.

The funds available for awards under each OSTEM program element described in this NOFO can range from less than $1 million to $5 million over the period of performance. This allows for selection of a few to as many as several dozen proposals per Appendix, depending on the proposed objectives and the submission of proposals of merit. Awards will be made as grants or cooperative agreements, depending on the extent of NASA’s involvement with the award recipient and the nature of activities. Procurement contracts shall not be awarded in conjunction with this NOFO. NASA’s ability to make awards is contingent upon the availability of appropriated funds from which payment can be made. Please see Appendices 1 and onward to view the anticipated number of awards, maximum award, and period of performance for each program element that may be made under this NOFO, pursuant to the authority of Title 2 Code of Federal Regulations (CFR) Part 200 (2 CFR §200) and the NASA Grant and Cooperative Agreement Manual (GCAM).
The typical period of performance for an award is one to three years, although some program elements may specify a shorter or longer (maximum of five years) period. Details of the solicited opportunities and any changes or modifications to any of these guidelines will be specified in the descriptions of the relevant program element in the appendices to this NOFO.

Proposal due dates are posted at the NASA Proposal Integrated Review and Evaluation System (NSPIRES) website and in Table 2 of this NOFO. Interested applicants are responsible for regularly monitoring NSPIRES for any amendments to this NOFO or additional new program elements.

A. PROGRAM DESCRIPTION
A.1 Background

NASA’s OSTEM is committed to defining and implementing a portfolio of programs, projects, activities, and products intended to drive a coherent and coordinated set of activities from across the Agency. Ultimately, the work will contribute to achieving NASA’s Public and Science, Technology, Engineering, and Mathematics (STEM) Engagement vision to immerse the public in the Agency’s work, enhance STEM literacy, and inspire the next generation to explore.

Central to this effort is a new architecture designed to enable relevant student contributions to NASA’s mission and work, relying on mission drivers and requirements from the Agency’s Mission Directorates. This will facilitate alignment of the appropriated education programs, as well as existing and emerging relevant projects, activities and products from across NASA, to an overarching framework and strategy, which will result in a more effective and coherent approach and improved outcomes.
Please see the full NOFO and appendices for complete information about available funding opportunities and general rules for prospective proposers to follow.

A.2 Congressional Focus on Education

**America COMPETES Reauthorization Act**

The America COMPETES Reauthorization Act of 2010 (Public Law. No. 111-358) established a mandate for the development of a Federal Government-wide strategy for STEM education investments. Through the National Science and Technology Council’s (NSTC) Committee on STEM Education (CoSTEM), federal agencies, including NASA, coordinate their investments in STEM education to magnify the impact of their work. In December 2018, CoSTEM released its five-year Federal STEM Education Strategic Plan that guides the work of these federal agencies. The strategic plan (or federal strategy) outlines goals and objectives for federal STEM education investments. This federal strategy is also written to engage the external community in fulfilling the vision of the plan.

As part of the implementation of the 2018 CoSTEM Federal STEM Education Strategic Plan, Federal departments and agencies that have STEM education programs, investments, and activities have identified the specific pathways and associated objectives that they will contribute to through mission-specific actions. As an agency, NASA has agreed to contribute to the following pathways and objectives:

- **Pathway 1:** Develop and Enrich Strategic Partnerships
  - **Objective 1:** Foster STEM Ecosystems that Unite Communities
  - **Objective 2:** Increase Work-Based Learning and Training through Educator-Employer Partnerships

- **Pathway 2:** Engage Students where Disciplines Converge
  - **Objective 3:** Encourage Transdisciplinary Learning

- **Pathway 3:** Operate with Transparency and Accountability

A.3 NASA Strategic Plan and Relevance to STEM Engagement

The NASA 2022 Strategic Plan includes a focus on building the next generation of explorers through STEM engagement investments. The Agency makes vital investments toward building a future diverse STEM workforce. The scope of STEM Engagement comprises all endeavors to attract, engage, and educate students and to support educators and educational institutions. The STEM engagement portfolio consists of a diverse set of opportunities, activities and products, encompassing internships; fellowships; student learning opportunities (challenges, competitions and other experiences); informal education and out-of-school learning activities; educational products, tools and platforms; educator support; competitive awards to educational institutions for research and development and institutional support.
NASA will implement strategies to broaden student participation to increase diversity, equity, inclusion, and accessibility (DEIA) in STEM through Agency opportunities and activities. While the number of women and underrepresented minorities earning STEM degrees has grown in broad science and engineering occupations over the last decade, significant underrepresentation remains in areas critical to NASA like engineering and computer and mathematical sciences. The Agency is committed to building a diverse, skilled future STEM workforce — our next generation of explorers with the technical skills needed to carry forward our Nation’s vital mission and work in aeronautics and space into the future.

The NASA Strategic Goal and Objective relevant to OSTEM are set forth in the NASA 2022 Strategic Plan as follows:

Strategic Goal 4: Enhance Capabilities and Operations to Catalyze Current and Future mission Success.

Strategic Objective 4.3: Build the next generation of explorers (Engage students to build a diverse future STEM workforce).

Annually, NASA OSTEM collects performance data, participant data, and metrics from awardees to generate a body of evidence indicating progress towards achieving programmatic goals, objectives, and OSTEM performance goals. NASA OSTEM assesses progress of its investments towards achieving programmatic goals and objectives and progress in achieving the following performance goals (PGs) which directly align with the 2020-2023 NASA Strategy for STEM Engagement Strategic Goals 1, 2, and 3:

- **PG 4.3.1** Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery.
- **PG 4.3.2** Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.
- **PG 4.3.3** Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work.

In alignment with NASA’s goals and priorities for STEM engagement, Federal Government evidence-based policy initiatives, and an increased need to add rigor to performance measures, NASA’s OSTEM implements a comprehensive performance assessment and evaluation strategy that includes a Learning Agenda. The Learning Agenda is a systematic approach to identifying gaps in knowledge and conducting research to generate knowledge to fill these gaps through collaborative, iterative processes. The Learning Agenda provides a more robust, comprehensive approach to understanding the scope and impacts of investments and generates a portfolio of evidence that includes evaluative studies, literature reviews, benchmarking studies, and output, outcome, and milestone performance measures. The portfolio of evidence that is generated through the execution of the Learning Agenda is used to inform evidence-based budgetary, programmatic, and operational decisions. The Learning Agenda serves as the foundational document for building a culture of learning and continual improvement within NASA’s OSTEM. The implementation of the Learning Agenda provides a systematic approach for building and using new knowledge about project and operational performance for evidence-based decision-making and continual improvement.
A.4 NASA’s STEM Engagement Priorities

NASA’s STEM Engagement vision is to immerse students in the Agency’s work, enhance STEM literacy and inspire the next generation to explore. The Agency’s STEM Engagement mission is to engage students in the Agency’s missions. NASA’s STEM Engagement has the following three strategic goals that support it in achieving its vision and mission: 1) Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery; 2) Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content and facilities; and 3) Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work. The objectives for each of these goals are:

**Strategic Goal 1.0:** Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery.

**Objective 1.1:** Provide student work experiences that enable students to contribute to NASA’s missions and programs, embedded with NASA’s STEM practitioners.

**Objective 1.2:** Create structured and widely accessible, experiential learning opportunities for students to engage with NASA’s experts and help solve problems that are critical to NASA’s mission.

**Strategic Goal 2.0:** Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content and facilities.

**Objective 2.1:** Develop and deploy a continuum of STEM experiences through authentic learning and research opportunities with NASA’s people and work to cultivate student interest, including students from underrepresented and underserved communities, in pursuing STEM careers and foster interest in aerospace fields.

**Objective 2.2:** Design the portfolio of NASA STEM engagement opportunities to contribute toward meeting Agency workforce requirements and serving the nation’s aerospace and relevant STEM needs.

**Strategic Goal 3.0:** Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work.

**Objective 3.1:** Develop and deploy targeted opportunities and readily available NASA STEM engagement resources and content, to attract students to STEM.

**Objective 3.2:** Foster student exposure to STEM careers through direct and virtual experiences with NASA’s people and work.
Office of STEM Engagement Metrics

NASA annually generates a body of evidence (i.e., milestone accomplishments, performance and participation data, evaluation outcomes, and/or other metrics) that assesses STEM engagement investments. NASA currently utilizes the NASA STEM Gateway registration/application and data management system for analyzing performance data and conducts evaluation studies to assess outcomes. Principal Investigators (PIs) are required to respond to performance and evaluation (P&E) data calls as requested by NASA OSTEM and utilize this Agency-approved data management system for performance data reporting. Additional communications and guidance regarding P&E data calls and the NASA STEM Gateway will be sent to award recipients from the NASA OSTEM and Activity Management team. The PI shall ensure it has the appropriate staff and resources to facilitate data collection activities and complete all tasks required for reporting to meet established deadlines.

A.5 NASA Research Areas of Interest and Technology Development Priorities

The research priorities for OSTEM program elements are defined by the Exploration Systems Development, Space Operations, Aeronautics Research, Science, and Space Technology Mission Directorates, and NASA’s nine Centers plus its only Federally Funded Research and Development Center, the Jet Propulsion Laboratory (JPL). Each Mission Directorate, Center, and JPL covers a major area of the Agency’s research and technology development efforts. The Mission Directorates identify their priorities on the NASA website. Please reference the NASA website, Appendix 8 of this NOFO, and subsequent appendices for information on the Agency’s missions and research priorities.

A.6 STEM Engagement Program Elements

Please reference the appendices of this NOFO for specific requirements and a detailed description of the following program elements.

Established Program to Stimulate Competitive Research (EPSCoR)

Public Law 102-588, passed in 1992, authorized NASA to initiate NASA EPSCoR to strengthen the research capability of jurisdictions that have not historically participated equably in competitive aerospace and aerospace-related research activities. Public Law 114-329, Section 103, passed in 2017, reauthorized EPSCoR and states that the leadership of each federal agency administering an EPSCoR program shall:

(1) Consider modifications to EPSCoR proposal solicitations, award types, and project evaluation to:
   (a) more closely align with current agency priorities and initiatives;
   (b) focus EPSCoR funding on achieving critical scientific, infrastructure, and educational needs of that agency;
   (c) encourage collaboration between EPSCoR eligible institutions and researchers, including with institutions and researchers in other states and jurisdictions;
   (d) improve communication between state and federal agency proposal reviewers; and
   (e) continue to reduce administrative burdens associated with EPSCoR;
(2) Consider modifications to EPSCoR award structures to:
   (a) emphasize long-term investments in building research capacity, potentially through the use of larger, renewable funding opportunities; and
   (b) allow the agency, states, and jurisdictions to experiment with new research and development funding models; and

(3) Consider modifications to the mechanisms used to monitor and evaluate EPSCoR awards to:
   (a) increase collaboration between EPSCoR-funded researchers and agency staff, including by providing opportunities for mentoring young researchers and for the use of federal facilities;
   (b) identify and disseminate best practices; and
   (c) harmonize metrics across participating federal agencies, as appropriate.

EPSCoR establishes partnerships with government, higher education and industry entities that are designed to effect lasting improvements in a state's or region's research infrastructure, research and development (R&D) capacity and hence, its national R&D competitiveness. Twenty-five states, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, and Guam currently participate in EPSCoR. Six federal agencies conduct EPSCoR programs, including NASA. The goal of EPSCoR is to provide seed funding that will enable jurisdictions to develop an academic research enterprise directed toward long-term, self-sustaining, nationally competitive capabilities in aerospace and aerospace-related research. NASA EPSCoR objectives are to:

- Contribute to and promote the development of research infrastructure in EPSCoR jurisdictions in areas of strategic importance to the NASA mission;
- Improve the capabilities of the jurisdictions to gain support from sources outside the NASA EPSCoR program;
- Develop partnerships between and among NASA research assets, industry, and EPSCoR jurisdictions’ academic institutions; and
- Contribute to the overall research infrastructure, science and technology capabilities, higher education, and/or economic development of the jurisdiction.

For more information visit the [EPSCoR](#) website.

**Minority University Research and Education Project (MUREP)**

The Minority University Research and Education Project (MUREP) is administered through NASA OSTEM. Through MUREP, the Agency provides financial assistance via competitive awards to Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities (HBCU), Hispanic Serving Institutions (HSI), Asian American and Native American Pacific Islander Serving Institutions (AANAPISI), Alaska Native and Native Hawaiian-Serving Institutions (ANNH), Tribal Colleges and Universities (TCU), Native American-Serving Nontribal Institutions (NASNTI), and other MSIs, as required by MSI-focused Executive Orders (see below). These institutions recruit and retain underrepresented
and underserved students, including women and girls, and persons with disabilities, into STEM fields.

**MSI-focused Executive Orders (listed in chronological order):**

**EO 13985:** Advancing Racial Equity and Support for Underserved Communities through Federal Government, (Underserved/Underrepresented), January 20, 2021

**EO 14031:** Advancing Equity, Justice and Opportunity for Asian Americans, Native Hawaiians and Pacific Islanders, (AANAPISI, ANNH), May 28, 2021

**EO 14041:** Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities (HBCU), September 3, 2021 (HBCU), September 3, 2021

**EO 4045:** White House Initiative on Advancing Educational Equity, Excellent, and Economic Opportunity for Hispanics, (HSI), September 13, 2021

**EO 14049:** White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity for Native Americans and Strengthening Tribal Colleges and Universities (TCU), October 11, 2021

**EO 14050:** White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity for Black Americans, (HBCU/PBI), October 19, 2021

MUREP investments enhance the research, academic, and technology capabilities of MSIs through multiyear cooperative agreements. Awards assist faculty and students in research and provide authentic STEM engagement related to Agency missions. Additionally, awards provide NASA-specific knowledge and skills to learners who have historically been underrepresented and underserved in STEM. MUREP investments assist the Agency in meeting the goal of a diverse workforce through student participation in internships and fellowships at NASA Centers and JPL. MUREP funds allocated for student internships at NASA Centers (not including JPL) will be held by NASA Headquarters for the payment of student stipends through the Guardians of Honor/NSTEM Contract. MUREP funds allocated for student internships at JPL will be awarded to the institution(s) for disbursement to the students.

For more information visit the [MUREP](#) website.

**National Space Grant College and Fellowship Program (Space Grant)**

Public Law 100-147, passed in 1987, authorized NASA to initiate the National Space Grant College and Fellowship Program (Space Grant) in response to the need for a coordinated effort to help maintain America's preeminence in aerospace science and technology. Through the establishment of state-based consortia, consisting of universities, university systems, associations, government agencies, industries, and informal education organizations involved in aerospace activities, lead institutions provide leadership and support for program objectives in their state and nationally. Lead institutions accomplish this by collaborating with other universities, broadening joint activities with NASA and aerospace-related industries, and providing public service functions, such as support to schools (elementary and secondary), and to the public.

These institutions are working to expand opportunities for Americans to understand and participate in NASA's aeronautics and space projects by supporting and enhancing science
and engineering education, research and public outreach efforts. The Space Grant national network includes over 1,000 affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. These affiliates belong to one of 52 consortia in all 50 states, plus the District of Columbia and the Commonwealth of Puerto Rico.

Space Grant is a workforce development program. The 52 consortia fund fellowships, internships and scholarships for students pursuing careers in STEM, as well as curriculum enhancement and faculty development. The Consortia engage students in hands-on experiential projects, which provide invaluable experiences to make these students well-positioned workers in a broad array of technological fields. Member colleges and universities also administer pre-college and public service education projects in their states.

The goal of Space Grant is to contribute to the NASA mission, specifically in the areas of government and industry partnerships “to improve America’s aerospace technologies and advance American leadership” by funding education, research, and informal education projects through a national network of university-based Space Grant consortia. Space Grant consortia are expected to develop innovative and integrated plans to advance aerospace knowledge and expand related activities.

The specific objectives of the Space Grant Program are:

For more information visit the [Space Grant](#) website.

**Next Gen STEM – Teams Engaging Affiliated Museums and Informal Institutions (TEAM II)**

Next Gen STEM’s mission is to spark and sustain interest in STEM in students in grades K-12, by connecting students and their formal and informal educators to NASA’s endeavors in exploration and discovery. Next Gen STEM (NGS) creates, delivers and curates NASA STEM products and experiences that make connections to NASA and fuel STEM learning and identity. Next Gen STEM provides funding for informal institutions, such as museums and science centers in direct alignment with NASA’s mission and operates NASA’s Museum and Informal
Education Alliance (MIE Alliance), a robust community of practice within its overall online community of practice for educators, NASA CONNECTS (Connecting Our Network of NASA Educators for Collaborating Together in STEM). Under NASA’s NGS project, initially there was the Competitive Program for Science Museums, Planetariums, and NASA Visitor Centers (CP4SMPVC). CP4SMPVC was authorized by Public Law (PL) 109-155, Sec. 616. MUSEUMS, which states: “The Administrator may provide grants to, and enter into cooperative agreements with, museums and planetariums to enable them to enhance programs related to space exploration, aeronautics, space science, earth science, or microgravity.” NASA satisfies this Congressional guidance through the selected award portfolio.

Replacing the CP4SMPVC, is the Teams Engaging Affiliated Museums and Informal Institutions TEAM II effort, which targets a limited number of topics of specific interest to NASA, places a stronger emphasis on recipients’ partnering and networking in order to increase the impact of awards in the informal education community, and supports the development of Informal Education Institutions (IEIs) as local community resources that are knowledgeable in NASA STEM and STEM Engagement-related opportunities and resources. (Ref: NASA Authorization Act of 2019, Section 602 STEM Engagement Activities). TEAM II also places significant emphasis on reaching students from communities underserved and underrepresented in STEM fields.

NASA TEAM II seeks to provide authentic STEM engagement opportunities for students, and for their learning support systems of families, informal and formal educators, and institutions, that also support NASA STEM Engagement Strategic Goals, Objectives, Strategies and Design Principles in order to:

- Provide authentic STEM engagement activities aligned with NASA mission-driven needs and priorities;
- Leverage NASA missions, content, people, and facilities to provide experiential authentic STEM opportunities that encourage innovation, critical thinking, and problem-solving skills;
- Use or develop evidenced-based educational strategies in designing and implementing the project and address state and local needs;
- Establish outcomes and define corresponding metrics and measures to demonstrate a measurable impact on learner interest in and positive attitudes towards STEM topics, and improve self-perception of the learner’s ability to participate in STEM;
- Attract and sustain diversity in student participation, and incorporate approaches to foster and promote inclusion, particularly for groups historically underrepresented and underserved in STEM fields; and
- Utilize partnerships and regional and national networks of STEM- and STEM education-related IEIs to magnify reach and impact.

Beginning in 2021, TEAM II implemented a two-tier award structure, adding smaller Community Anchor awards to encourage participation by substantially more institutions and to create a cohort of Community Anchors to partner with NGS and NASA in advancing diversity, equity, and inclusion in STEM. The inaugural cohort was selected in 2022.
A.7 The *NASA Proposer’s Guide*

All policies and procedures for the preparation and submission of proposals, as well as those for NASA's review and selection of proposals for funding, are set forth in a separate document entitled the “*NASA Proposer’s Guide*” (also referred to as the “*Proposer’s Guide*”). This document is updated frequently (latest update can be found at the link provided), therefore the most current published version is referenced throughout this NOFO.

The *NASA Proposer’s Guide* is hereby incorporated into this NOFO by reference, and proposers are responsible for understanding and complying with the *NASA Proposer’s Guide* before preparing and submitting their proposals. Unless otherwise noted, proposals that do not conform to the standards in the *NASA Proposer’s Guide* may be deemed noncompliant and rejected without full evaluation or peer review. The chapters and appendices in The *NASA Proposer’s Guide* provide supplemental information about the entire NOFO process, including: NASA policies for the solicitation of proposals; guidelines for writing complete and effective proposals; NASA policies and procedures for the review and selection of proposals; as well as for issuing and managing the awards to the institutions that submitted selected proposals. Note that NASA’s policy for proposals involving non-U.S. participants is provided in Appendix A of the *NASA Proposer’s Guide*.

If there is a conflict between the content of this NOFO or its appendices and the *NASA Proposer’s Guide*, this NOFO or its appendices takes precedence.

NOTE: If there is a conflict between the content of this NOFO and its appendix/appendices, the individual program elements described in the relevant appendix/appendices take precedence.

A.8 NASA Safety Policy

All proposals shall consider NASA’s priority emphasis on safety.

Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA’s safety priority is to protect: (1) the public, (2) astronauts and pilots, (3) the NASA workforce (including employees working under NASA award instruments), and (4) high-value equipment and property.

OSTEM awardees shall act responsibly in matters of safety and shall take all reasonable safety measures in performing under this award. The recipient shall comply with all applicable Federal, state, and local laws relating to safety. The recipient shall maintain a record of and notify the NASA Grant Officer, within one workday of any accident involving death, disabling injury, or substantial loss of property in performing this award. If non-NASA personnel are injured, the recipient will follow its internal investigation process. If NASA personnel are injured and/or NASA property is damaged, the recipient, in coordination with the cognizant NASA Program Manager, Technical Officer, or designee, shall comply with NASA Procedural Requirement (NPR) 8621.1D, NASA Procedural Requirements of Mishap and Close Call Reporting, Investigating, and Recordkeeping. Upon request, NASA and the recipient agree to provide assistance to each other in the conduct of any investigation. The
recipient will, within one workday, advise the NASA Grant Officer of hazards that come to
its attention as a result any work performed. Where the work under this award involves flight
hardware, the hazardous aspects, if any, of such hardware will be identified, in writing, by
the recipient. Compliance with this term and condition by subawardees/subcontractors shall
be the responsibility of the recipient.

A.9 Data Management Plan

All proposals submitted under this NOFO shall include a Data Management Plan (DMP), in
accordance with the NASA Plan for Increasing Access to the Results of Scientific Research.
The DMP shall include:

- Specific data requirements and expectations;
- An example DMP or outline for the specific type of data likely to result from the funded
  projects; or
- A statement that a DMP is not required because of the nature of the activity (e.g., no data
  or proprietary or personally identifiable data are expected).

See Senior Advisors for Research and Analysis (SARA) Q&A for more information on the
DMP.

Proposers shall submit the DMP by responding to the section of the cover page for
DMP in NSPIRES (limited to 4000 characters). DMPs shall describe how data generated
by the proposed research will be shared and preserved, and how data collected will be made
available to the public. If the proposer has determined that its data should not be publicly
shared, the proposer shall provide a detailed explanation as to why data-sharing and/or
preservation is not possible or scientifically appropriate. Additionally, the DMP shall
describe how data sharing and preservation will enable validation of results, or how results
could be validated if data are not shared or preserved. The DMP shall provide a plan for
making all research data underlying results and findings in publications digitally accessible at
the time of publication. NASA will review each proposer’s DMP during the evaluation/peer
review of proposals. Costs of the DMP shall be included in the proposed budget. For further
information, see Section 2.11 in the NASA Proposer’s Guide.

Any research project for which a DMP is not necessary shall provide an explanation in the
DMP block. Example explanations include but are not limited to:

- This is a development effort for flight technology that will not generate any data that the
  proposer can release, so a DMP is not applicable;

- The data that the proposer will generate will be subject to International Traffic in Arms
  Regulation (ITAR); or

- The proposer may explain why the project will not generate any data.

The type of proposal that requires a DMP is described in the NASA Plan for Increasing
Access to Results of Scientific Research. The DMP shall contain the following elements, as
appropriate to the project:
● A description of data types, volume, formats, and (where relevant) standards;

● A description of the schedule for data archiving and sharing;

● A description of the intended repositories for archived data, including mechanisms for public access and distribution;

● A discussion of how the plan enables long-term preservation of data; and

● A discussion of roles and responsibilities of team members in accomplishing the DMP. (If funds are required for data management activities, these should be covered in the normal budget and budget justification sections of the proposal.)

Proposers that include a plan to archive data should allocate suitable time for this task. Unless otherwise stated, this requirement as stated in this NOFO supersedes the DMP described in the NASA Proposer’s Guide. In addition, researchers submitting NASA-funded articles in peer-reviewed journals or papers from conferences shall make their work accessible to the public through NASA’s PubSpace. PubSpace provides free access to NASA-funded and archived scientific publications. Research papers will be available within one year of publication to download and read.

B. AWARD INFORMATION

B.1 Award Type and Availability of Funds

Awards resulting from this NOFO will be issued as grants or cooperative agreements. A cooperative agreement is used when it’s expected there will be “substantial involvement” from NASA. The type of award instrument used will be identified in each program element description in each appendix. The type of award to be offered to selected proposers will generally follow the policies in Appendix A of the NASA Proposer’s Guide, although in a few cases, only one type of award may be offered (please refer to the individual program element descriptions). NASA will determine the appropriate award instrument for the selections resulting from this NOFO. Grants and cooperative agreements will be subject to the provisions of 2 CFR §200, 2 CFR §1800 (NASA’s Supplement to 2 CFR §200), the NASA Grant and Cooperative Agreement Manual (GCAM), and Appendix A of the NASA Proposer’s Guide.

Prospective proposers to this NOFO are advised that in general, funds are not available to award all solicited activities at the time of issuance of this NOFO release. The Government’s obligation to make awards is contingent upon the availability of sufficient appropriated funds from which payment can be made and the receipt of proposals that NASA determines meet the criteria for award under this NOFO. Further, continuation of the awards in the second and subsequent years (if applicable) will be contingent on the availability of appropriated funds, the quality of project progress, and continued relevance of the project to the NASA mission.

The amount of funds expected to be available for new awards for proposals submitted in response to this NOFO is set forth in the Summary of Key Information at the end of each program element description in each appendix. Given the submission of meritorious
proposals, the number of awards that may be made for each program element is also provided. A list of OSTEM-solicited activities is provided in Table 2. Additional OSTEM-related opportunities (e.g. fellowships) also may be solicited through this NOFO.

**TABLE 2. Program Elements Ordered by Expected Release Date**

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<th>Program Element</th>
<th>Expected Release Date</th>
<th>Expected Proposal Due Date</th>
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<td>MUREP Institutional Research Opportunity (MIRO)</td>
<td>November 15, 2023</td>
<td>February 14, 2024</td>
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<tr>
<td>10</td>
<td>EPSCOR ISS</td>
<td>January 08, 2024</td>
<td>April 15, 2024</td>
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**NOTE:** Amended due dates and new program elements will be released as EONS-2024 is amended during fiscal year (FY) 2024. Additional OSTEM-related opportunities also may be solicited through this NOFO.

**B.2 Award Period of Performance**

The typical period of performance for an award is one to three years, although some program elements may specify shorter or longer (maximum of five years) periods. Prospective proposers should refer to the *Summary of Key Information* at the end of each program element description for the maximum duration for awards made under this NOFO. Any proposed period of performance shall be justified in the proposal. The appropriateness of such period of performance will be evaluated during the peer review process. NASA reserves the right to select proposals for shorter award durations than proposed.

**B.3 Cancellation of Notice of Funding Opportunity (NOFO)**

NASA reserves the right not to make any awards under this NOFO and/or to cancel this NOFO at any time prior to the issuance of the first award. If this occurs, NASA assumes no liability (including for reimbursement of entities’ proposal costs) for canceling the NOFO or for any entity’s failure to receive the notice of cancellation. Prospective submitters are responsible for regularly checking NSPIRES to ensure they receive all updates (e.g. amendments) for specific NOFOs in a timely manner.

**B.4 Schedule for Awards**

Every effort will be made to announce selections within six to nine months from the proposal submission deadline. Selection notifications will be communicated electronically via NSPIRES to the institution’s Authorized Organization Representative (AOR) and Principal Investigator (PI). When a selection announcement is made, NSPIRES sends a decision notice via email requesting the PI or AOR to log into NSPIRES. This decision notice email means that NSPIRES has been updated to indicate the status of a proposal in NASA’s selection review process. When a PI or AOR logs into NSPIRES, the following are examples of the types of decisions possible:

- A “declined” status means: 1) NASA’s review of the proposal is concluded, and 2) no NASA funds are available to support the proposed project.
● A “selected” or “selectable (pending)” status means the proposal’s review continues, and the proposal has NOT received an award. A “selected” or “selectable (pending)” proposal status in NSPIRES is neither a commitment that a proposal has or will receive an award by the NASA Shared Services Center (NSSC), nor a promise that the funds have been or will be transferred from NASA Headquarters to a NASA Center.

Proposers are strongly cautioned that only a NASA Grant Officer may make commitments, obligations, or awards on behalf of NASA or authorize the expenditure of funds for this opportunity. A commitment by NASA to fund an award is only made through a grant or cooperative agreement signed by a NASA Grant Officer. A PI or organization that makes financial and/or personnel commitments in the absence of a grant or cooperative agreement signed by a NASA Grant Officer does so at their own risk. Please refer to Section 4.3 and Appendix A of the NASA Proposer’s Guide.

B.5 Renewal Proposals and Resubmissions

Generally, researchers holding previous awards selected through any of the projects offered through earlier NOFOs may submit renewal proposals that seek to continue a previously funded line of work. However, each individual project will provide specific information on eligibility as outlined in the specific Appendix. For future offerings under continuing proposals, it is OSTEM’s policy that renewal proposals will be considered along with new proposals submitted for that same program element. Renewal proposals will undergo the full peer review process and will not be advantaged or disadvantaged in the evaluation process because they were previously submitted. If a renewal proposal is selected, NASA will fund the proposal as a new award, and the starting date of a renewal award will follow the end date of the preceding award (i.e., the period of performance for a renewal award shall not overlap with the period of performance of the predecessor award). Instructions regarding renewal proposals may be found in Section 2.5 of the NASA Proposer’s Guide.

Proposals that were submitted but not selected based on a previous NASA NOFO may be re-submitted in response to this NOFO in either in a revised or original form. Such proposals will undergo full peer review, along with new proposals that NASA receives, and will not be advantaged or disadvantaged in the evaluation process because they were previously submitted.

B.6 Funding Restrictions

All costs charged to awards covered by this NOFO must comply with the Uniform Administrative Requirements in 2 C.F.R. 200 and 1800, unless otherwise indicated in the NOFO, the terms and conditions of the award, and the Grants and Cooperative Agreement Manual (GCAM).

● All proposed funds shall be allowable, allocable and reasonable. Funds may only be used for the project. All activities charged under indirect cost shall be allowed under 2 CFR §200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.
• Grants and cooperative agreements shall not provide for the payment of fee or profit to the Recipient.

• Unless otherwise directed in 2 CFR §200, for changes to the negotiated indirect cost rate that occur throughout the project period, the Recipient shall apply the rate negotiated for that year, whether it is higher or lower than the rate that was in place at the time of award.

• Proposals shall not include bilateral participation, collaboration, or coordination with China or any Chinese-owned company or entity (including universities), whether funded or performed under a no-exchange-of-funds arrangement.

• Any funds used for cost sharing or matching shall be allowable under 2 CFR §200.

• During the period of performance, a non-Federal entity shall use one of the methods of procurement as prescribed in 2 CFR §200.320, Methods of procurement to be followed. As defined in 2 CFR §200.1, the micro-purchase threshold for acquisitions of supplies or services made under grant and cooperative agreement awards issued to institutions of higher education, or related or affiliated nonprofit entities, or to nonprofit research organizations or independent research institutes is $10,000; or such higher threshold as determined appropriate by the head of the relevant executive agency and consistent with audit findings under Chapter 75 of Title 31, United States Code, Internal Institutional Risk Assessment, or state law.

NOTE: For funding opportunities that will result in fellowships or scholarships the following requirement also applies:

• Awards made under NASA Fellowship and Scholarship funding opportunities shall not provide for the payment to the Recipient for Facilities and Administration (F&A), overhead, or indirect costs.

In addition to the funding restrictions and requirements listed above, and those included in the NASA Proposer’s Guide under Title 2 CFR §1800, the following restrictions are applicable to this EONS NOFO.

• As directed in the NASA Proposer’s Guide, Section 2.18, other than the special cases discussed in the same Section 2.18, and unless specifically noted otherwise in the specific EONS program element Appendix, the proposing PI’s institution shall subcontract the funding for all proposed Co-Investigators (Co-I) who reside at different non-Government institutions.

• The construction of facilities is not allowed for any of the activities solicited under this NOFO unless specifically stated. For further information on what costs are permissible, refer to the cost principles in Subpart E of 2 CFR §200.

• U.S. award recipients may directly purchase supplies and/or services from non-U.S. sources that do not constitute research, but award funds may not be used to fund research
carried out by non-U.S. institutions. However, a foreign national may receive payment through a NASA award for the conduct of research while employed either full-time or part-time by a U.S. institution (see Section 2.2.1 and Appendix C of the NASA Proposer’s Guide).

- Reasonable and justified travel by a participant in the research investigation, whether for the purpose of conducting the research, for collaboration, or for attending a conference, is considered to be a reasonable expense. NASA conducts its collaborations with foreign institutions on a no-exchange-of-funds basis. NASA funding may not be used for foreign institutions to conduct research efforts at any level. Therefore, NASA funding shall not be used for travel expenses for any participant who is not employed either full-time or part-time by a U.S. institution (see Section 2.2.1 and Appendix C of the NASA Proposer’s Guide).

B.7 Intellectual Property Resulting from Awards

Award and intellectual property information is available in Appendix J of the NASA Proposer’s Guide.

B.7.1 Data Rights

NASA encourages the widest practicable dissemination of research results at any time during the course of the investigation. The award will contain the clause in the NASA Grant and Cooperative Agreements Manual (GCAM), Appendix D, Terms and Conditions, D.11, Rights in Data, which allows a grant/cooperative agreement Recipient to assert copyright in any work that is subject to copyright and was developed, or for which ownership was acquired, under an award resulting from this NOFO. NASA will reserve a royalty-free, nonexclusive and irrevocable right to reproduce, publish, or otherwise use the work for Government purposes, and to authorize others to do so, in any such copyrighted work. Note that the Grant Officer may revise the language under this Rights in Data clause to modify each party's rights based on the particular circumstances of the program and/or the Recipient's need to protect its specific proprietary information.

B.7.2 Patent Rights

Awards are subject to the provisions of 37 CFR §401.3(a), which requires use of the standard clause set forth at 37 CFR §401.14, Patent Rights (Small Business Firms and Nonprofit Organizations), along with NASA’s supplemental language as set forth in the NASA Grant and Cooperative Agreement Manual (GCAM), Appendix D, Terms and Conditions, D.10., Patent Rights.

C. ELIGIBILITY INFORMATION

C.1 Proposing Institutions

The EONS NOFO is open to U.S. Institutions, Federal Government agencies (other than NASA), Federally Funded Research and Development Centers (FFRDCs) (other than NASA JPL), state government agencies, local government agencies, federally recognized tribal
government agencies, non-profit science museums, planetariums, and other informal education organizations, for-profit companies, and non-U.S. institutions. These entities may participate as a lead proposer or through a partnership with the lead institution as noted by the specific program element guidelines. NOTE: Specific appendices may further limit the eligibility of applicants. Refer to each Appendix for more details.

Proposals from EPSCoR are, as stated in NASA EPSCoR legislation (NASA Authorization Act for Fiscal Year 1993, Public Law 102-588), able to be submitted in response to this NOFO by jurisdictions eligible to compete in the National Science Foundation (NSF) EPSCoR Research Infrastructure Improvement Grant Program (RII). The NSF eligibility is based on whether the most recent five-year level of NSF research support is equal to or less than 0.75 percent of the total RII budget. The most recent eligibility table is located at https://new.nsf.gov/funding/initiatives/epscor/epscor-criteria-eligibility

Proposals from Space Grant shall be coordinated through the awarded lead institution (academic or other) within each of the 52 Space Grant members (50 states, DC, or Puerto Rico). These awarded institutions shall be made aware of this NOFO and shall distribute information about opportunities throughout their eligible affiliates. Information about each Space Grant, awarded lead institution, and their current Director is located here.

Proposals from MUREP shall originate from a minority-serving U.S. college or university, currently designated and listed by the U.S. Department of Education as a minority-serving institution (MSI) depending on the requirements listed in each appendix. A current list of institutions that NASA considers MSIs can be found here. If a lead proposer’s institution is not listed as an MSI by the proposal due date, the institution’s AOR shall provide confirmation of its MSI status to NASA Research and Education Support Services (NRESS) via email at NASAEONS2024@nasaprs.com at least 24 hours before the proposal due date.

The following categories of U.S. institutions are eligible to propose to the various activities under MUREP:

### TABLE 3. Eligibility for MUREP Lead Institutions

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Institution Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska Native and Native Hawaiian-Serving Institutions (ANNH)</td>
<td>American Indian Tribally Controlled Colleges and Universities (TCCU)</td>
</tr>
<tr>
<td>Asian American and Native American Pacific Islander-Serving Institutions (AANAPISI)</td>
<td>Hispanic-Serving Institutions (HSI)</td>
</tr>
<tr>
<td>Historically Black Colleges and Universities (HBCU)</td>
<td>Predominately Black Institutions (PBI)</td>
</tr>
<tr>
<td>Native American-Serving Nontribal Institutions Program (NASNTI)</td>
<td>Minority-Serving Community Colleges (includes community colleges with the above designations)</td>
</tr>
</tbody>
</table>
If an institution serves a substantial Hispanic enrollment but has not been designated as a Hispanic-Serving Institution (HSI) or MSI by the Department of Education, or is not included on the NASA MSI Listing, that institution shall submit documentation demonstrating that its full-time undergraduate Hispanic enrollment is at least 25 percent of its total enrollment.

NASA Centers, Federal Government agencies (other than NASA), FFRDCs (including JPL), non-minority serving higher education institutions, state government agencies, local government agencies, federally recognized tribal government agencies, science museums, and planetariums, for-profit companies, non-U.S. institutions and other institutions including those types listed in Table 3 above may participate through a partnership with the lead proposing institution. However, all institutions proposed to receive funds under an award shall be listed on the proposal cover page.

Work to be performed through subcontracts/subawards shall be proposed following Section 2.18 of the NASA Proposer's Guidebook.

For more information on the national policy concerning MSIs, please see the following non-NASA websites:

Advancing Racial Equity and Support for Underserved Communities through Federal Government

- White House Initiative on Asian Americans, Native Hawaiians, and Pacific Islanders
- White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities
- White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity for Hispanics
- White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity for Native Americans and Strengthening Tribal Colleges and Universities
- White House Initiative on Asian American and Pacific Islanders

Arrangements or agreements to have the fiscal management and/or administration of an award performed by a third party (e.g., an affiliated Board of Regents, University System, or Foundation) shall be facilitated between the Recipient and the third party. Institutions not meeting these criteria are encouraged to partner with a college or university that meets the eligibility requirements as set forth above.

**NOTE: Notwithstanding any other terms of this NOFO, proposals involving bilateral participation, collaboration, or coordination in any way with China or any Chinese-
owned company, whether funded or performed under a no-exchange-of-funds arrangement, shall be ineligible for award.

**Note for Proposals from Space Grant:** OSTEM has a Contract/Task Order with Guardians of Honor (GOH), LLC to support NASA’s Space Grant program. To avoid any possible perception of a real or potential conflict of interest, GOH is not eligible to serve as a subcontractor, partner, or collaborator at any tier to an entity proposing under the Space Grant program.

All institutions receiving funds shall be listed on the proposal cover page. Work to be performed through subcontracts/subawards shall be proposed in accordance with Section 2.18 of the *NASA Proposer’s Guidebook*.

**NASA’s Commitment to Diversity and Inclusion**

NASA recognizes and supports the benefits of having diverse and inclusive scientific, engineering, and technology communities, and fully expects the reflection of such values in the composition of all panels and teams, including peer review panels, proposal teams, science definition teams, and mission and instrument teams. Per federal statutes and NASA policy, no eligible applicant shall experience exclusion from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NASA on the grounds of their race, color, creed, age, sex, national origin, or disability. NASA welcomes proposals from all qualified and eligible sources, and strongly encourages proposals from HBCUs, MSIs, small disadvantaged businesses (SDBs), veteran-owned small businesses (VOSB), service-disabled veteran-owned small businesses (SDVOSB), HUBZone small businesses, and women-owned small businesses (WOSBs), as eligibility requirements allow.

**C.2 Number of Proposals and Teaming Arrangements**

Each individual Appendix contains specific requirements regarding the number of proposals an institution may submit as well as information regarding teaming arrangements. If more than one proposal is allowed per Appendix, each proposal shall be submitted as a separate, stand-alone, complete document to enable NASA to properly evaluate it.

**C.3 Principal Investigator (PI) and Proposal Team Members**

Every lead institution submitting a proposal in response to this NOFO shall designate a single individual, the PI, who is employed by the lead institution as of the date of proposal submission, and who will be responsible for the quality and direction of the entire proposed effort and for the use of all awarded funds. Because EONS does not accept the designation of a “Co-Principal Investigator,” there shall be only one PI who is solely responsible for the proposed investigation. An individual shall be listed as PI on only one proposal per NOFO, unless stated otherwise in an Appendix. However, an individual may be listed as PI on one proposal, and a Co-Investigator or collaborator on another proposal, unless otherwise stated in an Appendix.
Individuals from institutions other than eligible lead institutions may not serve as the PI. Rather, such individuals shall be identified in a proposal as a Co-Investigator (Co-I) or other type of team member/collaborator. (See Sections 2.15, 2.16, and 2.17 of the NASA Proposer’s Guide. Proposals that include the participation of an individual from a NASA Center or JPL shall include a statement of commitment acknowledging their participation and identify such team member’s role in NSPIRES.

C.4 Cost-Sharing or Matching

Cost sharing is not required; however, NASA can accept cost-sharing if it is voluntarily offered. See 2 CFR §200.306, 2 CFR §1800.306 and the NASA Grant and Cooperative Agreement Manual (GCAM) for more information on Cost Sharing. It is important to note that proposals offering cost-sharing will not be advantaged (i.e., receive extra credit) in the evaluation process.

Controller Alert 23-04 and Public Law 96-205, Title VI, Section 601, requires agencies to waive any requirements for local matching funds under $200,000 for grants to four “insular areas” (the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands). For local matching funds $200,000 and greater, agencies may waive the matching requirement for these four “insular areas.”

For information about funding levels and cost-share requirements for proposed activities, please refer to the individual appendices of this NOFO.

C.5 Special Considerations for NASA Team Members

Any proposal that includes a NASA or JPL employee as a team member shall include the name of the NASA Center or JPL on the cover page. The total budget request for the NASA Center or JPL (as stipulated in the accompanying Letter of Support) shall also be specified under the NASA Partner team member. Since NASA funding sent to NASA Centers or JPL is required to be obligated in the same fiscal year (FY) in which it is received, proposals including NASA Centers or JPL shall provide a breakdown of funding by NASA Center or JPL and by fiscal year, utilizing the start date set forth in the Summary of Key Information table at the end of each Appendix (the default start date is six months after proposal submission).

Letters of Support from NASA or JPL Team Members

- Proposals that will include any NASA or JPL technical team collaboration shall include a letter of support from the NASA Center or JPL, naming the team member(s) involved, details on activities to be carried out should the proposal be funded, and the accompanying total budget request (if applicable).

And/or

- If a proposal will include NASA or JPL student internships or fellowships, or other educational or STEM engagement activities, a letter of support shall be included from the
NASA Center’s OSTEM (or JPL Education Office). The letter shall include the team member(s) involved, details on activities to be carried out, and the accompanying total budget request (if applicable). See NASA STEM Engagement Directors for contact information. **NOTE:** The selection processes for NASA internships and fellowships are highly competitive, and selection of students attending Recipient institutions is not guaranteed. Proposers are encouraged to be prepared with alternative experiential learning placements in the event students are not selected for NASA internships or fellowships during the period of performance.

**NOTE:** Proposers are encouraged to contact NASA Centers and/or JPL early in the proposal process to discuss potential proposal arrangements.

C.6 Submissions from Non-Domestic Entities

NASA may consider proposals from entities outside the U.S. However, foreign entities are generally not eligible to receive funding from NASA. Therefore, unless otherwise noted in this NOFO, proposals from foreign entities shall not include a Cost/Budget submission unless the proposal involves collaboration with a U.S. institution, in which case a Cost/Budget submission for only the U.S. entity’s participation shall be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation shall be endorsed by the respective government agency or funding/sponsoring institution located in the country of the proposing foreign entity. Such endorsement shall indicate that the proposal merits careful consideration by NASA, and, if the proposal is selected, that sufficient funds will be made available to execute the activity as proposed.

*Ineligibility of Proposals that Include Participation of China or Chinese-owned Companies:* Proposals involving bilateral participation, collaboration, or coordination in any way with China or any Chinese-owned company (including universities), whether funded or performed under a no-exchange-of-funds arrangement, shall be ineligible for award.

C.7 Certifications of Compliance

On February 2, 2019, the System for Award Management (SAM) implemented a new process that allows financial assistance registrants to submit common Federal Government-wide certifications and representations. Individuals and businesses (entities) registering on SAM.gov can review and submit financial assistance certifications and representations online. The new process was required beginning January 1, 2020. Guidance on the new process and system change can be found [here](#).

Certifications shall be uploaded within the completed proposal package (as a single pdf document) and certified by the Authorized Organization Representative (AOR) in NSPIRES. The AOR’s signature on the proposal automatically certifies that the proposing organization has read, and is in compliance with, the identified certifications, assurances, and representations.

For additional guidance, see Section 2.9 of the *NASA Proposer’s Guidebook*. 
D. APPLICATION AND SUBMISSION INFORMATION

D.1 Proposal Submission Date and Time

All information needed to apply to this solicitation is contained in this EONS NOFO and in the *NASA Proposer’s Guidebook*. For each opportunity provided in the appendices of this NOFO, the electronic proposal shall be submitted in its entirety by an AOR no later than the proposal deadline on the appropriate proposal due date listed in Table 2 of this NOFO. Unless stated otherwise, the proposal deadline is 11:59 p.m. Eastern time. Please refer to the program element descriptions in each Appendix for specific due dates. An on-time electronic submission is required for every proposal.

While every effort is made to ensure the reliability and accessibility of the websites and to maintain a help center via e-mail and telephone, difficulty may arise at any point on the internet, including with the user’s own equipment. Accordingly, prospective proposers are urged to familiarize themselves with the NSPIRES site and to submit the required proposal materials well in advance of the proposal submission deadline. Difficulty in registering with or using the NSPIRES proposal submission system is not, in and of itself, a sufficient reason for NASA to accept a late proposal. Proposers may contact the NSPIRES help desk by email at nspires-help@nasaprs.com or by calling, Monday through Friday from 8:00 am to 6:00 pm Eastern Time at (202) 479-9376, excluding Federal Government holidays. **Please note that the NSPIRES Help Desk may close before the proposal submission deadline.**

D.2 Submission of Proposals

All proposals submitted in response to this EONS NOFO shall be submitted in a fully electronic form. **Hard copy proposals (in full or partial submissions) will not be accepted.**

Electronic proposals shall be submitted by the official at the PI’s institution who is authorized to make such a submission, the AOR. The AOR’s electronic submission of the proposal fulfills the requirement for signature of the proposal by an authorized official of the proposing institution.

Proposers shall submit proposals in response to this EONS NOFO via NSPIRES only. **Submissions to Grants.gov will not be accepted.** Additional information about NSPIRES can be found in Sections 3.2 of the *NASA Proposer’s Guidebook*. Note that proposers may begin working in these systems as soon as the NOFO is released. Further, proposers may edit the required information as many times as needed until the proposal and accompanying cover sheet information are ready for submission.

D.3 Unique Entity Identifier (UEI) and System for Award Management (SAM)

Each applicant for NASA funding (unless the applicant is an individual or is excluded per 2 CFR 25.110) is required to:

- Be registered in SAM before submitting an application
- Maintain an active SAM registration with current information, including information on a recipient’s immediate and highest-level owner and subsidiaries, as well as on all predecessors that have been awarded a Federal contract or grant within the last three years, if applicable, for all times during which it has an active Federal award or an application or plan under consideration by NASA; and
- Provide its UEI in each application or plan it submits to NASA. UEIs may be obtained by registering in SAM.gov

NASA may not issue an award or financial modification to an existing award to an applicant or recipient entity until the entity has complied with the requirements to provide a valid UEI and maintain an active SAM registration with current information. At the time of issuing an award, if the intended recipient has not complied with the UEI or SAM requirements, NASA may determine that the applicant is not qualified to receive an award and use that determination as a basis for making an award to another applicant.

D.4 Registration in NSPIRES

Once an organization has a SAM record, the listed Organization Point of Contact (POC) must register as a user with NSPIRES, log on, then begin the organization registration process. The proposing institutions and each team member shall then register with NSPIRES (if not already registered).

**PLEASE NOTE:** Linking a team member’s registration with its institution will automatically associate all required numbers (UEI, CAGE, and EIN) with the same proposal. To identify the AOR, who can also register the institution if it is not already registered in SAM, a potential PI can contact the campus Sponsored Research Office (SRO). The point of contact (POC) from the SRO or Electronic Business POC will be able to register the institution in SAM.

Proposers to this NOFO are required to obtain/complete the following no later than the proposal due date:

1) a valid registration in SAM;
2) a valid CAGE Code; and
3) a valid registration with NSPIRES

D.5 Notice of Intent (NOI) to Propose

Individual appendices to this EONS NOFO may require the submission of a Notice of Intent (NOI) to Propose to assist NASA in the planning of the proposal evaluation process. If required, NOIs are to be submitted electronically by entering the requested information through NSPIRES at by the date/time given in the Summary of Key Information, found at the end of the relevant Appendix. Note that NOIs may be submitted within NSPIRES directly by the PI; an NOI is not required to be submitted by an institution’s AOR.
All NOIs shall be submitted via NSPIRES. Interested proposers shall register with NSPIRES before it can be accessed for use. NSPIRES is open for the submission of NOIs for typically 30 days, starting on the day the NOFO is released. Since NOIs submitted after these deadlines may still be useful to NASA, late NOIs may be submitted as directed in Section 2.3 of the NASA Proposer’s Guidebook.

A separate NOI is to be submitted for each planned proposal. The submission of a NOI is not a commitment to submit a proposal, nor is information contained therein binding on the submitter in any way. NOIs will be treated by NASA as competition-sensitive material. Additional information about NOIs is included in Section 2.3 of the NASA Proposer’s Guidebook.

NOTE: Specific appendices may require submission of an NOI. Please refer to each Appendix for more details.

D.6 Team Member Confirmation

Every identified individual expected to have a role in the execution of the proposed effort shall be identified on the proposal cover page, using the most appropriate personnel as described in Appendix B of the NASA Proposer’s Guidebook. Prior to proposal submission via NSPIRES, every individual named on the proposal’s electronic cover page form as a team member (even Collaborators) must be registered in NSPIRES and confirm their commitment to that role. Team members will receive an email from NSPIRES indicating that they have been added to the proposal and must log into NSPIRES to corroborate. Through this electronic confirmation process, the organization through which they are participating in the proposed effort is also identified to enable organizational conflict of interest checks, which are required as part of the evaluation process. Such confirmation of participation is not needed for unnamed participants (e.g., students and postdoctoral associates). Any organization requesting NASA funds through the proposed project shall list each team member on the proposal cover page. Other than the category of PI, some NOFOs may explicitly disallow some or all of the categories in Appendix B and/or may add other categories.

D.7 Withdrawal of Proposals

Proposers may withdraw their proposals at any time before award. Proposers shall notify NASA in a timely manner if the proposal is funded by another institution, or of any other changed circumstances that necessitate withdrawal of the proposal.

D.8 Questions Related to this NOFO

Questions regarding this NOFO or its activities shall be directed to the cognizant Technical Officer identified in the Summary of Key Information subsection at the end of each program element description. Any published clarifications (Amendments to EONS) or questions and answers (“Frequently Asked Questions (FAQ)” Sheets) will be posted on the relevant NSPIRES web page. Interested proposers shall routinely check for such information prior to submitting their proposals.
Questions regarding this NOFO shall be submitted in writing via e-mail to the designated POC given for each program element as soon as possible, but no later than ten days prior to the proposal due date. NASA is not required to respond to questions that are submitted after this deadline.

D.9 Conflict of Interest Check Information

NASA requires all peer reviewers and/or panelists to disclose any conflicts of interest (see Appendix E of the NASA Proposer’s Guidebook). Peer reviewers are also expected to disclose situations that may give the appearance of bias, or that may cause a reasonable observer to question the ability of the reviewer to provide an unbiased or impartial evaluation of a proposal. Peer reviewers are required to sign a nondisclosure/conflict of interest form before they are given access to proposals. To facilitate adherence to the required conflict of interest disclosures, any institution requesting NASA funds through the proposal shall be listed on the proposal cover page.

D.10 Other Submission Requirements

All proposals shall comply with the general requirements of this NOFO. Upon receipt, proposals will be reviewed for compliance to ensure that the proposal includes the following:

- A complete proposal with all required elements;
- A proposal from an eligible proposer as specified in the Eligibility Information. (Section C of this NOFO);
- A budget narrative that includes details of any sub-awards and that is for a funding period consistent with this NOFO; and
- A proposal that is consistent with the page limitations and formatting guidelines specified in this NOFO and the NASA Proposer’s Guidebook.

At NASA’s sole discretion, non-compliant proposals may be rejected and eliminated for further consideration for award.

Collection of Demographic Information

NASA is implementing a process to collect demographic data from grant applicants for the purpose of analyzing demographic differences associated with its award processes. Information collected will include name, gender, race, ethnicity, and disability status. Submission of this information is completely voluntary and is not a precondition of award.

D.11 Content and Format of the Proposal Submission

Required elements of the proposal as described in Table 4 shall be submitted via the NSPIRES website. Proposers shall assemble their proposal into one PDF file (except the NSPIRES-generated Proposal Cover Page) prior to submitting the proposal. Proposers shall comply with all format requirements identified in this NOFO and in the NASA Proposer’s Guidebook. Please refer to Section 2 of the NASA Proposer’s Guidebook for more
information on proposal submission procedures. Section 2.6 of the *NASA Proposer’s Guidebook* provides important guidelines for style formats. A sample proposal cover page can be found in Appendix B of this NOFO.

### TABLE 4. Required Proposal Elements

<table>
<thead>
<tr>
<th>Proposal Elements</th>
<th>Page Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NSPIRES Cover Page and Budget Form</strong> (Section 2.8 of the <em>NASA Proposer’s Guidebook</em>): The NSPIRES Cover Page contains the following:</td>
<td>1 or more – NSPIRES will generate the necessary number of pages</td>
</tr>
<tr>
<td><strong>Proposal Information:</strong> PI information, proposal title, proposed start and end dates, submitting institution information, certification and authorization.</td>
<td></td>
</tr>
<tr>
<td>Certifications Regarding Lobbying, Disbarment, Suspension and Other Responsibility Matters: The AOR’s signature on the Proposal Cover Page automatically certifies that the proposing organization has read and shall comply with these certifications. No additional form is necessary. See 2 CFR §1800, Appendix A.</td>
<td></td>
</tr>
<tr>
<td><strong>Team Members:</strong> Names, institution and contact information. (Note: Each team member shall register in NSPIRES and complete all required data. Each team member shall establish an organizational relationship; i.e., identify the organization or other information through which the person is participating in the proposal. A proposal cannot be submitted if an organizational relationship within NSPIRES is missing for any team member.)</td>
<td></td>
</tr>
<tr>
<td><strong>Proposal Title:</strong> Include a meaningful title for the proposed project applicable to specific appendix. (Note: Title length may not exceed 255 characters including spaces.)</td>
<td></td>
</tr>
<tr>
<td><strong>Project Summary</strong> (max. 4000 characters, Section 2.7 &amp; 2.10 of the <em>NASA Proposer’s Guidebook</em>): Provide a brief description of the project, including objectives, targeted audience, partners, method of approach, relevance to NASA themes, use of NASA content, and outcomes.</td>
<td></td>
</tr>
<tr>
<td><strong>Budget Figures:</strong> Include figures for each year (up to the number of years of the period of performance) of the proposed project in the spaces provided. This is the total budget, including any sub-awards. <strong>Data Management Plan:</strong> limited to 4000 characters</td>
<td></td>
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</table>
Note: Sample Cover Pages are located in Appendix B of this NOFO. NASA is not permitted to fund institutions that are not listed on the Proposal Cover Page. This includes NASA Centers and JPL.

Note: To improve proposal reviewability, Proposers shall submit one PDF file to NSPIRES beginning with the Table of Contents and including all information described below:

<table>
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<tr>
<th>Table of Contents (TOC): (Section 2.7 &amp; 2.12 of the NASA Proposer’s Guidebook. NSPIRES does not offer a stand-alone TOC file upload choice. The proposer shall include a TOC as the first page(s) of the project description, even if that results in the project description being longer than 15 pages. In other words, the TOC does not count against the established page limits.</th>
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<tr>
<td>Project Description: A detailed description of the proposed plan. Page limit includes all illustrations, tables, and figures, where each “n-page” foldout counts as n-pages, and each side of a sheet containing text or an illustration counts as a page.</td>
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<tr>
<td>Maximum 15 pages</td>
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<td>1 or more (if applicable)</td>
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<tr>
<td>Biographical Sketches: Submit sketches for key personnel using the guidelines from Section 2.15 of the NASA Proposer’s Guidebook.</td>
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<tr>
<td>PI: max 2 pages Each Co-I and Other Key Personnel: max 1 page</td>
</tr>
<tr>
<td>Current and Pending Support: (Section 2.16 of the NASA Proposer’s Guidebook and references therein)</td>
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<tr>
<td>Statements of Commitment and Letters of Support: (Section 2.17 of the NASA Proposer’s Guidebook.)</td>
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<tr>
<td>1 or more (if appropriate)</td>
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<tr>
<td>Special Notifications and/or Certifications</td>
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E. APPLICATION REVIEW INFORMATION

E.1 Application Evaluation Criteria

Unless specifically stated in the individual appendices, all NASA-sponsored STEM engagement activities are evaluated, at a minimum, against the following criteria for award: (1) Intrinsic Merit, (2) Relevance to NASA, and (3) Budget/Cost (see Appendix D of the NASA Proposer’s Guidebook). Additional criteria for award may be added based upon the uniqueness of the requirement of the activity. Refer to each individual Appendix for specific details on the proposal evaluation criteria.

E.2 Review and Selection Process

Review of proposals submitted to this announcement will be consistent with the general policies and provisions set forth in the NASA Proposer's Guidebook. Appendix D. Evaluation
criteria (described in Appendix D) are superseded by the evaluation criteria described in each EONS Appendix. Selection procedures will be consistent with the procedures identified in Appendix D.

Proposals will be evaluated by a merit review process composed of proposers’ professional peers (Government and non-Government), including STEM education and evaluation experts, who have been screened in advance for any conflicts of interest. Unless specifically stated in the individual appendices (specific activities), each proposal will be evaluated and assessed based on its strengths and weaknesses for each of the three evaluation criteria for award (Intrinsic Merit, Relevance to NASA, and Budget/Cost) and their sub-elements.

NASA seeks a balanced project award portfolio. NASA also considers diverse factors in the final award portfolio, such as but not limited to: different types of institutional representation, participation by individuals traditionally underrepresented in STEM studies and careers, and geography.

The Selecting Official for each activity is identified in the Summary of Key Information at the end of each Appendix description.

**E.3 Risk Analysis**

The NASA Grant Officer will conduct a pre-award review of risk associated with the proposer as required by 2 CFR §200.206, Federal awarding agency review of risk posed by applicants. For all proposals selected for an award, the Grant Officer will review the submitting organization's information available through multiple government-wide repositories such as SAM (SAM.gov), the Contractor Performance and Assessment Reporting System (CPARS), the Federal Audit Clearinghouse (FAC), USAspending.gov, and Grant Solutions Recipient Insight.

**E.4 Risk Review**

For any federal award, if NASA anticipates the total federal share will be greater than the simplified acquisition threshold (SAT) (currently $250,000) during the period of performance:

i. Prior to making a federal award with a total amount of federal share greater than the SAT, NASA is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (see 41 U.S.C. §2313);

ii. An applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM;

iii. NASA will consider any comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment
about the applicant's integrity, business ethics, and record of performance under federal awards when completing the review of risk posed by applicants as described in 2 CFR §200.206, Federal awarding agency review of risk posed by applicants.

F. FEDERAL AWARD ADMINISTRATION INFORMATION

F.1 Notice of Award

NASA will notify successful grant recipients of funding via a Notice of Award (NASA Form 1687) signed by the Grant Officer. This Notice of Award is the authorizing document and will be sent to the recipient via email. NASA is committed to announcing selections and initiating awards as quickly as possible, consistent with ensuring the quality of the selection and award process and subject to the appropriation of federal funds for the initiation of new awards.

Selections are typically announced between 150-220 days after the proposal due date (see the NASA Proposer’s Guidebook, Section 4.3, Selection).

NASA has no obligation to evaluate ineligible proposals or those not meeting all stated requirements of this NOFO (see NASA Proposer’s Guidebook, Section 4.6. Proposal Rejected by NASA Without Review).

Upon approval of the Selecting Official, proposals recommended for funding will be forwarded to the NASA Grant Officer for final review of business, financial, and policy implications, and then processing and issuance of a grant or cooperative agreement will occur.

Proposers are strongly cautioned that only a NASA Grant Officer may make commitments, obligations or awards on behalf of NASA or authorize the expenditure of funds for this opportunity. The Grant Officer is also referred to as an Award Officer in the NASA Proposer’s Guidebook. No commitment on NASA’s part should be assumed based upon technical or budgetary discussions that the proposer has with any NASA employee other than the Grant Officer. Per 2 CFR §200.308, Revision of Budget and Program Plans, a PI and/or institution, at their own risk, may make financial or personnel commitments within the 90-day period preceding the effective date of their award in the absence of a written instrument signed by a NASA Grant Officer. Any costs that the proposer incurs in anticipation of a grant or cooperative agreement award will be subject to the rules at 2 CFR §1800.210, Pre-award costs.

Notification of both the selected and the non-selected proposals will be consistent with the policy stated in the NASA Proposer’s Guidebook, Appendix D. For selected proposals, a NASA Grant Officer will contact the proposer’s business office. The NASA NSSC will conduct the negotiation and award of any grants or cooperative agreements. Grant or cooperative agreement awards are made to the proposing institution, not to the PI or any other individual.
In order to announce selection decisions for grants and cooperative agreements as soon as possible, even in the presence of budget uncertainties, the Selection Official may defer selection decisions on some proposals while making selection decisions on others. If a Selection Official uses this option, then proposals will be either “selected,” “selectable (pending),” or “not selected.”

Proposals that are “selectable (pending)” may be considered for a supplemental selection if and when circumstances allow. All proposers that receive a “selectable (pending)” decision will eventually be notified whether their proposals are selected through a supplemental selection or are no longer being considered for a supplemental selection.

Proposers that are not selected will be notified by electronic mail and offered a debriefing consistent with the policy in Appendix D of the *NASA Proposer’s Guidebook*.

**F.2 Process for Appeals Prior to Formal Requests for Reconsideration**

This NOFO is limited to the awarding of grants and cooperative agreements. Accordingly, the appeals and reconsideration processes under this NOFO do not include protest rights for proposers with the U.S. Government Accountability Office (GAO) or with the Agency, as defined in Federal Acquisition Regulation (FAR) 33.101. Furthermore, the provisions at FAR 52.233-2 (Service of Protest) and NASA FAR Supplement (NFS) 1852.233-70 (Protests to NASA) do not apply to this NOFO.

Per Section 5.9.5 of the *GCAM*, this section does not apply to proposals returned without review by NASA for an applicant’s failure to:

1. Submit the proposal with enough lead time before the activity is to commence;

2. Submit a late proposal where information regarding the proposal deadline (i.e., date, time, and location) for submission had been previously specified;

3. Meet the NASA proposal preparation requirements, such as page limitations, formatting, instructions, and electronic submission as specified in the *NASA Proposer’s Guidebook*, or the NOFO; or

4. Submit a proposal that is responsive to the NOFO or that contains sufficient detail.

**F.2.1 Debriefing with Solicitation Activity Manager**

PIs who receive a “not selected” decision on their proposal will be notified by electronic mail and offered a debriefing meeting consistent with the policy in Appendix D of the *NASA Proposer’s Guidebook*. PIs who are interested in a debriefing shall first email the *Activity Manager* listed in the status letter with their questions and concerns. If a PI is not satisfied with the explanation provided for the basis of non-selection of their proposal, they may submit a Request for Reconsideration, as outlined in Section F.2.2 of EONS-2024.
F.2.2 Written Request for Reconsideration to Selecting Official

If a PI decides to have its institution’s declined proposal reconsidered for funding, the PI shall, within 30 calendar days of receipt of the synopsis of reviewers’ comments, submit a Request for Reconsideration in writing to the Selecting Official. If no synopsis of reviewers’ comments was received, the Request for Reconsideration shall be submitted within 60 calendar days of notification that the proposal had been declined. The Selecting Official will respond to the Request for Reconsideration within 30 calendar days. If additional time is required to prepare a response, the Selecting Official will send an explanation of the need for more time to the PI within 30 calendar days of the Agency’s receipt of the Request for Reconsideration.

F.2.3 Appeals Above the Selecting Official

Appeals of the Selecting Official's reconsideration decision shall be made within 30 calendar days of receipt of that decision. The written appeal shall be submitted to the Assistant Administrator of the Mission Directorate or Office issuing the NOFO. A response to the appeal will be provided to the PI within 30 calendar days of the Agency’s receipt of the appeal.

Mr. Torry Johnson
Deputy Associate Administrator for The STEM Engagement Program
Office of STEM Engagement
NASA Headquarters
300 E Street SW, Mail Code N
Washington, DC 20546

F.2.4 Appeals Above the Deputy Associate Administrator

Appeals of the Deputy Associate Administrator for STEM Engagement Program’s reconsideration decision shall be made within 30 calendar days of receipt of that decision. The written appeal shall be submitted to the Associate Administrator for STEM Engagement. A response to the appeal will be provided to the PI within 30 calendar days of the Agency’s receipt of the appeal.

Finally, the NASA Procurement Ombudsman Program is available under this NOFO as an option to address any concerns/or and disagreements. Accordingly, the clause at NFS 1852.215-84, Ombudsman, is incorporated into this NOFO. The cognizant Ombudsman is:

Marvin Horne
Deputy Assistant Administrator for Procurement, Procurement Ombudsman and Competition Advocate
300 E Street SW
Washington, DC 20546
Email: marvin.l.horne@nasa.gov
F.3 Administrative and National Policy Requirements

Throughout the year, NASA may issue policies or guidance by way of a Grant Information Circular (GIC). GICs supplement, clarify, augment, remove, and/or alter information included in NASA grant policies and/or provide other important updates. NASA distributes GICs on the NASA website on the Grants Policy and Compliance Regulations and Guidance section under Active GICs. Expired GICs are stored on the GICs Archive webpage. GICs supersede the policy document referenced in the circular. As such, NASA grant applicants and recipients should ensure they stay informed by checking NASA’s Grant Regulations and Guidance page for the most up-to-date policies and requirements. Recipients of NASA grant funding shall adhere to requirements set forth in 2 CFR §200, 2 CFR §1800, 2 CFR §170, 2 CFR §175, 2 CFR §182, and 2 CFR §183.

F.4 Award Reporting Requirements

The performance and financial reporting requirements for awards made through this NOFO will comply with the reporting requirements in 2 CFR §§200.328 - 200.330, Performance and Financial Monitoring and Reporting, and be consistent with any applicable NASA and federal regulations. Any additional requirements are specified in the program element appendices.

Research Terms and Conditions

Awards from this funding announcement that are issued under 2 CFR §1800 are subject to Federal Research Terms and Conditions (RTC). In addition to the RTC and NASA-specific guidance, three companion resources can also be found on the RTC website: Appendix A—Prior Approval Matrix, Appendix B—Subaward Requirements Matrix, and Appendix C—National Policy Requirements Matrix.

Federal Financial Reporting

Recipients of NASA funding must submit quarterly financial reports. Financial reports must be submitted via the Payment Management System (PMS):

- Quarterly Federal Financial Reports (FFR) are due no later than 30 days past the reporting period end date.
- Final Financial Status Reports/Final Federal Financial Report (FSR/FFR) are due no later than 120 days after the end of the award’s period of performance.

Performance Reporting

NASA annually generates a body of evidence (i.e., milestone accomplishments, performance and participation data, evaluation outcomes, and/or other metrics) that assesses STEM engagement investments. NASA OSTEM currently utilizes the NASA STEM Gateway registration/application and data management system for analyzing performance data. PIs are required to respond to data calls as requested by NASA OSTEM and utilize this Agency-
approved data management system for performance data reporting. Additional communications and guidance regarding data calls and the NASA STEM Gateway will be sent to award recipients from the NASA OSTEM and Activity Management team. The PI shall ensure it has the appropriate staff and resources to facilitate data collection activities and complete all tasks required for reporting. In addition, PIs are responsible for timely submitting the following:

- **Annual Performance Report** – used to describe a grant/cooperative agreement’s scientific progress, identify significant changes, report on personnel, and describe plans for the subsequent reporting period. Due: 60 days prior to the anniversary date of the award.
- **Final Performance Report**—used as part of the grant closeout process to submit project outcomes in addition to the information submitted on the Annual Performance Report. Due: within 120 days after the end of the award’s period of performance.

**Recipient Integrity and Performance Matters**

Awards under this solicitation that are $500,000 or more may be subject to the post-award reporting requirements reflected in 2 CFR §200 Appendix XII.

**FFATA Reporting Requirements**

Per 2 CFR §170, Reporting Subaward and Executive Compensation Information, award recipients that issue first-tier subawards above $30,000 shall report those subawards in the Federal Award Accountability and Transparency Act (FFATA) Subaward Reporting System (FSRS). 2 CFR §170 provides detailed guidance as to what information needs to be reported in these systems and the deadlines for submitting this information. Recipient information that is reported to FSRS is ultimately transferred to USAspending.gov for public display.

**Suspension and Debarment Disclosure**

This reporting requirement pertains to disclosing information related to government-wide suspension and debarment requirements. Before a Recipient enters into a grant award with NASA, the Recipient must notify NASA if it knows if it or any of its principals under the award fall under one or more of the four criteria listed at 2 CFR §180.335:

i. Are presently excluded or disqualified;

ii. Have been convicted within the preceding three years of any of the offenses listed in 2 C.F.R. § 180.800(a) or had a civil judgment rendered against it or any of the recipient’s principals for one of those offenses within that time period;

iii. Are presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state or local) with commission of any of the offenses listed in 2 C.F.R. § 180.800(a); or
iv. Have had one or more public transactions (federal, state, or local) terminated within the preceding three years for cause or default.

At any time after accepting the award, if the Recipient learns that it or any of its principals falls under one or more of the criteria listed at 2 CFR §180.335, the Recipient must provide immediate written notice to NASA in accordance with 2 CFR §180.350.

**Additional Reporting Requirements**

Recipients must conform to all reporting requirements outlined in the Required Publications and Reports section of the GCAM, currently Appendix F.

**F.5 Additional Terms and Conditions**

**Personal Identity Verification (PIV) of Grant/Cooperative Agreement Personnel**

Personnel who plan to work onsite at a NASA Center or JPL shall comply with the NASA Proposer’s Guidebook, Appendix F and the GCAM, Appendix D. These sections provide information about Recipients requiring access to a NASA Center, facility, or computer system, or to NASA technical information, which requires “Personal Identity Verification of Recipient Personnel.”

**Environmental Statement**

Awards of proposals related to this NOFO must comply with the National Environmental Policy Act (NEPA); thus, proposers are encouraged to plan and budget for any anticipated environmental impacts. While most research awards will not trigger action specific NEPA review, some activities (including international actions) will.

The majority of grant-related activities are categorically excluded as research and development (R&D) projects that do not pose any adverse environmental impact. A blanket NASA Grants Record of Environmental Consideration (REC) provides NEPA coverage for these anticipated activities. The NSPIRES award application cover page includes questions to determine whether a specific proposal falls within the Grants REC and must be completed as part of the proposal submission process. Activities outside of the bounding conditions of the Grants REC will require additional NEPA analysis. Examples of actions that will likely require NEPA analysis include but are not limited to suborbital-class flights not conducted by a NASA Program Office, activities involving ground-breaking construction/fieldwork, and certain payload activities such as the use of dropsondes.

Questions concerning environmental compliance may be addressed to the NASA NEPA Manager via the NASA program official listed in this NOFO.

**Access to Research**
As outlined in Appendix D.34 of the *NASA Proposer’s Guidebook*, awards issued under this NOFO shall comply with the provision set forth in the *NASA Plan for Increasing Access to the Results of Scientific Research* including the responsibility for:

- Submitting (as approved) peer-reviewed manuscripts and metadata to a NASA-designated repository: and
- Reporting publications with the annual and final progress reports

**Limited Release of Proposers’ Confidential Business Information**

(a) For proposal evaluation and other administrative processing, NASA may find it necessary to release information submitted by the proposer to individuals not employed by NASA. Business information that would ordinarily be entitled to confidential treatment may be included in the information released to these individuals. Accordingly, by submission of this proposal, the proposer hereby consents to a limited release of its confidential business information (CBI).

(b) Except where otherwise provided by law, NASA will permit the limited release of CBI only pursuant to non-disclosure agreements signed by NASA’s support contractor or subcontractor, and their individual employees who may require access to the CBI to perform the applicable contract or subcontract.

**G. POINTS OF CONTACT FOR FURTHER INFORMATION**

General questions and comments about this NOFO may be directed to:

NASAEONS2024@nasaprs.com

Note: Proposals shall not be submitted to the above address. Instead, proposals shall be submitted electronically as described in Section D of this NOFO.

Specific questions about a given activity in this NOFO shall be directed to the Activity Manager(s) listed in the *Summary of Key Information* subsection that concludes each activity description.

Instructions for using NSPIRES are available on the NSPIRES Online Help page. If additional help is needed, the NSPIRES Help Desk can be contacted at (202) 479-9376 or by email at nspires-help@nasaprs.com. This help center is staffed Monday through Friday, 8:00 a.m. – 6:00 p.m. Eastern Time, excluding Federal Government holidays.

**H. OTHER INFORMATION**

**H.1 Announcement of Updates/Amendments to Solicitation**
Because this NOFO is released in advance of many of the deadlines listed in Table 2, additional major programmatic information for certain elements may develop before proposal due dates. If so, such information will be added as a formal amendment to this NOFO and posted at the EONS-2024 landing page. Prospective proposers shall regularly check this NOFO’s homepage for updates concerning the activity(s) of interest.

Any published clarifications or questions and answers will be posted on the relevant activity’s NSPIRES page (select “Open” under the “Solicitations” heading, then “NNH23ZAO001N,” then “List of Activities,” then choose the relevant activity). FAQs may be updated until 10 business days prior the proposal due date.

H.2 Access to NASA Facilities

All recipients shall work with NASA project/program staff to ensure proper credentialing for any individuals who need access to NASA facilities and/or systems. Such individuals include U.S. citizens, lawful permanent residents (“green card” holders), and foreign nationals (those who are neither U.S. citizens nor permanent residents)
APPENDIX 1: PIV Card Issuance Procedures

in Accordance with FAR Clause 52.204-9,

Personal Identity Verification of Contractor Personnel (Jan. 2011)

Figure 1. Review Process

The enrollment and processing of NASA identity data and the issuance of credentials to those identities shall be completed in the Identity Management and Account Exchange (IdMAX) system following the requirements found in NPR 1600.4. Figure 1 depicts the processes described in steps 2 through 5.
Step 1

The grantee or recipient submits a formal letter that provides a list of the names of individuals (applicants) who require access to a NASA-controlled facility or access to a NASA information technology (IT) system to the cognizant NASA Technical Officer (TO). In the case of a foreign national applicant, approval through the NASA Identify Management System (IdMAX) shall be obtained for the visit or assignment before any processing for a PIV or alternate agency credential can take place. Further, if the foreign national is not under a grant or cooperative agreement for which a technical officer has been officially designated, the foreign national will provide the information directly to the visit/assignment host, and the host sponsor will fulfill the duties of the technical officer mentioned herein.

In each case, the letter shall include the subject grant or cooperative agreement number, the NASA Center organization code, the applicant’s full name (first, middle and last), countries of citizenship, email address, and phone number. If the applicant has a current satisfactorily completed Tier 1 or an equivalent or higher degree of background investigation, the letter shall indicate the type of investigation, the agency completing the investigation, and date the investigation was completed. Also, the letter shall specify the access requirements and the risk/sensitivity level associated with the position in which each applicant will be working (NPR 1600.3, §2.3 is germane). Further, the letter shall also acknowledge that applicants may be denied access to NASA facilities, information, and/or information systems based on an unsatisfactory background investigation/adjudication.

After reviewing the letter for completeness and concurring with the risk/sensitivity levels, the technical officer/host shall forward the letter to the Center Office of Protective Services (OPS).

Step 2

Upon acceptance of the letter/background information, the Center OPS shall create a remote identity invitation in IdMAX. The applicant shall utilize the invitation tool link and password in their email to review, correct, and submit additional personal data securely.

Upon receipt of the completed remote invite, the Center OPS shall ensure review of the OPM databases (e.g., DCII, PIPS, et al.) and validation of the applicant’s investigation status.

Requirements for a Tier 1 or other investigation shall be initiated only if necessary. Applicants who do not currently possess the required level of background investigation shall be directed to the e-QIP web site to complete the necessary background investigation forms online. The Center OPS shall provide to the technical officer/host information and instructions on how to access the e-QIP for each grantee, recipient or foreign national employee requiring access.

Upon completion of the e-QIP, the Center OPS will advise the applicant that in order to complete the investigation process, he or she shall appear in-person before the authorized registrar and submit two forms of identity source documents in original form. The identity source documents shall come from the list of NASA-approved identity source documents,
one of which shall be a Federal or State issued picture identification. The registrar will electronically scan the submitted documents; any document that appears invalid will be rejected by the registrar.

Fingerprints and a photograph will be taken at this time. The applicant shall appear no later than the entry on duty date. The information submitted by the applicant will be used to create or update the applicant identity record in IdMAX.

**Step 3**

Upon the applicant’s completion of the investigation forms, the Center OPS reviews the information, and resolves discrepancies with the applicant as necessary. When the applicant has appeared in person and completed fingerprints, the package is electronically submitted to initiate the background investigation. The Center OPS includes a request for feedback on the National Criminal History Check (NCHC) portion of the background investigation at the time the request is submitted.

**Step 4**

Prior to authorizing physical access of a grantee or recipient to a federally controlled facility or access to a Federal information system, the Center OPS will ensure that required database checks have been performed. If this process yields negative information, the Center OPS will immediately notify the Center Chief of Security (CCS) and the technical officer/host.

**Step 5**

Upon receipt of the completed NCHC, the Center OPS will update IdMAX and indicate the result of the suitability determination. If an unsatisfactory suitability determination is rendered, the technical officer will advise the grantee or recipient that the applicant is being denied physical access to all federally controlled facilities and Federal information systems.

Based on favorable results of the NCHC, National Crime Information Center (NCIC) Interstate Identification Index (III) check, and/or other required checks, the Center OPS will authorize the issuance of the appropriate credential in IdMAX. For foreign nationals the International Visit Coordinator (IVC), in consultation with other organizations, based on information provided in the access control plan, will determine what physical access the applicant should be granted once the appropriate credential is issued.

**Step 6**

Using the information provided by the applicant during his or her in-person appearance, the credential will be created and activated following necessary procedures for that credential.

**Step 7**
The applicant proceeds to the credential issuance facility to begin processing for receipt of his/her credential.

The applicant provides to the credential issuing operator the same identity source documents submitted for registration. The credential issuing operator will verify that the facial image, and optionally referenced fingerprint, matches the enrollment data used to produce the card. Upon verification of identity, the operator will locate the employee’s record and modify the record to indicate the credential has been issued. If required, the applicant will select a PIN for use with his or her new credential.

**Note:** A non-PIV government identification badge, including the NASA Photo Identification Badge, SHALL NOT BE USED for the original issuance of a PIV-vetted credential

**ALTERNATIVE FOR APPLICANTS WHO DO NOT HAVE A COMPLETED AND ADJUDICATED NCHC AT THE TIME OF ENTRANCE ON DUTY (EOD)**

Steps 1 through 4 shall be accomplished for all applicants in accordance with the process described above. If the applicant is unable to appear in person until the time of entry on duty, or does not, for any other reason, have a completed and adjudicated NCHC portion of the background investigation at the time of entrance on duty, the following interim procedures shall apply for US citizens and legal permanent residents. These procedures are not applicable to foreign nationals who must have a completed fingerprint check before EOD.

If the documents required to submit the background investigation have not been completed prior to EOD, the applicant will be instructed to complete all remaining requirements for submission of the investigation request. This includes presentation of identity source documents and completion of fingerprints, if not already accomplished. If the applicant fails to complete these activities as prescribed in NPR 1600.4 (Chapters 3 & 4), it may be considered as failure to meet the conditions required for access to a NASA-controlled facility or access to a NASA IT system, and result in denial of such access.

Based on favorable results of the NCIC III, the applicant shall be issued an appropriate alternate agency credential for a period not-to-exceed six months. If at the end of the six-month period the NCHC results have not been returned, the agency will at that time make a determination as to whether an additional extension will be granted for the temporary alternate agency credential.

Upon return of the completed background investigation, the process will continue from Step 5.
APPENDIX 2: Sample Proposal Format
### Cover Page for Proposal
Submitted to the National Aeronautics and Space Administration

**NASA Procedure for Handling Proposals**

This proposal shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this proposal shall also be strictly complied with. Disclosure of this proposal for any reason outside the Government evaluation purposes shall be made only to the extent authorized by the Government.

### SECTION I - Proposal Information

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For Consideration By NASA Organization (the soliciting organization, or the organization to which an unsolicited proposal is submitted)

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<table>
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<tr>
<th>Organization DBA Name</th>
<th>Division Number</th>
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<table>
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<tr>
<th>Street Address (1)</th>
<th>Street Address (2)</th>
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</thead>
<tbody>
<tr>
<td>City</td>
<td>State / Province</td>
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</table>

### SECTION IV - Proposal Point of Contact Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Email Address</th>
<th>Phone Number</th>
</tr>
</thead>
</table>

### SECTION V - Certification and Authorization

Certification of Compliance with Applicable Executive Orders and U.S. Code

By submitting the proposal identified in the Cover Sheet/Proposal Summary in response to the Research Announcement, the Authorizing Officer of the proposing organization for the individual proposal if there is no proposing organization as identified below:

- certifies that the statements made in this proposal are true and complete to the best of their knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal;
- certifies compliance with all prohibitions, rules, and stipulations set forth in the two certifications and one assurance contained in the NASA Integrity, ii) the Assurance of Compliance with the NASA Regulations Regarding Non-Discrimination in Federally Assisted Programs, and iii) Certifications, Disclosures, and Assurances Regarding Lobbying and Disclosure and iv) the need to provide the required information contained in this proposal and its supporting documents, or in records required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1011);

Authorized Organizational Representative (AOR) Name | AOR Email Address | Phone Number

AOR Signature (Must have AOR's original signature. Do not sign "For AOR") | Date

---

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# SECTION VIII - Other Project Information

<table>
<thead>
<tr>
<th>Environmental Impact</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does this project have an actual or potential impact on the environment?</td>
<td></td>
</tr>
<tr>
<td>Has an exemption been authorized or an environmental assessment (EA) or an environmental impact statement (EIS) been performed?</td>
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**Environmental Impact Explanation:**

**Exemption/EA/EIS Explanation:**

---

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### SECTION X - Budget

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<thead>
<tr>
<th>Budget Cost Category</th>
<th>Cumulative Budget</th>
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<tbody>
<tr>
<td></td>
<td>Funds Requested ($)</td>
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<td>A. Direct Labor - Key Personnel</td>
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<tr>
<td>B. Direct Labor - Other Personnel</td>
<td></td>
</tr>
<tr>
<td>C. Total Number Other Personnel</td>
<td></td>
</tr>
<tr>
<td>D. Total Direct Labor Costs (A+B+C)</td>
<td></td>
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<tr>
<td>E. Direct Costs - Equipment</td>
<td></td>
</tr>
<tr>
<td>F. Direct Costs - Travel</td>
<td></td>
</tr>
<tr>
<td>G. Direct Costs - Travel - Domestic Travel</td>
<td></td>
</tr>
<tr>
<td>H. Direct Costs - Travel - Foreign Travel</td>
<td></td>
</tr>
<tr>
<td>I. Direct Costs - Participant/Trainee Support Costs</td>
<td></td>
</tr>
<tr>
<td>J. Tuition/Fees/Health Insurance</td>
<td></td>
</tr>
<tr>
<td>K. Stipends</td>
<td></td>
</tr>
<tr>
<td>L. Travel</td>
<td></td>
</tr>
<tr>
<td>M. Subsistence</td>
<td></td>
</tr>
<tr>
<td>N. Other</td>
<td></td>
</tr>
<tr>
<td>O. Number of Participants/Trainees</td>
<td></td>
</tr>
<tr>
<td>P. Other Direct Costs</td>
<td></td>
</tr>
<tr>
<td>Q. Other Materials and Supplies</td>
<td></td>
</tr>
<tr>
<td>R. Publication Costs</td>
<td></td>
</tr>
<tr>
<td>S. Consultant Services</td>
<td></td>
</tr>
<tr>
<td>T. Total Direct Costs (A+B+C+D+E+F+G+H+I+J)</td>
<td></td>
</tr>
<tr>
<td>U. Indirect Costs</td>
<td></td>
</tr>
<tr>
<td>V. Total Direct and Indirect Costs (G+H+I+J+K)</td>
<td></td>
</tr>
<tr>
<td>W. Equipment or Facility Rental/User Fees</td>
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<tr>
<td>X. Alterations and Renovations</td>
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<tr>
<td>Y. Other</td>
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</tr>
<tr>
<td>Z. Total Direct Costs (A+B+C+D+E+F+G+H+I+J+K+L)</td>
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**Total Cumulative Budget**: 0.00
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<tbody>
<tr>
<td>1. Materials and Supplies</td>
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<td>2. Publication Costs</td>
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<td>3. Consultant Services</td>
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</tr>
<tr>
<td>4. ADP/Computer Services</td>
<td>0.00</td>
</tr>
<tr>
<td>5. Subawardee/Consortium/Contractual Costs</td>
<td>0.00</td>
</tr>
<tr>
<td>6. Equipment or Facility Rental/Use Fees</td>
<td>0.00</td>
</tr>
<tr>
<td>7. Alterations and Renovations</td>
<td>0.00</td>
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<tr>
<td><strong>Total Other Direct Costs</strong></td>
<td>0.00</td>
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<table>
<thead>
<tr>
<th>Item Description</th>
<th>Funds Requested ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Direct Costs (A+B+C+D+E+F)</strong></td>
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<th>Item Description</th>
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<td>Indirect Cost Rate (%)</td>
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<tr>
<td>Indirect Cost Basis ($)</td>
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<td><strong>Total Indirect Costs</strong></td>
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<thead>
<tr>
<th>Item Description</th>
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<td><strong>Total Direct and Indirect Costs (G+H)</strong></td>
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<table>
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<td>J. Fee</td>
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<td><strong>Total Cost</strong></td>
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<tr>
<th>Item Description</th>
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<td><strong>Total Cost with Fee (I+J)</strong></td>
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<tr>
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<td>Equipment Item Description</td>
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<tr>
<td>---------</td>
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**D. Direct Costs - Travel**

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<thead>
<tr>
<th>1. Domestic Travel (Including Canada, Mexico, and U.S. Possessions)</th>
<th>Funds Requested ($)</th>
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<tr>
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<table>
<thead>
<tr>
<th>2. Foreign Travel</th>
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**Total Travel Costs**

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**E. Direct Costs - Participant/Trainee Support Costs**

<table>
<thead>
<tr>
<th>1. Tuition/Fees/Health Insurance</th>
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<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>2. Stipends</th>
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<table>
<thead>
<tr>
<th>3. Travel</th>
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<table>
<thead>
<tr>
<th>4. Subsistence</th>
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<tbody>
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**Number of Participants/Trainees: Total Participant/Trainee Support Costs**

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<thead>
<tr>
<th>Number of Participants/Trainees</th>
<th>Total Participant/Trainee Support Costs</th>
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### SECTION X: Budget

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<th>End Date</th>
<th>Budget Type</th>
<th>Budget Period</th>
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#### A. Direct Labor - Key Personnel

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<th>Cal. Months</th>
<th>Acad. Months</th>
<th>Summ. Months</th>
<th>Requested Salary ($)</th>
<th>Fringe Benefits ($)</th>
<th>Funds Requested ($)</th>
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</thead>
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<td>0.00</td>
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Total Key Personnel Costs: 0.00

#### B. Direct Labor - Other Personnel

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<th>Cal. Months</th>
<th>Acad. Months</th>
<th>Summ. Months</th>
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<th>Fringe Benefits ($)</th>
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Total Other Personnel Costs: 0.00

Total Direct Labor Costs (Salary, Wages, Fringe Benefits) (A-B): 0.00
### SECTION X - Budget

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<td>3. Consultant Services</td>
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<td>6. Equipment or Facility Rental/Use Fees</td>
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<td>7. Alterations and Renovations</td>
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<table>
<thead>
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<th>G. Total Direct Costs</th>
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<table>
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<tr>
<th>H. Indirect Costs</th>
<th>Indirect Cost Rate (%)</th>
<th>Indirect Cost Base ($)</th>
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<td>Cognizant Federal Agency</td>
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<th>I. Direct and Indirect Costs</th>
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<table>
<thead>
<tr>
<th>J. Fee</th>
<th>Funds Requested ($)</th>
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<tr>
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<tr>
<th>K. Total Cost</th>
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<tbody>
<tr>
<td>Total Cost with Fee (I+J)</td>
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APPENDIX 3: EONS Policy on Late Proposals

NASA does not pre-approve the submission of late proposals. If a late proposal is submitted, it is NASA’s sole decision whether to accept it. If NSPIRES is available for submissions, the site automatically captures the time the system received the proposal. Proposals submitted later than the stated time deadline on the due date of proposals are considered “LATE.” The NSPIRES system may prevent the submission of proposals after the deadline.

NSPIRES generates an automatic acknowledgement when proposals are submitted. The acknowledgement for on time and late proposals is the same and will resemble the following:

Sample Acknowledgement of Submission

------------------------------------------------------------------Start Email------------------------------------------------------------------

From: nspires@nasaprs.com
Sent: <Name of the day of the Week>, Name of Month, Date, Year <Message Time Hour:Minute>
To: <email address of submitter> Cc: <email address of submitter>
Subject: NASA NSPIRES - Proposal has been submitted to NASA

The following proposal has been submitted for consideration of an award by NASA:
Proposal Number: xx-201?[EONS Appendix]-000X
Proposal Title: <Name as submitted by the AOR>
Submitting Organization: <Name that shows up in NSPIRES> Authorized Organization Representative: First and then Last NAME Principal Investigator: First then Last NAME
Date submitted: Numeric Month/ Numeric Day /Numeric Year Hour:Minute:Second To log in to NSPIRES, click on this link: http://nspires.nasaprs.com/
If the above URL is not an active link, please cut and paste the entire URL into your web browser.

If you have questions or problems regarding this, or any other NSPIRES business, please contact the NSPIRES Help Desk:

E-mail: NSPIRES-HELP@nasaprs.com
Phone Support: (202) 479-9376
Hours: Monday through Friday, 8:00 AM to 6:00 PM EST/EDT

This message is being sent from an outbound-only mail server. Please do not reply to this message.
------------------------------------------------------------------End Email------------------------------------------------------------------

-----

If a proposer does not receive a notice similar to the sample above after proposal submission, first check spam filters and junk boxes. If unable to locate the email acknowledgement, then
proposers shall contact the NSPIRES Help Desk or log in directly to NSPIRES to check a submission status.

Only the Selection Official or a designee may accept a late proposal for assignment to external review. If, for some known or unknown reason, an entity's proposal was not submitted by the proposal due date, the proposer shall send a detailed explanatory note via email to NASA’s Support Contractor for this NOFO:

NASA Research & Education Support Services
2345 Crystal Drive, Suite 500
Arlington, VA 22202
202-479-9030
202-479-0511 (fax)
Email: help@nasaprs.com

Decisions about each proposal submitted—either on time or late—will be communicated electronically (not by phone or personalized email) to each PI and AOR via NSPIRES. While not the norm, it is possible a late proposer may not know whether its proposal was accepted for review until all proposers are notified approximately 3-6 months from the NOFO's proposal due date.

When decisions resulting from the evaluation process for proposals are made, a computer-generated email is sent requesting the PI/AOR to log in. It will resemble the following:

**Sample Decision Notice Email**

```
---
From: nspires@nasaprs.com [mailto:nspires@nasaprs.com]
Sent: Name of Weekday, Month ??, 20?? H:Min PM/AM
To: NSPIRES-admin@nasaprs.com
Subject: NASA NSPIRES - Decision has been made.

A decision has been made by NASA for:
Solicitation Number: NNH???????? Solicitation Title: [EONS Appendix Reference]
Acronym: [EONS Appendix Reference] Proposal Due Date: 0?/??/20??
You may access information regarding this decision by logging in to NSPIRES:
http://nspires.nasaprs.com/

Decision information can be accessed in two ways:

After logging in, the Principal Investigator selects the "Proposals" link, the "Submitted Proposals/NOIs" link, and then clicks on the proposal submitted to the solicitation identified above. The document(s) provided by NASA will be displayed under the heading "PI Information Package" located at the bottom of the "View Proposal" page.

After logging in, the Authorized Organization Representative selects "Organization Mgmt" link and, from within the submitting organization, selects the "Organization Proposals" link, the "Submitted Proposals" link and then clicks on the proposal submitted to
```

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the solicitation identified above. The document(s) provided by NASA will be displayed under the heading "PI Information Package" located at the bottom of the "View Proposal" page. If the above URL is not an active link, please cut and paste the entire URL into your web browser.

If you have questions or problems regarding this, or any other NSPIRES business, please contact the NSPIRES Help Desk:
E-mail: nspires-help@nasaprs.com Phone Support: (202) 479-9376
Hours: Monday through Friday, 8:00 AM to 6:00 PM EST/EDT

This message is being sent from an outbound-only mail server. Please do not reply to this message.

Proposers should be aware that neither NASA personnel nor the employees of the support contractor that receive and handle proposals for NASA have the authority to receive or accept a late proposal and, therefore, such proposers shall not request such permission. It is NASA’s decision whether a late proposal will be accepted. Late proposals may be considered for review and possible selection only if they appear to offer a distinct benefit to NASA. In this regard, it is important to note that since almost every NOFO receives many more high-quality proposals than can be supported with the available funds, a NASA determination that a late proposal is of distinct benefit over its competitors is likely to be rare. Also, proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared to proposals previously received.

Also see 48 FAR 1852.235-72 Instructions for Responding to NASA Research Announcements (July 2016).

Allowances for Technical Problems

In every NASA solicitation, proposers are advised that it is their responsibility to begin the proposal submission process early enough to account for any technical problems with computer systems and with the internet that may arise. If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the Government office designated for receipt of proposals by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation closing date, the time specified for receipt of proposals will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume. For example, an unanticipated event includes an act of nature (e.g. hurricane or blizzard affecting NASA or a proposer's region) or an act of man (e.g. NSPIRES is offline). The proposer’s failure to complete its proposal prior to the deadline, for whatever reason, does not constitute a technical problem. Also, the proposer’s failure to meet a known delivery deadline does not constitute a technical problem. Other circumstances that may constitute a technical problem will be reviewed on a case-by-case basis. The NASA Selection Official may declare a proposal “on time” if NASA would have received the
proposal before the proposal deadline in the absence of the technical problem; if the technical problem could not have been reasonably anticipated and was beyond the proposer’s reasonable control; and if the proposer does not gain an unfair competitive advantage as a result of these circumstances.

**NOTE: Any Changes or Revisions to a Proposal After the Due Date Make the Proposal Late.** It is not possible for a proposal to be updated, particularly the substance of a proposal, without NASA considering such revisions/updates as a late proposal. If a proposer wants to provide new material, revise, clarify or change or expand a submitted proposal, such a substantial update is akin to submitting a new proposal after the proposal due date. Changes or updates to basic descriptive data (e.g., a PI has retired or the submitting organization has a new President) are not considered changes to the proposal’s substance under the NOFO; however, such changes cannot be reflected in the proposal submission, nor can they be considered in the review of the proposal. If, during the time between the proposal due date and the award decision announcement, there have been changes to the AOR and PI, the proposer shall immediately notify the above-mentioned NSPIRES Support Contractor for this NOFO to confirm the proposing organization will still be able to access NSPIRES.
APPENDIX 4: Glossary of Acronyms and Definitions

<table>
<thead>
<tr>
<th>ACRONYMS</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AANAPISI</td>
<td>Asian American and Native American Pacific Islanders Serving Institution</td>
</tr>
<tr>
<td>ANNH</td>
<td>Alaska Native-Serving Institution or Native Hawaiian-Serving Institution</td>
</tr>
<tr>
<td>AM</td>
<td>Activity Manager</td>
</tr>
<tr>
<td>AOR</td>
<td>Authorized Organization Representative</td>
</tr>
<tr>
<td>APG</td>
<td>Annual Performance Goal</td>
</tr>
<tr>
<td>API</td>
<td>Annual Performance Indicator</td>
</tr>
<tr>
<td>ARC</td>
<td>Ames Research Center, Moffett Field, CA</td>
</tr>
<tr>
<td>AFRC</td>
<td>Armstrong Flight Research Center, Edwards, CA</td>
</tr>
<tr>
<td>ARMD</td>
<td>Aeronautics Research and Mission Directorate</td>
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<td>CCE</td>
<td>Climate Change Education</td>
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<td>CCR</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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</tr>
<tr>
<td>DMP</td>
<td>Data Management Plan</td>
</tr>
<tr>
<td>EIN</td>
<td>Employer Identification Number</td>
</tr>
<tr>
<td>EONS</td>
<td>Engagement Opportunities in NASA STEM</td>
</tr>
<tr>
<td>EPD</td>
<td>Educator Professional Development</td>
</tr>
<tr>
<td>EPSCOR</td>
<td>Established Program to Stimulate Competitive Research</td>
</tr>
<tr>
<td>ESDMD</td>
<td>Exploration Systems Development Mission Directorate</td>
</tr>
<tr>
<td>F&amp;A</td>
<td>Facilities &amp; Administration</td>
</tr>
<tr>
<td>FAQ</td>
<td>Frequently Asked Questions</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
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<tr>
<td>FFRDC</td>
<td>Federally Funded Research and Development Center</td>
</tr>
<tr>
<td>FY</td>
<td>Fiscal Year (Federal) (October 1 – September 30)</td>
</tr>
<tr>
<td>GCAM</td>
<td>NASA Grant and Cooperative Agreement Manual</td>
</tr>
<tr>
<td>GO</td>
<td>Grant Officer</td>
</tr>
<tr>
<td>GRC</td>
<td>Glenn Research Center, Cleveland, OH</td>
</tr>
<tr>
<td>GSFC</td>
<td>Goddard Space Flight Center, Greenbelt, MD</td>
</tr>
<tr>
<td>HBCU</td>
<td>Historically Black Colleges and Universities</td>
</tr>
<tr>
<td>HSI</td>
<td>Hispanic-Serving Institution</td>
</tr>
<tr>
<td>IEI</td>
<td>Informal Education Institution</td>
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<tr>
<td>JPL</td>
<td>NASA Jet Propulsion Laboratory, Pasadena, CA</td>
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<tr>
<td>JSC</td>
<td>Johnson Space Center, Houston, TX</td>
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<tr>
<td>KSC</td>
<td>Kennedy Space Center, Cape Canaveral, FL</td>
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<tr>
<td>LaRC</td>
<td>Langley Research Center, Hampton, VA</td>
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<tr>
<td>MAA</td>
<td>MUREP Aerospace Academy</td>
</tr>
<tr>
<td>M-High Volume</td>
<td>MUREP Aerospace High Volume Manufacturing Challenge</td>
</tr>
<tr>
<td>MAIANSE</td>
<td>MUREP for American Indian and Alaskan Native STEM Engagement</td>
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<tr>
<td>MAIANSE CONNECT</td>
<td>MAIANSE CONNECTing Indigenous Culture and Science Through Co-design of STEM Ecosystems</td>
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<tr>
<td>MCA</td>
<td>MUREP Curriculum Awards</td>
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<tr>
<td>M-INCLUDES</td>
<td>MUREP INCLUDES</td>
</tr>
<tr>
<td>MITTIC</td>
<td>MUREP Innovation and Technology Transfer Idea Competition</td>
</tr>
<tr>
<td>MIRO</td>
<td>MUREP Institutional Research Opportunity</td>
</tr>
<tr>
<td>M-STAR</td>
<td>MUREP Space Technology Artemis Research</td>
</tr>
<tr>
<td>M-STTR</td>
<td>MUREP Small Business Technology Transfer Research</td>
</tr>
<tr>
<td>MSIs</td>
<td>Minority Serving Institutions (refers collectively to HBCUs, HSIs, TCUs, and other MSIs of higher education)</td>
</tr>
</tbody>
</table>
SOMD  Space Operations Mission Directorate
SRO  Sponsored Research Office
SSC  Stennis Space Center, Hancock County, MS
STEM  Science, Technology, Engineering, and Mathematics
STMD  Space Technology Mission Directorate
Space Grant  National Space Grant College and Fellowship Program
TCU  Tribal Colleges and Universities
TM  Technical Monitor
TO  Technical Officer

**DEFINITIONS**

**American Indian or Alaskan Native:** A person having origins in any of the original peoples of North and South America (including Central America) who maintains cultural identification through tribal affiliation or community attachment. (Source: IPEDS)

**Asian:** A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam. (Source: IPEDS)

**Black or African American:** A person having origins in any of the black racial groups of Africa. (Source: IPEDS)

**Co-Investigator (Co-I):** A Co-I is a member of the proposal’s investigation team who may hold either a full-time or limited-term appointment and who is a critical “partner” for the conduct of the investigation through the contribution of unique expertise and/or capabilities. A Co-I shall have a well-defined and generally sustained and continuing role in the proposed investigation, serve under the direction of the PI, and may or may not receive funding through the award. Only an individual who has formally agreed to the role may participate as a Co-I even if his/her participation is at no cost (i.e., contributed) to the proposal.

**Collaborator:** A Collaborator is an individual who is less critical to the proposal than a Co-I but who is committed to provide a focused but unfunded contribution for a specific task. If funding support is requested in the proposal, such a person shall be identified in one of the other categories above.

**Cooperative Agreement:** An award of federal assistance used to carry out a public purpose of support or stimulation authorized by a law. A cooperative agreement is similar to a grant with the exception that NASA and the award recipient are each expected to be substantially involved with one another for the performance of the project. Cooperative agreements are
managed pursuant to the policies set forth in 2 CFR §200, 2 CFR §1800, and the *NASA Grant and Cooperative Agreement Manual*.

**EPD:** Educator Professional Development uses NASA's missions, education resources, and unique facilities to provide high-quality STEM content and hands-on learning experiences to in-service, pre-service, and informal educators.

**Executive Orders:** Presidential Directives are considered a form of executive order issued by the President of the United States with the advice and consent of a major agency or department found within the Executive branch of the Government.

**Hispanic or Latino:** A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. (Source: IPEDS)

**Independent Evaluator:** The Independent Evaluator is a third party or a current employee of the awardee organization who is independent from the policy, operations, and management functions of the program element requiring evaluation. It is expected that the Independent Evaluator both works collaboratively with the Principal Investigator and retains independent objectivity in collecting and presenting evidence of effectiveness, impact on participants, proposed program outcomes, and progress toward achieving goals and objectives.

**IE:** Institutional Engagement increases the STEM capabilities at formal and informal educational institutions and organizations by incorporating content based on NASA's missions.

**Jurisdiction:** States or commonwealths eligible to submit proposals in response to this NOFO.

**NASA Mission Directorates:** There are four NASA Mission Directorates: Aeronautics Research (ARMD), Exploration Systems Development (ESDMD), Space Operations (SOMD), Space Technology (STMD), and Science (SMD).

**NASA's Unique Facilities:** There is an Office of STEM Engagement (OSTEM) at each of the following NASA facilities: Ames Research Center (ARC), Armstrong Flight Research Center (AFRC), Glenn Research Center (GRC), Goddard Space Flight Center (GFRC), Jet Propulsion Laboratory (“JPL Education Office”), Johnson Space Center (JSC), Kennedy Space Center (KSC), Langley Research Center (LaRC), Marshall Space Flight Center (MSFC), Stennis Space Center (SSC).

**Native Hawaiian or Other Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. (Source: IPEDS)

**NIF:** NASA Internships and Fellowships leverage NASA's unique missions and programs to enhance and increase the capability, diversity, and size of the Nation's future STEM workforce.
OMB: The Office of Management and Budget is the largest office within the Executive Office of the President of the United States. The main function of the OMB is to assist the President in preparing the budget and policy development and execution.

Partnership: A reciprocal and voluntary relationship between the project personnel and NASA, industry, or other partners, to cooperatively achieve the goals of the proposed research.

Principal Investigator (PI): The Principal Investigator is (are) the individual(s) a research organization designates as having an appropriate level of authority and responsibility for the proper conduct of the research, including the appropriate use of funds and administrative requirements such as the submission of scientific progress reports to the agency.

SE: STEM Engagement activities are designed to provide opportunities for participatory and experiential learning activities that connect learners to NASA-unique resources. The STEM Engagement line of business consists of Public Education Activities, Experiential Learning Opportunities and STEM Challenges

Targeted Disabled: A person having a physical or mental impairment that substantially limits one or more major life activities; who has a record of such impairment or who is regarded as having such impairment. (See the LEAD (Leadership for the Employment of Americans with Disabilities) pages at the U.S. Equal Employment Opportunity Commission.)

Technology Transferred for Commercialization: the development of dual use technologies that meet both NASA’s mission needs and other national objectives.

Underrepresented: Populations that are not present in the STEM professions relative to the size of the population at large. Refers to racial and ethnic populations as well as women and persons with disabilities.

Underrepresented Minority: Refers to persons from racial and ethnic groups whose enrollment in STEM education or participation in STEM professions is much smaller than that group's representation in the general population. African Americans, Hispanics/Latinos, and Native Americans and Pacific Islanders currently fit this definition.

Underserved: Often used interchangeably with “underrepresented,” particularly as it relates to the sciences and engineering. Specifically, it is used to promote access and opportunity to 23 persons of diverse backgrounds—racial, ethnic, gender, religious, age, sexual orientation, disabled, and other populations with limited access—to decent and affordable housing, gainful employment, and other services. In the STEM arena, “underserved” has typically referred to women and persons with disabilities.

White: A person having origins in any of the original peoples of Europe, the Middle East, or North Africa. (Source: IPEDS)
APPENDIX 5: Best Practices in Performance Assessment and Evaluation

NASA is enhancing the effectiveness of STEM engagement investments using performance assessment and evaluation-driven processes including the development and execution of a comprehensive performance assessment and evaluation strategy, Annual Performance Plan (APP) and a Learning Agenda. The Annual Performance Plan defines NASA Office of STEM Engagement (OSTEM) performance goals and success criteria in alignment with NASA’s 2022 Strategic Plan. The NASA STEM Engagement Learning Agenda puts forth Learning Questions with associated sub-questions, Learning Activities and assessment methodologies, and Learning Products that will inform the NASA Office of STEM Engagement’s understanding of the scope, methods, mechanisms, and impacts of its investments. The answers to these questions will enable the Office to prioritize and narrow the focus of STEM engagement investment areas by making evidence-based budgetary, programmatic, and operational decisions. Annually, a body of evidence (i.e., milestone accomplishments, performance and participation data, evaluation outcomes, and/or other metrics) was generated to assess progress of STEM engagement investments in achieving APP performance goals and success criteria and to assess outcomes.

Below are examples of federal and professional standards of evaluation practice and common guidelines for education research and development:

- The Office of Management and Budget (OMB) Memorandum M-21-27, “Evidence-Based Policymaking: Learning Agendas and Annual Evaluation Plans”
- Federal Strategy for STEM Education and Engagement Charting a Course for Success: America’s Strategy for STEM Education
- 2018 NASA Strategic Plan
- NASA Strategy for STEM Engagement
- Program Evaluation Standards developed by the Joint Committee on Standards Educational Evaluation

APPENDIX 6: Restrictions on The Use of The NASA Seal, Insignia, Logotype, Program Identifiers, or Flags (DEC 2014)

(a) In accordance with 14 CFR §1221, the NASA Seal, NASA Insignia, NASA Logotype, NASA Program Identifiers, and the NASA Flags are protected and shall be used exclusively to represent NASA, its programs, projects, functions, activities, or elements.

(b) The use of these devices by recipients shall be governed by the requirements and restrictions set forth at 14 CFR §§ 1221.109-113. Requests for the use of these devices by recipients shall be subject to the prior written approval of the NASA Grant Officer in conjunction with the NASA Headquarters, Office of Communications.

(c) The use of these devices by recipients for any purpose other than as authorized by NASA regulations shall be prohibited. Their misuse shall be subject to the penalties authorized by statute, as set forth in 14 CFR §1221.115 and shall be reported as provided in 14 CFR §1221.116.

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APPENDIX 7 – Examples of Costs Categories from 2 CFR 200 Subpart E

1. **Direct Labor (salaries, wages, and fringe benefits):** List number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.

2. **Other Direct Costs:**
   a. **Subcontracts:** Describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
   b. **Consultants:** Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay.
   c. **Equipment:** List separately. Explain the need for items costing more than $5,000 unless your institution has established a lower threshold for classifying such purchases as equipment. Describe the basis for the estimated cost. General-purpose equipment is not allowable as a direct cost unless specifically approved by the grant officer. Grant award constitutes approval for any equipment provided and requested in the original proposal. Requests by grant recipients for the acquisition of equipment shall be supported by written documentation setting forth the description, purpose, and acquisition value of the equipment.
   d. **Supplies:** For items below the threshold established for equipment, provide the general categories of needed supplies, the method of acquisition, and the estimated cost.
   e. **Travel:** Describe the purpose of the proposed travel in relation to the grant and provide the basis of the estimate, including information on destination and number of travelers where known.
   f. **Other:** Identify and support all other direct costs not covered by 2a through 2e. Provide an itemized list explaining the need for each item and the basis for the estimate.

3. **Facilities and Administrative (F&A) Costs:** Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the F&A expense pool and corresponding allocation base for each rate.

4. **Other Applicable Costs:** Provide description, detail, and necessity for each item.
5. **Subtotal-Estimated Costs**: Provide the sum of items 1 through 4.

6. **Less Proposed Cost Sharing (if any)**: Provide the amount proposed. If cost-sharing is based on specific cost items, identify each item and amount in an attachment.

7. **Carryover Funds (if any)**: Provide the dollar amount of any funds that are expected to be available for carryover from the prior budget period. Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget. Not applicable to 2nd-year and subsequent-year budgets submitted for the award of a multiple-year grant.

8. **Total Estimated Costs**: Provide the total after subtracting items 6 and 7 from item 5.
APPENDIX 8: NASA Mission Directorates and Center Alignment with Points of Contact

NASA’s Mission to drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth, draws support from four Mission Directorates, nine NASA Centers, and JPL, each with a specific responsibility and research requirements.

8.1 Aeronautics Research Mission Directorate (ARMD)

Aeronautics Research Mission Directorate (ARMD) conducts high-quality, cutting-edge research and flight tests that generate innovative concepts, tools, and technologies to enable revolutionary advances in our Nation’s future aircraft, as well as in the airspace in which they will fly.

NASA Aeronautics is partnering with industry and academia to accomplish the aviation community’s aggressive carbon reduction goals. Through collective work in three areas -- advanced vehicle technologies, efficient airline operations and sustainable aviation fuels – NASA is committed to supporting the U.S. climate goal of achieving net-zero greenhouse gas emissions from the aviation sector by 2050.

ARMD’s current major missions include:

- Sustainable Aviation
- High Speed Commercial Flight
- Advanced Air Mobility
- Future Airspace
- Transformative Tools

Additional information on the Aeronautics Research Mission Directorate (ARMD) can be found at: https://www.nasa.gov/aeroresearch and in ARMD’s Strategic Implementation plan that can be found at: https://www.nasa.gov/aeroresearch/strategy.

Areas of Interest - POC: Dave Berger, dave.e.berger@nasa.gov

Proposers are directed to the following:

- ARMD Programs: https://www.nasa.gov/aeroresearch/programs
- The ARMD current year version of the NASA Research Announcement (NRA) entitled, "Research Opportunities in Aeronautics (ROA)" is posted on the NSPIRES web site at http://nspires.nasaprs.com (Key word: Aeronautics). This solicitation provides a complete range of ARMD research interests.

8.2 Space Operations Mission Directorate (SOMD)

https://www.nasa.gov/directorates/space-operations-mission-directorate

POC: Marc Timm, marc.g.timm@nasa.gov
Commercial Space Capabilities (CSC)

The SOMD Commercial Space Division (CSD)’s Commercial Crew and Commercial Low Earth Orbit (LEO) Development Programs encompass Crew and Cargo Transportation to and from, and in-space Destinations and operations in, LEO. The purpose of this CSC focus area is to harness the capabilities of the U.S. research community to mature theoretical concepts that are of interest to U.S. commercial spaceflight companies into initial practice. The goal is that such companies can then apply and further evolve that initial practice to improve state-of-art of current capabilities, or to create new capabilities to benefit the growth of a robust near Earth orbit US economy. Such advances might also have eventual benefits to commercial operations on Moon or even Mars.

U.S. commercial spaceflight industry interests vary by company and change over time, so Researchers are encouraged to directly engage with industry to determine relevant interests. Before submitting proposals in this area, the Proposer is encouraged to contact the NASA CSC POCs to discuss the intended proposal. Some current high-level interests include:

- Low consumable environmental control and life support (ECLS), crew hygiene, and/or clothes washing. (Closed loop or nearly so. Includes waste product repurposing.)
- Small cargo return, Destination resupply systems, and related technologies
- In-Space Welding
- Materials and Processes Improvements for Chemical Propulsion State of Art
- Materials and Processes Improvements for Electric Propulsion State of Art
- Improvements to Space Solar Power State of Art (SoA)
- Other topics in this area that have demonstrable need and support from a U.S. company(ies)

8.3 Exploration Systems Development Mission Directorate (ESDMD)

https://www.nasa.gov/directorates/exploration-systems-development

POC: Matt Simon, matthew.a.simon@nasa.gov

The Exploration Systems Development Mission Directorate (ESDMD) provides the Agency with leadership and management of NASA space operations related to human exploration in and beyond low-Earth orbit. Through the Artemis missions, NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface than ever before. NASA is collaborating with commercial and international partners to establish the first long-term human-robotic presence on and around the Moon. Then, we will use what we learn on and at the Moon to take the next giant leap: sending the first astronauts to Mars.
The Exploration Systems Development Mission Directorate (ESDMD) defines and manages systems development for programs critical to the NASA’s Artemis program and planning for NASA’s Moon to Mars exploration approach in an integrated manner. ESDMD manages the human exploration system development for lunar orbital, lunar surface, and Mars exploration. ESDMD leads the human aspects of the Artemis activities as well as the integration of science into the human system elements. ESDMD is responsible for development of the lunar and Mars architectures. Programs in the mission directorate include Orion, Space Launch System, Exploration Ground Systems, Gateway, Human Landing System, and Extravehicular Activity (xEVA) and Human Surface Mobility. Additional information about the Exploration Systems Development Mission Directorate can be found at: https://www.nasa.gov/directorates/exploration-systems-development.

Engineering Research

- **Spacecraft**: Guidance, navigation, and control; thermal; electrical; structures; software; avionics; displays; high speed re-entry; modeling; power systems; interoperability/commonality; advanced spacecraft materials; crew/vehicle health monitoring; life support.
- **Propulsion**: Propulsion methods that will utilize materials found on the moon or Mars, “green” propellants, on-orbit propellant storage, motors, testing, fuels, manufacturing, soft landing, throttle-able propellants, high performance, and descent.
- **Robotic Systems for Lunar Precursor Missions**: Precision landing and hazard avoidance hardware and software; high-bandwidth communication; in-situ resource utilization (ISRU) and prospecting; navigation systems; robotics (specifically environmental scouting prior to human arrival, and to assist astronaut with surface exploration); environmental analysis, radiation protection; small payloads to accomplish science and research objectives, as well as for risk reduction for human-rated systems.
- **Data and Visualization Systems for Exploration**: Area focus on turning precursor mission data into meaningful engineering knowledge for system design and mission planning of lunar and Mars surfaces; visualization and data display; interactive data manipulation and sharing; modeling of lighting and thermal environments; simulation of environmental interactions for pressurized and unpressurized vehicles.
- **Research and technology development areas in ESDMD support exploration systems development including in-space vehicles, space communications, commercial space, and the International Space Station. Examples of research and technology development areas (and the associated lead NASA Center) with great potential include:**

  o **Processing and Operations**
    - Crew Health and Safety Including Medical Operations, Johnson Space Center (JSC)
- Non-invasive diagnostic aides that work in a communication delay setting (JSC)
- In-helmet Speech Audio Systems and Technologies (JSC)
- Vehicle Integration and Ground Processing, Kennedy Space Center (KSC)
- Mission Operations (JSC)
- Portable Life Support Systems (JSC)
- Pressure Garments and Gloves (JSC)
- Air Revitalization Technologies (ARC)
- In-Space Waste Processing Technologies (JSC)
- Cryogenic Fluids Management Systems (MSFC)

**Space Communications and Navigation**

- Coding, Modulation, and Compression, Goddard Spaceflight Center (GSFC)
- Precision Spacecraft & Lunar/Planetary Surface Navigation and Tracking (GSFC)
- Communication for Space-Based Range (GSFC)
- Antenna Technology, Glenn Research Center (GRC)
- Reconfigurable/Reprogrammable Communication Systems (GRC)
- Miniaturized Digital EVA Radio (JSC)
- Transformational Communications Technology (GRC)
- Long Range Optical Telecommunications, Jet Propulsion Laboratory (JPL)
- Long Range Space RF Telecommunications (JPL)
- Surface Networks and Orbit Access Links (GRC)
- Software for Space Communications Infrastructure Operations (JPL)
- TDRS transponders for launch vehicle applications that support space communication and launch services (GRC)

**Space Transportation**

- Optical Tracking and Image Analysis (KSC and GSFC)
- Space Transportation Propulsion System and Test Facility Requirements and Instrumentation (Stennis Space Center (SSC)
- Automated Collection and Transfer of Launch Range Surveillance/Intrusion Data (KSC)
- Technology tools to assess secondary payload capability with launch vehicles (KSC)
- Spacecraft Charging/Plasma Interactions (Environment definition & arcing mitigation), Marshall Space Flight Center (MSFC)

**Commercial Space Capabilities**

- The goal of this area is to support research, development, and commercial adoption of technologies of interest to the U.S. spaceflight industry to further their space-related capabilities. (KSC)
- These include capabilities for Moon, Mars, and Earth orbit. Such efforts are in pursuit of the goals of the National Space Policy and NASA’s strategic plans, to foster developments that will lead to education and job growth in science and engineering, and spur economic growth as capabilities for new space markets are created. (KSC)
- U.S. commercial spaceflight industry interests naturally vary by company. Proposers are encouraged to determine what those interests are by engagement with such companies in various ways, and such interests may also be reflected in the efforts of various NASA partnerships. (KSC)
- Proposals should discuss how the effort aligns with U.S. commercial spaceflight company interest(s) and identify potential alignments with NASA interests. (KSC)

8.4 Human Research Program

Space Operations Mission Directorate (SOMD)

https://www.nasa.gov/directorates/space-operations-mission-directorate

The Human Research Program (HRP) is focused on investigating and mitigating the highest risks to human health and performance to enable safe, reliable, and productive human space exploration. The HRP budget enables NASA to resolve health risks for humans to safely live and work on missions in the inner solar system. HRP conducts research, develops countermeasures, and undertakes technology development to address human health risks in space and ensure compliance with NASA's health, medical, human performance, and environmental standards.

8.4.1 Office of Chief Health and Medical Officer (OCHMO)

POC: Dr. Victor Schneider, vschneider@nasa.gov P: (202) 258-3645
Dr. James D. Polk, james.d.polk@nasa.gov P: (202) 358-1959

Areas of Research Interest:

- Development and elaboration of Functional aids and testing paradigms to measure activity for use by parastronauts during spaceflight. This may include egressing and exiting space capsules and donning and doffing spacesuits and other aids for parastronauts. The European Space Agency is establishing a parastronaut feasibility project. Since NASA offers its international partners access to NASA supported spacecraft and the International Space Station, NASA wants to establish appropriate functional testing measures to determine the time it takes fit astronaut-like subjects compared to fit parastronaut subjects to egress and exit simulated space capsules and simulated donning and doffing spacesuit. Research proposals are sought to establish appropriate functional testing.

- Evaluation space capsule and spacesuit activity in stable and fit lower or upper extremity amputees and compare their responses to non-amputee fit individuals. The European Space Agency is establishing a parastronaut feasibility project. Since NASA offers its international partners access to NASA supported spacecraft and the International Space Station, NASA wants to obtain research data measuring the time it takes fit astronaut-like subjects compared to fit parastronaut subject to egress and exit simulated space capsules
and simulated donning and doffing spacesuit. Research proposals are sought to obtain data measuring the functional testing indicated.

8.4.2 Human Research Program/Space Radiation Element

POC: Dr. Robin Elgart, shona.elgart@nasa.gov, P: (281) 244-0596

Research Overview:

Space radiation exposure is one of numerous hazards astronauts encounter during spaceflight that impact human health. High priority health outcomes associated with space radiation exposure are carcinogenesis, cardiovascular disease (CVD), and central nervous system (CNS) changes that impact astronaut health and performance.

Areas of Research Interest:

1. Research proposals are sought to **accelerate risk characterization for high priority radiation health risks and inform mitigation strategies** the NASA Human Research Program (HRP) Space Radiation Element (SRE) by sharing animal tissue samples and data. The proposed work should focus on translational studies that support priority risk characterization (cancer, CVD, CNS), development of relative biological effectiveness (RBE) values, identification of actionable biomarkers, and evaluation of dose thresholds for relevant radiation-associated disease endpoints. Cross-species comparative analyses of rodent data/samples with higher order species (including human archival data and tissue banks) are highly encouraged.
   - Data can include but is not limited to behavioral tasks, tumor data, physiological measurements, imaging, omics’, etc. that has already been, or is in the process of being, collected.
   - Tissue samples can include, but are not limited to, samples that have already been, or are in the process of, being collected and stored as well as tissues from other external archived banks (e.g., http://janus.northwestern.edu/janus2/index.php).
   - Relevant tissue samples and data from other externally funded (e.g., non-NASA) programs and tissue repositories/archives for comparison with high linear energy transfer (LET), medical proton, neutron and other exposures can be proposed.
   - A more detailed list of samples and tissues available from SRE can be found at our tissue sharing websites:
     - Instructions for accessing the tissue sharing information are posted at: https://spaceradiation.jsc.nasa.gov/tissue-sharing/.

2. Research proposals are sought to define the mechanisms underlying sexual dimorphism following exposure to space radiation. Research should focus on translational biomarkers relevant to changes in cognitive and/or behavioral performance, cardiovascular function,
and the development of carcinogenesis in non-sex-specific organs. Due to limited time and budget, researchers are encouraged to utilize radiation sources located at home institutions at space relevant doses (0-5 Gy of photons or proton irradiation). A successful proposal will not necessitate the use of the NASA Space Radiation Laboratory (NSRL) at Brookhaven National Laboratory at this phase. Collaborations between investigators and institutions for the sharing of data and tissue samples are highly encouraged. Samples available for use by SRE, can be found at https://lsda.jsc.nasa.gov/Biospecimen by searching “NASA Space Radiation Laboratory (NSRL)” in the payloads field (SRE approval required). Instructions for accessing the tissue sharing information are posted at: https://spaceradiation.jsc.nasa.gov/tissue-sharing/. Other topics include:

- Individual sensitivity
- Early disease detection (Cancer, CVD, neurological/behavioral conditions)
- Biomarker identification
- High-throughput countermeasure screening
- Sex-specific risk assessment
- Radiation quality and/or dose-rate effects

3. Research proposals are sought to establish screening techniques for compound-based countermeasures to assess their efficacy in modulating biological responses to radiation exposure relevant to the high priority health risks of cancer, CVD, and/or CNS. Techniques that can be translated into high-throughput screening protocols are highly desired, however high-content protocols will also be considered responsive.

4. Research proposals are sought to evaluate the role of the inflammasome in the pathogenesis of radiation-associated CVD, carcinogenesis, and/or central nervous system changes that impact behavioral and cognitive function. Although innate inflammatory immune responses are necessary for survival from infections and injury, dysregulated and persistent inflammation is thought to contribute to the pathogenesis of various acute and chronic conditions in humans, including CVD. A main contributor to the development of inflammatory diseases involves activation of inflammasomes. Recently, inflammasome activation has been increasingly linked to an increased risk and greater severity of CVD. Characterization of the role of inflammasome-mediated pathogenesis of disease after space-like chronic radiation exposure can provide evidence to better quantify space radiation risks as well as identify high value for countermeasure development.

### 8.4.3 Human Research Program/ Exploration Medical Capability (ExMC) Element

**POC:** Moriah Thompson: moriah.s.thompson@nasa.gov  P: (713) 437-2500

**Title:** Non-Invasive Behavioral Health Diagnostic Capabilities for Mars

**Description:** Missions to Mars will involve increased stressors such as isolation, confinement, interpersonal issues, etc. The risk of behavioral health issues increases with such missions. Current behavioral health diagnostic and treatment techniques rely on real-
time communication. Non-invasive diagnostic aides that work in a communication delay setting are needed to improve behavioral health support for exploration missions to Mars.

8.5 Science Mission Directorate (SMD)

SMD POC: Lin Chambers lin.h.chambers@nasa.gov

Science Mission Directorate (SMD) leads the Agency in five areas of research: Biological and Physical Sciences (BPS), Heliophysics, Earth Science, Planetary Science, and Astrophysics. SMD, using the vantage point of space to achieve with the science community and our partners a deep scientific understanding of our planet, other planets and solar system bodies, the interplanetary environment, the Sun and its effects on the solar system, and the universe beyond. In so doing, we lay the intellectual foundation for the robotic and human expeditions of the future while meeting today's needs for scientific information to address national concerns, such as climate change and space weather. SMD's high-level strategic objectives are presented in the 2022 NASA Strategic Plan. Detailed plans by science area corresponding to the science divisions of SMD: Heliophysics, Earth Science, Planetary Science, Biological and Physical Science, and Astrophysics appear in SCIENCE 2020-2024: A Vision for Scientific Excellence Updated", which is available at http://science.nasa.gov/about-us/science-strategy/. The best expression of specific research topics of interest to each Division within SMD are represented in by the topics listed in SMD's "ROSES" research solicitation, see ROSES 2023 and the text in the Division research overviews of ROSES. By perusing the tables of contents from this year at https://solicitation.nasaprs.com/ROSES2023table3 and last year at https://solicitation.nasaprs.com/ROSES2022table3, proposers can view all of the topics that are of interest, even if a given topic is not solicited in any given year.

Additional information about the SMD may be found at: https://science.nasa.gov/

8.5.1 Biological and Physical Sciences (BPS)

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The mission of BPS is two-pronged:

- Pioneer scientific discovery in and beyond low Earth orbit to drive advances in science, technology, and enhance knowledge, education, innovation, and economic vitality
- Enable human spaceflight exploration to expand the frontiers of knowledge, capability, and opportunity in space

Execution of this mission requires both scientific research and technology development.

BPS administers NASA’s:

- Space Biology Program, which solicits and conducts research to use the space environment to advance our knowledge of how gravity affects the design and function of
living organisms, and to understand how biological systems accommodate to spaceflight environments

- Physical Sciences Program, which solicits and conducts research using the space environment as a tool to provide transformational insights in physics and engineering science, and to understand how physical systems respond to spaceflight environments, particularly weightlessness and the partial gravity of planetary bodies
- Commercially Enabled Rapid Space Science project (CERISS), which will develop transformative research capabilities with commercial space industry to dramatically increase the pace of research

BPS partners with the research community and a wide range of organizations to accomplish its mission. Grants to academic, commercial and government laboratories are the core of BPS’s research and technology development efforts.

Additional information on BPS can be found at: https://science.nasa.gov/biological-physical

**Space Biology Program**

The Space Biology Program within NASA’s Biological and Physical Sciences Division focuses on pioneering scientific discovery and enabling human spaceflight exploration. Research in space biology has the following goals:

- To understand how radiation, altered gravity, and the other characteristics of the space environment alter fundamental biological processes;
- To develop the scientific and technological foundations for a safe, productive human presence in space for extended periods and in preparation for exploration; and
- To apply this knowledge and technology to improve our nation's competitiveness, education, and the quality of life on Earth.

Research proposals for this opportunity are being solicited on the following topic:

- Mammalian Biology – biological and physiological responses of rodents to ionizing radiation and other spaceflight-relevant stressors such as altered gravity (i.e., through hindlimb unloading or partial weightbearing, etc.).
  - Proposals must be for ground-based studies.
  - All proposals for rodent studies must address the five points outlined in the Vertebrate Animal and Higher Order Cephalopod Section (VACS) instructional document which can be found here. This response should be included as part of the research plan and should be limited to two pages. A sample VACS is provided in the VACS instructional document posted on NSPIRES alongside this document
  - Ionizing radiation and altered gravity regimes (partial gravity and microgravity) are a hallmark of the deep space environment. These stressors may cause direct physiological changes in the organisms or result in indirect effects such as loss of sleep in some organisms. Studies shall effectively delineate the biological effects of these factors, separately and/or in combination where possible.
The proposed use of other spaceflight stressors, including altered atmospheric pressures, altered levels of CO2, altered light spectra/durations, etc., in lieu of altered gravity is acceptable, however, all proposed studies must include the use of ionizing radiation as the primary stressor.

While all rodent studies involving radiation in combination with another spaceflight stressors will be considered responsive to this topic, Space Biology is particularly interested in studies that utilize rats as the model system to be investigated.

Proposed investigators should focus on understanding the mechanistic bases of the changes induced by these stressor, preferably from a systems biology perspective, and could include genetic, cellular, or molecular biological effects. Further information for the Space Biology program are available at https://science.nasa.gov/biological-physical/programs/space-biology, and at https://science.nasa.gov/biological-physical/documents.

Investigators are encouraged to propose experiments that use the radiation facilities at the NASA Space Radiation Laboratory (NSRL) located at the Brookhaven National Lab, however Space Biology cannot not directly pay the cost of their use. Proposers planning to use these facilities must contact NSRL (https://www.bnl.gov/nsrl/) for cost estimates and necessary logistical information and must appropriately account for the cost of beam-time and facility use in their budget.

If a Space Biology research topic is proposed, other than Mammalian Biology research noted above, please reach out to the Space Biology POC listed above at spacebiology@nasaprs.com to discuss proposed research for consideration.

Investigators receiving awards from this opportunity for a proposal submitted to a Space Biology Focus Area will be required to upload all relevant data produced by their funded project in the GeneLab Data Systems (https://genelab.nasa.gov). They must also make the source code of any computational simulations developed via awards under this proposal available in an open source repository. Furthermore, articles published in peer-reviewed scholarly journals and papers published in peer-reviewed conference proceedings, should be made publicly accessible via NASA’s PubSpace website (Submit to PubSpace - Scientific and Technical Information Program (nasa.gov)). Proposers submitting application that are responsive to this focus are will therefore be expected to address these requirements in their proposal’s data management plan.

Further information for the Space Biology program is available at:

https://science.nasa.gov/biological-physical/programs/space-biology

https://science.nasa.gov/biological-physical/documents
Physical Science Program

The Physical Science Research Program conducts fundamental and applied research to advance scientific knowledge, to improve space systems, and to advance technologies that may produce new products offering benefits on Earth. Space offers unique advantages for experimental research in the physical sciences. NASA supports research that uses the space environment to make significant scientific advances. Many of NASA's experiments in the physical sciences reveal how physical systems respond to the near absence of gravity. Forces that on Earth are small compared to gravity can dominate system behavior in space. Understanding the consequences is a critical aspect of space system design. Research in physical sciences includes both basic and applied research in the areas of combustion science, fluid physics, materials science, soft matter physics and fundamental physics.

Combustion Science

The goal of the microgravity combustion science research program is to advance understanding of combustion processes, leading to added benefits to human health, comfort, and safety on both Earth and during crewed exploration missions. NASA’s microgravity combustion science research focuses on effects that can be studied in the absence of buoyancy-driven flows caused by Earth’s gravity. Research conducted without the interference of buoyant flows can lead to an improvement in combustion efficiency, producing a considerable economic and environmental impact. Combustion science is also relevant to a range of challenges for long-term human exploration of space that involve reacting systems in reduced and micro gravity. These challenges include: spacecraft fire prevention; fire detection and suppression; thermal processing of regolith for oxygen and water production; thermal processing of the Martian atmosphere for fuel and oxidizer production; and processing of waste and other organic matter for stabilization and recovery of water, oxygen and carbon. Substantial progress in any of these areas will be accelerated significantly by an active reduced-gravity combustion research program.

The research area of combustion science includes the following themes:

- Spacecraft fire safety
- Droplets
- Gaseous – premixed and non-premixed
- High pressure – transcritical combustion and supercritical reacting fluids

Fluid Physics

The goal of the microgravity fluid physics program is to understand fluid behavior of physical systems in space, providing a foundation for predicting, controlling, and improving a vast range of technological processes. Specifically, in reduced gravity, the absence of buoyancy and the stronger influence of capillary forces can have a dramatic effect on fluid behavior. For example, capillary flows in space can pump fluids to higher levels than those achieved on Earth. In the case of systems where phase-change heat transfer is required, experimental results demonstrate that bubbles will not rise under pool boiling conditions in microgravity, resulting in a change in the heat transfer rate at the heater surface. The microgravity experimental data can be used to
verify computational fluid dynamics models. These improved models can then be utilized by future spacecraft designers to predict the performance of fluid conditions in space exploration systems such as air revitalization, solid waste management, water recovery, thermal control, cryogenic storage and transfer, energy conversion systems, and liquid propulsion systems.

The research area of fluid physics includes the following themes:

- Adiabatic two-phase flow
- Boiling and condensation
- Capillary flow
- Interfacial phenomena
- Cryogenic propellant storage and transfer

**Materials Science**

The goal of the microgravity materials science program is to improve the understanding of materials properties that will enable the development of higher-performing materials and processes for use both in space and on Earth. The program takes advantage of the unique features of the microgravity environment, where gravity-driven phenomena, such as sedimentation and thermosolutal convection, are nearly negligible. On Earth, natural convection leads to dendrite deformation and clustering, whereas in microgravity, in the absence of buoyant flow, the dendritic structure is nearly uniform. Major types of research that can be investigated include solidification effects and the resulting morphology, as well as accurate and precise measurement of thermophysical property data. These data can be used to develop computational models. The ability to predict microstructures accurately is a promising computational tool for advancing materials science and manufacturing.

The research area of materials science includes the following themes:

- Glasses and ceramics
- Granular materials
- Metals
- Polymers and organics
- Semiconductors

**Soft Matter Physics**

Granular material is one of the key focus areas of research areas in the field of soft matter. The fundamental understanding of physics of granular materials under different gravity condition is of key importance for deep space exploration and long-term habitation to sample collection from asteroids to improving the understanding of granular material handling on earth. Also, fundamental understanding of granular materials can help us understand motions in large bodies on earth (e.g.- landslides) that can help us save lives in case of natural emergencies. This research topic focuses on developing fundamental knowledge base in the field of-

- Rheology of granular materials (both wet and dry)
Impact of anisotropy and structure
Impact of electrostatic charging
- In depth understanding of stress distribution in granular materials
- Dynamics of interparticle interaction and short range forces in granular materials

Both experimental and theoretical/numerical work will be in scope.

**Fundamental Physics**

Quantum mechanics is one of the most successful theories in physics. It describes the very small, such as atoms and their formation into the complex molecules necessary for life, to structures as large as cosmic strings. The behavior of exotic matter such as superfluids and neutron stars is explained by quantum mechanics, as are everyday phenomena such as the transmission of electricity and heat by metals. The frontline of modern quantum science involves cross-cutting fundamental and applied research. For example, world-wide efforts concentrate on harnessing quantum coherence and entanglement for applications such as the enhanced sensing of electromagnetic fields, secure communications, and the exponential speed-up of quantum computing. This area is tightly coupled to research on the foundations of quantum mechanics, which involves exotica such as many-worlds theory and the interface between classical and quantum behavior. Another frontier encompasses understanding how novel quantum matter—such as high-temperature superconductivity and topological states—emerges from the interactions between many quantum particles. Quantum science is also central to the field of precision measurement, which seeks to expand our knowledge of the underlying principles and symmetries of the universe by testing ideas such as the equivalence between gravitational and inertial mass.

Quantum physics is a cornerstone of our understanding of the universe. The importance of quantum mechanics is extraordinarily wide ranging, from explaining emergent phenomena such as superconductivity, to underpinning next-generation technologies such as quantum computers, quantum communication networks, and sensor technologies. Laser-cooled cold atoms are a versatile platform for quantum physics on Earth, and one that can greatly benefit from space-based research. The virtual elimination of gravity in the reference frame of a free-flying space vehicle enables cold atom experiments to achieve longer observation times and colder temperatures than are possible on Earth. The NASA Fundamental Physics program plans to support research in quantum physics that will lead to transformational outcomes, such as the discovery of phenomena at the intersection of quantum mechanics and general relativity that inform a unified theory, the direct detection of dark matter via atom interferometry or atomic clocks, and the creation of exotic quantum matter than cannot exist on Earth.

Proposals are sought for ground-based theory and experimental research that may help to develop concepts for future flight experiments. Research in field effects in quantum superposition and entanglement are of particular interest.

For any Physical Sciences proposal selected for award, all data must be deposited in the Physical Sciences Informatics Database starting one year after award completion. They must also make
the source code of any computational simulations developed via awards under this proposal available in an open-source repository.

The two NASA GRC drop towers described below are also available to augment research investigations. These facilities are typically used to conduct combustion or fluid physics experiments. Please go to link for further information. The Points of Contact for each research area are:
Fluid Physics: John McQuillen, john.b.mcquillen@nasa.gov
Combustion Science: Dan Dietrich, daniel.l.dietrich@nasa.gov

Since there is a cost involved to use these drop towers, please contact the appropriate POC for cost estimates for your proposal.

2.2 s tower:  https://www1.grc.nasa.gov/facilities/drop/

The 2.2 Second Drop Tower has been used for nearly 50 years by researchers from around the world to study the effects of microgravity on physical phenomena such as combustion and fluid dynamics and to develop technology for future space missions. It provides rapid turnaround testing (up to 12 drops/day) of 2.2 seconds in duration.

5.2 s tower:  https://www1.grc.nasa.gov/facilities/zero-g/

The Zero Gravity Research Facility is NASA’s premier facility for ground based microgravity research, and the largest facility of its kind in the world. It provides researchers with a near weightless environment for a duration of 5.18 seconds. It has been primarily used for combustion and fluid physics investigations.

Implementing Centers: NASA's Physical Sciences Research Program is carried out at the Glenn Research Center (GRC), Jet Propulsion Laboratory (JPL) and Marshall Space Flight Center (MSFC). Further information on physical sciences research is available at: https://science.nasa.gov/biological-physical/programs/physical-sciences

**Commercially Enabled Rapid Space Science Project (CERISS)**

The Commercially Enabled Rapid Space Science initiative (CERISS) will develop transformative research capabilities with commercial space industry to dramatically increase the pace of research. Long-range goals include conducting scientist astronaut missions on the International Space Station and commercial low-earth orbit (LEO) destinations and develop automated hardware for experiments beyond low Earth orbit, such as to the lunar surface.

The benefits will include a 10-to-100-fold faster pace of research for a wide range of research sponsored by Biological and Physical Sciences Division, the NASA Human Research Program, other government agencies, and industry. Another benefit will be the increased demand for research and development in low earth orbit, facilitating growth of the commercial space industry.
Area of particular interest include:

Sample preparation Characterization of materials (e.g. differential scanning calorimetry, x-ray diffraction, Fourier transform infrared spectroscopy, etc.) Analysis of samples (e.g. fluorescent activated cell sorting, protein and -omics, imaging, etc.)

Further information on CERISS is available at: https://science.nasa.gov/biological-physical/commercial

8.5.2 Heliophysics Division

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Madhulika Guhathakurta, Ph.D. NASA HQ madhulika.guhathakurta@nasa.gov

Heliophysics encompasses science that improves our understanding of fundamental physical processes throughout the solar system, and enables us to understand how the Sun, as the major driver of the energy throughout the solar system, impacts our technological society. The scope of heliophysics is vast, spanning from the Sun's interior to Earth’s upper atmosphere, throughout interplanetary space, to the edges of the heliosphere, where the solar wind interacts with the local interstellar medium. Heliophysics incorporates studies of the interconnected elements in a single system that produces dynamic space weather and that evolves in response to solar, planetary, and interstellar conditions.


The decadal survey articulates the scientific challenges for this field of study and recommends a slate of design reference missions to meet them, to culminate in the achievement of a predictive capability to aid human endeavors on Earth and in space. The fundamental science questions are:

- What causes the Sun to vary?
- How do the geospace, planetary space environments and the heliosphere respond?
- What are the impacts on humanity?

To answer these questions, the Heliophysics Division implements a program to achieve three overarching objectives:

- Explore and characterize the physical processes in the space environment from the Sun to the heliopause and throughout the universe
• Advance our understanding of the Sun’s activity, and the connections between solar variability and Earth and planetary space environments, the outer reaches of our solar system, and the interstellar medium
• Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth.

The program supports theory, modeling, and data analysis utilizing remote sensing and in situ measurements from a fleet of missions; the Heliophysics System Observatory (HSO). Frequent CubeSats, suborbital rockets, balloons, and ground-based instruments add to the observational base. Investigations that develop new observables and technologies for heliophysics science are sought.

Supported research activities include projects that address understanding of the Sun and planetary space environments, including the origin, evolution, and interactions of space plasmas and electromagnetic fields throughout the heliosphere. The program seeks to characterize these phenomena on a broad range of spatial and temporal scales, to understand the fundamental processes that drive them, to understand how these processes combine to create space weather events, and to enable a capability for predicting future space weather events.

The program supports investigations of the Sun, including processes taking place throughout the solar interior and atmosphere and the evolution and cyclic activity of the Sun. It supports investigations of the origin and behavior of the solar wind, energetic particles, and magnetic fields in the heliosphere and their interaction with the Earth and other planets, as well as with the interstellar medium.

The program also supports investigations of the physics of magnetospheres, including their formation and fundamental interactions with plasmas, fields, and particles and the physics of the terrestrial mesosphere, thermosphere, ionosphere, and auroras, including the coupling of these phenomena to the lower atmosphere and magnetosphere. Proposers may also review the information in the ROSES-23 Heliophysics Research Program Overview for further information about the Heliophysics Research Program.

8.5.3 Earth Science Division

POC: Yaitza Luna-Cruz, yaitza.luna-cruz@nasa.gov NASA Headquarters (HQ)

Laura Lorenzoni, laura.lorenzoni@nasa.gov NASA HQ

Nancy Searby, nancy.d.searby@nasa.gov NASA HQ

The overarching goal of NASA’s Earth Science program is to develop a scientific understanding of Earth as a system. The Earth Science Division of the Science Mission Directorate (https://science.nasa.gov/earth-science) contributes to NASA's mission, in particular, Strategic Objective 1.1: Understanding The Sun, Earth, Solar System, And Universe. This strategic objective is motivated by the following key questions:

• How is the global Earth system changing?
• What causes these changes in the Earth system?
• How will the Earth system change in the future?
• How can Earth system science provide societal benefit?

These science questions translate into seven overarching science goals to guide the Earth Science Division’s selection of investigations and other programmatic decisions:

• Advance the understanding of changes in the Earth’s radiation balance, air quality, and the ozone layer that result from changes in atmospheric composition (Atmospheric Composition)
• Improve the capability to predict weather and extreme weather events (Weather)
• Detect and predict changes in Earth’s ecosystems and biogeochemical cycles, including land cover, biodiversity, and the global carbon cycle (Carbon Cycle and Ecosystems)
• Enable better assessment and management of water quality and quantity to accurately predict how the global water cycle evolves in response to climate change (Water and Energy Cycle)
• Improve the ability to predict climate changes by better understanding the roles and interactions of the ocean, atmosphere, land and ice in the climate system (Climate Variability and Change)
• Characterize the dynamics of Earth’s surface and interior, improving the capability to assess and respond to natural hazards and extreme events (Earth Surface and Interior)
• Further the use of Earth system science research to inform decisions and provide benefits to society

In applied sciences, the ESD encourages the use of data from NASA’s Earth-observing satellites and airborne missions to tackle tough challenges and develop solutions that improve our daily lives. Specific areas of interest include efforts that help institutions and individuals make better decisions about our environment, food, water, health, and safety (see http://appliedsciences.nasa.gov). In technological research, the ESD aims to foster the creation and infusion of new technologies – such as data processing, interoperability, visualization, and analysis as well as autonomy, modeling, and mission architecture design – in order to enable new scientific measurements of the Earth system or reduce the cost of current observations (see http://esto.nasa.gov). The ESD also promotes innovative development in computing and information science and engineering of direct relevance to ESD. NASA makes Earth observation data and information widely available through the Earth Science Data System program, which is responsible for the stewardship, archival and distribution of open data for all users.

The Earth Science Division (ESD) places particular emphasis on the investigators' ability to promote and increase the use of space-based remote sensing through the proposed research. Proposals with objectives connected to needs identified in most recent Decadal Survey (2017-2027) from the National Academies of Science, Engineering, and Medicine, Thriving on our Changing Planet: A Decadal Strategy for Earth Observation from Space are welcomed. (see https://www.nap.edu/catalog/24938/thriving-on-our-changing-planet-a-decadal-strategy-for-earth).
NASA's ability to view the Earth from a global perspective enables it to provide a broad, integrated set of uniformly high-quality data covering all parts of the planet. NASA shares this unique knowledge with the global community, including members of the science, government, industry, education, and policy-maker communities.

8.5.4 Planetary Science Division

POC: Erica Montbach, PhD (she/her), erica.n.montbach@nasa.gov
Manager, Planetary Exploration Science Technology Office (PESTO)
Planetary Science Division

Michael Lienhard, PhD (he/him), michael.a.lienhard@nasa.gov
Program Officer, Planetary Exploration Science Technology Office (PESTO)
Planetary Science Division

The Planetary Science Research Program, managed by the Planetary Science Division, sponsors research that addresses the broad strategic objective to "Ascertain the content, origin, and evolution of the Solar System and the potential for life elsewhere." To pursue this objective, the Planetary Science Division has strategic goals and objectives that guide the focus of the division's science research and technology development activities. As described in the NASA 2022 Science Strategic Plan (https://science.nasa.gov/about-us/science-strategy), these are:

Discover:
- Expand human knowledge through new scientific discoveries
  - 1.2: Understand the Sun, solar system, and universe

Explore:
- Extend human presence to the Moon and on towards Mars for sustainable long-term exploration, development, and utilization
  - 2.1: Explore the surface of the Moon and deep space

Innovate:
- Catalyze economic growth and drive innovation to address national challenges
  - 3.1: Innovate and advance transformational space technologies

The NASA Planetary Science strategic objective is to advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space.
In order to address these goals and objectives, the Planetary Research Program invites a wide range of planetary science and astrobiology investigations. Example topics include, but are not limited to:

- Investigations aimed at understanding the formation and evolution of the Solar System and (exo)planetary systems in general, and of the planetary bodies, satellites, and small bodies in these systems;
- Investigations aimed at understanding materials present, and processes occurring, in the early stages of Solar System history, including the protoplanetary disk;
- Investigations aimed at understanding planetary differentiation processes;
- Investigations of extraterrestrial materials, including meteorites, cosmic dust, presolar grains, and samples returned by the Apollo, Stardust, Genesis, and Hayabusa missions;
- Investigations of the properties of planets, satellites (including the Moon), satellite and ring systems, and smaller Solar System bodies such as asteroids and comets;
- Investigations of the coupling of a planetary body’s intrinsic magnetic field, atmosphere, surface, and interior with each other, with other planetary bodies, and with the local plasma environment;
- Investigations into the origins, evolution, and properties of the atmospheres of planetary bodies (including satellites, small bodies, and exoplanets);
- Investigations that use knowledge of the history of the Earth and the life upon it as a guide for determining the processes and conditions that create and maintain habitable environments and to search for ancient and contemporary habitable environments and explore the possibility of extant life beyond the Earth;
- Investigations into the origin and early evolution of life, the potential of life to adapt to different environments, and the implications for life elsewhere;
- Investigations that provide the fundamental research and analysis necessary to characterize exoplanetary systems;
- Investigations related to understanding the chemistry, astrobiology, dynamics, and energetics of exoplanetary systems;
- Astronomical observations of our Solar System that contribute to the understanding of the nature and evolution of the Solar System and its individual constituents;
- Investigations to inventory and characterize the population of Near Earth Objects (NEOs) or mitigate the risk of NEOs impacting the Earth;
- Investigations into the potential for both forward and backward contamination during planetary exploration, methods to minimize such contamination, and standards in these areas for spacecraft preparation and operating procedures;
- Investigations which enhance the scientific return of NASA Planetary Science Division missions through the analysis of data collected by those missions;
- Advancement of laboratory- or spacecraft-based (including small satellites, e.g., CubeSats) instrument technology that shows promise for use in scientific investigations on future planetary missions; and
- Analog studies, laboratory experiments, or fieldwork to increase our understanding of Solar System bodies or processes and/or to prepare for future missions.
Additional information on technologies needed to support NASA Planetary Science Division missions may be found on the Planetary Exploration Science Technology Office website.

Proposers may also review the information in the ROSES-2023 Planetary Science Research Program Overview for further information about the Planetary Science Research Program. The use of NASA Research Facilities is available to supported investigators (see section IVe Demonstration of Access to Required Facility). If their use is anticipated, this use must be discussed and justified in the submitted proposals and include a letter of support from the facility (or resource) confirming that it is available for the proposed use during the proposed period.

8.5.5 Astrophysics Division

Science Mission Directorate (SMD)

POC: Dr. Hashima Hasan, hhasan@nasa.gov  NASA Headquarters (HQ)

Dr. Mario Perez, mario.perez@nasa.gov  NASA HQ

NASA's strategic objective in astrophysics is to discover how the universe works, explore how it began and evolved, and search for life on planets around other stars. Three broad scientific questions flow from this objective:

- How does the universe work?
- How did we get here?
- Are we alone?

Each of these questions is accompanied by a science goal that shapes the Astrophysics Division’s efforts towards fulfilling NASA's strategic objective:

- Probe the origin and destiny of our universe, including the nature of black holes, dark energy, dark matter and gravity
- Explore the origin and evolution of the galaxies, stars and planets that make up our universe
- Discover and study planets around other stars, and explore whether they could harbor life

To address these Astrophysics goals, the Astrophysics Research Analysis and Technology Program invites a wide range of astrophysics science investigations from space that can be broadly placed in the following categories:

- The development of new technology covering all wavelengths and fundamental particles, that can be applied to future space flight missions. This includes, but is not limited to, detector development, and optical components such as primary or secondary mirrors, coatings, gratings, filters, and spectrographs.
- New technologies and techniques that may be tested by flying them on suborbital platforms such as rockets and balloons that are developed and launched by commercial
suborbital flight providers or from NASA’s launch range facilities, or by flying them on small and innovative orbital platforms such as cubesats.

- Studies in laboratory astrophysics. Examples of these studies could include atomic and molecular data and properties of plasmas explored under conditions approximating those of astrophysical environments.
- Theoretical studies and simulations that advance the goals of the astrophysics program
- Analysis of data that could lead to original discoveries from space astrophysics missions. This could include the compilations of catalogs, statistical studies, algorithms and pattern recognition, artificial intelligence applications, development of data pipelines, etc.

Citizen Science programs, which are a form of open collaboration in which individuals or organizations participate voluntarily in the scientific process, are also invited. The current SMD Policy (https://smd-prod.s3.amazonaws.com/science-red/s3fs-public/atoms/files/SPD%2033%2DCitizen%20Science.pdf) on citizen science describes standards for evaluating proposed and funded SMD citizen science projects. For more information see the https://science.nasa.gov/citizenscience webpage, that provides information about existing SMD-funded projects.


Investigations submitted to this program element should explicitly support past, present, or future NASA astrophysics missions. These investigations can include theory, simulation, data analysis, and technology development. Information on the Astrophysics research program and missions are available at https://science.nasa.gov/astrophysics.

8.6 Space Technology Mission Directorate (STMD)

POC: Damian Taylor, Damian.Taylor@nasa.gov

The Space Technology Mission Directorate (STMD) is where technology drives exploration and the space economy; and aims to transform future missions while ensuring American leadership in aerospace.

STMD rapidly develops, demonstrates, and infuses revolutionary, high-payoff technologies through transparent, collaborative partnerships, expanding the boundaries of the aerospace enterprise. STMD employs a merit-based competition model with a portfolio approach, spanning a range of discipline areas and technology readiness levels. By investing in bold, broadly
applicable, disruptive technology that industry cannot tackle today, STMD seeks to mature the technology required for NASA’s future missions in science and exploration while proving the capabilities and lowering the cost for other government agencies and commercial space activities.

Research and technology development takes place within NASA Centers, at JPL, in academia and industry, and leverages partnerships with other government agencies and international partners. STMD engages and inspires thousands of technologists and innovators creating a community of our best and brightest working on the nation’s toughest challenges. By pushing the boundaries of technology and innovation, STMD allows NASA and our nation to remain at the cutting edge. Additional information on STMD can be found at: http://www.nasa.gov/directorates/spacetech/about_us/index.html.

STMD looks to engage new and diverse partners to garner different perspectives and approaches to our biggest technology challenges. An overarching principle guiding STMD’s work is our commitment to inspiring and developing a diverse and powerful US aerospace technology community. As part of our strategic approach, STMD is committed to empowering innovators by expanding our work with and support for underrepresented communities. Furthermore, we are focused on demonstrating engaging practices for underserved and underrepresented communities through the R&D process that strengthens and supports economic growth for a diverse technology community. This is paramount to our Lead strategic thrust through which Go, Land, Live and Explore thrusts are realized.

STMD plans future investments to support our strategic thrusts as follows:

**Lead: Ensuring American global leadership in Space Technology**

- Advance US space technology innovation and competitiveness in a global context
- Encourage technology driven economic growth with an emphasis on the expanding space economy
- Inspire and develop a diverse and powerful US aerospace technology community

**Go: Rapid, Safe, & Efficient Space Transportation**

- Develop nuclear technologies enabling fast in-space transits.
- Develop cryogenic storage, transport, and fluid management technologies for surface and in-space applications.
- Develop advanced propulsion technologies that enable future science/exploration missions.

**Land: Expanded Access to Diverse Surface Destinations**

- Enable Lunar/Mars global access with ~20t payloads to support human missions.
- Enable science missions entering/transiting planetary atmospheres and landing on planetary bodies.
- Develop technologies to land payloads within 50 meters accuracy and avoid landing hazards.
**Live:** *Sustainable Living and Working Farther from Earth*

- Develop exploration technologies and enable a vibrant space economy with supporting utilities and commodities.
  - Sustainable power sources and other surface utilities to enable continuous lunar and Mars surface operations.
  - Scalable ISRU production/utilization capabilities including sustainable commodities on the lunar & Mars surface.
  - Technologies that enable surviving the extreme lunar and Mars environments.
  - Autonomous excavation, construction & outfitting capabilities targeting landing pads/structures/habitable buildings utilizing in situ resources.
- Enable long duration human exploration missions with Advanced Habitation System technologies. [Low TRL STMD: Mid-High TRL SOMD/ESDMD]

**Explore:** *Transformative Missions and Discoveries*

- Develop next generation high performance computing, communications, and navigation.
- Develop advanced robotics and spacecraft autonomy technologies to enable and augment science/exploration missions.
- Develop technologies supporting emerging space industries including: Satellite Servicing & Assembly, In Space/Surface Manufacturing, and Small Spacecraft technologies.
- Develop vehicle platform technologies supporting new discoveries.
- Develop technologies for science instrumentation supporting new discoveries. [Low TRL STMD/Mid-High TRL SMD. SMD funds mission specific instrumentation (TRL 1-9)]
- Develop transformative technologies that enable future NASA or commercial missions and discoveries.

Furthermore, the above strategic thrusts describe the STMD investment priority strategy and are further detailed in the Strategic Technology Architecture Roundtable (STAR) Process: [https://techport.nasa.gov/framework](https://techport.nasa.gov/framework).

STMD’s Principal Technologists and System Capability Leads are available for consultation with proposers regarding the state-of-the-art, on-going activities and investments, and strategic needs in their respective areas of expertise. Proposers are encouraged to consult with the appropriate PT or SCLT early in the proposal process.
<table>
<thead>
<tr>
<th>POC</th>
<th>Technology Area</th>
<th>NASA Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew Abercromby</td>
<td>ECLSS</td>
<td><a href="mailto:andrew.f.abercromby@nasa.gov">andrew.f.abercromby@nasa.gov</a></td>
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<tr>
<td>Danette Allen</td>
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<td>Jim Broyan</td>
<td>ECLSS Lead</td>
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<tr>
<td>John Carson</td>
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<td>Ron Litchford</td>
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<tr>
<td>Bo Naasz</td>
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<td>Arthur Werkheiser</td>
<td>Cryo Fluid Management</td>
<td><a href="mailto:arthur.werkheiser@nasa.gov">arthur.werkheiser@nasa.gov</a></td>
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<tr>
<td>Mike Wright</td>
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<td><a href="mailto:michael.j.wright@nasa.gov">michael.j.wright@nasa.gov</a></td>
</tr>
</tbody>
</table>

In recognition of NASA’s leadership in developing advanced technologies for the benefit of all, research topics related to advancing national capabilities in the following climate-related and addressing orbital debris technology areas are of interest:

- **Clean Energy and Emissions Technologies:** Clean energy and emissions mitigation technology projects focusing on the research and development, demonstration, or deployment of systems, processes, best practices, and sources that reduce the amount of greenhouse gas emitted to, or concentrated in, the atmosphere.

- **U.S. Climate Change Research Program:** Earth-observing capabilities to support breakthrough science and National efforts to address climate change.
  - Specific topic areas could include:
    - Reductions in greenhouse gas emissions (including CO2, CH4, N2O, HFCs)
      - Fuel Cells
      - Batteries and Energy Storage
- Carbon Capture, Utilization, and Storage
- Processes that enhance industrial efficiency and reduce emissions
- Production of clean energy including solar, hydrogen, nuclear, or other clean energy sources

- Enabling platforms and early-stage instruments for climate-relevant science observations
- Addressing Orbital Debris: Control the long-term growth of debris population.

  - POCs for additional information:
    - Clean energy: John Scott (john.h.scott@nasa.gov)
    - Nuclear systems: Anthony Calomino (anthony.m.calomino@nasa.gov)
    - Hydrogen: Jerry Sanders (gerald.b.sanders@nasa.gov)
    - Earth-observing capabilities: Chris Baker (christopher.e.baker@nasa.gov), Justin Treptow (justin.treptow@nasa.gov)
    - Carbon capture and utilization: James Broyan (james.l.broyan@nasa.gov)
    - Harnessing data for improved visualization: Lawrence Friedl (SMD) (lfriedl@nasa.gov)
    - Addressing Orbital Debris: Bo Naasz (Bo.j.naasz@nasa.gov)

Applicants are strongly encouraged to familiarize themselves with the 2020 NASA Technology Taxonomy (replaced the 2015 NASA Technology Roadmaps) and the NASA Strategic Technology Framework that most closely aligns with their space technology interests. The 2020 NASA Technology Taxonomy may be downloaded at the following link: https://www.nasa.gov/offices/oct/taxonomy/index.html. The NASA Strategic Technology Framework, including presentations describing the Envisioned Future and strategy for addressing each of the STMD capability areas and outcomes, can be found at: https://techport.nasa.gov/framework.

The National Aeronautics and Space Administration (NASA) Space Technology Mission Directorate (STMD) current year version of the NASA Research Announcement (NRA) entitled, "Space Technology Research, Development, Demonstration, and Infusion" has been posted on the NSPIRES web site at: http://nspires.nasaprs.com (select “Solicitations” and then “Open Solicitations”). The NRA provides detailed information on specific proposals being sought across STMD programs. Specifically, STMD supports research from universities through a number of other solicitations from early stage programs such as NASA’s Innovation Corps Pilot, NASA Innovative Concepts, Space Technology Research Grants, Small Business Technology Transfer, and Lunar Surface Innovation Consortium. Additionally, here’s a link to other STMD program opportunities that potentially could benefit from university research ideas.

8.7 NASA Centers Areas of Interest

“Engagement with Center Chief Technologists and the Agency Capability Leadership Teams is critical to value of the research and selection of proposals.” Examples of Center research
interest areas include these specific areas from the following Centers. If no POC is listed in the Center write-up and contact information is needed, please contact the POC listed in Appendix D for that Center and request contacts for the research area of interest.

8.7.1 Ames Research Center (ARC)

POC: Harry Partridge, harry.partridge@nasa.gov

- **Entry systems**: Safely delivering spacecraft to Earth & other celestial bodies
- **Advanced Computing & IT Systems**: Enabling NASA's advanced modeling and simulation
  - Supercomputing
  - Quantum computing, quantum sensors and quantum algorithms
  - Applied physics and Computational materials
- **Aero sciences**:
  - Wind Tunnels: Testing on the ground before you take to the sky
- **Air Traffic Management**:
  - NextGen air transportation: Transforming the way we fly
  - Airborne science: Examining our own world & beyond from the sky
  - Airspace Systems, Unmanned aerial Systems
- **Astrobiology and Life Science**: Understanding life on Earth - and in space
  - Biology & Astrobiology
  - Space radiation health risks
  - Biotechnology, Synthetic biology
  - Instruments
- **Cost-Effective Space Missions**: Enabling high value science to low Earth orbit & the moon
  - Small Satellites, Cube satellites
- **Intelligent/Adaptive Systems**: Complementing humans in space
  - Autonomy & Robotics: Enabling complex air and space missions, and complementing humans in space
  - Human Systems Integration: Advancing human-technology interaction for NASA missions
  - Nanotechnology-electronics and sensors, flexible electronics
- **Space and Earth Science**: *Understanding our planet, our solar system and everything beyond*
  - Exoplanets: Finding worlds beyond our own
  - Airborne Science: Examining our own world & beyond from the sky
  - Lunar Sciences: Rediscovering our moon, searching for water
8.7.2 Armstrong Flight Research Center (AFRC)

POC: Timothy Risch, timothy.k.risch@nasa.gov

<table>
<thead>
<tr>
<th>POC</th>
<th>Technology Area</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sean Clarke</td>
<td>Hybrid Electric Propulsion</td>
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<tr>
<td>Ed Hearing</td>
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<tr>
<td>Dan Banks</td>
<td>Supersonic Research (Laminar Flow)</td>
<td><a href="mailto:daniel.w.banks@nasa.gov">daniel.w.banks@nasa.gov</a></td>
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<tr>
<td>Larry Hudson</td>
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<tr>
<td>Matt Boucher</td>
<td>Control of Flexible Structures, Modeling, System Identification, Advanced Sensors</td>
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<tr>
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<tr>
<td>Bruce Cogan</td>
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</tr>
</tbody>
</table>

8.7.3 Glenn Research Center (GRC)

POC: Kurt Sacksteder, kurt.sacksteder@nasa.gov

- **Power and Energy Storage Systems for Aviation and Space Applications**: sustainable, reduced- and zero-carbon emission approaches, substantial mass and efficiency improvements, and operability in challenging environments
- **Power System Architectures, Networks, and Systems Management and Integration Approaches**: including microgrids and power conversion and management electronics
• **Breakthrough Concepts in Photovoltaics, Electrochemistry, Photocatalysis, Photo/Thermal Energy Conversion:** including enabling manufacturing approaches and integration

• **Electronics for Extreme Temperature Environments:** devices, components, and subsystems

• **Microwave, Optical, and Cognitive Communications Devices, Components, and Systems:** expanded bandwidth and reductions in size and power consumption

• **Quantum Sensors, Communications, and Networks:** devices and simulations

• **Communication Architectures, Networks, and Systems:** integration and simulation

• **Intelligent and Autonomous Systems:** smart sensors, extreme environment instruments

• **Advanced Concepts in Systems Engineering for Aeronautical and Space Systems:** physics-based models, machine learning, and artificial intelligence applications

• **Electrified Aircraft:** architectures, components, systems, and system-level simulations

• **Space-Based Electric Propulsion:** advanced materials, components, and systems

• **Cryogenic Fluid Systems:** components, systems, and cryofluid management simulations

• **Thermal Management Systems:** propulsion and/or power systems for aviation and space

• **Acoustic Emission Mitigation:** aviation and space propulsion applications

• **Aircraft Icing:** prevention, mitigation, and simulation

• **Aviation Safety:** simulation, system concepts, architectures

• **Advanced Computational Fluid Dynamics and Systems Engineering** related to aviation propulsion systems including internal and external aerodynamics, aero-thermochemistry

• **Multi-Functional Materials:** concepts, components, and simulations engaging mechanical, structural, electrical, thermal, energy, communications, or propulsion features, especially including applications enabled by advanced manufacturing processes

• **Shape Memory Alloy Utilization:** actuation, harsh environments, high-strain applications

• **Advanced Metallic Alloy, Ceramic, Macromolecular, and Composite Materials and Coatings:** for extreme environments, especially where enabled by advanced manufacturing processes

• **Nanotechnology Applications:** enhanced mechanical, thermal, electrical, chemical, electrochemical, or catalytic properties

• **Fundamentals of Fluid Physics, Combustion Phenomena, Complex Fluids, and Bioengineering** in reduced- or near-zero gravitational environments

• **Transformational Technologies** such as In-Situ Resource Utilization ((ISRU), in-Space Assembly and Manufacturing (ISAM), and Thermal Management, that are optimized for reduced-gravity environments
8.7.4 Goddard Space Flight Center (GSFC)

8.7.4.1 Engineering Technology Directorate (ETD)

POC: Denise Cervantes, Ph.D.  denise.cervantes@nasa.gov

NASA Goddard Space Flight Center is home to the nation’s largest organization of scientists, engineers, and technologists who conceive, design and build new technology to study the solar system and universe.

The Engineering and Technology Directorate (ETD) is the engine that powers Goddard. ETD is the largest organization at Goddard and is home to approximately 1,300 engineers who provide multidisciplinary engineering expertise to NASA’s many missions. Goddard has six distinctive facilities & installations. ETD has employees at the Greenbelt main campus in Maryland, Wallops Flight Facility in Virginia, and White Sands Test Facility Ground Stations in New Mexico.

ETD provides multi-disciplinary engineering expertise for the development of cutting-edge science and exploration systems and technologies in the following areas: Earth Science, Astrophysics, Solar System, Heliophysics and Exploration. In addition, ETD acquires and distributes science data worldwide. Goddard encompasses major laboratories and facilities for developing and operating unmanned scientific spacecraft.

GSFC ETD POCS:

- Code 500/GSFC ETD Workforce Development & OSTEM/Higher Education Manager, Dr. Denise Cervantes, denise.cervantes@nasa.gov
- Code 500/GSFC ETD Chief Technologist, Michael Johnson, michael.a.johnson@nasa.gov
  - Code 500/ETD Wallops Flight Facility Engineering Division
    - Associate Chief Technologist, Sarah Wright, sarah.wright@nasa.gov
  - Code 540/ETD Mechanical Systems Division
    - Associate Chief Technologist, Dr. Vivek Dwivedi, vivek.h.dwivedi@nasa.gov
  - Code 550/ETD Instrument Systems and Technology Division
    - Associate Chief Technologist, Renee Reynolds, renee.m.reynolds@nasa.gov
  - Code 560/ETD Electrical Engineering Division
    - Associate Chief Technologist, Chris Green, christopher.m.green-1@nasa.gov
  - Code 580/ETD Software Engineering Division
    - Associate Chief Technologist, Karin Blank, karin.b.blank@nasa.gov
  - Code 590/ETD Mission Engineering and Systems Analysis Division
    - Associate Chief Technologist, Cheryl Gramling, cheryl.l.gramling@nasa.gov
- Code 500/GSFC ETD New Business Leads
Code 500/ETD Wallops Flight Facility Engineering Division
   - WFF New Business Lead, Benjamin Cervantes, benjamin.w.cervantes@nasa.gov

Code 540/ETD Mechanical Systems Division
   - New Business Lead, Sharon Cooper, sharon.cooper@nasa.gov

Code 550/ETD Instrument Systems and Technology Division
   - New Business Lead, Dr. Aprille Ericsson, aprille.j.ericsson@nasa.gov

Code 560/ETD Electrical Engineering Division
   - New Business Lead, Marcellus Proctor, marcellus.proctor@nasa.gov

Code 580/ETD Software Engineering Division
   - New Business Lead, Steve Tompkins, steven.d.tompkins@nasa.gov

Code 590/ETD Mission Engineering and Systems Analysis Division
   - New Business Lead, Peter Knudtson, peter.a.knudtson@nasa.gov

ETD Research Areas:

- Advanced Manufacturing - facilitates the development, evaluation, and deployment of efficient and flexible additive manufacturing technologies. (ref: NAMII.org)
- Advanced Multi-functional Systems and Structures - novel approaches to increase spacecraft systems resource utilization
- Micro- and Nanotechnology - Based Detector Systems - research and application of these technologies to increase the efficiency of detector and optical systems
- Ultra-Miniature Spaceflight Systems and Instruments - miniaturization approaches from multiple disciplines - materials, mechanical, electrical, software, and optical - to achieve substantial resource reductions
- Systems Robust to Extreme Environments - materials and design approaches that will preserve designed system properties and operational parameters (e.g. mechanical, electrical, thermal), and enable reliable systems operations in hostile space environments.
- Spacecraft Navigation Technologies
  - Surface Localization algorithm for autonomous navigation based on sensor observation fusion
  - Spacecraft GNSS receivers, ranging crosslink transceivers, and relative navigation sensors
  - Optical navigation and satellite laser ranging
  - Deep-space autonomous navigation techniques
  - Software tools for spacecraft navigation ground operations and navigation analysis
  - Formation Flying
- Automated Rendezvous and Docking (AR&D) techniques
  - Algorithm development
  - Pose estimation for satellite servicing missions
  - Sensors (e.g., LiDARs, natural feature recognition)
  - Actuation (e.g., micro propulsion, electromagnetic formation flying)
- Mission and Trajectory Design Technologies
Mission design tools that will enable new mission classes (e.g., low thrust planetary missions, precision formation flying missions)

Mission design tools that reduce the costs and risks of current mission design methodologies

Trajectory design techniques that enable integrated optimal designs across multiple orbital dynamic regimes (i.e. earth orbiting, earth-moon libration point, sun-earth libration point, interplanetary)

- Spacecraft Attitude Determination and Control Technologies
  - Modeling, simulation, and advanced estimation algorithms
  - Advanced spacecraft attitude sensor technologies (e.g., MEMS IMU’s, precision optical trackers)
  - Advanced spacecraft actuator technologies (e.g. modular and scalable momentum control devices, ‘green’ propulsion, micropropulsion, low power electric propulsion)

- CubeSats - Participating institutions will develop CubeSat/Smallsat components, technologies and systems to support NASA technology demonstration and risk reduction efforts. Student teams will develop miniature CubeSat/Smallsat systems for: power generation and distribution, navigation, communication, on-board computing, structures (fixed and deployable), orbital stabilization, pointing, and de-orbiting. These components, technologies and systems shall be made available for use by NASA for integration into NASA Cubesat/Smallsats. They may be integrated into complete off-the-shelf “CubeSat/Smallsat bus” systems, with a goal of minimizing “bus” weight/power/volume/cost and maximizing available “payload” weight/power/volume. NASA technologists will then use these components/systems to develop payloads that demonstrate key technologies to prove concepts and/or reduce risks for future Earth Science, Space Science and Exploration/Robotic Servicing missions.

- On-Orbit Multicore Computing - High performance multicore processing for advanced automation and science data processing on spacecraft. There are multiple multicore processing platforms in development that are being targeted for the next generation of science and exploration missions, but there is little work in the area of software frameworks and architectures to utilize these platforms. It is proposed that research in the areas of efficient inter-core communications, software partitioning, fault detection, isolation & recovery, memory management, core power management, scheduling algorithms, and software frameworks be done to enable a transition to these newer platforms. Participating institutions can select areas to research and work with NASA technologists to develop and prototype the resulting concepts.


- Quantum Sensors and Quantum Networking

- Artificial Intelligence and Machine Learning
Generative Design- leveraging an artificial intelligence-based iterative design process to optimize the design of systems.

Radiation Effects and Analysis
- Flight validation of advanced event rate prediction techniques
- New approaches for testing and evaluating 3-D integrated microcircuits and other advanced microelectronic devices
- End-to-end system (e.g., integrated component level or higher) modeling of radiation effects
- Statistical approaches to tackle radiation hardness assurance (i.e., total dose, displacement damage, and/or single-event effects) for high-risk, low-cost missions.

Model Based System Engineering (MBSE)

8.7.4.2 Sciences and Exploration Directorate

POC: Blanche Meeson, Blanche.W.Meeson@nasa.gov

Dr. Blanche Meeson (she/her/hers)

Chief for Higher Education and GSFC NASA Postdoctoral Program

The Sciences and Exploration Directorate at NASA Goddard Space Flight Center (http://science.gsfc.nasa.gov) is the largest Earth and space science research organization in the world. Its scientists advance understanding of the Earth and its life-sustaining environment, the Sun, the solar system, and the wider universe beyond. All are engaged in the full life cycle of satellite missions and instruments from concept development to implementation, analysis and application of the scientific information, and community access and services.

- The Earth Sciences Division 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. We analyze observational data from these spacecraft and make it available to the world's scientists and policy makers. The Division conducts extensive field campaigns to gather data from the surface and airborne platforms. The Division also develops, uses, and assimilates observations into models that simulate planetary processes involving the water, energy, and carbon cycles at multiple scales up to global.

POC: Eric Brown de Colstoun (eric.c.browndecolsto@nasa.gov)

- The Astrophysics Science Division conducts a broad program of research in astronomy, astrophysics, and fundamental physics. Individual investigations address issues such as the nature of dark matter and dark energy, which planets outside our solar system may harbor life, and the nature of space, time, and matter at the edges of black holes. Observing photons, particles, and gravitational waves enables researchers to probe
astrophysical objects and processes. Researchers develop theoretical models, design experiments and hardware to test theories, and interpret and evaluate observational data.

POC: Rita Sambruna (Rita.m.Sambruna@nasa.gov).

- 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 magnetosphere and its outer atmosphere, and Space Weather—the important effects that heliospheric disturbances have on spacecraft and terrestrial systems. Division scientists develop spacecraft missions and instruments, systems to manage and disseminate heliophysical data, and theoretical and computational models to interpret the data. Possible heliophysics-related research include: advanced software environments and data-mining strategies to collect, collate and analyze data relevant to the Sun and its effects on the solar system and the Earth (“space weather”); and advanced computational techniques, including but not limited to parallel architectures and the effective use of graphics processing units, for the simulation of magnetized and highly dynamic plasmas and neutral gases in the heliosphere.

POC: Doug Rabin (Douglas.Rabin@nasa.gov).

- The **Solar System Exploration Division** builds science instruments and 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. To study how planetary systems form and evolve, division scientists develop theoretical models and experimental research programs, as well as mission investigations and space instruments to test them. The researchers participate in planetary and Earth science missions, and collect, interpret, and evaluate measurements.

POC: Terry Hurford (Terry.a.Hurford@nasa.gov)

- **Artificial Intelligence, Machine Learning, Big Data Analytics:** The Data Science Group (DSG) supports science through the implementation and applications of artificial intelligence, machine learning, and big data analytics. The DSG supports all science divisions across a wide variety of applications using standard software engineering practices. The DSG is focused on accelerating science and enabling new discoveries through such activities as creation of AI/ML ready data sets, Foundation Models, uncertainty quantification, explainable AI/ML, reproducibility, and open science.

POC: Dr. Mark Carroll (mark.carroll@nasa.gov)

Scientists in all four divisions and our computational and information science organization publish research results in the peer-reviewed literature, participate in the archiving and public dissemination of scientific data, and provide expert user support.
8.7.5 Jet Propulsion Laboratory (JPL)

POC: Dr. Tom Cwik, thomas.a.cwik@jpl.nasa.gov

- **Solar System Science**
  - Planetary Atmospheres and Geology
  - Solar System characteristics and origin of life
  - Primitive (1) solar systems bodies
  - Lunar (9) science
  - Preparing for returned sample investigations

- **Earth Science**
  - Atmospheric composition and dynamics
  - (Atmospheric Dynamics)
  - Land and solid earth processes (Solid Earth Processes)
  - Water and carbon cycles, Carbon Cycles, Water Cycles
  - Ocean and ice
  - Earth analogs to planets, Earth Analog Climate Science

- **Astronomy and Fundamental Physics**
  - Origin, evolution, and structure of the universe, Origin Universe, Evolution Universe, Structure Universe
  - Gravitational astrophysics and fundamental physics
  - Extra-solar planets: Exoplanets; Star formation; Planetary formation
  - Solar and Space Physics
  - Formation and evolution of galaxies; Formation Galaxies; Evolution Galaxies

- **In-Space Propulsion Technologies**
  - Chemical propulsion
  - Non-chemical propulsion
  - Advanced propulsion technologies
  - Supporting technologies
  - Thermal Electric Propulsion
  - Electric Propulsion

- **Space Power and Energy Storage**
  - Power generation
  - Energy storage

- **Human Exploration Destination Systems**
  - In situ resource utilization and Cross-cutting systems

- **Science Instruments, Observatories and Sensor Systems**
  - Science Mission Directorate Technology Needs
  - Remote Sensing instruments/Remote Sensing Sensors
  - Observatory technologies
  - In-situ instruments, Sensor technologies Sensors
  - In situ technologies
  - Instrument technologies
  - Precision frequency
  - Precision timing

- **Entry, Descent and Landing Systems**
  - Aerobraking, Aerocapture and entry system; Descent; Engineered materials; Energy generation and storage; Propulsion; Electronics, devices, and sensors
  - Nanotechnology
  - Microtechnology
  - Microelectronics
  - Microdevice
  - Orbital Mechanics
  - Spectroscopy

- **Modeling, Simulation, Information Technology and Processing**
  - Flight and ground computing; Modeling; Simulation; Information processing

- **Materials, Structures, Mechanical Systems and Manufacturing**
  - Materials; Structures; Mechanical systems; Cross cutting

- **Thermal Management Systems**
  - Cryogenic systems; Thermal control systems (near room temperature); Thermal protection systems
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</table>

**8.7.6 Johnson Space Center (JSC)**

POC: Schwing, Brian M. (JSC-AA211) [brian.m.schwing@nasa.gov](mailto:brian.m.schwing@nasa.gov)

Goodman, William {Doug} (JSC-XT)[Jacobs Technology, Inc.]  
doug.goodman@nasa.gov

Linda Ham, [linda.j.ham@nasa.gov](mailto:linda.j.ham@nasa.gov)

Exploration Integration and Science Directorate
Active Thermal Control

- Condensing heat exchanger coatings with robust hydrophilic, antimicrobial properties
- Development and demonstration of wax and water-based phase change material heat exchangers
- Lightweight heat exchangers and cold plates

ECLSS

- Advancements in Carbon Dioxide Reduction
- Habitation systems that minimize consumables
- Human thermal modeling
- Low toxicity hygiene and cleaning products and methods

EVA

- Portable Life Support System
- Power, Avionics and Software
- Pressure Garment

Entry, Descent, and Landing

- Innovative, Groundbreaking, and High Impact Developments in Spacecraft GN&C Technologies
- Deployable Decelerator Technologies
- High-Fidelity Parachute Fluid/Structure Interaction
- Mechanical Reefing Release Mechanism for Parachutes
- Next Generation Parachute Systems & Modeling
- Precision Landing & Hazard Avoidance Technologies
- Regolith – Rocket Plume Interaction: In-situ Measurements to Enable Multiple Landings at the Same Site
- Optical / Vision-Based Navigation for EDL Applications
- Sensors, including those embedded in thermal protection systems and proximity operations and landing
- Additive Manufacturing for Thermal Protection Systems
- Advanced Materials and Instrumentation for Thermal Protection Systems
- Predictive Material Modeling

Power Distribution and Control

- Lightweight, radiation tolerant cables and spools for Lunar/Mars surface power
- Dust tolerant electrical connectors
- Radiation hard power convertors.
Energy Storage technologies

- Batteries, Regenerative Fuel cells
- High energy, long-life fuel cell membranes

In-Situ Resource Utilization

- Lunar/Mars regolith processing and water-ice mining (Regolith collection, delivery, regolith processing, and drying; Water separation and capture, water cleanup processing, water electrolysis)
- Mars atmosphere processing (CO2 collection; Dust filtering; Solid Oxide CO2 electrolysis; Sabatier; Reverse water gas shift)
- Methane/Oxygen liquefaction and storage
- ISRU regolith processing simulation and modeling

In-space propulsion technologies

- Human rated in-space propulsion systems (storable and cryogenic)
- EVA-IVA compatible miniature propulsion systems (including CubeSat)
- Propellant transfer and refueling
- Propellant gauging

Pyrotechnic device development and test

- Miniature pyrovalves
- Low energy, long duration pyrotechnic devices

Autonomy and Robotics

- Biomechanics
- Crew Exercise
- Human Robotic interface
- Autonomous Vehicle Systems/Management
- Data Mining and Fusion
- Robotics and TeleRobotics
- Simulation and modeling

Autonomous Rendezvous and Docking - Next generation In-space docking systems concepts addressing challenges of mass, environments, flight operations and including long duration missions, consider:

- New Rendezvous & Docking strategies i.e., greater vehicle reliance vs kinetic energy, addressing vehicle capabilities, sensors, etc.
- Simplification of soft capture system attenuation; less complex and lighter systems
• Docking independent LRU strategies vs Integrated vehicle solution
• Seals and sealing technology
• Consumables transfer technology (power, data, water, air, fluids)
• Maintenance

**Surface Docking System Concepts addressing:**

• System design and interfaces
• Environment’s tolerance including long duration exposure

**Human Research**

• Behavioral health diagnostic and treatment techniques
• Non-invasive diagnostic aides that work in a communication delay setting

**Inflatable and Attachments**

• Inflatable Technology Archive/Database (Inflatable data from 30+ years being compiled/tech transfer)
• Advanced Material Development (Lunar/Martian Surface Protection)
• Inflatable Structural Design (hard structure Integration)
• Inflatable Attachment Technology Development (hatches, windows, handrails, floors, internal walls, grapple fixture, docking hatch, radiators, solar panels, etc.)
• Softgoods Structural Health Monitoring (Strain measurement, impact detection)
• Softgoods Folding and Packaging Testing (Cold temp folding)
• Softgoods Materials Testing (Creep test, Air barrier, Permeability)
• Sub-scale Structural Testing (Proof, Burst, Creep Testing)
• Full-scale Thermal Vacuum Testing (Chamber A environmental testing)

**Spacecraft Glass & Windows**

• Further the state of the art in light weight windows by advancing polymer materials as windowpanes.
  o Understand and mitigate the effects of UV/Radiation and other spaceflight environments on polymer windowpane materials and developing accurate testing techniques for environmental characterization
  o Produce accurate loads/stress modeling and correlation techniques of non-linear materials.
  o Conduct elevated temperature creep testing for polymer windowpane materials.
  o Develop mechanical material properties as a function of temperature, and optical material properties a function of wavelength for polymer windowpane materials.
  o Investigate methods of reducing flammability of polymer windowpane materials.
  o Understand storage effects of polymer window materials.
  o Develop inspection techniques correlated to residual polymer window materials.
  o Evolve the design of polymer windows to allow for long term spaceflight and enhanced viewability.
• Reduce the overhead of processing brittle material windowpanes by improving ground inspection and assessment techniques and developing on-orbit inspection techniques.

**Computer Human Interfaces (CHI)**

**CHI - Human System Integration**

• Human Computer Interaction design methods (Multi-modal and Intelligent Interaction) and apparatuses
• Human Systems Integration, Human Factors Engineering: state of the art in Usability, workload, and performance assessment methods and apparatus.
• Inclusion of Human Readiness Level into HSI
• Humans Systems Integration Inclusion in Systems Engineering
• Human-in-the-loop system data acquisition and performance modeling
• Trust computing methodology

**CHI - Informatics**

• Crew decision support systems
• Advanced Situation Awareness Technologies
• Intelligent Displays for Time-Critical Maneuvering of Multi-Axis Vehicles
• Intelligent Response and Interaction System
• Exploration Space Suit (xEMU) Informatics
• Graphic Displays to Facilitate Rapid Discovery, Diagnosis and Treatment of Medical Emergencies
• CHI machine learning methods and algorithms
• Imaging and information processing
• Audio system architecture for Exploration Missions

**CHI - Audio**

• Array Microphone Systems and processing
• Machine-learning front end audio processing
• Audio Compression algorithms implementable in FPGAs.
• COMSOL Acoustic modeling
• Front end audio noise cancellation algorithms implementable in FPGAs-example Independent Component Analysis
• Large bandwidth (audio to ultra-sonic) MEMs Microphones
• Sonification Algorithms implementable in DSPs/FPGAs
• Far-Field Speech Recognition in Noisy Environments

**CHI - Imaging and Display**

• Lightweight/low power/radiation tolerant displays
• OLED Technology Evaluation for Space Applications
• Radiation tolerant Graphics Processing Units (GPUs)
• Scalable complex electronics & software-implementable graphics processing unit
• Radiation-Tolerant Imagers
• Immersive Imagery capture and display
• H265 Video Compression
• Ultra High Video Compressions
• A Head Mounted Display Without Focus/Fixation Disparity
• EVA Heads-Up Display (HUD) Optics

**Wearable Technology**

• Tattooed Electronic Sensors
• Wearable Audio Communicator
• Wearable sensing and hands-free control
• Wearable Sensors and Controls
• Wearable digital twin/transformation sensor systems

**Wireless and Communications Systems**

• Computational Electromagnetics (CEM) Fast and Multi-Scale Methods/Algorithms
• EPCglobal-type RFID ICs at frequencies above 2 G
• Radiation Hardened EPCglobal Radio Frequency Identification (RFID) Readers
• Radiation robust 3GPP network technologies
• Robust, Dynamic Ad hoc Wireless Mesh Communication Networks
• Wireless Energy Harvesting Sensor Technologies
• Flight and Ground communication systems

**Radiation and EEE Parts**

• Mitigation and Biological countermeasures
• Monitoring
• Protection systems
• Risk assessment modeling
• Space weather prediction

8.7.7 Kennedy Space Center (KSC)

POC: Tim Griffin ([timothy.p.griffin@nasa.gov](mailto:timothy.p.griffin@nasa.gov))

• Storage, Distribution, and Conservation of Cryogenic Fluids and Commodities
• Tools and Techniques for Control, Operation, Inspection, Analysis and Repair
• Environmental and Green Technologies
• Safety Systems for Operations
• Communication and Tracking Technologies
• Robotic, Automated, and Autonomous Systems and Operations
• Operations Support and Advanced Studies Leveraging Primary Center Role Expertise
• Payload Processing and Integration Technologies
• Logistics
• Water/Nutrient Recovery and Management
• Food Production and Waste Management
• Plant Habitats and Flight Systems
• Robotic, Automated and Autonomous Food Production
• ISRU Development Planning/Strategy to Fit Into Architecture
• Resource Acquisition - Regolith/Trash & Gases Liquids
• Consumable Production - Extract/Produce Fuel
• In Situ Construction such as, Landing Pads, Roads, and Berms
• Distribution and Storage of In Situ Resources
• Scientific Instruments
• Resource Assessment/Prospecting

8.7.8 Langley Research Center (LaRC)

POC: Neyda Abreu, neyda.m.abreu@nasa.gov

<table>
<thead>
<tr>
<th>POC</th>
<th>Technology Area - Topics</th>
<th>NASA Email</th>
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</thead>
<tbody>
<tr>
<td>Alireza Mazaheri</td>
<td>Topic 1: Aerosciences</td>
<td><a href="mailto:ali.r.mazaheri@nasa.gov">ali.r.mazaheri@nasa.gov</a></td>
</tr>
</tbody>
</table>

**Topic 1: Aerosciences**

• Uncertainty quantification for high-fidelity multidisciplinary (e.g., aeroelastic, aeroacoustic) analysis for aircraft flight
  POC: Beth Lee-Rauch, e.lee-rausch@nasa.gov
• Multi-physics high-fidelity approaches for advanced or emerging computer architectures
  POC: Beth Lee-Rauch, e.lee-rausch@nasa.gov
• Machine learning for turbulent or transitional flow modeling
  POC: Beth Lee-Rauch, e.lee-rausch@nasa.gov
• HYBRID turbulent simulation methods and models to simulate highly separated turbulent flows
  POC: Luther Jenkins, luther.n.jenkins@nasa.gov
• Efficient synthetic turbulence generation methods
  POC: Luther Jenkins, luther.n.jenkins@nasa.gov
• Wall models for compressible flows
  POC: Luther Jenkins, luther.n.jenkins@nasa.gov
• High-order unstructured schemes for high-speed flows and aerothermodynamics
  POC: Alireza Mazaheri, ali.r.mazaheri@nasa.gov
• Modular GPU-based chemically reacting solver with stiff integrator
  POC: Andrew Norris andrew.t.norris@nasa.gov
• Uncertainty quantification for stochastic probability density function (PDF) methods
POC: Andrew Norris andrew.t.norris@nasa.gov
• Gas lattice methods for continuum (high density) flows
  POC: Andrew Norris andrew.t.norris@nasa.gov
• Broadband noise prediction of advanced air mobility aircraft
  POC: Mike Doty, michael.j.doty@nasa.gov
• Novel material concepts to extend the frequency range of acoustic liners
  POC: Ran Cabell, randolph.h.cabell@nasa.gov
• Novel noise reduction concepts for urban air mobility (UAM) propulsors
  POC: Ran Cabell, randolph.h.cabell@nasa.gov

“Mike” Fremaux    Topic 2: Intelligent Flight Systems & Trusted Autonomy    c.m.fremaux@nasa.gov

Topic 2: Intelligent Flight Systems & Trusted Autonomy

Research in areas of advanced air mobility, increasingly automated and autonomous systems, robotics, and “smart cities” to enable current and future NASA missions and maintain U.S. aerospace preeminence. Development and validation of new architectures, technologies, and operations for increasingly complex and increasingly autonomous aerospace systems is accomplished by:

• Enabling robust control, vehicle performance, and mission management under nominal, and contingency management under off-nominal conditions.
• Ensuring robust and flexible human-machine integration and teaming.
• Advancing technologies for vehicle and system-autonomy, robotics, and flight vehicle environment awareness.
• Developing new methods and tools for the verification, validation, and safety assurance of complex and autonomous systems.
• Developing, maintaining, and utilizing experimental ground and flight test facilities and labs.

Chris Wohl    Topic 3: Advanced Materials, Manufacturing Technologies & Structural Systems    c.j.wohl@nasa.gov

Topic 3: Advanced Materials, Manufacturing Technologies & Structural Systems

• Rapid, scalable additive manufacturing
• Materials for extreme environments
• Materials manufacturing and characterization in extreme environments
- Computational modeling of the manufacturing process influence on metallic microscale and bulk properties
- Computational modeling of polymer synthesis, processing, and additive manufacturing
- Multifunctional materials supporting electric aircraft
- Composite materials supporting green aviation
- Process monitoring during composites fabrication
- Materials systems supporting Human Landing System (HLS) and Environmental Control and Life Support System (ECLSS) objectives

<table>
<thead>
<tr>
<th>“Tony” Humphreys</th>
<th>Topic 4: Measurement Systems - Advanced Sensors and Optical Diagnostics</th>
<th><a href="mailto:william.m.humphreys@nasa.gov">william.m.humphreys@nasa.gov</a></th>
</tr>
</thead>
</table>

**Topic 4: Measurement Systems - Advanced Sensors and Optical Diagnostics**

- Measurement Systems - Advanced Sensors and Optical Diagnostics
  POC: “Tony” Humphreys - william.m.humphreys@nasa.gov
- Detectors and focal planes for Low Earth Orbit observing platforms
  POC: Alan Little, a.little@nasa.gov
- Electronics for both flight platforms and ground test facilities
  POC: Arthur Bradley, arthur.t Bradley@nasa.gov
- Optical components including adaptive optics based on phase change materials
  POC: Hyun Jung Kim, hyunjung.kim@nasa.gov
- Microwave, millimeter, and sub-millimeter wave detection systems
  POC: Jay Ely, jay.j.ely@nasa.gov
- Weather sensors for Advanced Air Mobility (AAM) applications
  POC: Jay Ely, jay.j.ely@nasa.gov
- Custom laser designs (wavelengths, pulse durations, etc.) for remote sensing and ground facility test applications
  POC: Paul Danehy, paul.m.danehy@nasa.gov
- Flow visualization methods for high-speed ground test facilities (supersonic to hypersonic)
  POC: Brett Bathel, brett.f.bathel@nasa.gov
- High spatial and temporal resolution velocimetry measurements, both seeded and seedless
  POC: Paul Danehy, paul.m.danehy@nasa.gov
- Global surface pressure and temperature measurements
  POC: Neal Watkins, anthony.n.watkins@nasa.gov
- Cryogenic and thermal sensors for ground test facilities
  POC: Lisa Le Vie, lisa.r.levie@nasa.gov
- Non-destructive evaluation (NDE) methods for crewed vehicle structural health
  POC: Patti Howell, patricia.a.howell@nasa.gov
- Automated non-destructive evaluation (NDE) methods and systems utilizing machine learning
  POC: Patti Howell, patricia.a.howell@nasa.gov
<table>
<thead>
<tr>
<th>Ron Merski</th>
<th>Topic 5: Entry, Descent &amp; Landing</th>
<th><a href="mailto:n.r.merski@nasa.gov">n.r.merski@nasa.gov</a></th>
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<td><strong>Topic 5: Entry, Descent &amp; Landing</strong></td>
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<tr>
<td>• Advanced EDL architecture approaches</td>
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<td>• Advanced EDL vehicle concepts – small spacecraft</td>
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<td>• EDL systems analysis (empirical performance assessment tools, packaging)</td>
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<td>• Aero-assist technologies -- Aerocapture concepts</td>
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<td>• Aero maneuvering technologies – trim tabs, morphing, RCS, magneto-hydrodynamics (MHD)</td>
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<td>• Decelerator technologies – ballutes, parachutes, supersonic retro-propulsion, hypersonic inflatable aerodecelerators (HIADs)</td>
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<td>• High end computing for EDL modeling -- GPUs</td>
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<td>• Atmospheric model development</td>
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<thead>
<tr>
<th>Allen Larar</th>
<th>Topic 6: Terrestrial and Planetary Atmospheric Sciences</th>
<th><a href="mailto:allen.m.larar@nasa.gov">allen.m.larar@nasa.gov</a></th>
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<tr>
<td><strong>Topic 6: Terrestrial and Planetary Atmospheric Sciences</strong></td>
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<tr>
<td>• Atmospheric science focus areas cover a broad range of measurements and applications, including:</td>
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<td>o Measurements of water vapor, carbon dioxide, ozone, methane, nitrogen oxides, and other important greenhouse gases</td>
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<td>o Aerosol and cloud properties</td>
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</table>
- Atmospheric winds
- Radiation budget
- Atmospheric chemistry and air quality
- Climate change

| Allen Larar | Topic 7: Innovative Concepts for Earth and Space Science Measurements | allen.m.larar@nasa.gov |

**Topic 7: Innovative Concepts for Earth and Space Science Measurements**

- Advanced active and passive remote sensing and in-situ concepts & sensors for new and improved measurements, including:
  - LiDAR
  - Radiometers
  - Spectrometers
  - Interferometers

### 8.7.9 Marshall Space Flight Center (MSFC)

POC: John Dankanich, john.dankanich@nasa.gov and

https://www.nasa.gov/offices/oct/center-chief-technologists-2

These Principal Technologists and System Capability Leads are available for consultation with proposers regarding the state-of-the-art, on-going activities and investments, and strategic needs in their respective areas of expertise. Proposers are encouraged to consult with the appropriate PT or SCLT early in the proposal process.

<table>
<thead>
<tr>
<th>POC</th>
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<tbody>
<tr>
<td>Danette Allen</td>
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<tr>
<td>Scott Cryan</td>
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<tr>
<td>John Dankanich</td>
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<tr>
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<td>Name</td>
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<td>Michael Johansen</td>
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<td>Julie Kleinhenz</td>
<td>In Situ Resource Utilization</td>
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<td>Angela Krenn</td>
<td>Thermal Technologies</td>
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<tr>
<td>Ron Litchford</td>
<td>Propulsion Systems</td>
<td><a href="mailto:ron.litchford@nasa.gov">ron.litchford@nasa.gov</a></td>
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<td>Jason Mitchell</td>
<td>Communications &amp; Navigation</td>
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</tr>
<tr>
<td>Michelle Munk</td>
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<td><a href="mailto:michelle.m.munk@nasa.gov">michelle.m.munk@nasa.gov</a></td>
</tr>
<tr>
<td>Bo Naasz</td>
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</tr>
<tr>
<td>Denise Podolski</td>
<td>Sensors/Radiation/Comm.</td>
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</tr>
<tr>
<td>Jerry Sanders</td>
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<td>John Scott</td>
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<td>John Vickers</td>
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</tr>
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</tr>
<tr>
<td>Mike Wright</td>
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<td><a href="mailto:michael.j.wright@nasa.gov">michael.j.wright@nasa.gov</a></td>
</tr>
</tbody>
</table>

**Propulsion Systems**

- Launch Propulsion Systems, Solid & Liquid
- In Space Propulsion (Cryogenics, Green Propellants, Nuclear, Fuel Elements, Solar-Thermal, Solar Sails, Tethers)
- Propulsion Testbeds and Demonstrators (Pressure Systems)
- Combustion Physics
- Cryogenic Fluid Management
- Turbomachinery
- Rotordynamics
- Solid Propellant Chemistry
- Solid Ballistics
- Rapid Affordable Manufacturing of Propulsion Components
- Materials Research (Nano Crystalline Metallics, Diamond Film Coatings)
- Materials Compatibility
- Computational Fluid Dynamics
- Unsteady Flow Environments
- Acoustics and Stability
- Low Leakage Valves

**Space Systems**

- Surface Habitation
- Surface Construction and Manufacturing
- In Space Habitation (Life Support Systems and Nodes, 3D Printing)
• Mechanical Design & Fabrication
• Small Payloads (For International Space Station, Space Launch System)
• In-Space Asset Management (Automated Rendezvous & Capture, De-Orbit, Orbital Debris Mitigation, Proximity Operations)
• Radiation Shielding
• Thermal Protection
• Electromagnetic Interference
• Advanced Communications
• Small Satellite Systems (CubeSats)
• Structural Modeling and Analysis
• Spacecraft Design (CAD)

Space Transportation

• Mission and Architecture Analysis
• Advanced Manufacturing
• Space Environmental Effects and Space Weather
• Lander Systems and Technologies
• Small Spacecraft and Enabling Technologies (Nanolaunch Systems)
• 3D Printing/Additive Manufacturing/Rapid Prototyping
• Meteoroid Environment
• Friction Stir and Ultrasonic Welding
• Advanced Closed-Loop Life Support Systems
• Composites and Composites Manufacturing
• Wireless Data & Comm. Systems
• Ionic Liquids
• Guidance, Navigation and Control (Autonomous, Small Launch Vehicle)
• Systems Health Management
• Martian Navigation Architecture/Systems
• Planetary Environment Modeling
• Autonomous Systems (reconfiguration, Mission Planning)
• Digital Thread / Product Lifecycle Management (for AM and/or Composites)
• Material Failure Diagnostics

Science

• Replicated Optics
• Large Optics (IR, visible, UV, X-Ray)
• High Energy Astrophysics (X-Ray, Gamma Ray, Cosmic Ray)
8.7.10 Stennis Space Center (SSC)

POC: Anne Peek anne.h.peek@nasa.gov

Intelligent Integrated System Health Management (ISHM) for Ground and Space Applications

Integrated system health management (ISHM) is a unified approach to assess the current and future state of a system. ISHM incorporates interdependencies with other systems, available resources, concepts of operations, and operational demands. Multiple sources of data are used to analyze the behavior of a system, identify trends, and estimate the remaining useful life of a system. SSC is interested in methodologies to assess the “health” of ground and space systems that enable sustainable lunar exploration and a commercial lunar economy. SSC creates and applies intelligent models of components that constitute systems. EPSCoR research could: (1) develop monitoring and diagnostic capabilities that use, or can be incorporated by, intelligent models to monitor and document the operation of the system; or (2) develop prognostics capabilities to accurately estimate the remaining useful life of a component or a system.

Autonomous Operations for Ground and Space Applications

Unprecedented levels of autonomy will be required by government and industry to enable sustainable space exploration of the Moon and Mars. Trust in these autonomous systems must be established. SSC is interested in creating robust, predictable, intelligent, hierarchical, distributed, autonomous systems to operate ground (Earth) systems, surface (Moon or Mars) systems, and space vehicles. EPSCoR research could: (1) create architectures and/or procedures to design predictable, safe autonomous systems (no black box approaches dependent on sparse training data); or (2) design and demonstrate edge-enabled autonomous operations (no connection to a
cloud or off-premises/vehicle server) translatable to radiation-tolerant hardware suitable for Moon or Mars missions.

**Advanced Propulsion Test Technology Development**

Launch systems continue to undergo a design and manufacturing revolution. Rigorous testing mitigates design and manufacturing issues with these systems. However, as the launch industry grows dramatically, rocket propulsion testing must significantly lower the costs of testing and increase test throughput.

EPSCoR research could: (1) investigate the use of design-of-experiments techniques to optimize test operations to reduce the total number of tests required to accurately estimate the performance of a rocket engine or its components; (2) investigate options to transform the 2 design and manufacture of high-pressure (up to 15,000 psi), LOX-compatible, cryogenic tanks; (3) investigate the use of artificial intelligence and/or quantum computing to rapidly (and cost effectively) evaluate test site locations and optimize test stand configurations to meet customer needs, and generate the essential design information (preliminary design review level) for the best candidates; (4) improve capabilities and methods to accurately predict and model the transient fluid structure interaction between cryogenic fluids and immersed components to predict the dynamic loads and frequency response of facilities; and (5) improve capabilities to predict the behavior of components (valves, check valves, chokes, etc.) during the facility design process are needed. These capabilities are required for modeling components in high pressure (to 12,000 psi), with flow rates up to several thousand lb/sec, in cryogenic environments and must address two-phase flows. Challenges include accurate, efficient, thermodynamic state models; cavitation models for propellant tanks, valve flows, and run lines; reduction in solution time; improved stability; acoustic interactions; and fluid-structure interactions in internal flows.

**Advanced Rocket Propulsion Test Instrumentation**

Rocket propulsion system development is enabled by rigorous ground testing to mitigate the propulsion system risks inherent in spaceflight. Test articles and facilities are highly instrumented to enable a comprehensive analysis of propulsion system performance. Advanced instrumentation has the potential for substantial reduction in time and cost of propulsion systems development, with substantially reduced operational costs and improvements in ground, launch, and flight system operational robustness.

EPSCoR research could design and demonstrate a wireless, highly flexible instrumentation solution capable of multiple types of measurements (e.g., heat flux, temperature, pressure, strain, and/or near-field acoustics). These advanced instruments should function as a modular node in a sensor network, capable of performing some processing, gathering data, and communicating with other nodes in the network. The sensor network must be capable of integration with data from conventional data acquisition systems adhering to strict calibration and timing standards (e.g., Synchronization with Inter-Range Instrumentation Group— Time Code Format B (IRIG-B) and National Institute of Standards and Technology (NIST) traceability is critical to propulsion test data analysis.)
Appendix 8.B: Contact/Inquiries

For inquiries regarding technical and scientific aspects of NASA's Research Focus Areas in this NOFO, please contact the designated POC.

8.B.1 Mission Directorates: Inquiries/Contacts

<table>
<thead>
<tr>
<th>Mission Directorates</th>
<th>POC</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Dave Berger, <a href="mailto:dave.e.berger@nasa.gov">dave.e.berger@nasa.gov</a></td>
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<tr>
<td>Space Operations Mission Directorate (SOMD)</td>
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<tr>
<td>Commercial Space Capabilities</td>
<td></td>
</tr>
<tr>
<td>Space Operations Mission Directorate (SOMD)</td>
<td>Marc Timm, <a href="mailto:marc.g.timm@nasa.gov">marc.g.timm@nasa.gov</a></td>
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<td>Nancy Searby <a href="mailto:nancy.d.searby@nasa.gov">nancy.d.searby@nasa.gov</a></td>
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<tr>
<td>Science Mission Directorate (SMD) Planetary Science Division</td>
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<td>Michael Lienhard, PhD (he/him) <a href="mailto:michael.a.lienhard@nasa.gov">michael.a.lienhard@nasa.gov</a></td>
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<td>Science Mission Directorate (SMD) Astrophysics Division</td>
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<td>Dr. Mario Perez, <a href="mailto:mario.perez@nasa.gov">mario.perez@nasa.gov</a></td>
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<tr>
<td>POC</td>
<td>STMD Technology Area</td>
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<tr>
<td>Andrew Abercromby</td>
<td>ECLSS</td>
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<td>Danette Allen</td>
<td>Autonomous Systems</td>
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<tr>
<td>Jim Broyan</td>
<td>ECLSS Lead</td>
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<tr>
<td>John Carson</td>
<td>EDL Precision Landing</td>
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<tr>
<td>John Dankanich</td>
<td>In Space Transportation</td>
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<tr>
<td>Bernie Edwards</td>
<td>Communications &amp; Navigation</td>
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<tr>
<td>Mark Hilburger</td>
<td>Structures/Materials; Excavation, Construction and Outfitting</td>
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<tr>
<td>Kristen John</td>
<td>Dust Mitigation</td>
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<tr>
<td>Julie Kleinhenz</td>
<td>In Situ Resource Utilization</td>
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<tr>
<td>Angela Krenn</td>
<td>Thermal and Surface Systems</td>
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<td>Josh Mehling</td>
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<td>Wes Powell</td>
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<td>John Scott</td>
<td>Space Power &amp; Energy Storage</td>
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<td>Arthur Werkheiser</td>
<td>Cryo Fluid Management</td>
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<td>John Scott</td>
<td>Clean energy</td>
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<tr>
<td>Anthony Calomino</td>
<td>Nuclear systems</td>
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<tr>
<td>Jerry Sanders</td>
<td>Hydrogen</td>
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<tr>
<td>Chris Baker</td>
<td>Earth-observing capabilities</td>
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<tr>
<td>Justin Treptow</td>
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<tr>
<td>James Broyan</td>
<td>Carbon capture and utilization</td>
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<tr>
<td>Lawrence Friedl</td>
<td>Harnessing data for improved visualization</td>
</tr>
<tr>
<td>Bo Naasz</td>
<td>Addressing Orbital Debris</td>
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### 8.B.2 NASA Centers: Inquiries/Contacts

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<tr>
<th>NASA Center</th>
<th>POC</th>
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<tbody>
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<td>Sean Clarke</td>
<td>Hybrid Electric Propulsion</td>
</tr>
<tr>
<td>Ed Hearing</td>
<td>Supersonic Research (Boom mitigation and measurement)</td>
</tr>
<tr>
<td>Dan Banks</td>
<td>Supersonic Research (Laminar Flow)</td>
</tr>
<tr>
<td>Larry Hudson</td>
<td>Hypersonic Structures &amp; Sensors</td>
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<tr>
<td>Matt Boucher, Jeff Ouellette</td>
<td>Control of Flexible Structures, Modeling, System Identification, Advanced Sensors</td>
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<tr>
<td>Nelson Brown</td>
<td>Autonomy (Collision Avoidance, Perception, and Runtime Assurance)</td>
</tr>
<tr>
<td>Curt Hanson</td>
<td>Urban Air Mobility (UAM) Vehicle Handling and Ride Qualities</td>
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<td>Shawn McWherter</td>
<td>Urban Air Mobility (UAM) Envelope Protection</td>
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<tr>
<td>Peter Suh, Kurt Kloesel</td>
<td>Aircraft Electrical Powertrain Modeling</td>
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<tr>
<td>Bruce Cogan</td>
<td>Un-crewed Aerial Platforms for Earth and Planetary Science Missions</td>
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<td>Glenn Research Center (GRC)</td>
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<td>Organization</td>
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<td>Goddard Space Flight Center (GSFC)</td>
<td>Dr. Blanche Meeson (she/her/hers)</td>
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<td>Sciences and Exploration Directorate</td>
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<td>Goddard Space Flight Center (GSFC)</td>
<td>Eric Brown de Colstoun</td>
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<td>Earth Sciences Division</td>
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<td>Solar System Exploration Division</td>
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<td>Goddard Space Flight Center (GSFC)</td>
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<tr>
<td>Artificial Intelligence, Machine Learning, Big Data Analytics</td>
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<td>Jet Propulsion Laboratory (JPL)</td>
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<td>Johnson Space Center (JSC)</td>
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<td></td>
<td>Goodman, William {Doug}</td>
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<td>Linda Ham, <a href="mailto:linda.j.ham@nasa.gov">linda.j.ham@nasa.gov</a></td>
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<td>Kennedy Space Center (KSC)</td>
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<tr>
<td>Aerosciences</td>
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<tr>
<td>Intelligent Flight Systems &amp; Trusted Autonomy</td>
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<tr>
<td>Advanced Materials, Manufacturing Technologies &amp; Structural Systems</td>
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<tr>
<td>Terrestrial and Planetary Atmospheric Sciences</td>
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**Stennis Space Center (SSC)**

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APPENDIX 9: MUREP Institutional Research Opportunity (MIRO)

9.1 PROGRAM DESCRIPTION

9.1.1 Overview of the Funding Opportunity

The Minority University Research and Education Project (MUREP) is administered through NASA’s Office of STEM Engagement (OSTEM). Through MUREP, NASA provides financial assistance via competitive awards to Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities (HBCU), Hispanic Serving Institutions (HSI), Asian American and Native American Pacific Islander Serving Institutions (AANAPISI), Alaska Native and Native Hawaiian-Serving Institutions (ANNH), Tribal Colleges and Universities (TCU), Native American-Serving Nontribal Institutions (NASNTI), and other MSIs, as required by MSI-focused Executive Orders. These MSI recipient institutions then provide their students financial assistance to study science, technology, engineering and mathematics (STEM) fields.

MUREP investments enhance the research, academic and technology capabilities of MSIs through multiyear cooperative agreements. Awards assist faculty and students in research and provide authentic STEM engagement related to Agency missions. Additionally, awards provide NASA specific knowledge and skills to MSI students who have historically been underrepresented and underserved in STEM. MUREP investments assist NASA in meeting the goal of a diverse workforce through student participation in internships and fellowships at NASA Centers and the Agency’s Jet Propulsion Laboratory (JPL).

The NASA OSTEM MUREP Program solicits proposals from four-year colleges/universities designated by the U.S. Department of Education as MSIs. (see the NASA MSI List) for the MUREP Institutional Research Opportunity (MIRO) awards. MIRO develops significant scientific, engineering, and/or technology research centers. The purpose of MIRO is to strengthen and develop the research capacity and infrastructure of MSIs in areas of strategic importance and value to NASA’s mission and priorities. MIRO awards promote STEM literacy and enhance and sustain the capability of institutions to perform NASA-related research and education. Additionally, MIRO strengthens student participation in research at MSIs in order to develop and diversify the next generation of the STEM workforce. MIRO awards directly support research pertinent to NASA’s five Mission Directorates (MDs) – Aeronautics Research, Exploration Systems Development, Space Operations, Science, and Space Technology.

Background

The United States is becoming a minority-majority nation. As Science, Technology, Engineering, and Math (STEM) employment continues to grow at a faster pace, the STEM workforce must increasingly come from the nation’s underrepresented population (Jackson & Rudin, 2019; Solomon, 2019). A catalyst tool that will advance this mission is Minority Serving Institutions (MSIs). MSIs are federally classified institutions that enroll diverse groups of
students, particularly within STEM fields (Sansone & Sparks, 2022; Wilson & Chavela Guerra, 2021). Therefore, MSIs play a critical role in advancing diversity in STEM. As a result, it is imperative to focus on capacity building, which is developing the knowledge, attitude, and skills within these institutions (Jayachitra, 2023).

Strengthening and improving student learning among MSIs will significantly impact the success of underrepresented students and help fill the gap in the STEM workforce. Capacity-building initiatives fill the gap by equipping MSIs with the resources to develop more robust research programs and promote innovation. According to Kassu (2020), involving undergraduate students in research projects and practical laboratory experiences enhances students' learning. Students with undergraduate research experiences have better interest and motivation to advance in STEM-related professional careers (Kassu, 2020). Adding more sequenced and comprehensive courses and opportunities to engage in hands-on and culturally relevant research is also helpful (NASEM, 2019).

Partnering with local organizations fosters the student-teacher relationship in developing programs. It creates avenues for STEM jobs to be in more places so that people can contribute their ideas and talent where they live (Panchanathan, 2023). Success in capacity building often requires the institution to strengthen the participation of faculty and researchers at MSIs in the research programs. One study suggests faculty training on research, mentorship opportunities for MSI faculty with experienced research faculty, opportunities to meet future collaborators, and seed money for MSI faculty to learn from faculty at research-intensive institutions will build such capacity (Wilson & Chavela Guerra, 2021).

9.1.2 Goals and Objectives

MIRO cooperative agreements are competitively awarded to MSIs to promote research capacity, expand aerospace research, increase workforce diversity, and strengthen students’ STEM skills.

The MIRO awards goals and objectives are to:

1. **Expand the nation's base for aerospace research and development by fostering new aerospace research and technology development concepts aligned with NASA research priorities as defined by NASA’s MDs.**
   
   *Objective 1.1* Develop significant scientific, engineering, and/or technology research centers at the MSI that align and engage one or more programs of the NASA Mission Directorates.

   *Objective 1.2* Increase the lead institution’s capacity to contribute to the priorities of NASA’s Mission Directorates (Aeronautics Research, Exploration Systems Development, Science, Space Operations and Space Technology) and NASA’s Centers and facilities.

2. **Promote institutional advancement and enhanced research capacity through partnerships among MSIs, other academic institutions, NASA, and industry.**

   *Objective 2.1* Increase the lead institution’s ability to sustain research efforts through development of strategic partnerships.
Objective 2.2 Increase the lead institution’s pursuit of additional funding opportunities offered by NASA, industry, and other agencies.

Objective 2.3 Increase the ability of research leadership at the lead institution to leverage resources to enhance its research capacity at the project, program, department, college, and/or university levels.

3. Strengthen participation of faculty, researchers, and students at MSIs in the research programs of NASA’s MDs.

Objective 3.1 Increase faculty and researcher knowledge and skills in NASA-related research through professional development and NASA research opportunities.

Objective 3.2 Increase capacity to develop student knowledge and skills in NASA-related research through curriculum enhancement, redesign, and development at the course, degree, and/or department levels

Objective 3.3 Increase capacity to develop student knowledge and skills in NASA-related research through NASA internships and opportunities.

4. Facilitate mechanisms to ensure degrees awarded to students from MSIs in NASA-related fields reflect the diversity of our nation and contribute to the diversity of the NASA workforce.

Objective 4.1 Increase the number of undergraduate and graduate degrees awarded to students from MSIs in NASA-related fields.

9.1.3 National Priorities

MIRO addresses Executive Orders 13985, 14031, 14041, 14045, 14049, 14050, and 14091 by providing funding to MSIs to build research capacity through curricular innovations aligned with NASA’s missions and projects. Federal Register :: Executive Orders

As part of the implementation of the 2018 Committee on STEM Education (CoSTEM) Federal STEM Education Strategic Plan, federal departments and agencies that have STEM education programs, investments, and activities have identified the specific pathways and associated objectives that they will contribute to through mission-specific actions. The CoSTEM four Pathways to Success, Develop and Enrich Strategic Partnerships, Engage Students where Disciplines Converge, Build Computational Literacy, and Operate with Transparency and Accountability, should be evident in the goals and objectives that the funding will be used to implement. Applicants are highly encouraged to propose innovative and seemingly traditional or non-traditional STEM ideas that will incorporate the subcategories of the CoSTEM Pathways to Success; specifically, Foster STEM Ecosystems that Unite Communities, Increase Work-Based Learning and Training through Educator-Employer Partnerships, and Encourage Transdisciplinary Learning.

9.1.4 Agency Priorities
MIRO addresses the following NASA goals and objectives outlined in the 2022 NASA Strategic Plan including but not limited to:

- **Strategic Goal 2**: Extend human presence to the moon and on towards Mars for sustainable long-term exploration, development, and utilization
  
  **Strategic Objective 2.3**: Develop capabilities and perform research to safeguard explorers.

- **Strategic Goal 3**: Catalyze economic growth and drive innovation to address national challenges.
  
  **Strategic Objective 3.1**: Innovate and advance transformational space technologies.

- **Strategic Goal 4**: Enhance capabilities and operations to catalyze current and future mission success.
  
  **Strategic Objective 4.1**: Attract and develop a talented and diverse workforce.
  
  **Strategic Objective 4.3**: Build the next generation of explorers.

These measures will be supported by the agency’s short-term Annual Performance Indicators, which set quantifiable targets for NASA offices, programs and projects. NASA’s goals and objectives are subject to change over time to adapt to national and agency-wide priorities. NASA’s Strategic Goals and Objectives relevant to education are outlined in the 2022 NASA Strategic Plan.

**9.1.4.1 Relevance to NASA and OSTEM**

MIRO addresses the following strategic goals outlined in the 2020-2023 NASA Strategy for STEM Engagement:

- **Strategic Goal 1.0**: Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery.

- **Strategic Goal 2.0**: Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.

- **Strategic Goal 3.0**: Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work.

OSTEM monitors progress of its investments towards achieving programmatic goals and objectives by assessing recipients’ achievements towards the following multi-year OSTEM Performance Goals (PGs) outlined in the Annual Performance Plan (APP), which directly align with the 2020-2023 NASA Strategy for STEM Engagement Strategic Goals 1,2 and 3:

Performance Goal 4.3.1: Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery.

Performance Goal 4.3.2: Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.

Performance Goal 4.3.3: Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA's mission and work.
9.1.4.2 Research Priorities for NASA Mission Directorates (MDs) and Centers

MUREP is designed to capitalize on the unique facilities, capabilities, and staff of MSIs to contribute to the priorities of NASA’s MDs. Through MIRO, NASA seeks to strengthen the research capacity of MSIs in areas of priority for NASA MDs and engage diverse students in authentic learning experiences with NASA’s staff, content, and facilities. Each proposal shall identify the primary NASA research priorities to which the proposed activities will align. The following websites can be used to access additional information about NASA’s MDs.

Aeronautics Research Mission Directorate (ARMD)

Exploration Systems Development Mission Directorate (ESDMD)

Space Operations Mission Directorate (SOMD)

Science Mission Directorate (SMD)

Space Technology Mission Directorate (STMD)

NASA’s MD goals and objectives can also be found in EONS-2024, Appendix 8 and Appendix 9A of this Notice of Funding Opportunity (NOFO).

9.1.4.3 Relevance to Lead Institution

MIRO goals and objectives include strengthening institutional “research capacity and infrastructure” and increasing “the ability of research leadership at the lead institution to leverage resources to enhance its research capacity at the project, program, department, college, and/or university levels.” Proposals shall demonstrate how the proposed project will be a significant element of the Lead Institution’s long and short-term STEM strategic research plans, interests, and capabilities and how the project will result in enhanced research capacity at multiple levels. It is recommended that the proposal reference elements of department, college, and university strategic plan(s), research priorities, and/or other pertinent university documents.

9.1.4.4 Data Management Plan (DMP)

All proposals submitted under this Notice of Funding Opportunity (NOFO) are required to submit a Data Management Plan (DMP) in accordance with the NASA Plan for Increasing Access to the Results of Scientific Research at http://www.nasa.gov/sites/default/files/files/NASA_Data_Plan.pdf. Data resulting from funded programs may be quantitative or qualitative in nature.

In addition, Frequently Asked Questions (FAQ) were posted in a website that addresses questions about DMP requirements. Note that although the questions pertain to the SMD ROSES Notice of Research Announcement (NRA), the requirements provided in the answers also apply to this opportunity.

Note: Proposers that include a plan to archive data shall allocate suitable time for this task.
9.1.4.5 Data Sharing Plan (DSP)

All proposals submitted in response to this NOFO shall include a DSP as part of the project description describing how data and information obtained through MIRO will be shared. Award recipients shall promptly prepare and submit for publication, with authorship that accurately reflects the contributions of those involved, all significant findings from work conducted under the MIRO cooperative agreement. MIRO recipients shall continuously develop technical paper(s)/journal article(s) during the five-year period of performance. MIRO recipients are expected to share their findings at appropriate professional conferences, meetings, and/or workshops. Recipients may also develop oral or poster presentations using the information generated through this cooperative agreement. NASA will review each proposer’s DSP during the proposal evaluation phase. Costs of the DSP, including travel for PI, Co-Is, and students shall be included in the proposed budget. MIRO recipients shall ensure that all publications developed as a result of this cooperative agreement and authored or coauthored by investigators and sub-recipients and funded, in whole or in part by NASA, are submitted to the MIRO Activity Manager. Recipients shall also provide a list of these publications with its annual and final reports that are required to be submitted to the NASA Shared Services Center (NSSC) and the MIRO Activity Manager.

9.1.4.6 Roles and Responsibilities of Key Personnel

Principal Investigator (PI)

Every institution submitting a proposal shall identify a single individual as the PI, who will be responsible for the quality and direction of the entire proposed effort and for the use of all awarded funds. PIs shall meet all the following criteria on the date of the proposal submission:

1. Must be a tenure or tenure-track faculty member of the lead institution, if a tenure system is established. Eligible four-year institutions that do not have a tenure track system shall submit a letter of commitment to comply with guidance provided under section 9.6.2 Summary of Recipient Responsibilities (this document), which states that any proposed change to the PI under the agreement is subject to NASA approval.

2. Must have a Ph.D. or equivalent in an engineering, computer science, technology, mathematics, or science discipline relevant to NASA’s research needs.

Eligible PIs are required to submit a letter of commitment to comply with the guidance under Section 2.17 of the NASA Proposer’s Guide. Any proposed change to the PI under the cooperative agreement is subject to prior written NASA approval.

The PI’s responsibilities include, but are not limited to:

- Provides visionary and contemporary leadership for the delivery of high-impact research and educational programs.
- Provides overall leadership, administration, implementation, and performance data collection and reporting of the project and its activities.
- Engages with the institution’s department, college, and university leadership to promote institutional advancement and enhanced research capacity.
• Carries out supervisory responsibilities for project staff in accordance with the organization’s policies and applicable state and federal laws.
• Provides day-to-day management of project budgets and ensuring that all applicable institutional and NASA rules, as well as state and federal guidelines, are followed in the utilization of such funding.
• Engages with the Independent Evaluator and project administration support staff to ensure evaluation and required reports are appropriately conducted, compiled, and reported.
• Participates in MIRO program teleconferences and meetings.
• Attends the annual conference hosted by OSTEM.
• Coordinates and administers MIRO data collection, analysis, and reporting of such data to NASA in alignment with guidance and the approved Gateway data management system.
• Coordinates intern placements and intern registration in Gateway.

**Co-Investigator (Co-I)**

A Co-I is a member of the proposal’s investigation team who may hold either a full-time or limited-term appointment and who is a critical “partner” for the conduct of the investigation through the contribution of unique expertise and/or capabilities. A Co-I must have a well-defined, and generally sustained, continuing role in the proposed investigation, serve under the direction of the PI, and may or may not receive funding through the award. Only an individual who has formally agreed to the role may participate as a Co-I even if his/her participation is at no cost (i.e., contributed) to the proposal. There is no limit for the number of Co-Is that can participate in a MIRO project.

**Independent Evaluator (IE)**

Every institution submitting a proposal shall identify a single individual, an IE, who will be responsible for analyzing qualitative and quantitative data for the sites evaluation activities and assisting the PI in development and implementation of the site’s comprehensive Evaluation Plan. Within three months after award, every institution submitting a proposal in response to this opportunity, shall submit a Comprehensive Evaluation Plan, for which both the PI and IE have concurred on in writing. The MIRO Management and OSTEM Performance and Evaluation (P&E) Team will provide guidance on the proposed plan. IE responsibilities include, but are not limited to:

- Develop a Comprehensive Evaluation Plan for proposed program in collaboration with the PI and the MIRO management;
- Coordinate and administer data collection, analysis, and reporting of proposed program evaluation data;
- Provide status updates to the PI on evaluation activities, progress, and challenges;
- Participate in annual kick-off meetings, virtual site visits, and evaluation technical assistance meetings with MIRO Management Team to review the proposed program’s progress in achieving MIRO goals and objectives; and
- Develop an annual evaluation report and final evaluation report.
9.2 FEDERAL AWARD INFORMATION

Subject to Congressional appropriation of sufficient funds and NASA’s receipt of proposals of adequate merit, NASA expects to select up to seven proposals for MIRO. The period of performance is five years. Recipients of awards under this NOFO will be designated as NASA MIRO Group 8. Successful proposals for Group 8 will be funded as cooperative agreements. As cooperative agreements, substantial involvement is expected between recipients and NASA. For specific description of the substantial involvement required of recipients, see Section 9.1.4.6 Roles and Responsibilities of Key Personnel and Section 9.6.1, Cooperative Agreement Award Reporting Requirements of this NOFO. Funding shall be up to a maximum of $4,999,999 per five-year award. Funding for each MIRO award may not exceed $1,250,000 per year in any given year and shall not exceed a total of $4,999,999 over the five-year performance period. The total maximum amount of funds expected to be awarded is up to a maximum of $34,999,993 with up to $8,750,000 awarded annually for each of the five years. The period of performance is expected to begin two to three months from the date of the selection announcement.

Proposals shall cover the full five years of performance, with a maximum funding request of $1,250,000 each year. The continuation of NASA funding on each award annually is based on a satisfactory evaluation of documented progress; compliance with data reporting, applicable regulations and laws, other program requirements, fulfillment of fiduciary responsibilities, and the availability of appropriated funds.

9.2.1 Partnerships and Collaborations

Universities, industry, and government agencies play major roles in carrying out much of NASA’s work and conducting research and development activities in related areas. Carefully constructed partnerships between MIRO recipients and other entities will lead to substantial benefits for all parties involved. MIRO recipients may gain access to special-purpose facilities, exposure to new work areas, leveraged support for their research efforts, and future funding sources. Industry and other universities and colleges may gain from the capabilities that the MIRO recipients bring in specialized work areas and from MIRO-funded students who may be recruited as future employees or graduate students. NASA benefits from the increased productivity that these partnerships bring to missions and projects.

Proposals shall demonstrate partnerships and collaborations among various entities, including academic institutions, government agencies, business and industry, private research foundations, and non-profit agencies. Proposals shall describe how the proposed partnerships and collaborations will increase student access to research opportunities; achieve MIRO goals and objectives; leverage significant sources of additional funding; obtain essential services that are not available at the proposer’s home institution; and/or contribute to sustainability.
Partnerships shall be coordinated in advance and described in detail in the proposal. The budget narrative shall document how partnerships will contribute to the proposing institution’s research capacity. (See Section 9.2.2, Integration with NASA and Other OSTEM and/or Mission Activities of this NOFO). Note: The lead MSI shall receive not less than 70 percent of the proposed budget.

At a minimum, proposals shall include each of the following partners:

- Lead MSI four-year college/university
- At least one additional four-year institution of higher education with established research capabilities. Additional institutions do not need to be MSIs. Also, proposers are strongly encouraged to partner with two-year institutions of higher education, to gain an advantage in proposal review, including those from which the lead institution receives a significant number of transfer students; and
- At least one NASA center (including JPL) can be considered for a partnership. Note: Proposers are strongly encouraged to contact a NASA Center or facility at least one month prior to the proposal due date to discuss collaborations. Contact information for Center/Mission Directorate personnel is listed in EONS-2024 Appendix 8. Points of contact for OSTEM offices at Centers (plus the Education Office at JPL) can be found here.

In addition, it is strongly encouraged that the proposal includes partnerships and/or collaborations with at least one industry or other government agency that is relevant to the scientific, engineering, and/or technology proposed. This will not impact the proposal score.

9.2.2 Integration with NASA and Other OSTEM and/or Mission Activities

The MIRO Management Team will facilitate communication between and among recipients, and NASA OSTEM and Subject Matter Experts to promote synergy, leverage ongoing work, and support relationship building during the five-year award period of performance. The MIRO Activity Manager will establish opportunities to share information with recipients and appropriate members of NASA OSTEM. To facilitate communication and networking, recipients shall participate in a MIRO kickoff meeting, training workshops, and activity meetings as required. PIs shall participate in one annual Agency OSTEM in-person meeting.

9.2.3 Budget Guidelines and Requirements

9.2.3.1 Total Budget Guidelines and Funding Restrictions

Proposed use of MIRO funds shall be for support of faculty and researchers to conduct research, engage in professional development, and redesign, enhance, or develop curriculum; for support of undergraduate students, graduate students, post-doctoral fellows and their research; for research-related equipment, travel, and materials; and to support project management, administration, and evaluation.
MIRO budget proposals shall address costs that will be incurred by NASA Centers and/or NASA JPL for the use of facilities and/or technical support. The costs of such NASA services shall be included in the proposal as part of the annual funding amount. For additional budget guidelines, see the NASA Proposer's Guide.

All costs charged to awards covered by this NOFO must comply with the Uniform Administrative Requirements in 2 CFR parts 200 and 1800, unless otherwise indicated in the NOFO, the terms and conditions of the award, and the Grant and Cooperative Agreement Manual (GCAM).

- All proposed funds must be allowable, allocable, and reasonable. Funds may only be used for the project. All activities charged under indirect cost must be allowed under 2 CFR 200 cost principles.
- Grants and cooperative agreements shall not provide for the payment of fee or profit to the recipient.
- Unless otherwise directed in 2 CFR 200, for changes to the negotiated indirect cost rate that occur throughout the project period, the recipient must apply the rate negotiated for that year, whether the rate is higher or lower than at the time the budget and application was awarded.
- Proposals must not include bilateral participation, collaboration, or coordination with China or any Chinese-owned company or entity, whether funded or performed under a no-exchange-of-funds basis.
- Any funds used for match or cost sharing must be allowable under 2 CFR 200.
- The award recipient/lead institution must use one of the methods of procurement as prescribed in 2 CFR 200.320, Methods of procurement to be followed.
- All awards under this NOFO will be made by NASA to the lead institution. Subcontracts, collaborations, and any other agreements described in the proposal are between that entity and the lead institution, not between that entity and NASA. No more than 30% of the total budget may be allocated to subcontracts or collaborations.
- Indirect costs including the lead institution’s general and administrative (G&A) expenses and Facilities & Administrative (F&A) Costs are permitted under this NOFO. Any indirect costs must comply with the “Indirect Costs” section of the NASA Grant and Cooperative Agreement Manual (GCAM), currently section 5.14.2 and be consistent with the definition of “modified total direct costs” in 2 CFR 200.1, Definitions. The budget must clearly include information for the lead institution’s overhead/ G&A expenses.
- Proposals shall clearly indicate key personnel roles, the division of labor, and labor costs. The funding distribution shall be commensurate with the roles of the team members in supporting project activities.
- Foreign travel costs are allowable with justification stated in the proposal (refer to sections 9.2.3.4 and 9.3.3 in this document for more details).
• The lead MSI must retain a minimum of 70 percent of the total budget; a maximum of 30 percent of the total budget may be distributed for subcontracts to teaming organizations and collaborators.

• Only student internships, research assistantships, and/or apprenticeships at NASA facilities or institutions of higher education shall be paid using funds awarded by NASA. Experiential learning opportunities (e.g., internships or apprenticeships) with industry collaborators shall not be funded with MIRO award funding.

• A maximum of 15 percent of the total budget may be used for acquiring direct NASA services related to the conduct of research (i.e., cost for use of NASA unique facilities, etc.).

• A maximum of 20 percent of the total budget may be used for infrastructure (equipment and laboratory facilities).

• A maximum of five percent of the total budget may be distributed to NASA Centers that are partnering with institutions. These funds may not be used for NASA civil servant salaries or travel. The maximum total five-year budget per recipient is $4,999,999. The proposed plan and evaluation shall have a five-year period of performance.

• A minimum of 20 percent and a maximum of 40 percent of the annual budget must be allocated for undergraduate and graduate student support (including fringe benefits and indirect costs, if any).
  
  ▪ A minimum of five percent of the annual budget of 20-40% stated above must be allocated to fund students participating in internships at NASA Centers or JPL. Required funding for students participating in internships at NASA Centers or JPL is considered part of the 20 – 40% allocation for student support amount identified above. U.S Citizenship is required for individuals who need access to NASA Centers or JPL for participation in the internship experience. These internships are solely for students from the recipient institutions and its partners. At a minimum, students participating in an internship experience should receive funding commensurate with the current NASA standard stipends (contact a NASA OSTEM Office or JPL for current stipend rates). Current internship rates are included in Section 9.5.3 of this document. Institutions have the flexibility to augment stipends.

9.2.3.2 Annual Budget Guidelines and Restrictions

• The maximum annual budget for each recipient is $1,250,000, not to exceed the total budget of $4,999,999 during the five-year period of performance.

• The budget shall include the IE's compensation, including travel to project annual meetings and site visits.

• Travel costs for required annual conference attendance by PIs shall be included in the budget. Proposers should include travel costs for this event in their budget.

Other Guidelines and Restrictions
• A maximum of 50 percent of the annual salary for the PI, Co-Is, and senior researchers may be charged to this award.
• The budget shall include support for an administrative assistant for the project, who will provide PI support for monitoring the budget, track project students, and assist with other administrative tasks. Alternatively, the proposal shall clearly indicate how other resources will support this role.

9.2.3.3 Cost Sharing or Matching
Cost sharing or matching is not required but may be offered. However, voluntary cost sharing or matching will not be considered in the evaluation of proposals.

9.2.3.4 Direct Costs Limitations
Foreign travel is discouraged, however may be considered on a case-by-case basis and approved by the MIRO Activity Manager and/or MUREP Program Manager. Inclusion of foreign travel will not impact the evaluation of proposals.

9.2.3.5 Indirect Facilities & Administrative (F&A) Costs
F&A costs are allowable.

9.2.4 Program Evaluation
NASA identifies evidence of effective practices of MIRO activities through program evaluation. Evidence is a key criterion in NASA’s competitive processes for allocating resources, ensuring that the most effective activities are supported. Program evaluations are planned studies using research methods to collect and analyze data to assess to what extent activities/programs are being implemented and what, if any, impact can be measured. Evaluations answer specific questions about performance and may focus on assessing activity/program process and outcomes.

Proposers shall develop a Comprehensive Evaluation Plan that follows generally accepted professional standards for evaluation research. An initial plan is required as part of the original proposal and shall include strategies for collecting data for performance metrics for MIRO Reporting Requirements and independent program evaluation.

Effective evaluation models are evidence-based, meaning that they are based on verifiable data and information that has been gathered using the standards of professional research and evaluation organizations. Such data may be qualitative and/or quantitative. A wide variety of evaluation designs may be utilized, such as case studies, quasi-experimental designs, or experimental designs, as well as data collection methods, such as key informant interviews, surveys, direct observation, or focus group discussions. Regardless, such data shall pass the tests of reliability and validity, which are different for qualitative and quantitative data.

NASA sets concrete performance goals and is accountable to those goals through a framework that measures progress. Objective and verifiable performance metrics, internal and external review processes, valid and reliable data collection instruments, and evaluation studies are used to assess progress and performance across the portfolio. Through performance monitoring,
assessment, and a meta-evaluation of the MIRO program, NASA will demonstrate its results-driven management approach focused on optimizing value to the American public. In accordance with this objective, the MIRO Management will provide feedback and negotiate the final evaluation plans with grantees to ensure commonality across evaluation methods so that this meta-evaluation may be achieved.

9.3 ELIGIBILITY INFORMATION

9.3.1 NASA’s Commitment to Diversity and Inclusion
NASA recognizes and supports the benefits of having diverse and inclusive scientific, engineering, and technology communities and fully expects the reflection of such values in the composition of all panels and teams, including peer review panels, proposal teams, science definition teams, and mission and instrument teams. Per federal statutes and NASA policy, no eligible applicant shall experience exclusion from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NASA on the grounds of their race, color, religion, age, sex, national origin, or disability. NASA welcomes proposals from all qualified and eligible sources, and strongly encourages proposals from HBCUs, MSIs, small disadvantaged businesses (SDBs), veteran-owned small businesses, service-disabled veteran-owned small businesses (SDVOSB), HUBZone small businesses, and women-owned small businesses (WOSBs), as eligibility requirements apply.

9.3.2 Eligible Applicants
To be eligible for this funding opportunity, all proposals shall originate from an institution designated and listed by the U.S. Department of Education (DOE) as four-year MSI college/university on the proposal due date (see NASA MSI List). Proposals from institutions that are not designated and listed by the DOE as an MSI on the proposal due date will result in NASA returning the proposal without review, as such proposals are not eligible to receive an award under this NOFO. Any arrangement or agreement to have the fiscal management and/or administration of the award performed by a third party is between the recipient and the third party, (e.g., an affiliated Board of Regents, University System or Foundation). Institutions not meeting these criteria are encouraged to collaborate with colleges or universities that satisfy the requirements.

Eligible lead institutions for this funding opportunity include
- Public and state-controlled institutions of higher education, and
- Private institutions of higher education

Further information defining the individual types of organizations are available on Grants.gov and 2 CFR Part 200.1: Education Organizations.
IMPORTANT: Universities awarded as part of MIRO Group 6, Group 6R, and Group 7 are ineligible to propose as a lead institution to this funding opportunity. These institutions are encouraged to consider partnering with an eligible institution.

Institutions that have not previously received MIRO (formerly referred to as URC or University Research Center) award funding will receive higher priority in the selection process.

9.3.2.1 Limit on the Number of Proposals per Unique Entity Identifier (UEI)
Eligible institutions shall submit only ONE lead proposal per UEI number. Eligible institutions that have multiple and/or different UEI numbers shall submit no more than one lead proposal from each different UEI number. If an eligible organization submits more than one lead proposal using the same UEI number, then none of the proposals will be evaluated.

Eligible institutions may submit a proposal as the lead institution in accordance with the above restriction, and/or be included as an unfunded partner or sub-awardee in any number of proposals in a non-lead role.

9.3.3 Proposals Involving Foreign Participation
Except as outlined in the certification regarding restriction on doing business with certain countries, NASA welcomes proposals that include the participation of non-U.S. organizations. However, proposals that offer research to be performed with a non-U.S. organization as part of a proposal submitted by a U.S. organization typically are supported on a no-exchange-of-funds basis. For additional guidance on foreign participation, see the NASA Proposer’s Guide, Appendix A. Note: Foreign institutions are not eligible to submit a proposal in response to this NOFO.

9.3.4 Ineligibility of Proposals That Include Participation of China or Chinese-Owned Companies
Proposals involving bilateral participation, collaboration, or coordination in any way with China or any Chinese-owned company or entity, whether funded or performed under a no-exchange-of-funds basis, shall be ineligible for award.

9.3.5 Other Eligibility Criteria
All proposals shall identify at least one additional four-year US college or university collaborator (MSI or non-MSI), and at least one NASA center or facility collaborator. Proposals not meeting this requirement will not be eligible for award and will not be reviewed.

All collaborators must demonstrate their awareness of the proposal and summarize plans for participation via Letters of Support (see EONS-2024, and the NASA Proposer’s Guide, for additional information).

9.3.6 Export Control
Recipients shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this cooperative agreement. In the absence of available license exemptions/exceptions, the Recipient shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

The Recipient shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this cooperative agreement.

The Recipient shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

The Recipient shall be responsible for ensuring that the provisions of this clause apply to its contractors, subcontractors, and partners. See additional information in the NASA GCAM and the NASA Proposer’s Guide.

9.4 APPLICATION AND SUBMISSION INFORMATION

9.4.1 Address to Request Application Package
Proposal applications are available via the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES).

9.4.2 Request for ‘Notice of Intent’
Institutions planning to submit a proposal are strongly encouraged to submit a Notice of Intent (NOI) to propose. NOIs assist NASA in assessing the response to this funding opportunity and to determine the expertise required for the proposal review panel. NOIs are to be submitted by the PI to the NSPIRES website by no later than 75 days after posting. Eastern Time. Proposers shall register with NSPIRES before it can be accessed for use.

The NOI shall include:

1. Name of the lead institution.
2. College/University Minority Designation (HBCU, PBI, TCU, HSI, AANAPSI, ANNH, and/or NASNTI).
3. Name, title, regular mail and e-mail address, telephone, and fax number of the proposed PI.
4. Planned title and brief description of research focus.
5. Primary affiliated NASA Mission Directorate, NASA Center and other collaborators; and key words that describe the technical area of proposed research.

9.4.3 Proposal Preparation and Submission

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All information needed for proposers to respond to this NOFO is contained in this Appendix, the EONS-2024 announcement, the *NASA GCAM* and the *NASA Proposer’s Guide*. If the information contained in this Appendix conflicts with the *GCAM* or the *NASA Proposer’s Guide*, the information in this NOFO takes precedence.

All proposed activities shall address the following requirements, as well the operating principles underlying the NASA STEM Engagement Strategic Plan, and contribute to the achievement of MIRO goals and objectives. Evidence-based strategies shall be used that rely on verifiable data, literature review, subject matter expert input, and information that has been gathered using the standards of professional research and evaluation organizations.


<table>
<thead>
<tr>
<th>Required Parts of a Proposal (in order of assembly)</th>
<th>No. of Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal Cover Page (NSPIRES web forms or Grants.gov forms) including:</td>
<td>Constrained by NSPIRES and Grants.gov</td>
</tr>
<tr>
<td>• Proposal Summary – limit to 4,000 characters (including spaces)</td>
<td></td>
</tr>
<tr>
<td>• NSPIRES cover page budget</td>
<td></td>
</tr>
<tr>
<td>• Proposal team members</td>
<td></td>
</tr>
<tr>
<td>• Other required elements</td>
<td></td>
</tr>
<tr>
<td>Table of Contents</td>
<td>As needed</td>
</tr>
<tr>
<td>Scientific/Technical/Management Plan including <em>but not limited to</em>:</td>
<td>15</td>
</tr>
<tr>
<td>• Detailed plans to address the Goals and Objectives of MIRO and research priorities for NASA mission directorates and centers.</td>
<td></td>
</tr>
<tr>
<td>• NASA Center or facility collaborator(s);</td>
<td></td>
</tr>
<tr>
<td>• specific STEM laboratory equipment and supplies/materials to be purchased to support research and/or curriculum.</td>
<td></td>
</tr>
<tr>
<td>• proposed number of internships/research assistantships per year, and proposed location of placements (e.g. NASA Center, college or university);</td>
<td></td>
</tr>
<tr>
<td>• A timeline of all proposed activities, including the responsible personnel for each activity</td>
<td></td>
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<tr>
<td>• Evaluation Plan</td>
<td></td>
</tr>
<tr>
<td>• Data Sharing Plan (dissemination)</td>
<td></td>
</tr>
<tr>
<td>References and Citations</td>
<td>As needed</td>
</tr>
<tr>
<td>Biographical Sketches for: See Section 2.15 in <em>NASA Proposer’s Guide</em></td>
<td></td>
</tr>
<tr>
<td>The Principal Investigator</td>
<td>2</td>
</tr>
<tr>
<td>Each Co-Investigator</td>
<td>1 (per Co-I)</td>
</tr>
<tr>
<td>Current and Pending Support</td>
<td>As needed</td>
</tr>
<tr>
<td>Statements of Commitment and Letters of Support</td>
<td>As needed</td>
</tr>
</tbody>
</table>
Proposal Budget (budget) – both the budget narrative and budget details | As needed
Facilities and Equipment | As needed
Table of Personnel and Work Effort | As needed
Data Management Plan | As prescribed in the NOFO

Note: NASA does not endorse or require proposers to use any specific source of information, but strongly encourages proposers to use research-based best practices described in peer-reviewed journals and/or conducted by credible institutions that specialize in STEM education research.

9.4.4 NASA Contact Information

The MIRO NOFO will be released on Wednesday, November 15, 2023, and remain open until Wednesday, February 14, 2024, at 5:00 pm Eastern Time (ET). Potential applicants with questions or experiencing problems while the funding opportunity is open shall reach out to the NASA point of contact for MIRO, Dr. Gaffar Gailani. Contact information is provided below in Section 9.4.5, Contact and Resource Information, Program Office Contact of this NOFO.

9.4.4.1 Pre-proposal Webinars and Questions and Answers

Three optional pre-proposal webinars will be held prior to the proposal submission due date to provide potential applicants with the opportunity to ask questions and address problems.

The first pre-proposal webinar will take place on Thursday, December 7, 2023 at 4:00 pm ET. The second pre-proposal webinar will take place Monday, January 8, 2024 at 4:00 pm ET. A final “office hour” will take place on Tuesday, February 6, 2024 at 4:00 pm ET. Applicants shall refer to the MIRO landing page for connection details. Proposers shall submit any written questions no later than seven business days before the pre-proposal webinars so that NASA will be able to cover as much information as possible during the meeting. Prospective proposers may also ask questions they have about this opportunity during the teleconference. Proposers may also receive technical assistance from project staff at this time, which may include tips and guidance for proposing for this opportunity.

Potential applicants are strongly encouraged to register early in NSPIRES and sign up for notification emails so they will receive notice of the pre-proposal webinars. Refer to the MIRO landing page for question submission and schedule information.

Proposers shall submit any questions via email only as instructed on the NSPIRES announcement of this opportunity. Responses to questions submitted will be provided in
a “Frequently Asked Questions (FAQ)” list that will be posted on the MIRO landing page. The list will be updated frequently during the open period of this NOFO.

9.4.5 Contact and Resource Information

Selection Official
TBD
MUREP Program Manager
NASA Headquarters
Washington, DC 20546

Program Office Contact
Dr. Gaffar Gailani
MIRO Activity Manager
NASA’s Armstrong Flight Research Center
4800 Lilly Ave, Edwards, CA 93523
Email: NASAMIRO@nasaprs.com

9.4.6 Proposal Submission Method, Dates, and Times

Electronic proposal submission is required via NSPIRES ONLY. See NASA Proposer’s Guide.

<table>
<thead>
<tr>
<th>Application Materials</th>
<th>Required or Recommended</th>
<th>Due Date and Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notice of Intent</td>
<td>Recommended</td>
<td>Friday, January 12, 2024, 11:59 pm ET</td>
</tr>
<tr>
<td>Full Application</td>
<td>Required</td>
<td>Monday, February 14, 2024, 11:59 pm ET</td>
</tr>
</tbody>
</table>

NASA will not review or consider proposals that are received after the deadline. It is highly recommended that proposers do not wait until the final hours before the proposal deadline to submit their proposals.

Proposers experiencing technical problems outside of their control must notify NASA as soon as possible and before the deadline for receipt of proposals. Failure to notify NASA of the issue that prevented submission of the proposal on or before the required submission date may preclude consideration of the proposal.

For technical assistance with NSPIRES please contact the NSPIRES Help Desk at nspires-help@nasaprs.com or (202) 479-9376, Monday through Friday, 8:00 AM – 6:00 PM Eastern Time, except Federal Government holidays. All dates are subject to change. Please regularly check the NSPIRES website for details.

All information to be reviewed in support of a proposal must be uploaded together as a single PDF submission in NSPIRES. All proposals shall be submitted electronically through NSPIRES.
only. All organizations and the team members participating in the proposal must be registered in NSPIRES. Proposals delivered through any other means will be rejected and will not be reviewed.

Collection of Demographic Information
NASA has implemented a process to collect demographic data from grant applicants for the purpose of analyzing demographic characteristics associated with its award processes. Information collected will include name, gender, race, ethnicity, disability status, and citizenship status. Submission of this information is completely voluntary and is not required in order to receive an award.

9.5 APPLICATION REVIEW INFORMATION
The principal elements for proposal evaluation are: Relevance to NASA Objectives (40%), Intrinsic Merit (40%), and Budget/Cost (20%). Proposers shall review the following specific criteria for MIRO awards.

As stated above, priority will be given to institutions that have not previously received MIRO award funding. MIRO recipients from Group 5 and earlier are eligible to propose. (MIRO recipients in Group 6 and Group 7 are ineligible to submit proposals to this funding opportunity, however may serve as partners to eligible proposing MSIs). In addition, the following proposal features will be closely considered:

- The degree to which the proposal establishes synergetic partnerships and collaborations with other institutions and agencies, including members of NASA centers, NASA EPSCoR jurisdictions, NASA Space Grant Consortiums, and other government agencies; non-profits; community colleges, minority-serving institutions, and other universities; and industry and other organizations.
- The degree to which the proposal develops core expertise and institutional capacity to sustain the project and obtain funding support from non-MIRO sources.
- The degree to which the proposal succinctly articulates the strategic focus of the research activities, plan for building institutional capacity, and strategies for enhancing knowledge and skills of faculty, researchers, staff, and graduate/undergraduate students; and
- The degree to which the proposal increases the number of STEM degrees awarded to students at the graduate and undergraduate levels in fields that contribute to NASA’s mission.

9.5.1 Relevance to NASA (weighted 40% in the evaluation)
Evaluation of Relevance to NASA considers the following sub-elements: Technical Relevance, Educational Relevance, and Institutional Capacity Building Relevance. Proposers shall adequately and clearly define how the activity proposes to address the following criteria:

1) Technical Relevance
   a) Identifies the primary Mission Directorate(s) to which proposed research is aligned.
b) Demonstrates how research findings, results, and products align with one or more of the research priorities of NASA Mission Directorates and Centers. See 9.1.4.2 and Appendix 9A for Research Priorities for NASA Mission Directorates and Centers.

c) Describes current publications related to the proposed research and how the project will enhance, extend, or challenge the status quo.

d) Demonstrates how designated research infrastructure will align with NASA technology and safety standards.

e) Describes the use of NASA content, personnel, and/or facilities in the execution of the research activities.

f) Develops mechanisms for increased participation by students, faculty, and researchers to engage in research activities.

g) Clearly identifies all members of the technical team and how they will contribute towards the research efforts of the proposed activity.

h) Describes how individuals in key positions are qualified in the proposed research and can facilitate all aspects of research development.

i) Describes how the lead institution will establish, maintain, and sustain a suitable infrastructure to support research efforts.

j) Demonstrates a strong evaluation plan that tracks the evolution of the research and research infrastructure over the life of the award.

2) Educational Relevance

a) Demonstrates how project objectives align with the 2022 NASA Strategic Plan.

b) Demonstrates innovative methods, approaches, and concepts that will ensure implementation of the proposed project by meeting MIRO objectives.

c) Demonstrates capacity to support efforts to build a more diverse STEM workforce that reflects the diversity of the nation.

d) Demonstrates how program activities will encourage continued student affiliation with NASA throughout their academic careers.

e) Demonstrates culturally appropriate marketing and outreach plans that will engage students in NASA’s mission, with emphasis on reaching geographically diverse underrepresented and underserved populations.

f) Demonstrates easily accessible application materials and coordination of research and mentoring experiences.

g) Demonstrates capacity of the institution to facilitate disbursement of scholarships and other funds.

h) Demonstrates that collaboration with other educational institutions will enhance student recruitment and involvement.

i) Demonstrates a strong evaluation plan that tracks student progress and program success.

3) Institutional Capacity Building

a) Describes the value of the proposed research to the lead institution’s strategic plan and research priorities (at the college and/or university levels) and articulates how the proposed research activities will build institutional capacity.
b) Demonstrates how research leadership will be involved in leveraging university, college, and department resources to support the project.

c) Provides an overview of how institutional capacity for research will be developed over the course of the award, including modification of existing center space and enhancement of facilities, equipment, and resources.

d) Describes how and what curriculum will be enhanced/modified over the course of the award, including new graduate and/or undergraduate program pathways, degree programs, courses, student research experiences, and/or instructional facilities and materials.

e) Describes how and what faculty and researcher professional development will be provided to enhance overall research capacity, including how NASA assets will be leveraged to support professional development needs.

f) Describes a plan for sustaining this capacity after award period ends.

g) Demonstrates a strong evaluation plan that tracks institutional capacity development.

9.5.2 Intrinsic Merit (weighted 40% in the evaluation)

Evaluation of Intrinsic Merit considers the following sub-elements: Management Plan, Collaboration Plan, Sustainability Plan, and Evaluation Plan. The proposer shall address these criteria to demonstrate the capability of the institution, staff, faculty, collaborators, and targeted students to achieve successful outcomes for the proposed activity.

1) Management Plan

a) Demonstrates a management plan that aligns with at least (1) MIRO goals and objectives, (2) the 2022 NASA Strategic Plan, and (3) the recipient institution’s mission and goals.

b) Provides a project Logic Model that illustrates the relationship between MIRO goals and objectives and project objectives, activities, benchmarks, and results.

c) Demonstrates a clearly organized and feasible management plan for achieving research and educational goals and objectives and includes clear lines of communication with NASA and other members of the collaborative team.

d) Provides specific details of the organizational structure including the PI, administrative support, Co-Is, key partners and collaborators, the appropriate management oversight office at the lead institution, and an initial lead for the External Advisory Committee who will aid in the development of this committee. Provides organization chart for proposed management structure.

e) Describes how the PI is qualified to serve as the PI for the project and includes biographical sketches for the PI and each Co-I.

f) Identifies all populations served by the project (faculty, researchers, students, etc.), specifies their needs and explains how these needs will be addressed.

g) Describes how proposed administrative assistance will be sufficient for scope of project.

h) Demonstrates an achievable timeline for program activities, including benchmarks for success.
i) Provides a work breakdown structure for the proposed research plan that includes a timeline for project short and long-term outcomes.

2) **Collaboration Plan**
   a) Delineates mechanisms for building partnerships to enhance the ability of the lead institutions to achieve its objectives, to obtain and leverage sources of additional funding, and/or to obtain essential services not otherwise available.
   b) Includes a list of partners and collaborators, the organization to which they belong, their roles and responsibilities, the percentage of time allocated to support the proposed research, and capabilities that the partnership contributes. Collaborators may include, but are not limited to: individuals from NASA centers, NASA EPSCoR jurisdictions, NASA Space Grant Consortiums, and other government agencies; non-profits; community colleges, MSIs, and other universities; and industry and other organizations.
   c) Presents a plan that outlines each collaborator’s responsibilities to the proposed activities.
   d) Details specific contributions (such as financial, personnel, assets, and facilities) being provided by each collaborator and how they will contribute to the goals and objectives of the proposed research.
   e) Provides a letter of support from each collaborator that specifies the unique responsibilities and contributions as outlined above.

3) **Sustainability Plan**
   a) Describes a strategic roadmap that demonstrates sustainability beyond the five-year award period and includes plans to apply for funding opportunities offered by NASA Mission Directorates, industry, and other funding agencies.
   b) Provides a multi-year plan demonstrating the process to acquire resources to sustain the project. Identifies resources or funding capabilities that are in place or will be pursued via the following entities: institutional support, federal or state agencies, contracting opportunities, etc.
   c) Identifies all long-term relationships that have been or will be established to ensure that the project will sustain educational programming, research activities, and utilization of research infrastructure.
   d) Describes how key project elements may be replicated and scalable in other environments.
   e) Identifies initial lead of the External Advisory Committee (EAC) and describes how the committee will support sustainability efforts.
   f) Demonstrates a strong evaluation plan that tracks sustainability efforts and successes.

4) **Evaluation Plan**
   a) Describes the planned approach that will be used to evaluate the proposed program, including processes to collect and analyze qualitative and quantitative data of indicators that may be utilized to track student engagement and progress; faculty, researcher, research, and curriculum development; quality of project
infrastructure and programming; and institutional change. Note, a Comprehensive Evaluation Plan template will be provided post award.

b) Identifies proposed evaluation questions, program measurable goals, objectives, outcomes, and data collection tools that describe progress towards meeting MIRO goals and objectives.

c) Identifies and justifies capabilities of an Independent Evaluator who will; develop the comprehensive evaluation plan; identify/develop tools or processes for data collection; carry out evaluation tasks; conduct analysis; and provide formative and summative feedback to the project leadership throughout the life cycle of the award.

d) Describes an appropriate evaluation plan/process that will document outcomes and demonstrate progress toward achieving the objectives of proposed education activities.

e) Evaluation methods shall be based upon reputable models and techniques that are appropriate to the content and scale of the project.

f) Describes methods that will be used to track student progress. Student progress shall be evaluated at different levels/phases of involvement with the proposed project such as across cohort groups, per education level, and post-involvement.

g) Provides a timeline of data collection, analysis, and reporting that aligns with MIRO Reporting Requirements outlined in H.6.2 Cooperative Agreement Award Reporting Requirements.

h) Describes how feedback from institutional staff, faculty, and students, collaborators partners and stakeholders will be obtained; shared with TRC, EAC, and MIRO Management Team members; and utilized to improve project activities.

9.5.3 Budget/Cost and Budget Narrative (weighted 20% in the evaluation)

Proposers shall clearly describe how the proposed budget is appropriate for the proposed effort. Proposals shall include a detailed implementation/costing plan with a clear narrative that demonstrates how funds requested will be fully utilized for the duration of the five-year award period of performance. The following elements will be considered in the evaluation of the Budget/Cost and Budget Narrative:

- Clarity of alignment between the proposal narrative and budget;
- Budget is adequate, appropriate, reasonable, and realistic for the development, implementation, and reporting of activities.
- Budget demonstrates effective use of funds for which outcomes justify total costs; and
- All budget line items are fully explained and justified.

In addition, the budget and budget narrative shall:

1) Align with budget guidelines and requirements outlined in 9.2.3 Budget Guidelines and Requirements (in this document).
2) Include sufficient travel funds to cover costs for the PI, other key staff, and students to attend critical meetings. Requested travel shall include purpose, the number of trips and expected location, duration of each trip, airfare, and per diem.

3) Include annual stipend/scholarship support for students to participate in internship opportunities at NASA Centers and research facilities during NASA’s spring, summer, or fall session. The agency’s current (implementation Summer 2024) rate is $8,200 for undergraduates and $9,900 for graduates (at the master’s and doctoral levels). This rate is based on 40 hours a week for 10 weeks.

4) Indicate how the proposed budget is clearly aligned with the proposal narrative and budget narrative.

5) Describe how the proposed budget is adequate, appropriate, reasonable, and realistic.

6) Demonstrate effective use of funds in which outcomes justify total costs.

7) Include sufficient funds to support a project administrative assistant (or explanation of how project administration will be supported through other funding).

8) Include sufficient funds to support the Independent Evaluator, including necessary travel.

9) Provide a budget justification detailing how funds will be allocated to support project personnel, travel, student scholarships or support, research funding, and subcontracts.

9.5.4 Review and Selection Process

Reviewers and panelists with appropriate expertise will be identified to evaluate each proposal that is compliant and meets requirements that have been stated within the MIRO solicitation. Proposers shall provide sufficient detail to enable an effective evaluation by persons who are knowledgeable of, but not necessarily specialists in the proposed research area. The reviewers may include personnel from NASA, other government agencies, industry, and universities.

Proposals will be evaluated through a two-phased process to include an evaluation completed by reviewers and panelists. The first phase will be conducted online by reviewers, with the highest-rated proposals moving forward to panel review, which is the second phase. The MIRO Activity Manager will present the panel’s final recommendations to the NASA Selection Official. Note: NASA reserves the right to implement a one-phase panel review process.

The Selection Official will use programmatic factors (including considering available funding) to achieve an award portfolio that meets the goals and objectives of MIRO. NASA seeks a balanced award portfolio, and considers diverse factors, including but not limited to, different types of institutional representation (e.g. MSI type), participation by individuals traditionally underrepresented in STEM studies and careers, receipt of prior NASA MUREP awards, and geography.

In evaluating the proposals, NASA will assign one of the following overall ratings:

- **Excellent** - A comprehensive and thorough proposal of exceptional merit with one or more significant strengths. No deficiency or significant weakness exists.

- **Very Good** - A proposal having no deficiency, and which demonstrates overall competence. One or more significant strengths have been found, and strengths outbalance any weaknesses that exist.
• **Good** - A proposal having no deficiency, and which shows a reasonably sound response. There may be strengths or weaknesses, or both. Weaknesses not offset by strengths do not significantly detract from the Proposer’s response.

• **Fair** - A proposal having no deficiency, and which has one or more weaknesses. Weaknesses outbalance strengths.

• **Poor** - A proposal that has one or more deficiencies or significant weaknesses that demonstrate a lack of overall competence or would require a major proposal revision to correct.

### 9.5.4.1 Successful Proposals

Upon selection of award recipients by the Selection Official, the PI of each successful proposal will receive a “Notice of Intent to Make a Federal Award” letter via NSPIRES with an explanation of the review process and reviewers’ comments about the proposal. It is anticipated that these letters will be released in May 2024. Proposers are strongly cautioned that only a NASA Grant Officer may make commitments, obligations, or awards on behalf of NASA or authorize the expenditure of funds for this opportunity. Pre-award costs will not be allowed for cooperative agreements awarded through this funding opportunity. It is this program’s practice to provide a letter indicating application selection and “Notice of Intent to Make a Federal Award” letter prior to the release of federal award funding. This letter is not an authorization to begin performance. If a submitter is selected for an award, and it incurs pre-award costs, this is at the submitter’s/recipient’s own risk and NASA will not reimburse such costs.

NASA will notify recipients of funding via a Notice of Award (NASA Form 1687) signed by the NASA Grant Officer. This Notice of Award is the authorizing document and will be sent to the proposing PI and the Authorized Organization Representative (AOR) listed in the proposal via electronic delivery. All expenses incurred on cooperative agreement activities prior to the period of performance start date listed on the Notice of Award are at the recipient’s risk of the non-Federal entity until the Notice of Award is received and period of performance commences.

### 9.5.4.2 Unsuccessful Proposals

Upon selection of award recipients, the PI of an unsuccessful proposal will receive a non-selection letter with an explanation of the review process and reviewers’ comments about the proposal via NSPIRES.

### 9.5.4.3 Anticipated Announcement and Federal Award Dates

- **Open Application Period:** November 15, 2023
- **Pre-proposal Webinar 1:** December 7, 2023, 4:00 pm ET
- **Pre-proposal Webinar 2:** January 8, 2024, 4:00 pm ET
- **Pre-proposal Webinar 3:** February 6, 2024, 4:00 pm ET
- **Application Period Closes:** February 14, 2024, 11:59 pm ET
- **Anticipated Selection Announcement Date:** May 2024
- **Anticipated Federal Award Date:** Prior to September 1, 2024
9.6 FEDERAL AWARD ADMINISTRATION INFORMATION

9.6.1 Cooperative Agreement Award Reporting Requirements

The reporting requirements for award recipients under the MIRO will be consistent with the NASA GCAM.

Unless otherwise noted, the MIRO PI shall submit reports via secure transfer and following Personally Identifiable Information (PII) requirements to the NASA Shared Services Center (NSSC) with a courtesy copy to the MIRO Activity Manager. For additional information on PII, see NASA Privacy Procedural Requirements.

All reports shall include the following data elements on the report’s cover page:

- Federal agency (i.e., NASA) and program office to which the report is submitted
- Award number
- Project title
- PI name, title, and contact information (e-mail address and phone number)
- Name of submitting official, title, and contact information (e-mail address and phone number), if other than PI
- Submission date
- UEI number and EIN number
- Recipient organization name and address
- Recipient identifying number or account number, if any
- Period of performance start and end date
- Reporting period end date
- Report term or frequency (annual, semi-annual, quarterly, other)
- Final Report? Indicate “Yes” or “No”
- Signature of submitting official (either handwritten or electronic)

In addition to the data elements above, all NASA performance reports shall report on one mandatory reporting category, “accomplishments.”

Accomplishments data element:

1. What were the major goals and objectives of this project?
2. What was accomplished under these goals and objectives?
3. What opportunities for training and professional development has the project provided?
4. How were the results disseminated to communities of interest?
5. What do you plan to do during the next reporting period to accomplish the goals and objectives?

For further details on reporting project performance, please refer to the Post-Award Phase Section of the NASA GCAM (Section 7.3.1)
Comprehensive Evaluation Plan (CEP) -

Within three months after award, using required report formats, recipients shall submit a Comprehensive Evaluation Plan (CEP) that:

- Is developed by the IE with concurrence by the PI.
- Provides a clearly articulated logic model.
- Describes an appropriate evaluation plan/process that is based on reputable models and techniques, documents outcomes and demonstrates progress toward achieving the goals and objectives of the proposed education activities.
- Identifies how progress toward achieving the objectives of proposed education activities will be measured; and
- Identifies a timeline and benchmarks for objectives that align with MIRO reporting requirements.

NOTE: The NASA OSTEM Performance and Evaluation (P&E) Team will provide guidelines and templates for the CEP and evaluation report deliverables. The CEP should be submitted to NSSC with a courtesy copy to the MIRO Activity Manager and the OSTEM P&E Team. The submitted CEP will be approved by the MIRO Management Team after the recipient dispositions any feedback and comments provided by the P&E Team.

Federal Financial Reporting

Recipients must submit quarterly financial reports. The following financial reports must be submitted via the Payment Management System (PMS):

- Quarterly Federal Cash Transaction Reports (FCTR) are due no later than 30 days past the reporting period end date
- Final Financial Status Reports/Final Federal Financial Report (FSR/FFR) are due no later than 120 days after the end of the period of performance

Performance Reporting

Recipients must also submit annual and final performance reports. Annual reports are due to NASA 60 days prior to the anniversary date of the award, except in the award’s final year. Recipient of awards that are in their final year are required to submit final performance reports instead of the annual performance report. Descriptions of annual and final reporting requirements for MIRO are below:

Annual Report (due each year 60 days prior to the anniversary date of the award, except in the award’s final year)

Recipients shall submit an Annual Report every year not later than 60 days prior to the anniversary date of the award, except in the award’s final year.

Annual Evaluation Report (Developed by the IE, as an Appendix to the Annual Report) that includes, at a minimum:
• The outcomes and demonstrated progress toward achieving the objectives of proposed activities aligned to the comprehensive evaluation plan; and
• An annual and formative/summative assessment of the evaluation questions identified in site evaluation plans using the methods and instruments previously identified

**Final Report (120 days following the end of the performance period)**
Recipients shall submit a Final Report no later than 120 days following the end of the award’s performance period.

**Additional Reporting Requirements**
Recipients must conform to all reporting requirements outlined in the Required Publications and Reports section of the *GCAM*, currently Appendix F. Additional reporting may be requested.

**9.6.2 Summary of Recipient Responsibilities**
Recipients have the primary responsibility for implementing, operating, and managing the project as described in their submitted proposal.

• Each recipient shall select a PI in support of this agreement, to be primarily responsible for the overall management of the award and serve as the primary point of contact for NASA. If the PI to be named is different from the individual identified in the proposal, the NASA Shared Services Center (NSSC) and the MIRO Activity Manager shall be notified in advance and in writing. Any proposed change to the PI under this Agreement is subject to NASA’s written advance approval. Also, see the *GCAM, Section 7.7, Change of Principal Investigator or Recipient Institution*, for more information.
• Each recipient shall be present and participate during the kickoff meeting, training workshops, and monthly activity meetings as required.
• Each recipient shall travel to and participate in annual Agency OSTEM in-person meetings.
• Performance Outcomes: All institutional PIs with NASA OSTEM grants and/or cooperative agreements shall provide and verify performance data for the awarded project and submit such data to NASA in accordance with NASA guidance (i.e. NASA STEM Gateway system).
• The MIRO PI shall submit all required reports via email to the NSSC with a courtesy copy to the MIRO Activity Manager.
• The recipient institution, in concert with the PI, is responsible for the financial management of MIRO as specified in the basic award notice under the terms and conditions (T&Cs) issued by NASA and in the *GCAM*. Failure to comply with the T&Cs in an award may result in NASA terminating the award/cooperative agreement.
• NASA reserves the right to add requirements to the cooperative agreement during the period of performance in order to achieve broader MIRO or NASA objectives. Such requirements will be negotiated and agree to between NASA and the recipient before the cooperative agreement is modified in writing to include them.
9.6.3 Office of STEM Engagement Performance Metrics

NASA currently utilizes the NASA STEM Gateway registration/application and data management system (Gateway system) for analyzing performance data. PIs are required to respond to data calls as requested by NASA OSTEM and utilize the Gateway system for performance data reporting in a timely and proper manner. Additional communications and guidance regarding data calls and the Gateway system will be sent to award recipients from OSTEM and MIRO Activity Manager. The PI shall ensure that they have the appropriate staff and resources to facilitate data collection activities and properly complete tasks required for timely reporting to NASA.

9.6.4 Other Information

Access to NASA Facilities/Systems
All recipients shall work with NASA project/program staff to ensure proper credentialing for any individuals who require access to NASA facilities and/or systems during the period of performance of the cooperative agreement. Such individuals include U.S. citizens, lawful permanent residents (“green card” holders), and foreign nationals (i.e., individuals who are neither U.S. citizens nor permanent residents).

9.6.5 Summary of Key Information

| Total ESTIMATED annual budget for the NASA MIRO ACTIVITY | ~ up to $8,750,000 |
| Number of new awards pending adequate proposals of merit | Up to seven |
| Start date (estimated) | October 1, 2024 |
| Duration of awards | five years |
| Award Type | Cooperative Agreement |
| Release Date | November 15, 2023, 11:59 pm ET (DATE SUBJECT TO CHANGE); Check the MIRO landing page for details. |
| Pre-proposal Conference (Optional) | #1 - December 7, 2023, 4:00 pm ET (DATE SUBJECT TO CHANGE); Check the MIRO landing page for details. |
| | #2 - January 8, 2024, 4:00 pm ET (DATE SUBJECT TO CHANGE); Check the MIRO landing page for details. |
Final Office Hour – February 6, 2024, 4:00 pm ET (DATE SUBJECT TO CHANGE); Check the MIRO landing page for details.

Due date for Notice of Intent to propose (NOI) - OPTIONAL
January 12, 2024, 11:59 pm ET (DATE SUBJECT TO CHANGE); Check the MIRO landing page for details.

Proposal Due Date
February 14, 2024, 11:59 pm ET (DATE SUBJECT TO CHANGE); Check the MIRO landing page for details.

Page limit for the central Scientific-Educational-Management section of proposal
15pp (includes all illustrations, tables, and figures, where each "n-page" foldout counts as n-pages and each side of a sheet containing text or an illustration counts as a page.); See NASA Proposer's Guide

Detailed instructions for the preparation and submission of proposals
See NASA Proposer's Guide

Submission medium
Electronic proposal submission is required via NSPIRES only; hard copy proposals will not be accepted. See NASA Proposer's Guide

Web site for submission of proposal via NSPIRES
NSPIRES (Help Desk available at nspires-help@nasaprs.com or (202) 479-9376 from 8 am to 6 pm ET) Monday through Friday, excluding Federal Government holidays.

Selection Official
TBD
MUREP Manager
NASA Headquarters
Washington, DC 20546

NASA Point of Contact for this project
Dr. Gaffar Gailani
MIRO Activity Manager
NASA’s Armstrong Flight Research Center
4800 Lilly Ave, Edwards, CA 93523
Email: NASAMIRO@nasaprs.com

References


5. Sansone, V., & Sparks, C. (2022). Exploring Hispanic-serving in minority serving institutions: Pathways, racial equity, and STEM doctoral degree production in the United States. *Journal of Higher Education Policy and Leadership Studies, 3* (3), 119 -124. DOI: [https://dx.doi.org/10.52547/johepal.3.3.119](https://dx.doi.org/10.52547/johepal.3.3.119)


Appendix 9A: NASA Mission Directorates Research Priorities

9A.1 INTRODUCTION

9A.1.1 Overview of Mission Directorates

NASA is organized with five Mission Directorates as listed below. The information provided herein is not a comprehensive listing of all NASA research priorities but is intended to provide a generalized representation of research interests as determined by the five directorates. Additional and more detailed information can be provided by directly contacting the Mission Directorates.

- Aeronautics Research Mission Directorate (ARMD)
- Exploration Systems Development Mission Directorate (ESDMD)
- Space Operations Mission Directorate (SOMD)
- Science Mission Directorate (SMD)
- Space Technology Mission Directorate (STMD)

9A.2 MISSION DIRECTORATES

9A.2.1 Aeronautics Research Mission Directorate (ARMD)

ARMD conducts high-quality, cutting-edge research that generates innovative concepts, tools, and technologies to enable revolutionary advances in our Nation’s future aircraft, as well as in the airspace in which they will fly. ARMD programs will facilitate a safer, more environmentally friendly, and more efficient national air transportation system. Using a Strategic Implementation Plan, NASA ARMD sets forth the vision for aeronautical research aimed at the next 25 years and beyond. It encompasses a broad range of technologies to meet future needs of the aviation community, the nation, and the world for safe, efficient, flexible, and environmentally sustainable air transportation.

ARMD Areas of Interest

Researchers responding to ARMD research priorities shall propose a research project that is aligned with one or more of the ARMD programs. Proposers are directed to the following:
ARMD Programs: http://www.aeronautics.nasa.gov/programs.htm

ARMD Topics Specific to MUREP MIRO Group 8

ARMD is specifically targeting the development of capabilities for conducting Zero Emission Aviation related research. NASA is looking to extend the Nation’s capabilities at academic institutions for the development of future air transport technologies which limit or completely circumvent the environmental harm associated with air transportation. Although the focus is on methods for reducing the harm associated with air travel on the environment, the needs are not limited to subsonic flight. It is foreseen that sustainable methods for harnessing energy required for supersonic and hypersonic air transportation will also eventually be needed.
ARMD’s Vision for Zero Emissions Aviation (ZEA) for 2050 and beyond looks past Sustainable Aviation Fuel (SAF) to alternative ways to provide propulsive power and eliminate the harmful emissions directly exhausted by air transport vehicles. This Vision challenges the research and development community to strive towards true zero and net negative sustainable lifecycle carbon emissions as well as the elimination of other harmful emissions.

Through experience gained in running NASA ARMD’s University Leadership Initiative (ULI) Project as well as in the Advanced Air Transport Technologies (AATT) Project, NASA has generated the following list of potential capabilities which could be considered for development in an opportunity such as this one. This is by no means a list of ideas from which one must choose from.

**Potential Research Areas**

- Laboratory and modeling infrastructure for investigating metal fuels or completely new fuels developed using AI or Machine Learning techniques.
- Fuel cell laboratories for designing innovative high temperature cells and creating and testing new anodes, cathodes, advanced fuel cells, and fuel cell combustors.
- Advanced electric rotating machinery laboratories for creating new components and the eventual testing of integrated iron-bird drive systems.
- Laboratories for demonstrating power beaming techniques for use in aviation propulsion.
- Laboratories for safely testing concept systems utilizing LH₂ for propulsion system component cooling, LH₂ flight system development, and for educating a workforce with experience and knowhow for safely handling cryogenic fuels such as hydrogen.
- Laboratories for testing advanced, highly efficient thermodynamic cycles including new, innovative, and applicable hybrid and combined cycles.
- Capabilities for determining/measuring the construct of aircraft emissions and modeling the effects of those emissions on our climate.

**9A.2.2 Exploration Systems Development Mission Directorate (ESDMD)**

The Exploration Systems Development Mission Directorate defines and manages systems development for programs critical to NASA’s Artemis program and planning for NASA’s Moon to Mars exploration approach. ESDMD manages the human exploration system development for lunar orbital, lunar surface, and Mars exploration.

NASA has established the Moon to Mars Program Office within ESDMD to focus on hardware development, mission integration, and risk management functions for programs critical to the agency’s exploration approach. Artemis missions will open a new era of scientific discovery and economic opportunity at the Moon while validating operations and systems and to prepare for human missions to Mars. The Moon to Mars Program Office oversees development of the Space Launch System rocket, Orion spacecraft, supporting ground systems, human landing systems, spacesuits, Gateway, and more related to deep space exploration. The new office will also lead planning and analysis for long-lead developments to support Mars missions.

**9A.2.3 Space Operation Mission Directorate (SOMD)**
The Space Operations Mission Directorate (SOMD) is responsible for enabling human exploration sustained operations of the solar system. SOMD manages NASA crewed space operations in and beyond low-Earth orbit (LEO) and commercial launch services. SOMD operates, and maintains exploration systems, develops and operates communications, and space transportation systems, and performs scientific research to enable sustained human exploration. In addition, SOMD is responsible for managing the space transportation services for NASA or NASA-sponsored payloads that require orbital launch, and the Agency's space communications and navigation services supporting all NASA space systems. Additional information on SOMD can be found at: https://www.nasa.gov/directorates/space-operations-mission-directorate

SOMD Areas of Interest: Human Research Program

The Human Research Program (HRP) is focused on investigating and mitigating the highest risks to human health and performance to enable safe, reliable, and productive human space exploration. The HRP budget enables NASA to resolve health risks for humans to safely live and work on missions in the inner solar system. HRP conducts research, develops countermeasures, and undertakes technology development to address human health risks in space and ensure compliance with NASA's health, medical, human performance, and environmental standards. The research falls into one or more categories corresponding to HRP’s five elements: Space Radiation, Human Health Countermeasures, Exploration Medical Capability, Human Factors and Behavioral Performance, and Research Operations and Integration. Solicitation covers all aspects of research to provide human health and performance countermeasures, knowledge, technologies, and tools to enable safe, reliable, and productive human space exploration. Ground and Flight investigations within applied research and development; technology readiness level maturation; and technology demonstrations.

Human Research Program

The NASA Human Research Program (HRP) drives advances in scientific and technological research to enable human space exploration. It is a human-focused Program dedicated to providing solutions and mitigation strategies beyond low-earth orbit by reducing the risks to human health & performance through focused translational, applied and operational research. HRP's primary deliverables include:

- Human health, performance, and habitability standards
- Countermeasures and other risk mitigation solutions
- Advanced habitability and medical support technologies
- Recently, HRP has developed a strategy to deliver critical components for an evolvable Crew Health and Performance System by 2032. This will be central to how HRP characterizes spaceflight risks and produces mitigation strategies that enable optimal crew health and performance during exploration missions. HRP will demonstrate and mature this system in ground analogs, in LEO, and on and around the moon to support a 2039 Mars mission. The Human Research Roadmap
(https://humanresearchroadmap.nasa.gov) is a web-based version of an HRP Integrated Research Plan that allows users to search HRP risks, gaps, and tasks. The HRP is organized into several research elements:

- Human Health Countermeasures
- Human Factors and Behavioral Performance
- Exploration Medical Capability
- Space Radiation

Each of the HRP Elements addresses a subset of the risks. Proposals should address specific gaps listed in the Human Research Roadmap (https://humanresearchroadmap.nasa.gov/Gaps/).

**HRP Topic Specific to MUREP MIRO Group 8**

**ECLSS - Crew Health & Performance System Capability Leadership Team (SCLT)**

A specific area of interest to NASA is terrestrial crop evaluations to increase the number and types of crops validated in spaceflight-relevant environments, augment crew diets with bioavailable nutrients, generate data on astronaut preferences and potential spaceflight countermeasures, and understand human-plant-microbial communities and changes over time.

This project would involve high throughput cultivar screening to assess horticultural compatibility under relevant environmental conditions. It is expected that technology demonstrations would be conducted with down-selected crops in analog growth chambers (i.e., Veggie, Advanced Plant Habitat). Experiments to improve crop performance may also be proposed. The overall intent is to advance crops from a variety of categories (i.e., leafy greens, fruiting crops, etc.) through the Crop Readiness Level evaluation.

**9A.2.4 Science Mission Directorate (SMD)**

In addition to reviewing the list of topics for any given division, one can get context by reading the overview, e.g., E.1 The Biological and Physical Sciences Research Overview. There is an overview for each division, for example: A.1 for Earth Science, B.1 for Heliophysics and so on.

**9A.2.5 Space Technology Mission Directorate (STMD)**

Technology drives exploration and the space economy. NASA’s Space Technology Mission Directorate (STMD) aims to transform future missions while ensuring American leadership in aerospace. As NASA embarks on the next era of space exploration with Artemis, STMD is advancing technologies and testing new capabilities at the Moon. Many of the same systems will prove critical at Mars. STMD’s portfolio spans a range of discipline areas and technology readiness levels.

STMD bolsters and funds diverse ideas from entrepreneurs, researchers, and innovators across the country. Space technology research and development occurs at NASA centers, universities, national labs, and small businesses. STMD leverages partnerships with other government agencies and commercial partners to quickly advance and demonstrate cross-cutting capabilities.
Investments in revolutionary, American-made space technologies provide solutions on Earth and in space. We make our innovations available to commercial companies to generate real-world benefits – everything from creating jobs to saving lives. Learn more at NASA TechPort - Strategic Framework.
APPENDIX 10: Space Grant Opportunities in NASA STEM FY2025-2028

10.1 PROGRAM DESCRIPTION
10.1.1 Overview of the Funding Opportunity

The Space Grant College and Fellowship Program (Space Grant) is administered through the National Aeronautics and Space Administration’s (NASA) Office of STEM Engagement (OSTEM). Through Space Grant, NASA provides financial assistance via competitive awards to Consortia of Lead Institutions of a national network. The Space Grant national network includes over 1,000 affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. These affiliates belong to one of 52 consortia in all 50 states, the District of Columbia and the Commonwealth of Puerto Rico. Space Grant was established by Congress in 1989 as a workforce development program in the United States that produces STEM-trained professionals.

The National Aeronautics and Space Administration (NASA)’s Office of Science, Technology, Engineering, and Mathematics (OSTEM) Engagement solicits proposals for the National Space Grant College and Fellowship Program (Space Grant) Space Grant Opportunities in NASA STEM FY2025-2028. Each funded proposal is expected to define a comprehensive consortium program devoted to increasing student and youth’s understanding of space and aeronautics and to executing the assessment, development, and utilization of resources to bolster the STEM pipeline for aerospace. The funding opportunity is intended to provide four years of funding via an educational cooperative agreement.

Proposals will only be accepted from the lead institution of Space Grant consortia in each state along with the District of Columbia and the Commonwealth of Puerto Rico. NASA will only accept one proposal per consortium. For a list of eligible Space Grant lead institutions and Space Grant Directors, visit: [https://www.nasa.gov/stem/spacegrant/home/Space_Grant_Consortium_Websites.html](https://www.nasa.gov/stem/spacegrant/home/Space_Grant_Consortium_Websites.html)

10.1.2 Goals and Objectives

The purpose of the Space Grant Program is to contribute to the 2022 NASA Strategic Plan, by “Strengthening STEM education through inspirational missions and collaboration with the academic community.” Specifically, Strategic Objective 4.3 within the 2022 NASA Strategic Plan: Build the next generation of explorers, Engage students to build a diverse future STEM workforce.

The OSTEM Performance Goals (PGs) are directly aligned with and support the 2022 NASA Strategic Plan and the OSTEM Learning Agenda. Additionally, the Space Grant Program also aligns with these performance goals. The following describes performance goals and associated objectives for the National Space Grant Program. These have been outlined below to assist Recipients in aligning OSTEM Performance Goals with the objectives for the National Space Grant Program:
**Performance Goal 4.3.1:** Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery.

**Objective 1.1:** Create opportunities that enable students to produce knowledge or products that will be used by NASA

**Objective 1.2:** Create opportunities that enable students to support NASA mission work and research

**Objective 1.3:** Establish and maintain a national network of universities that enable creating opportunities for students to contribute to NASA’s work in exploration and discovery

**Performance Goal 4.3.2:** Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.

**Objective 2.1:** Enhance students’ STEM identity, skills, and knowledge by engaging them in NASA-based authentic STEM learning activities

**Objective 2.2:** 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

**Objective 2.3:** Broaden participation of students in Space Grant Programming that leverages authentic learning experiences with NASA’s people, content, and facilities

**Performance Goal 4.3.3:** Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work.

**Objective 3.1:** Expand the reach of individual Consortia to collaborate regionally on efforts that directly support middle and high school student participation in hands-on, NASA-aligned STEM activities

**Objective 3.2:** Attract diverse populations of traditionally underserved and underrepresented middle and high school students to STEM and equip them with the tools necessary for success in college STEM degree programs leading to STEM careers

**Objective 3.3:** Promote a strong STEM education base for middle and high school students while training teachers in these grade levels to become more effective at improving student academic outcomes.

**Performance and Evaluation Strategy (Learning Agenda):**

OSTEM continues to move beyond basic quantitative output measures of successful implementation, to a more robust, comprehensive approach to understand the scope and impacts of investments by generating a body of evidence that is increasing in rigor and focuses on outcomes. OSTEM’s historic use of quantitative output measures provided a limited understanding of the scope of NASA’s STEM engagement activities and did not provide the depth of understanding and quality of evidence needed to make meaningful programmatic decisions. To address this gap, OSTEM has been operating under a Learning Agenda since FY 2019, which serves as the foundational document for building a culture of learning and continual improvement. The implementation of the Learning Agenda provides a
systematic approach for building and using new knowledge about project and operational performance for evidence-based decision making and continual improvement.

The purpose of this Learning Agenda is to put forth Learning Questions with associated sub-questions, Learning Activities and assessment methodologies, and Learning Products that will inform the NASA OSTEM’s understanding of the scope, methods, mechanisms, and impacts of its investments. The answers to these questions will enable NASA OSTEM to more effectively prioritize and narrow the focus of STEM engagement investment areas by making evidence-based budgetary, programmatic, and operational decisions. Specifically, the FY 2022 – FY 2023 NASA OSTEM Learning Agenda is being executed to gain an understanding of the extent to which STEM engagement investments are:

**Contributing to NASA’s missions and work**

**Learning Question 1:** How can NASA STEM Engagement develop cross-project metrics that support internal and external contributions to STEM Engagement goals and objectives?

**Contributing to the diversity of the future aerospace industry’s STEM workforce**

**Learning Question 2:** How do NASA Internships broaden participation of underrepresented and underserved students to advance equity and build a diverse future STEM workforce?

**Understanding how to attract K-12 students to STEM engagement investments**

**Learning Question 3:** How can NASA attract K-12 students, especially those underrepresented and underserved, to STEM?

### 10.1.3 National Priorities

On January 20, 2021, President Biden issued Executive Order 13985 (Advancing Racial Equity and Support for Underserved Communities Through the Federal Government), which calls upon all Federal Government agencies to pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our government. Because advancing equity requires a systematic approach to embedding fairness in decision-making processes, executive departments and agencies must recognize and work to redress inequities in their policies and programs that serve as barriers to equal opportunity. This Executive Order (EO) also defines the terms of underserved and underrepresented groups that this funding opportunity plans to positively impact.

On May 28, 2021, President Biden issued EO 14031(Advancing Equity, Justice, and Opportunity for Asian Americans, Native Hawaiians, and Pacific Islanders). This EO establishes a White House initiative on Asian Americans, Native Hawaiians, and Pacific Islanders, as well as a Presidential Advisory Commission, both of which aim to advance equity, justice, and opportunities between and among these groups.
On June 25, 2021, President Biden issued EO 14035 (Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce). This EO creates a Government-wide initiative to promote diversity, equity, inclusion, and accessibility (DEIA). This EO is based on a growing body of evidence demonstrating that diverse, equitable, and accessible workplaces result in higher levels of employee performance. Awardees of the Space Grant Opportunities in NASA STEM FY2025-2028 recipients shall serve as examples of how SG continues to evolve to meet changing national and agency priorities.

10.1.4 Agency Priorities

The National Aeronautics and Space Act (Space Act) at 51 U.S.C. § 20112(a)(3) directs NASA “to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.” In support of this law, NASA engages students in its mission through a portfolio of STEM programs and activities.

The 2022 NASA Strategic Plan reinforces the agency’s commitment to inspiring an informed society; engaging students in science, technology, discovery, and exploration; and providing unique STEM opportunities for diverse stakeholders. NASA’s investments in these areas are guided by Strategic Goal 4: Enhance capabilities and operations to catalyze current and future mission success; and Strategic Objective 4.3: Build the next generation of explorers (reference section 10.1.2).

NASA’s support of U.S. industry and academia seeks to foster economic development and growth, embody American ingenuity, and serve as a magnet for the STEM workforce. Additionally, the Agency has made a commitment to contribute to the diversity of the future aerospace STEM workforce and employs proactive efforts to diversify STEM pathways leading to NASA internships and employment.

10.1.4.1 Relevance to NASA OSTEM

NASA’s OSTEM plays a critical role in achieving NASA Agency Strategic Objective 4.3 by implementing activities aligned to three Performance Goals for STEM engagement: 1) Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery; 2) Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities; and 3) Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work. Within the body of the proposal, each consortium’s proposal should clearly outline the consortium’s plan to broaden the diversity of students whom they attract and engage. The consortium will be asked within their annual report to outline the tangible steps which were taken toward achieving these goals.

Annually, NASA OSTEM generates a body of evidence (e.g., performance data, participant data, metrics) collected from recipients to assess progress of its investments in achieving programmatic goals and objectives, as well as OSTEM’s progress in achieving the following multi-year OSTEM Performance Goals (PGs):
• **PG 4.3.1** Create unique opportunities for a **diverse** set of students to contribute to NASA’s work in exploration and discovery.

• **PG 4.3.2** Build a **diverse** future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.

• **PG 4.3.3** Attract **diverse** groups of students to STEM through learning opportunities that spark interest and provide connections to NASA's mission and work.

Proposals shall clearly and concisely describe the **relevance and alignment** of the proposed work to NASA’s currently funded research priorities and programs of the NASA Mission Directorate(s). Proposals are required to address one or more priorities of the Mission Directorates and Centers, which are summarized in Appendix 8: [EONS 2024 Omnibus .pdf](nasaprs.com) NASA Mission Directorates and Center Alignment with Points of Contact. The current NASA mission directorates are as follows:

- Exploration Systems Division ([Exploration Systems Development Mission Directorate - NASA](http://www.aeronautics.nasa.gov/))
- Science ([http://science.nasa.gov/](http://science.nasa.gov/))
- Spaceflight Operations ([Space Operations Mission Directorate - NASA](http://science.nasa.gov/))
- Space Technology ([http://www.nasa.gov/directorates/spacetech/home/index.html](http://www.nasa.gov/directorates/spacetech/home/index.html))

Proposals shall address how the proposed Project and its programmatic elements directly align with the NASA Strategy for STEM Engagement (reference Section 10.1.2).

Consortia should strategically identify the areas consistent with the needs of their state and those which will contribute to the goals, objectives, and priorities of NASA. Consortia shall highlight in the proposal where these areas of emphasis will be implemented. Reference Section 10.1.2 for an overview of NASA’s STEM Engagement Priorities.

### 10.1.4.2 Relevance to Consortium

One of the goals of Space Grant is to encourage cooperative programs among universities, aerospace industry, and Federal, state, and local governments. Proposals shall demonstrate how the proposed project will be a contributor to the respective state’s long and short-term STEM strategic research plans, interests, and capabilities; and how the project will result in interdisciplinary training, research, and public service programs related to aerospace while promoting multi-faceted diversity amongst the students the project serves. It is strongly recommended that the proposal reference elements of department, college, and university strategic plan(s), research priorities, and/or other pertinent university documents.
10.2 FEDERAL AWARD INFORMATION

NASA’s ability to make awards is contingent upon the availability of appropriated funds from which payment can be made.

Subject to Congressional appropriation of sufficient funds and NASA’s receipt of proposals of adequate merit, NASA expects to select up to 52 proposals for Space Grant Opportunities in NASA STEM FY2025-2028 awards. The period of performance for each proposal/resulting award is four (4) years. Successful proposals for this opportunity will be funded as cooperative agreements. As cooperative agreements, substantial involvement between awardees and NASA is expected. For specific description of the substantial involvement required of awardees, see Section 10.6.3 Summary of Space Grant Awardee Responsibilities and Section 10.6.1 Cooperative Agreement Award Reporting Requirements of this Notice of Funding Opportunity (NOFO).

Proposals shall cover the full four years of performance. The continuation of NASA funding on each award annually is based on a satisfactory evaluation of documented progress; compliance with data reporting, applicable regulations and laws, and other program requirements; fulfillment of fiduciary responsibilities, and the availability of appropriated funds. At the time of this Appendix release, NASA does not plan to extend funding beyond the initial performance period of four years. Should additional funds become available, OSTEM will encourage proposals for an augmentation of funds.

Each Recipient/Proposer (required to be from the lead Space Grant Consortium institution) is eligible to apply for funds in the amount not to exceed (NTE) $800k for the first year of the award. The amount not to exceed (NTE) for Years 2 through 4 shall have a Base Award of $800k, and each Recipient/Proposer is eligible to apply for augmentation funds (in addition to the yearly Base Awards) for Years 2 – 4 in an amount NTE $70k.

For augmentation funds to be awarded, each Space Grant Consortium must have demonstrated expenditures (costed funds) and not encumbered or obligated funds (i.e., “costed” refers to the amount of funding that has been withdrawn against the award in the U.S. Department of Human and Health Services’ Payment Management System) as outlined below before any augmentation funds are released. If all the requirements as described below, are not met on a yearly basis the Consortia that do not meet these requirements will forfeit the additional augmentation funds for that year.

For example, if a consortium met the percent of costed funds requirement but submitted their CPR after the established deadline, the consortium will forfeit their augmentation funds for that year. However, if the consortium did not meet the requirements for Year 2 augmentation funds but does meet them for Year 3 then they shall be awarded the Year 3 augmentation funds.

Augmentation Eligibility Requirements:

1. To be eligible for Year 2 augmentation funds a consortium shall:
   a. Demonstrate expenditures (costed funds) of at least 30% of the prior year’s (Year 1) total funding (i.e., base award only) by the last calendar day, of the month in which the consortium’s last day of their period of performance falls.
   b. Have submitted the CPR and the APR on-time.
2. To be eligible for Year 3 augmentation funds a consortium shall:
   a. Demonstrate expenditures (costed funds) of at least 33% of the prior year’s (Year 2) total funding (i.e., base and augmentation awards) by the last calendar day, of the month in which the consortium’s last day of their period of performance falls.
   b. Have submitted the CPR and the APR on-time.

3. To be eligible for Year 4 augmentation funds a consortium shall:
   a. Demonstrate expenditures (costed funds) of at least 36% of the prior year’s (Year 3) total funding (i.e., base and augmentation awards) by the last calendar day, of the month in which the consortium’s last day of their period of performance falls.
   b. Have submitted the CPR and the APR on-time.

10.2.1 Funding
The Government’s obligation to make an award is contingent upon the availability of appropriated funds from which payment can be made. In the event legislation is enacted that provides a lower/higher funding level than what is assumed in the solicitation, states will have to propose revised budgets that reflect those lower/higher amounts.

While the National Space Grant College and Fellowship Program is focused on higher education, it is understood that many K-12 activities are supported by the Consortia nationwide. However, it is important to note that the focus of the congressionally allocated funds to Space Grant shall be primarily focused on higher education.

Consortia are highly encouraged to financially support student teams to participate in the Artemis Student Challenges (Join Artemis | NASA)

In general, this solicitation is not restricted in the use of funds beyond the NIF requirement and the need for each consortium to hire an Independent Evaluator.
   A. NIF activities shall be allocated as outlined in Section 10.2.4. See Sections 10.2.4, 10.4.3.6 and 10.4.3.7 for more information regarding the NIF requirements.

10.2.3 Budget Guidelines and Requirements
10.2.3.1 Total Budget Guidelines and Funding Restrictions
All costs charged to awards covered by this NOFO must comply with the Uniform Administrative Requirements in 2 C.F.R. 200, 2 C.F.R. 1800, and 14 C.F.R. 1259, unless otherwise indicated in the NOFO, the terms and conditions of the award, and the Grants and Cooperative Agreement Manual (GCAM).

- All proposed funds must be allowable, allocable, and reasonable. Funds may only be used for the project. All activities charged under indirect cost must be allowed under 2 CFR 200 cost principles.
- Grants and cooperative agreements shall not provide for the payment of fee or profit to the recipient.
- Unless otherwise directed in 2 CFR 200, for changes to the negotiated indirect cost rate that occur throughout the project period, the recipient must apply the rate negotiated for that year, whether higher or lower than at the time the budget and application was awarded.
• Proposals must not include bilateral participation, collaboration, or coordination with China or any Chinese-owned company or entity, whether funded or performed under a no-exchange-of-funds basis.
• Any funds used for match or cost sharing must be allowable under 2 CFR 200.
• The non-Federal entity must use one of the methods of procurement as prescribed in 2 CFR 200.320, Methods of procurement to be followed.
• Awards made under NASA Fellowship and Scholarship funding opportunities shall not provide for the payment of Facilities and Administration, overhead, or indirect costs per the definition of “modified total direct cost” in 2 CFR 200.1, Definitions.
• As directed in the NASA Guidebook for Proposers, Section 3.18, other than the special cases discussed in the same Section 3.18, and unless specifically noted otherwise the proposing PI institution shall subcontract the funding of all proposed Co-Is who reside at other non-Government institutions.
• The construction of facilities is not allowed for any of the activities solicited in this CAN unless specifically stated. For further information on what costs are permissible, refer to the cost principles in Subpart E of 2 CFR 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.
• U.S. award recipients may directly purchase supplies and/or services from non-U.S. sources that do not constitute research, but award funds may not be used to fund research carried out by non-U.S. institutions. However, a foreign national may receive payment through a NASA award for the conduct of research while employed either full-time or part-time by a U.S. institution (see Section 3.2 of the NASA Guidebook for Proposers).
• Reasonable and justified travel by a participant in the research investigation, whether for the purpose of conducting the research, for collaboration, or for attending a conference, is considered to be a reasonable expense. NASA conducts its collaborations with foreign institutions on a no-exchange-of-funds basis. NASA funding may not be used for foreign institutions to conduct research efforts at any level. Although Co-Investigator (Co-Is) or collaborators employed by non-U.S. organizations may be identified as part of a proposal submitted by a U.S. organization, NASA funding may not support research efforts by non-U.S. organizations, collaborators or subcontracts at any level, including travel by investigators at non-U.S. organizations. In other words, participants from U.S. organizations can receive travel funding, with the exception above for non-U.S. organizations (see Section 3.2 of the NASA Guidebook for Proposers; see also Appendix C).

10.2.3.2 Cost Sharing or Matching
Cost sharing/matching is required. Reference Sections 10.4.3.6 Budget Tables: Details and Narrative and 10.4.3.7 Cumulative Cost Share & Cumulative NIF Investment Tables for more details.
10.2.3.3 Direct Costs Limitations

Foreign travel shall be related to the goals of Space Grant. Foreign travel requires prior approval from the Space Grant Project Manager and shall not exceed $5,000 per year. Requested foreign travel shall include justification, the purpose, location, duration, airfare and per diem for each trip. The term “Space Grant” shall be included in verbal presentations and written acknowledgements when representatives of the institution are writing reports and publications. Within ten (10) business days of the trip’s conclusion, the institution’s representative shall submit to the Space Grant Program Office a post-trip summary report that describes the benefits gained as a result of the trip. If a summary report is not provided, the Space Grant Program Manager has the discretion to limit the Consortium’s future foreign travel request(s).

10.2.3.4 Pre-Award Costs

Per 2 CFR §1800.210, NASA waives the requirement for applicants to obtain prior approval for pre-award costs incurred 90 days or less before an award’s period of performance start date. Pre-award costs in excess of 90 days before an award’s period of performance start date are not allowable under this NOFO. Any costs that the applicant incurs in anticipation of a grant or cooperative agreement award is at the risk of the applicant and will be subject to the rules described in 2 CFR §1800.210, Pre-award costs and the “Pre-award Costs” section of the GCAM, currently section 5.14.1.

10.2.3.5 Indirect Facilities & Administrative (F&A) Costs

Under cooperative agreements, waived/unrecovered indirect costs can be used as cost-share. Please refer to the Code of Federal Regulations (2 CGF 200.306) regarding cost-sharing or matching of unrecovered indirect costs.

Funds utilized specifically for NASA or industry internships shall not be classified as a scholarship or fellowship. Additionally, it is the policy of the Space Grant Program that the awardee cannot charge management fees nor indirect costs to any NIF award under this Educational Cooperative Agreement.

10.2.4 NASA Internships and Fellowship Opportunities

Requesters/Proposers are required to meet the minimum NASA internship and fellowship (NIF) requirement for this announcement as outlined in Section 10.4.3.6 Budget Tables: Details and Narrative. All NIF awards, regardless of whether they meet the “significant” threshold (see below), are required to be reported in the NASA-approved data management system (i.e., the NASA STEM Gateway system). Longitudinal tracking is required to be completed by the Recipient for a significant student investment. A significant award is a monetary award, or experience that includes one or more of the following: (a) has a value of greater than or equal to $3,000 or (b) participation of greater than or equal to 160 hours annually.

For NIFs, Consortia shall allocate the established minimum NIF amounts referenced in Section 10.4.3.6. The purpose of this dollar threshold is to ensure that a significant amount of NASA’s investment is applied directly to student awards. Reference Appendix D for definitions of internships.
executed by NASA at NASA Centers and facilities, and any fellowship.

NASA no longer awards scholarships; however, Recipients are not prohibited from offering scholarships under their award. Recipients can make awards to undergraduate students, but those awards shall not be called fellowships.

For internships at a NASA Center, Consortia shall ensure that those awards adhere to the standard NASA internship stipend funding levels (reference Table 1). Funds utilized specifically for NASA or industry internships shall not be classified as a fellowship.

Table 1 – NASA Center Internship Student Stipends

<table>
<thead>
<tr>
<th>Session</th>
<th>Graduate Student</th>
<th>Undergraduate Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall and Spring (16 weeks)</td>
<td>$15,840</td>
<td>$13,120</td>
</tr>
<tr>
<td>Summer (10 weeks)</td>
<td>$9,900</td>
<td>$8,200</td>
</tr>
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</table>

Application for and selection of NASA interns shall be performed through the NASA STEM Gateway system. Students applying for NASA Center Internships should be directed to the NASA Internship Programs website (https://intern.nasa.gov) for details on applicant qualifications (GPA, citizenship, enrollment status, the minimum number of required contact hours, etc.). As specified by the NASA internships guidelines on the above referenced website, typically a minimum of 400 contact hours (time spent on task completion under mentors’ direction) are required for summer internships.

Proposals shall clearly demonstrate how internships, fellowships, and scholarships will be competitively awarded. A description of the recruitment of applicants, the selection process, and plans that demonstrate the inclusiveness of member/affiliate institutions shall be included.

Awards made under NIF funding opportunities shall not provide for the payment of Facilities and Administration (F&A), overhead, or indirect costs.

Note: All direct-funded participants regardless of the funding level, as well as those receiving significant awards shall be U.S. Nationals (reference 14 CFR part 1259.101 (c) for a definition of a U.S. National). This requirement applies to all sub-awards including, for example, participants funded from a faculty fellowship (i.e., participants/students receiving direct funding under a faculty fellowship must meet this requirement). A National of the United States is defined as a citizen of the United States or a native resident of a possession of the United States. Due to NASA security policies, all students who intern onsite at a NASA Center are required to be United States citizens.
10.2.5 Independent Evaluator (IE)
The proposer shall hire an Independent Evaluator in alignment with this solicitation/NOFO, and for the duration of this award. In addition to other responsibilities each consortium may require, the IE will be required to complete a Comprehensive Evaluation Plan (CEP) as well as a yearly assessment which shall be completed and provided as part of the Annual Performance Report.

In Appendix G, NASA has provided the Comprehensive Evaluation Plan (CEP) template which shall be used by the IE. This template is required to be used and no other format of a CEP will be accepted. The completed CEP by the IE shall be submitted (by either the IE or the consortium Director) to NASA HQ Space Grant at hq-space-grant@mail.nasa.gov no later than 45 calendar days after the start of the consortium’s period of performance. If the CEP is not provided prior to the established deadline, the consortium will be considered not in good standing. This may require the consortium to hold a meeting/s with the Space Grant HQ and the Performance and Evaluation Teams to discuss why the deadline for the CEP was not met, and to ensure delivery of the completed CEP as soon as possible. Based on the results of the meeting, the consortium may be required to schedule additional follow-on meetings and may be required to meet additional reporting requirements. For any of these required follow-on meetings, NASA HQ may provide a list of consortium and lead institution personnel required to attend.

In addition to the CEP, the IE will be required to complete a yearly assessment of the consortium. This assessment shall be included as part of the Annual Performance Report submitted by each consortium. Appendix H includes an example template for the IE portion of the Annual Report and shall only be used as a reference. The final version to be used by the IE will be provided by the Space Grant main office (yearly) when the Annual Performance Report template is provided to the consortia. It should be noted that the final yearly assessment template for the IE may vary slightly from the example template in Appendix H. While the final template provided may have only slight variations from the provided example, the yearly template provided by the Space Grant main office (and not Appendix H) shall be used by the consortium and the IE. No other version of the report template shall be accepted.

10.2.6 NASA STEM Gateway
The NASA STEM Gateway system was initially used by the Space Grant consortia for direct student data reporting in 2023. For reporting reasons, this system was designed to replace the Office of Education Performance Measurement (OEPM) system. However, the NASA STEM Gateway system’s capabilities extend beyond yearly reporting. Since its release, integration into OSTEM has slowly increased as system capabilities and access has also increased. The initial major use of the NASA STEM Gateway system, by OSTEM, has been for NASA internships. This requires that all students interested in participating in the NASA Space Grant internships, create a participant profile and apply through the NASA STEM Gateway system. This has allowed for more transparency into who is applying for NASA internships across the country, as well as who is being selected. To provide the consortia with more visibility, as well as allow for easier reporting capabilities, the Space Grant consortia have been provided access into the NASA STEM Gateway system including NASA badges and software system licenses.

The NASA STEM Gateway system is the required reporting system for the Space Grant consortia’s yearly Closeout Performance Report (CPR) which has a deadline of no later than November 30th of
each year. The CPR shall be completed within the NASA STEM Gateway system prior to the deadline, by all consortia.

In addition to using the NASA STEM Gateway system for reporting, in a similar fashion to its use for internships, the capabilities of the NASA STEM Gateway system continue to expand to allow data gathering of applicants and participants for opportunities outside of NASA internships. To gather full applicant and participant data, while still allowing each consortium to use their current software/systems for applicant review and awardee selection, it is necessary for some limited and basic information to be provided by the applicants in both the NASA STEM Gateway system as well as in whichever system is used by the consortia for their standard selection/awarding processes. Space Grant understands that any repetitive steps should be minimized. However, it is also understood that each consortium has their application, review, and selection process for each of their award opportunities with some including hundreds of applicants.

To allow for transparency, the consortia shall use the NASA STEM Gateway system to document applicants as well as participants for all awards. The implementation of this is outlined in Section 10.6.1 Additional Reporting Requirements. It should be noted that the intention of this is to document the demographics of the applicants and participants, not to have the applicants complete a full application (essay, transcript, resume, etc.) nor for the consortia to execute the selection process through the NASA STEM Gateway system. Most of the selection process/activities will remain within current consortia processes.

10.2.8 Consortium Performance Indicators

In collaboration with the Performance and Evaluation (P&E) Team and based on feedback gathered from the Space Grant consortia, metrics related to Performance Management, Budget Management, Milestones, Consortium Management, and Evaluation will be used to track and determine (on a yearly basis) the health of a consortium throughout the life of this cooperative agreement.

The intention of determining and tracking a consortium’s health is to be able to identify specific areas of concern where the Space Grant Main Office may be able to provide additional assistance so that all consortia are successful.

The major categories used to track and establish the health of a consortium, as mentioned above, were developed based on inputs gathered from the Space Grant consortia during an Evaluation Workshop held at the 2023 Space Grant Spring National Conference, on how the consortia believed a consortium should be evaluated.

The evaluation data gathered within each category will primarily focus on items such as (but not limited to) the successful completion of Milestones and SMART Goals and Objectives, as well as the yearly data gathered from the IE on a consortium’s: successes, areas of improvement, and overall impact. Additional items tracked will include execution of funds and timeliness of meeting reporting requirements.

Based on the results of the health tracking of a consortium, a consortium may receive feedback to assist with improvements in their performance. To track improvements more closely, a consortium may be required to participate/report in additional engagement activities with NASA. Specifics will
depend on the resulting health performance and areas of concern, but may include quarterly or semi-
annual virtual meetings, additional sections added to their consortium unique semi-annual or annual
performance reports, and possibly a site visit if there are continued concerns beyond the performance
of a single year (reference Section 10.6.1)

10.3 ELIGIBILITY INFORMATION
10.3.1 NASA’s Commitment to Diversity and Inclusion
NASA recognizes and supports the benefits of having diverse and inclusive scientific, engineering,
and technology communities and fully expects the reflection of such values in the composition of all
panels and teams, including peer review panels, proposal teams, science definition teams, and mission
and instrument teams. In accordance with Federal statutes and NASA policy, no eligible applicant
shall experience exclusion from participation in, be denied the benefits of, or be subjected to
discrimination under any program or activity receiving financial assistance from NASA on the
grounds of their race, color, creed, age, sex, national origin, or disability.

10.3.2 Eligible Applicants
Proposals will only be accepted from the lead institution of Space Grant consortia in each state along
with the District of Columbia and the Commonwealth of Puerto Rico. NASA will only accept one
proposal per consortium. For a list of eligible Space Grant lead institutions and Space Grant
Directors, visit:
https://www.nasa.gov/stem/spacegrant/home/Space_Grant_Consortium_Websites.html

10.3.2.1 Principal Investigator (PI)
A PI shall be appointed (i.e., Space Grant Director) in support of this Agreement. The SG
director shall be from and employed by the lead institution. If the PI to be named is different from
the individual identified in the proposal, the NASA Space Grant Program Office shall be notified
in writing per the Guidelines for Space Grant Director & Lead Institution Changes. Any proposed
change to the PI under this Agreement is subject to NASA approval. NOTE: If NASA approves
the proposed change, the NASA Grant Officer will issue a formal written modification to the
Agreement to reflect such change. If NASA does not approve the change in the PI, the recipient
will propose another PI until NASA approval is obtained.

10.3.2 Proposals Involving Foreign Participation
Except as outlined in the certification regarding restriction on doing business with certain countries,
NASA welcomes proposals that include the participation of non-U.S. organizations. Proposals that
propose research to be performed with a non-U.S. organization as part of a proposal submitted by a
U.S. organization typically are supported on a no-exchange-of-funds basis. For additional guidance on
foreign participation, see the NASA Guidebook for Proposers, Appendix A.

10.3.3 Ineligibility of Proposals That Include Participation of China or Chinese-Owned
Companies
Proposals involving bilateral participation, collaboration, or coordination in any way with China or
any Chinese-owned company, whether funded or performed under a no-exchange-of-funds basis,
shall be ineligible for award.
10.4 APPLICATION SUBMISSION INFORMATION

10.4.1 Address to Request Application Package
Proposal applications are available via the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES).

10.4.2 Proposal Preparation and Submission
All information needed for proposers to respond to this NOFO is contained in this Appendix, the EONS-2024 announcement, the NASA Grant and Cooperative Agreement Manual (GCAM) and the NASA Guidebook for Proposers. If the information contained in this Appendix conflicts with the GCAM or the NASA Guidebook for Proposers, then the information in this NOFO takes precedence.

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<th>Required Space Grant Opportunities in NASA STEM FY2025-2028 - Proposal Sections</th>
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<td>Data Management Plan</td>
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<td>A. Budget Tables: Details and Narrative</td>
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<td>B. Cumulative Cost Share &amp; Cumulative NIF Investment Tables *</td>
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<td>H. Summary Cost Match Table</td>
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<td>K. Consortium Programmatic Summary</td>
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<td>L. Guam/US VI Proposal Narrative (Statement of Work) **</td>
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<td><strong>Volume II – Augmentations (Years 2 – 4)</strong></td>
<td></td>
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<tr>
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<td>Milestones</td>
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* These two tables are small enough that they can both be placed on the same page within their required Appendix section. Reference Tables 3 and 4.

** These Appendixes are only to be included in the HI and SC proposals to include the details provided by Guam and US Virgin Islands (respectively) for their planned use, budget, and goals associated with those funds.

10.4.2.1 Proposal Submission Guidelines
Detailed instructions for the preparation and submission of proposals are available in the NASA Guidebook for Proposers. Applicants shall submit their proposals using electronic proposal submission via NSPIRES (http://nspires.nasaprs.com) or Grants.gov (http://www.grants.gov). Registration in NSPIRES is required for proposal submission regardless of the proposer’s intent to submit via NSPIRES or Grants.gov.

All required documentation shall be provided as a single document with up to two Volumes clearly delineated. Volume I of that document shall be used to include all required information pertaining to the proposal for the Base Awards of the multi-year across the four years, Volume II shall include all required information pertaining to the Augmentations of the multi-year across years 2-4 (if desired to be submitted).

Proposals shall use standard size 8 ½” x 11” paper with at least a 12-point font with a minimum 1” margin on all sides of each page. Proposals shall use an easily readable font such as Times New Roman, Calibri, Arial, Helvetica, Georgia, or Garamond. Illustrations, tables, and charts shall not be smaller than an 8-point font. The required appendices set forth above are to be labeled as listed above (e.g., the Budget Tables with details and narrative shall be Appendix A within the proposal, the Cumulative Cost Share & Cumulative NIF Investment Tables shall be included as Appendix B, Affiliate Concurrences shall be included as an Appendix G, Letters of Resource Support shall be provided as Appendix I, etc.). Proposals shall be uploaded into NSPIRES in PDF format with applicable section bookmarks.

It is essential that all PDF files generated and submitted meet the NASA requirements below. This will ensure that the submitted files can be transferred into NSPIRES. At a minimum, it is the proposer’s responsibility to: (1) ensure that all PDF files are unlocked and that edit permission is enabled – this is necessary to allow NSPIRES to concatenate submitted files into a single PDF document; and (2) ensure that all fonts are embedded in the PDF file and that only Type 1 or TrueType fonts are used. In addition, any proposer who creates files using TeX or LaTeX is required to first create a DVI file and then convert the DVI file to Postscript and then to PDF. See http://nspires.nasaprs.com/tutorials/PDF_Guidelines.pdf for more information on creating PDF documents that are compliant with NSPIRES. PDF files that do not meet the NASA requirements may be declared noncompliant and not submitted to peer review for evaluation.
10.4.3 Volume I – Multi-Year Base Award

10.4.3.1 Proposal Executive Abstract
This section shall summarize the larger consortium-wide project. The proposal shall concisely describe the content and scope of the project, and identify the objective(s), methodology, and intended results.

10.4.3.2 Data Management Plan
While Space Grant awardees typically do not create the types of data normally captured and covered under a Data Management Plan (DMP), Space Grant awardees are required to capture and maintain the integrity of personally identifiable information (PII). As such, the program requires a DMP to address the collection, storage, security, and maintenance of PII data.

All proposals submitted under this NOFO are required to submit a DMP in accordance with the NASA Plan for Increasing Access to the Results of Scientific Research located at http://www.nasa.gov/sites/default/files/files/NASA_Data_Plan.pdf.

At a minimum, the following are required elements in a DMP:
- Specify the roles and responsibilities of all parties with respect to the DMP activities;
- Specify the types of data or products that will be generated (e.g., survey responses, images, data tables, video or audio data, software, curricular, or exhibit materials);
- Specify how these data or products are to be stored, preserved, and shared;
- Specify any restrictions on data or product storage, access, preservation or sharing;
- Specify what data formats will be used (e.g., XML files, websites, image files, data tables, software code, text documents, or physical materials);
- Specify how long access to data and products, and sharing of data or products, will be maintained after the life of the project, and how any associated costs will be covered and by whom;
- If data or products are to be preserved by a third party, please refer to their preservation plans if available.

Any research project that does not require a DMP to be submitted shall explicitly indicate this fact in the DMP block. The type of proposal that requires a DMP is described in the NASA Plan for Increasing Access to Results of Scientific Research (see link below): https://www.nasa.gov/sites/default/files/atoms/files/206985_2015_nasa_plan-for-web.pdf

For additional information related to DMP requirements, please reference the following websites (NASA’s Scientific and Technical Information Program’s DMP FAQ at https://sti.nasa.gov/faq/ and the Science Mission Directorate’s DMP FAQ at FAQs - NASA Science).

Proposers that include a plan to archive data shall allocate suitable time for this task. Unless otherwise stated, the requirement for a DMP supersedes the Data Sharing Plan that is described in the NASA Guidebook for Proposers.
10.4.3.3 Consortium Profile
Describe the environment of the Consortium, including state demographics, unique consortium aspects as well as any consortium-wide themes or specialization. Provide a brief analysis of the state’s needs and discuss how they align with NASA priorities. This section should convey how the unique mix of projects proposed by the Consortium is strategically designed to respond to the state’s needs and NASA priorities.

10.4.3.4 Body of Proposal
The proposal shall clearly convey how the Project’s goals and objectives align with Space Grant goals and objectives, the state’s STEM needs, and with NASA Mission Directorate needs. Reference Appendix 8: EONS 2024 Omnibus .pdf (nasaprs.com) NASA Mission Directorates and Center Alignment with Points of Contact for more information on the Mission Directorate needs.

This section shall clearly identify the consortium project’s goals and objectives, and describe the proposed integrated and comprehensive project, including all its programmatic elements and activities, as directed above. Describe how these elements and activities meet the proposed goals and objectives. Describe how each element and activity supports NASA Mission Directorate needs and priorities, and clearly identify how each individual activity aligns with NASA’s Strategy as outlined in Section 10.1.2 and 10.1.4. In this section, the first time a multi-disciplinary activity is mentioned, the Proposer shall identify to which Mission Directorate(s) the activity aligns. Proposed activities that are to be competitively awarded at the Consortium-level, can be written under “Competitive Projects”. This category can be used for activities that have yet to be selected. In general, the proposal shall be outlined to align with the budget table. Each Consortium has the discretion to determine which Mission Directorate(s) its work will be aligned with, but every activity should align to at least one Mission Directorate, unless the activity falls under a “Competitive Project.” However, the activities/opportunities which are competed and fall under the Competitive Project category shall also ultimately align with a Mission Directorate.

NASA Internships and Fellowships: The proposal shall describe in detail, proposed internship and fellowship projects and opportunities. As described in Sections 10.2.6 and 10.6.1, student data for awardees (including NIF) must be entered into the NASA STEM Gateway system.

This section shall outline how the consortium will collect student information and obtain the necessary approvals at the institutional level to fulfill grant reporting requirements. This section shall clearly identify the number of projected awards, and a plan to longitudinally track all significant student investments. Proposers may categorize funding that is a direct student award under the category called NIF. While all direct funded student awards are not required to be included within the NIF category, all direct funded student awards are still required to meet the citizenship requirements.

All funds meant to be included in the NIF investment calculation (Reference Section 10.4.3.7, Cumulative NIF Investment Table) which are not directly listed within the NIF budget section (Category G), shall be clearly identified throughout the budget table allowing the quantities listed in the NIF Investment Table to be easily/clearly confirmed.
Proposers shall ensure that the budget table and budget justification/narrative directly align, and funding quantities match exactly. See Appendix D for NIF definitions.

Funds utilized specifically for NASA or industry internships shall not be classified as a scholarship or fellowship. Additionally, it is Space Grant Program policy that Recipients cannot charge management fees nor indirect costs to any NIF award under this Cooperative Agreement. Management fees may be applied to all awards outside of the NIF category.

The proposal shall clearly demonstrate how internships and fellowships will be competitively awarded at the lead, member, and affiliate institutions. A description of the recruitment of applicants, the selection process, and plans that show the inclusiveness of member/affiliate institutions and student eligibility shall be included. All direct funded participants receiving either a NASA internship or any fellowship award shall be a U.S. National, see policy concerning citizenship.

Note that the proposers should focus on the definition as provided in Appendix D, of the term fellowship and not only the term itself. Some institutions may use terms other than research “fellowship” for their various opportunities (i.e., research opportunity, research experience, etc.). If the activity defines as a research fellowship, regardless of the name the proposer establishes, any participant of a direct funded research “fellowship” shall be a U.S. National. This requirement extends to all sub-awards including, for example, participants funded from a faculty fellowship (i.e., participants/students receiving direct funding under a faculty fellowship must meet this requirement).

Should a proposal include support for non-U.S. citizens and the support is not classified as a NASA internship or a fellowship of any type, then the Recipient must work with the Technical Officer in coordination with the NASA Office of International and Interagency Relations (OIIR) to ensure that there are no additional restrictions related to the country of origin of that individual.

NOTE: The consortia of Hawaii and South Carolina may include Appendixes L, M, and N within their proposals (Reference Section 10.4.2). These Appendixes are required to be provided by Guam and the U.S. Virgin Islands and included within the Hawaii and South Carolina proposals (respectively) if the intention is to request the additional $150k for each Guam and US VI. These appendixes provide Guam and US VI an opportunity to describe how they plan to collaborate and contribute to the Hawaii and South Carolina consortium’s respective goals and objectives. Guam and US VI shall Reference: Section 10.4.3.4 for guidelines related to the requirements associated with Appendix L, Section 10.4.3.6 for guidelines for the Budget Details and Narrative requirements associated with Appendix M, and Section 10.4.3.9 for guidelines for the required Milestone Schedule in Appendix N.

NOTE: Consortia Strategic Plans are not a required component of the proposal; however, if a proposer references a strategic plan, then such a plan shall be included as an appendix to the proposal.
10.4.3.5 Consortium Management
The proposer shall describe the following aspects of the management of the Consortium. This section shall include budget figures for all Consortium administrative costs (labor, benefits, supplies, etc.).

A. **Consortium Management**: Describe the Consortium’s management structure, and operational policies and procedures.

B. **Consortium Structure/Network (Internal)**: Describe the composition of institutions that comprise the Consortium; include the number, demographics, and characteristics. Describe the roles and responsibilities of campus/organization representatives in terms of on-campus effectiveness, communication of the program to their constituents, the process to build a NASA presence at the location, and participation and involvement in Consortium operations. Also, describe the Consortium’s strategy and specific objectives for seeking opportunities to develop new relationships and/or sustain and strengthen existing institutional relationships with minority-serving institutions (MSI) (i.e., Historically Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, Other Minority Universities, and institutions of higher education that have a higher enrollment of minority students) internal or external to the consortium. Describe plans that will ensure "meaningful involvement" of MSIs through collaborations and partnerships.

C. **Consortium Operations**: Describe staffing levels at the lead institution, and support provided by other institutions or organizations (FTEs for director, program coordinator, support staff, affiliate representatives, etc.). Staffing levels and costs shall allow for the maximum amount of funds being made available to Consortium programs/projects. Describe how staff resources are allocated in terms of management and administrative tasks, resource development, and/or project implementation. Include a discussion of the composition, role/purpose, and meeting frequency of Advisory/Executive Committee(s)/Boards (i.e., internal and external groups). Describe the Consortium policy for adding and removing members to/from the Consortium.

D. **Collaborations and Partnerships Outside the Consortium**: Describe collaborations and partnerships (number, characteristics, and purpose) outside the membership of the consortium. Discuss how these collaborations/partnerships benefit the consortium. Discuss Publicity/Outreach plans, if applicable.

E. **Recruiting of Underrepresented/Underserved students in STEM**: Describe how the consortium plans to broaden the diversity of the students whom they attract and engage in its programs to increase the quantity of underrepresented/underserved students impacted in achieving the three performance goals (reference Section 10.1.2 Goals and Objectives)

- Include established policies, plans, and processes to address Diversity, Equity, and Inclusion (DEI) priorities within the consortium.
- Include performance metrics planned to be used to measure progress of plans/strategies to broaden participation of students from underserved communities in STEM.
• Include plans, strategies, and specific steps to engage and broaden participation of students from underserved communities in STEM
• **The consortium will be asked within their annual report to outline the tangible steps which were taken toward achieving these goals.**

### 10.4.3.6 Budget Tables: Details and Narrative

The proposal shall provide a budget spreadsheet for each year (FY2025-2028) of proposed work. A single cumulative budget for the four (4) year award period is not required. These budget spreadsheets **shall not include any augmentation funds being requested in Volume II** of the proposal. The budget spreadsheet format to be used **must be that as shown in Appendix A, and other formats will not be accepted**. The proposer may recreate this table as shown, or an excel version of the budget table will be provided to the proposer upon request to the Space Grant Program Office at NASA HQ.

A budget narrative/description is also required and shall accompany the spreadsheet. The budget narrative/description shall provide funding values which exactly match those included in the budget spreadsheet and provide a clear alignment and description of the items listed in the budget. The proposed budget/s shall be adequate, appropriate, reasonable, realistic, and demonstrate the effective and appropriate use of funds to align with the proposed projects and consortium grant type. The budget and budget justification shall clearly align with the content. The scope of the proposed effort, budget and budget narrative shall contain sufficient cost detail and supporting information to facilitate a prompt evaluation and award.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>$800,000</td>
<td>$200,000</td>
<td>$512,000</td>
</tr>
<tr>
<td>Years 2 - 4</td>
<td>$800,000</td>
<td>$200,000</td>
<td>$480,000</td>
</tr>
</tbody>
</table>

The U.S. territories of Guam and U.S. Virgin Islands (US VI) may not submit proposals for full Consortium-status; however, Hawaii and South Carolina, respectively, are eligible to receive an additional $150,000 per year for each territory. The supplemental funds for US VI and Guam are exempt from cost-share requirements.

Proposers shall meet the minimum cost-share requirement for this announcement. If the proposed budget is less than the maximum NASA budget, the amount of the cost-share shall be determined based on the following information and formula:
NOTES:
[1] The Minimum Required NASA Internship and Fellowship Allocation, shall be met using only NASA awarded funds. The minimum $200k requirement shall not be met by a combination of NASA funds and cost match funds (i.e., using only $100k of NASA funds and using $100k of cost match funds to meet the $200k minimum is not allowable).

[2] Regardless of the proposed funding amount, the minimum NIF quantity must first be met. I.e., if a consortium proposes for only $300k in the first year, $200k of that total amount must first be allocated toward NIF.

[3] If the proposed budget is less than the maximum allowable NASA budget, the minimum required yearly cost share for the Year 1 funding shall be 64% of the yearly proposed funding amount, and 60% of the yearly proposed funding amount for Years 2-4 (Reference equations 1 and 2 below).

\[
\text{Total Actual Year 1 Requested NASA Funds} \times 0.64 = \text{Actual Minimum Required Cost Share} \quad (1)
\]

\[
\text{Total Actual Years 2-4 Requested NASA Funds} \times 0.60 = \text{Actual Minimum Required Cost Share} \quad (2)
\]

Proposers shall use NASA funds for support of students, faculty, and researchers to conduct research, execute student-centric programs, engage in professional development, and redesign, enhance, or develop curriculum; for support of undergraduate students, graduate students, and their research; for research-related equipment, travel, and materials; and to support project management, administration, and evaluation. While equipment purchases are allowable, per 2 CFR §200.439 and GCAM Section 7.10 Approval of Equipment, any equipment purchase over $5,000 requires prior written approval of the Federal awarding agency.

Proposers shall submit a budget spreadsheet/table, budget justification, and cost share for the proposed work. Please note:

- A budget justification is required, shall accompany the budget table, and the values presented in both the budget and the justification shall match (i.e., it is required that the categories and their subcomponents referenced between the budget and budget justification match). It is highly recommended that the proposal text reference specific and consistent budget categories and vice-versa.

- Significant dollar amounts proposed with no accompanying explanation may result in a determination of proposal unacceptability, or cause delays in funding. All costs shall be
explained in reasonable detail.

- Proposers shall provide a summary table that details all Projected Cost Share (reference Table 3 – Cumulative Projected Cost Share Table).

- Proposers shall provide a summary table that details all NIF investments (reference Table 4 – Cumulative NIF Investment Table).

- Each budget and associated budget justification shall reflect and detail where in the NIF category the requested funds are being spent.

- Costs budgeted for the Independent Evaluator shall be included in either Section E – Services or Section N – Subcontracts, of the proposed budget.

- Subcontracts to an individual (including the Independent Evaluator) or organization: Refer to the NASA Proposer’s Guide. Subcontract awards shall include a separate budget, work statement, and/or a breakout of hourly rates for direct labor.

- Direct Labor costs shall be separated by titles (e.g., director, program manager, program coordinator, graduate research assistant, clerk, etc.) with estimated hours, FTE, hourly rates, and total amounts of each. The certified negotiated indirect costs for the institution shall be explained sufficiently whether they are being requested from NASA funds or from the cost-share portion.

- **Labor costs for all Key Personnel** shall be included in Sections A (Personnel/Direct Labor) and B (Fringe Benefits) of the budget table regardless of the project/work in which the individuals will be participating. Key Personnel shall include at a minimum the Director/PI, Associate Directors, Assistant Directors, Space Grant Coordinators, and any personnel associated as primary personnel within that consortium’s main Space Grant office.

- Other costs (within each significant category detailed) shall be explained in reasonable detail and substantiated whenever possible.

- Domestic travel shall include the purpose, the number of trips and expected location, duration of each trip, airfare, and per diem. Domestic travel shall be appropriate and reasonable to conduct proposed activities and all in support of Space Grant activities. Proposals may include travel, registration fees, and per diem for national meetings and regional meetings only up to the duration of activities directly including NASA Space Grant activities (estimated at up to three days). Space Grant funds shall not to be used for expenses (lodging and per diem) on any day(s) at the national, regional, and other meetings in which non-NASA meetings and activities are being conducted.

- Proposers shall include sufficient estimated travel funding for attendance of an annual NASA OSTEM National Conference to ensure that availability of travel funds specifically intended for this conference is available. The travel funding should be
sufficient to cover attendance by at least two consortia members from the lead consortium’s office. **Attendance of the annual NASA OSTEM National Conference is required.** It is expected that one of the attendees be the award PI/Director and the second attendee be an additional Key Personnel from the lead Space Grant consortium. The location of the annual NASA OSTEM National Conference will be communicated to Recipients once those details are available.

### 10.4.3.7 Cumulative Cost Share & Cumulative NIF Investment Tables

Proposers shall provide a cumulative projected cost share table, which tracks all cost share amounts across the lifetime of the multi-year cooperative agreement. Reference Table 3 below.

**Table 3 – Cumulative Projected Cost Share Table**

<table>
<thead>
<tr>
<th>Cumulative Cost-Share</th>
<th>Cumulative Total Cost – Share (Years 1 – 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1 Total</td>
<td>Year 2 Total</td>
</tr>
<tr>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>Required Minimum Cost-Share</strong></td>
<td><strong>$ 1,952,000</strong></td>
</tr>
</tbody>
</table>

* Note: Actual cumulative minimum cost-share requirement may be a lesser number if the amount of total funds being requested each year is lesser than the maximum allowed. Reference equations 1 and 2 in section 10.4.3.6.

Please note that cost-share minimum requirements are not flexible. Unrecovered indirect costs on NIF awards can be used as cost-share amounts. Funding above the minimum NASA Internship and Fellowship allocation amount is allowed; however, proposers shall still meet the required minimum cost-share amount. See 2 CFR 200.306 and 2 CFR 1800.306 for more information on Cost Sharing.

The total required minimum NIF investment for this multi-year award is $800,000 and must be met using only NASA awarded funds (not including cost match). Proposers shall provide a cumulative NIF investment table, which tracks all NIF investments across the lifetime of this multi-year cooperative agreement. Reference Table 4 below.

**Table 4 – Cumulative NIF Investment Table**

<table>
<thead>
<tr>
<th>Cumulative NIF Investment</th>
<th>Cumulative Total NIF Investment (Years 1 – 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1 Total</td>
<td>Year 2 Total</td>
</tr>
<tr>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>Required minimum NIF Investment</strong></td>
<td><strong>$ 800,000</strong></td>
</tr>
</tbody>
</table>

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** Note: Actual cumulative minimum NIF investment may be a lesser amount only if a consortium proposes for a total award amount lesser than the minimum yearly NIF required investments. Reference Note [2] in Section 10.4.3.6.

10.4.3.8 Estimated Costing Schedule Table: Details and Narrative

The proposal shall include an estimated budget costing table for the Base Award funds, for each year of the four-year award (not required for the augmentation funds) which aligns with the major budget categories using the table as presented in Appendix B. The table shall show the planned intent to cost 100% of the funds, of each year, within 15 months of the start of each period of performance. For example, the table shall show a plan to cost 100% of the funds for Year 2, no later than 15 months after the start of the Year 2 period-of-performance.

A narrative specifically addressing items 1 through 3 listed under the example table in Appendix B shall accompany the table. For any identified risks to the costing schedule, specific actionable items shall be included within the mitigation plan for each identified risk.

The costing table shall clearly align with the budget table.

As a reminder, per the Performance Management System (PMS), current year funding, except during the first year, cannot begin to be costed until 100% of prior year funds have been costed. This means that prior year costing will impact current year costing. Percent costed across and at the end of each period-of-performance will be metric-tracked and will be one factor used to determine the status and health of a consortia.

10.4.3.9 Milestones

Proposers are required to complete a milestone chart (see Appendix F, Sample Milestone Chart for Base Award and Augmentation Award). Milestones shall be broken down by programmatic element, e.g., Mission Directorate, Competitive Projects, etc. and then by activity. The timescale shall be listed by month, and a separate table shall be provided for each of the four years of the award such that each year is in alignment with the consortium’s period of performance.

These milestones shall align with the proposed activities, and budget narrative and justification.

10.4.3.10 Summarized Table of SMART Goals, Objectives, and Targets

Proposers shall complete the provided S.M.A.R.T. matrix as shown in Appendix E. The format shown in Appendix E shall be used and no other format will be accepted. Each of the years to which the consortium is proposing (total of four) shall have three separate tables (total of 12 tables). Each table breaks down the focus of the SMART goals into three categories: NIF Activities, Mission Directorate/Competitive Projects, and Diversity.

Reference Appendix E for more details instructions on how to complete the required S.M.A.R.T. matrix.
10.4.3.11 Comprehensive Evaluation Plan (CEP)
The proposer shall have their Independent Evaluator (reference section 10.2.5 Independent Evaluator (IE)) complete a CEP using the provided template in Appendix G. This template is required to be used and no other CEP format will be accepted. The CEP is not required as part of the proposal for this solicitation but is required to be submitted by the IE within 45 calendar days of the start of the period of performance of this award. The completed CEP by the IE shall be submitted via email to NASA HQ Space Grant (hq-space-grant@mail.nasa.gov) with the email subject line: XX CEP- Space Grant Opportunities in NASA STEM FY2025-2028, where XX is the 2 letter state/consortium designation.

If the CEP is not provided prior to the established deadline, the consortium will be considered not in good standing. This may require the consortium to hold a meeting/s with the Space Grant HQ and the Performance and Evaluation Teams to discuss why the deadline for the CEP was not met, and to ensure delivery of the completed CEP as soon as possible. Based on the results of the meeting, the consortium may be required to hold additional follow-on meetings and may be required to meet additional reporting requirements. For any of these required follow-on meetings, NASA HQ may provide a list of consortium and lead institution personnel required to attend.

10.4.3.12 Affiliate Concurrences
In Appendix G of the proposal, proposers shall provide a listing of all affiliate members including the institution name and the name of the affiliate member and/or their designated representative, who will provide concurrence on the content of the proposal. The designated representative from the lead institution (Director) and each affiliate representative must sign the concurrence document. The signature represents the affiliate’s agreement with the contents of the proposal. Email concurrences also are acceptable as long as the email contains sufficient information to unambiguously identify the sender, the affiliate institution, and the affiliate representative’s position, name, and concurrence.

10.4.3.13 Summary Cost Match Table
In Appendix H of the proposal, the proposer shall provide a Summary Cost Match Table in addition to the Letters of Resource Support. Reference Appendix C of this solicitation for the required format to be used for the Summary Cost Match Table. The format shown in Appendix C is required to be used, and no other format of the table will be accepted.

10.4.3.14 Letters of Resource Support
Separate, and in addition, to the Affiliate Concurrences and the Summary Cost Match Table, proposers shall provide the actual Letters of Resource Support to be included within Appendix I of the proposal to substantiate the total required cost-share over the lifetime of the award. Each written statement shall be addressed to the PI, may be a facsimile of an original statement or the copy of an email (the latter must have sufficient information to unambiguously identify the sender), and is required even if the Co-I, or Collaborator is from the proposing lead institution.
Letters of resource support are required when an agreed level of resource support is established. For example, instances of faculty/staff time and/or fringe benefits and/or waived/reduced F&A costs/IDCs that are used as cost-match, will require a letter of resource support from the institution.

Letters of Resource Support are required to address the following items: expected cost-match and contributions (programmatic and budget) the institution will provide. Also, in cases where an individual’s time is used as cost-match, a Letter of Resource Support from the respective institution is required. In the case where a Consortium receives cost-match from competitive awards run by the Consortium, a Letter of Resource Support is not required since the known value of the cost-match will not be known by the date of the proposal submission. Additionally, Letters of Resource Support are only required when an agreed-upon level of support is established. This letter shall at a minimal include signatures from an official at the institution/organization who is able to commit the institution, e.g., Provost, Dean, etc. Letters must be recent; addressed to the Consortium Director; written specifically for this proposal; and dated within 45 days prior to the solicitation due date.

10.4.3.15 List of Affiliates
Appendix J of the proposal shall be a continuously numbered (not bulletized) list of all affiliates of the proposing consortium (see example below). These shall be split into two categories. Category 1 is a list of the Academic Affiliates and Category 2 shall list all other affiliates. Apart from the name of the institution, no additional details are needed in this list.

Example:

Category 1 (Academic Affiliates)
1. Name of an academic affiliate
2. Name of an academic affiliate
3. Name of an academic affiliate
4. Etc.

Category 2 (All other non-academic affiliates)
5. Name of a non-academic affiliate
6. Name of a non-academic affiliate
7. Name of a non-academic affiliate
8. Etc.

10.4.3.16 Consortium Programmatic Summary
Appendix K of the proposal shall include a 1-2 page (max of 2 pages) descriptive project abstract of the main programmatic activities planned to be conducted by the consortium. This is NOT intended to be a detailed overview of all activities, and hence why it is limited to 2 pages.

These abstracts will be placed as a link under each consortium’s appropriate section within the Space Grant Consortium Directors and Websites - NASA. This location will allow for all consortia to gain high level knowledge on the activities being executed at other consortia. If consortia are interested to learn more about a specific topic, they may reach out to the
consortium performing that activity. If a consortium submits more than two pages, that consortium will be notified that they are required to modify and resubmit to remain within the two-page limit.

NASA understands the uniqueness of each consortium and wants to provide you with the flexibility to showcase your consortium's activities in a way that's most meaningful to each consortium. Therefore, you are not required to use a specific format (apart from the minimal information listed below) but should keep in mind that this summary will be made available to all consortia with the intent of providing them with a broad overview of the activities being executed as part of this FY25 – FY28 Space Grant multi-year award.

Instructions: Provide a maximum two-page summary (and include it as Appendix K of your proposal) outlining the major activities that you believe highlight the activities your consortium intends to execute as part of the FY25 – FY28 Space Grant multi-year award. Your two-page summary must include the minimum contact information on at least one of the two pages:

- Name of Space Grant Director
- Contact Email (email of your choice)
- Each page must be numbered
- All information, including the contact information, must be limited to 2 pages
10.4.4 Volume II – Augmentations (Years 2 – 4)

10.4.4.1 Overview
Proposers are invited, but not required to request in their proposals, additional augmentation funds above the Base Award funding for Years 2 through 4. The overarching goal of these augmentation funds is to provide additional funding to support or enhance existing projects or fund new initiatives and endeavors as a part of the base awards in Years 2 - 4.

For this funding augmentation opportunity, each recipient/proposer shall submit a budget table/s (separate from the base award budget), not to exceed $70,000 for each year of the Years 2, 3, and 4 of this multi-year award, as well as a detailed budget narrative, justification, and scope of work explaining how the additional funds will be spent. Proposers shall ensure that the budget table and budget justification/narrative directly align, and funding quantities match exactly.

The period of performance will not change. For these additional augmentation funds only, no increase will be made to the stated cost-share minimums listed in Section 10.4.3.7.

Note that it is not required to submit a proposal for each of the three years (Year 2, 3, and 4). If a proposer wishes to only propose for 1 or 2 of the three years, or none, that is acceptable. However, a budget table and accompanying budget narrative shall be provided for each proposed augmentation year.

To be eligible for awarding of these augmentation funds, each Space Grant Consortium must have demonstrated expenditures (costed funds) and not encumbered or obligated funds (i.e., “costed” refers to the amount of funding that has been withdrawn against the award in the U.S. Department of Human and Health Services’ Payment Management System) as outlined below before any augmentation funds are released. If all the requirements as described below, are not met on a yearly basis the Consortia that do not meet these requirements will forfeit the additional augmentation funds for that year.

For example, if a consortium met the percent of costed funds requirement but submitted their CPR after the established deadline, the consortium will forfeit their augmentation funds for that year. However, if the consortium did not meet the requirements for Year 2 augmentation funds but does meet them for Year 3 then they shall be awarded the Year 3 augmentation funds. The eligibility requirements for the augmentation funds do not impact awarding of Base funds.

Augmentation Eligibility Requirements:
1. To be eligible for Year 2 augmentation funds a consortium shall:
   a. Demonstrate expenditures (costed funds) of at least 30% of the prior year’s (Year 1) total funding by the last calendar day, of the month in which the consortium’s last day of their period of performance falls.
   b. Have submitted all the following on-time: the Year 1 CPR, semi-annual report, and longitudinal tracking data (Reference Section 10.6.1 for deadlines).
2. To be eligible for Year 3 augmentation funds a consortium shall:
   a. Demonstrate expenditures (costed funds) of at least 33% of the prior year’s (Year 2) total funding by the last calendar day, of the month in which the consortium’s last day of their period of performance falls.
   b. Have submitted all the following on-time: Year 2 CPR, semi-annual report, and longitudinal tracking data (Reference Section 10.6.1 for deadlines).
3. To be eligible for Year 4 augmentation funds a consortium shall:
   a. Demonstrate expenditures (costed funds) of at least 36% of the prior year’s (Year 3) total funding by the last calendar day, of the month in which the consortium’s last day of their period of performance falls.
   b. Have submitted all the following on-time: the Year 3 CPR, semi-annual report, and longitudinal tracking data (Reference Section 10.6.1 for deadlines).

10.4.4.1 Use of Funding
In general, this solicitation is not restricted in the use of funds beyond the NIF requirement and the need for each consortium to hire an Independent Evaluator.
A. NIF activities shall be allocated as outlined in Section 10.2.4. See Sections 10.2.4, 10.4.3.6 and 10.4.3.7 for more information regarding the NIF requirements.
B. While the National Space Grant College and Fellowship Program is focused on higher education, it is understood that many K-12 activities are supported by the Consortia nationwide. However, it is important to note that the focus of the congressionally allocated funds to Space Grant shall be primarily focused on higher education.

10.4.4.2 Cost Sharing
Cost-sharing for these additional augmentation funds is not required, but Recipients may voluntarily offer it. Recipients offering cost-sharing will not receive additional credit in the evaluation for doing so.

Note: This only pertains to the Augmentation funds and not the cost share requirements outlined for the Base Award funding.

10.4.4.3 Budget Table
The proposal shall provide a separate budget spreadsheet for the total amount of augmentation funds being requested for each of the Year 2, 3, and 4 periods of performance of proposed work for a total of 3 budget spreadsheet. The budget spreadsheet format to be used must be that as referenced in Appendix A, and other formats will not be accepted. The proposer may recreate this table as shown, or an excel version of the budget table will be provided upon request from the proposer to the Space Grant Program Office at NASA HQ.

A budget narrative/description is also required and shall accompany each spreadsheet. The budget narrative/description shall provide funding values which exactly match those included in the budget spreadsheet and provide a clear alignment and description of the items listed in the
budget. The proposed budget/s shall be adequate, appropriate, reasonable, realistic, and demonstrate the effective and appropriate use of funds to align with the proposed projects and consortium grant type. The budget and budget justification shall clearly align with the content. The scope of the proposed effort, budget and budget narrative shall contain sufficient cost detail and supporting information to facilitate a prompt evaluation and award.

Table 5 – Augmentation Funding Requirements

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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$70,000</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

NOTES:
[1] Cost-sharing is not required for these augmentation funds.
[2] No minimum/maximum NIF requirement is present for these augmentation funds (i.e., all or none of these funds may be used for NIF).

Proposers shall submit a budget spreadsheet/table, budget justification, (and cost share if applicable) for the proposed work to be augmented. Please note:

- A separate budget table is required and shall be provided for each augmentation year (separately) of funds being proposed (Reference Appendix A for the required budget table format)
- A budget justification/narrative is required for each separate augmentation budget and shall accompany each budget table. This justification/narrative must exactly match the proposed budget.
- Each budget justification shall indicate where in the category/ies the requested funds are being spent and the companion budget narrative shall match the values exactly.
- Significant dollar amounts proposed with no accompanying explanation may result in a determination of proposal unacceptability, or cause delays in funding. All costs shall be explained in reasonable detail.

10.4.4.4 Budget Restrictions
The following restrictions apply to the use of the NASA Space Grant funds:

- In total, these NASA Space Grant augmentation funds are not to exceed $70,000 for each of the Years 2 - 4.
- NASA Space Grant funds shall not be used for civil-service personnel, labor, or travel.
- Refer to Section 10.2.3.1 Total Budget Guidelines and Funding Restrictions for additional restrictions.
10.4.4.5 Milestones
Proposers shall provide a separate milestone chart from that provided for the Base Award (reference Appendix F) for the Augmentation funds. The milestones shall be broken down by programmatic element, i.e., Mission Directorate, Competitive Projects, etc. and then by activity. The timescale shall be listed by month, aligning with each individual consortium’s period of performance.

These milestones shall align with the proposed activities, and budget narrative and justification. Upon selection, if a Recipient needs to update its milestone chart, a Recipient will have up to 30 days after award notification from the NSSC to provide an updated milestone chart.

10.4.5 NASA Contact Information
The Space Grant Opportunities in NASA STEM FY2025-2028 NOFO will be released on Friday, March 8, 2024, and remain open until July 10, 2024. Potential applicants with questions or experiencing problems while the funding opportunity is open shall reach out to the NASA Research and Education Support Services (NRESS) Support Team point of contact for the Space Grant Opportunities in NASA STEM FY2025-2028, as listed in Section 10.6.6. Contact information is provided below in Section 10.4.6, Contact and Resource Information, Program Office Contact of this NOFO.

10.4.5.1 Pre-proposal Webinars and Questions and Answers
A pre-proposal webinar will be held in the weeks following release of this solicitation. Details will be communicated with all Space Grant consortia. During this time, a summary of the solicitation will be provided, pre-gathered questions will be answered, and as time is available questions brought up by the prospective proposers during the webinar will be addressed.

Applicants shall refer to the Space Grant Opportunities in NASA STEM FY2025-2028 landing page on NSPIRES for connection details. Prospective proposers may also ask questions they have about this opportunity during the teleconference. Proposers may also receive technical assistance from project staff at this time, which may include tips and guidance for proposing for this opportunity.

Potential applicants are strongly encouraged to register early in NSPIRES and sign up for notification emails so they will receive notice of the pre-proposal webinars. Refer to the Space Grant Opportunities in NASA STEM FY2025-2028 landing page on NSPIRES for question submission and schedule information.

Proposers shall submit any questions via email only as instructed on the NSPIRES announcement of this opportunity. Responses to questions submitted will be provided in a “Frequently Asked Questions (FAQ)” list that will be posted on the Space Grant Opportunities in NASA STEM FY2025-2028 landing page on NSPIRES. The list will be updated frequently during the open period of this NOFO.
10.4.6 Contact and Resource Information

Selection Official
Tomas Gonzalez-Torres
Manager, Space Grant Program
NASA Headquarters
Washington, DC 20546

NRESS Contact
NASA Research and Education Support Services (NRESS) Support Team regarding inquiries and assistance for submission of the electronic proposal materials into NSPIRES
Email: spacegrant@nasaprs.com

10.4.7 Proposal Submission Method, Dates, and Times
Electronic proposal submission is required via NSPIRES or Grants.gov. See NASA Guidebook for Proposers.

Application Submission Deadline

<table>
<thead>
<tr>
<th>Application Materials</th>
<th>Required or Encouraged</th>
<th>Due Date and Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Application</td>
<td>Required</td>
<td>July 10, 2024, at 11:59pm ET</td>
</tr>
</tbody>
</table>

All applications must be received by the established deadline.

NASA will not review applications that are received after the deadline or consider these late applications for funding.

Applicants experiencing technical problems outside of their control must notify NASA as soon as possible and before the application deadline. Failure to timely notify NASA of the issue that prevented the timely filing of the application may preclude consideration of the award.

For technical assistance with NSPIRES, please contact the NSPIRES Help Desk at nspires-help@nasaprs.com or (202) 479-9376, Monday through Friday, 8:00 AM – 6:00 PM ET. PLEASE NOTE: The NSPIRES Help Desk closes at 6:00 pm Eastern Time, Monday through Friday, and is closed on federal holidays. Respondents experiencing difficulty using Grants.gov may contact the Help Desk at Support@Grants.gov or call 1-800-518-4726, 24 hours a day, seven days a week, except for Federal Government Holidays when Grants.gov support is closed.

While every effort is made to ensure the reliability and accessibility of the websites and to maintain a help center via email and telephone, difficulty may arise at any point on the Internet, including with the user’s own equipment. Therefore, prospective proposers are urged to familiarize themselves with the NSPIRES and Grants.gov sites and to submit the required proposal materials well in advance of the proposal submission deadline.
Collection of Demographic Information

NASA is implementing a process to collect demographic data from grant applicants for the purpose of analyzing demographic differences associated with its award processes. Information collected will include name, gender, race, ethnicity, disability status, and citizenship status. Submission of the information is voluntary and is not a precondition of award.

10.5 APPLICATION REVIEW INFORMATION

10.5.1 Review and Selection Process

Proposals will be reviewed and evaluated by both NASA and external (non-NASA) subject matter experts based on standards established by NASA OSTEM and the Space Grant Program Manager. All sections of the proposal (see Proposal and Submission Guidance) will be individually evaluated against the same evaluation criteria. Quality of content and adherence to specified format as described in this solicitation will be considered. Funding will not be awarded unless at a minimum, the proposal meets all solicitation requirements. If a proposer remains non-responsive/non-compliant to this solicitation 45 days after the Cooperative Agreement’s anniversary date, i.e., the period of performance end date, then planned funding for that proposal will be reprogrammed by NASA OSTEM.

Any proposal that does not meet the requirements as outlined in this solicitation will be deemed non-compliant, will not be considered for initial funding, but may be allowed to resubmit according to solicitation guidelines.

10.5.2 Successful Proposals

Upon selection of the awardee, recipients by the Selection Official, the PI of each successful proposal will receive a “Notice of Intent to Make a Federal Award” letter via NSPIRES with an explanation of the review process and reviewers’ comments about the proposal. Proposers are strongly cautioned that only a NASA Grant Officer may make commitments, obligations, or awards on behalf of NASA or authorize the expenditure of funds for this opportunity. During the awarding process, the NSSC will perform a final budget and budget narrative review. Any issues and inconsistencies they note will require the proposer to update prior to awarding.

Pre-award costs will not be allowed for cooperative agreements awarded through this funding opportunity. It is this program’s practice to provide a letter indicating application selection and “Notice of Intent to Make a Federal Award” letter prior to the release of Federal award funding. This letter is not an authorization to begin performance. If a submitter is selected for an award, and it incurs pre-award costs, this is at the submitter’s/recipient’s own risk and NASA will not pay them.

NASA will notify successful grant recipients of funding via a Notice of Award (NASA Form 1687) signed by the Grant Officer. This Notice of Award is the authorizing document and will be sent to the proposing PI and the Authorized Organization Representative (AOR) listed in the proposal via electronic delivery. All expenses incurred on grant activities prior to the period of performance start date listed on the Notice of Award are at the risk of the non-Federal entity until the Notice of Award is received and period of performance commences.
10.6 FEDERAL AWARD ADMINISTRATION INFORMATION

10.6.1 Cooperative Agreement Award Reporting Requirements

The reporting requirements for award recipients under the Space Grant Opportunities in NASA STEM FY2025-2028 will be consistent with the NASA Grant and Cooperative Agreement Manual (GCAM).

Unless otherwise noted, the Space Grant Opportunities in NASA STEM FY2025-2028 PI shall submit reports as described below via secure transfer and following Personally Identifiable Information (PII) requirements to the NASA Shared Services Center (NSSC) as well as the NASA Space Grant Program Office. For additional information on PII, see NASA Privacy Procedural Requirements.

For further details on reporting project performance, please refer to the Post-Award Phase Section of the GCAM.

Federal Financial Reporting

Recipients of NASA funding must submit quarterly financial reports. Financial reports must be submitted via the Payment Management System (PMS):

- Quarterly Federal Financial Reports (FFR) are due no later than 30 days past the reporting period end date
- Final Financial Status Reports/Final Federal Financial Report (FSR/FFR) are due no later than 120 days after the end of the period of performance

Performance Reporting

NASA award recipients must submit annual and final performance reports. Annual reports are due to NASA 60 days prior to the anniversary date of the award, except in the award’s final year. Awards that are in their final year are required to submit final performance reports instead of the annual performance report. Descriptions of annual and final reporting requirements for Space Grant Opportunities in NASA STEM FY2025-2028 are below:

Comprehensive Evaluation Plan (CEP) *(due within 45 days after award period has started)*

The CEP is not required as part of the proposal for this solicitation but is required to be submitted by the Independent Evaluator (IE) within 45 calendar days of the start of the period of performance of this award. The completed CEP by the IE shall be submitted to NASA HQ Space Grant at hq-space-grant@mail.nasa.gov with the subject line: CEP- Space Grant Opportunities in NASA STEM FY2025-2028.

The template to be used by the IE shall be that provided as a template in Appendix G, and no other CEP format will be accepted. Reference Sections 10.2.5 and 10.4.3.11 for additional details.

Semi-Annual Progress Report *(due each year at 6 months)*

Award recipients shall submit a Semi-Annual Progress Report every year no later than 6 months plus 15 days after the start of their award. In other words, if a consortium’s award date (start of their period of performance) is Feb 15th then their semi-annual report is due no later than August 15th + 15 days (6 months + 15 days later). The template for the Semi-Annual Report will be provided by the main Space Grant office. Only the template provide shall be used and will be accepted for the report.
Annual Progress Report *(due each year 60 days prior to the anniversary date of the award, except in the award’s final year)*

Award recipients shall submit an Annual Progress Report (APR) every year no later than 60 days prior to the anniversary date of the award, with the exception of the award’s final year. The template for the Annual Report will be provided by the main Space Grant office. That template will include sections to be completed by the consortium PI as well as an appendix to be completed by the consortium’s Independent Evaluator. The combined report (PI and IE sections) shall be submitted jointly, as a single document. Only the template provided shall be used and will be accepted for the report.

Final Report *(90 days following the end of the performance period)*

Recipients shall submit a Final Report no later than 90 days of the expiration of the project. The template for this report will be provided to the consortia by the Space Grant Program Office. That template will include sections to be completed by the consortium PI as well as an appendix to be completed by the consortium’s Independent Evaluator and will cover the entire project’s period-of-performance. The combined report (PI and IE sections) shall be submitted jointly. Only the template provided shall be used and will be accepted for the report.

Awardees shall also complete all required reports as requested by the NASA Shared Services Center (NSSC) as listed on the cooperative agreement Required Publications and Reports within the award document (i.e., NF1687).

Additional Reporting Requirements

In addition to the yearly semi-annual and annual (or final) reports, the consortia shall:

1. Submit the CPR performance data into the NASA STEM Gateway system (Gateway) by November 30th of each calendar year. The awardee shall adhere to the Gateway reporting guidelines provided by the OSTEM P&E team (i.e., the submitted data shall include data for a full year of performance and participant data, etc.). Gateway report training will be provided by Space Grant HQ Office & OSTEM P&E Team. Note: Unless otherwise directed by the OSTEM P&E team, for consistency, the data reported in Year X shall include data from fall semester Year X-1, spring semester Year X, and summer semester Year X. CPR reporting for Year 1 of this solicitation shall be completed by November 30, 2026. The CPR data provided into the NASA STEM Gateway system shall:
   a. Reporting for Year 1: Provide at a minimum, full awardee demographics via completed participant profiles (Participant List Only – PLO), within the STEM Gateway system.
   b. Reporting for Years 2 – 4: Provide full applicant as well as awardee demographics via completed applicant and awardee profiles within the STEM Gateway system

   **Note:** Demographics into the NASA STEM Gateway system shall only be reported directly from participant completed profiles. The consortia may not report demographics on behalf of the participants.

2. Submit an accurate Student Longitudinal Tracking table by November 30th of the next calendar year (in similar fashion as the deadline for the CPR described in number 1 above).
Awardees will report the status of longitudinal tracking results annually to the NASA Office of STEM Engagement (OSTEM). The template for these reports will be provided to the consortia each year by the main Space Grant office.

3. Dependent on the results of the health tracking of a consortium, as determined by the OSTEM Performance and Evaluation Team based on various factors as outlined in 10.2.8 Performance Indicators, a consortium may be required to participate in additional engagement activities with NASA. Specifics will depend on the resulting health performance, but may include a singular virtual meeting, quarterly or semi-annual virtual meetings, additional sections added to their consortium unique semi-annual or annual performance reports to gather additional insight into the areas of specific issues, and possibly a site visit if there are continued concerns beyond the performance of a single year.

NASA recipients must conform to all reporting requirements outlined in the Required Publications and Reports section of the GCAM, currently Appendix F.

10.6.2 Administrative and National Policy Requirements
In addition to the requirements in this section and in this NOFO, NASA may place specific terms and conditions on individual awards in accordance with 2 C.F.R. Part 200. Recipients of NASA grant funding shall adhere to requirements set forth in 2 CFR 200, 2 CFR 1800, 2 CFR 170, 2 CFR 175, 2 CFR 182, and 2 CFR 183.

10.6.3 Summary of Space Grant Awardee Responsibilities
The Space Grant Opportunities in NASA STEM FY2025-2028 award recipients have the primary responsibility for implementing, operating, and managing the project as described in their submitted proposal.

- Space Grant Lead Institutions (i.e., recipients) shall assume primary responsibility for implementing, operating, and managing the project as described in their original proposal and as modified in subsequent proposals for continuation beyond the initial period.
- The recipient shall appoint a PI (i.e., Space Grant Director) in support of this Agreement. If the PI to be named is different from the individual identified in the proposal, the NASA Space Grant Program Office shall be notified in writing per the Guidelines for Space Grant Director & Lead Institution Changes. Any proposed change to the PI under this Agreement is subject to NASA approval. NOTE: If NASA approves the proposed change, the NASA Grant Officer will issue a formal written modification to the Agreement to reflect such change. If NASA does not approve the change in the PI, the recipient will propose another PI until NASA approval is obtained.
- The recipient shall provide a written response as to how the recommendations by the NASA Space Grant Program will be integrated into the programmatic and/or administrative plan.
- The recipient shall submit a variety of reports and data, including quarterly progress reports, performance and participant data, evaluation data, and annual
reports. The recipient may be required to host an annual on-campus or virtual (NASA will determine how) NASA site visit, following the schedule in the Management Guidelines. See additional information regarding reporting under **10.6.1 Cooperative Agreement Award Reporting Requirements**.

- The recipient, in concert with the Space Grant PI (Director), is responsible for the financial management of the Consortium as specified in the basic award notice under the terms and conditions issued by NASA and in the *NASA GCAM*. A recipient’s failure to comply with the terms and conditions of an award can result in termination of the award by NASA.

- The recipient shall ensure that all peer-reviewed scientific research publications authored or co-authored by investigators and sub-recipients and funded, in whole or in part by NASA, are submitted to [PubSpace System](#).

- NASA reserves the right to impose additional requirements during the Cooperative Agreement’s period of performance to achieve broader Space Grant or NASA objectives.

- Recipients shall utilize all data collection tools and complete all assigned data entry tasks for NASA’s approved data management system.

- Recipients may also be required to collaborate with a third party in support of a program- level evaluation of the Space Grant Consortia. The Space Grant Program Office will provide additional communications and guidance regarding data calls, activity tracking and future program-level evaluation efforts.

- Recipients shall send at least two consortia representatives from the lead consortium’s office to the NASA OSTEM National Conference. It is expected that one of the attendees be the award PI/Director and the second attendee be an additional Key Personnel from the lead Space Grant consortium.

**10.6.4 Office of STEM Engagement Performance Metrics**

NASA currently utilizes the NASA STEM Gateway registration/application and data management system (Gateway system) for analyzing performance data. PIs are required to timely and properly respond to data calls as requested by NASA OSTEM and utilize the Gateway system for performance data reporting. Additional communications and guidance regarding data calls associated with *Space Grant Opportunities in NASA STEM FY2025-2028* and the Gateway system will be sent to award recipients from the NASA OSTEM and Space Grant Program or Integration Manager. The PI shall ensure that it has the appropriate staff and resources to facilitate data collection activities and properly complete tasks required for timely reporting to NASA.

**10.6.5 Other Information**

**Access to NASA Facilities/Systems**

All recipients shall work with NASA project/program staff to ensure proper credentialing for any individuals who need access to NASA facilities and/or systems. Such individuals include U.S. citizens, lawful permanent residents ("green card" holders), and foreign nationals (those who are neither U.S. citizens nor permanent residents).
### 10.6.6 Summary of Key Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
</table>
| Total ESTIMATED annual budget for *Space Grant Opportunities in NASA STEM* FY2025-2028 | Year 1 – $800k  
Year 2 – $870k  
Year 3 – $870k  
Year 4 – $870k |
| Anticipated number of new awards, pending adequate proposals of merit        | 52                                                                     |
| Estimated Start Date                                                         | Varied (dependent on current period of performance)                    |
| Duration of awards                                                           | Four (4) years                                                         |
| Award Type                                                                   | Cooperative Agreement                                                 |
| Release Date for *Space Grant Opportunities in NASA STEM FY2025-2028 NOFO*   | **March 8, 2024** (DATE SUBJECT TO CHANGE); Check NSPIRES for details |
| **DUE DATE FOR PROPOSALS**                                                   | **July 10, 2024, 11:59pm Eastern Time** (DATE SUBJECT TO CHANGE); Check NSPIRES for details |
| Page limit for the Narrative Section of proposal                             | 15 pp. See *NASA Guidebook for Proposers*                              |
| Detailed instructions for the preparation and submission of proposals        | See *NASA Guidebook for Proposers*                                    |
| Submission medium                                                            | Electronic proposal submission is required via NSPIRES or Grants.gov. See *NASA Guidebook for Proposers* |
| Selection Official                                                           | Tomas Gonzalez-Torres  
Manager, Space Grant Program  
NASA Headquarters  
Washington, DC 20546 |
| NRESS contact regarding inquiries and assistance for submission of the electronic proposal materials into NSPIRES | NASA Research and Education Support Services (NRESS) Support Team  
Email: spacegrant@nasaprs.com |
Appendix 10A – Budget Tables

Notes:

a. This budget spreadsheet format shown below is the required format, and no other formats will be accepted. The proposer may recreate this table as shown, or an excel version of the budget table will be provided to the proposer upon request to the Space Grant Program Office at NASA HQ.

b. This same table format shall be used for the various required proposed budget tables, with updated titles as listed below to match:
   i. Year 1, Fiscal Year 2025 Base Award – example shown below
   ii. Year 2, Fiscal Year 2026 Base Award
   iii. Year 3, Fiscal Year 2027 Base Award
   iv. Year 4, Fiscal Year 2028 Base Award
   v. Year 2, Fiscal Year 2026 Augmentation
   vi. Year 3, Fiscal Year 2027 Augmentation
   vii. Year 4, Fiscal Year 2028 Augmentation

c. No cumulative budget is required to be submitted

d. Budget tables for the Augmentation dollars are only required if proposing for those funds.

e. Add rows as needed.

<table>
<thead>
<tr>
<th>Year 1, Fiscal Year 2025 Base Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA Funds</td>
</tr>
<tr>
<td>A. Personnel/ Direct Labor</td>
</tr>
<tr>
<td>1. Principal Investigator/ Director</td>
</tr>
<tr>
<td>2. Program Manager</td>
</tr>
<tr>
<td>3. Research Associate</td>
</tr>
<tr>
<td>4. Staff Support</td>
</tr>
<tr>
<td>Total Salaries</td>
</tr>
<tr>
<td>B. Fringe Benefits</td>
</tr>
<tr>
<td>1. Principal Investigator/ Director</td>
</tr>
<tr>
<td>2. Program Manager</td>
</tr>
<tr>
<td>3. Research Associate</td>
</tr>
<tr>
<td>4. Staff Support</td>
</tr>
<tr>
<td>Total Fringe</td>
</tr>
<tr>
<td>C. Equipment</td>
</tr>
<tr>
<td>D. Materials and Supplies</td>
</tr>
<tr>
<td>E. Services</td>
</tr>
<tr>
<td>F. Domestic Travel</td>
</tr>
<tr>
<td>Section</td>
</tr>
<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>G. NASA Internships and Fellowships</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>H. Aeronautics Mission Directorate Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td>I. Spaceflight Operations Mission Directorate</td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td>J. Exploration Systems Development Mission</td>
</tr>
<tr>
<td>Directorate Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td>K. Science Mission Directorate Projects</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td>L. Space Technology Mission Directorate</td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Projects</td>
</tr>
<tr>
<td>M. Competitive Projects</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>N. Subcontracts</td>
</tr>
<tr>
<td>O. Total Direct Costs</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>P. Indirect Cost ( % rate of item O )</td>
</tr>
<tr>
<td>Q. Total Costs</td>
</tr>
</tbody>
</table>
Appendix 10B – Base Award Estimated Costing Schedule Table and Rationale

Note: This table is required to be included in Appendix C of the proposal. The format shown below is the required format, and a separate table must be completed for each of the funding years (1 thru 4).

<table>
<thead>
<tr>
<th>Budget Category</th>
<th>Year X, Fiscal Year 202X Base Award Estimated Costing Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Funding</td>
</tr>
<tr>
<td>A + B</td>
<td></td>
</tr>
<tr>
<td>C + D + E + F</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
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<tr>
<td>J</td>
<td></td>
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<tr>
<td>K</td>
<td></td>
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<tr>
<td>L</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

a. An Estimated Costing Schedule Table and its accompanying Rationale must be provided for each of the 4 years of this multi-year award (total of 4 tables).

b. Update the title of each table to be:
   a. Year 1, Fiscal Year 2025 Base Award
   b. Year 2, Fiscal Year 2026 Base Award
   c. Year 3, Fiscal Year 2027 Base Award
   d. Year 4, Fiscal Year 2028 Base Award

c. This is not required for proposed augmentation funds
d. Values for estimated % costed maybe rounded to the nearest 10%.

Rationale for the three items listed below is required to be provided. If the rationale/information is NOT expected to be the same across all four award years, then the points which are specific to only certain award years must be clarified.

1. Please explain how your current draw-down schedule is sufficient in scope and timing to meet the spending expectations outlined in the costing table above.

2. If your current draw-down schedule presents any risks to your proposed costing schedule in the table above, please enumerate those risks and provide a corresponding mitigation plan to address each risk. Note that both the risk and a mitigation plan is required. If no risks are expected, that needs to be specifically stated.

3. Please list all other perceived risks along with a corresponding mitigation plan for each. Note that both the risk and a mitigation plan is required. If no additional risks are perceived to exist, that needs to be specifically stated.
Appendix 10C – Summary Cost-Match Table

Note: The 3 tables below are required to be included in Appendix H of the proposal. The **format shown below is the required format**, and a separate table must be completed for each of the funding years (1 thru 4). If the value is zero for any of the tables, please include the table and enter “0” for the same table(s).

**<Enter State Name Here>** Space Grant Consortium Cost-Matching Funds Table for Year 1, Fiscal Year 2025 Base Award for the Lead Institution: **<Enter Name of Lead Institution Here>**

<table>
<thead>
<tr>
<th>Cost-Share Amount from the Lead Institution</th>
<th>Letter of Resource Support Included to reflect the total cost-share from the Lead Institution? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$XX, XXX</td>
<td></td>
</tr>
</tbody>
</table>

**<Enter State Name Here>** Space Grant Consortium Cost-Matching Funds Table for Year 1, Fiscal Year 2025 Base Award for Affiliates to be determined after competitive competitions.

<table>
<thead>
<tr>
<th>Total Cost-Share Amount from Affiliates to be determined after competitive competitions</th>
<th>Letters of Resource Support are not required since awardees will not be determined until after competitive competitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$XX, XXX</td>
<td>X</td>
</tr>
</tbody>
</table>

**<Enter State Name Here>** Space Grant Consortium Affiliate Cost-Matching Funds Table for Year 1, Fiscal Year 2025 Base Award

<table>
<thead>
<tr>
<th>Cost-Share Amount from Affiliate</th>
<th>Institution Name</th>
<th>Letter of Resources Support Included in Proposal? (Y/N)</th>
<th>If No, provide rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>$XX,XXX</td>
<td>Institution A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$XX,XXX</td>
<td>Institution B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$XX,XXX</td>
<td>Institution C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$XX,XXX</td>
<td>Institution D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$XX,XXX</td>
<td>Institution E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$XX,XXX</td>
<td>Institution F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$XX,XXX</td>
<td>Institution G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Affiliate Cost- Match</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 10D - OSTEM NASA Internships and Fellowships Definitions

The definitions in this appendix (Appendix D) are applicable to NASA Center Internships, and all Fellowships regardless of whether they are managed by NASA or not. These definitions are provided to proposers and reviewers as guidance, so that proposers and reviewers understand certain differences between internships vs. fellowships.

The Space Grant program recognizes that each respective proposing institution may have different guidance and policy on what constitutes an internship. The Space Grant program wants to ensure that each proposing institution has the necessary flexibility to execute its respective programs, including internships, in alignment with its institution’s policies and practices. The following definitions are representative of the types of direct student awards that OSTEM offers.

- **Internships** are educational hands-on traineeships that provide unique NASA-related research and operational experiences for educators and high school, undergraduate, and graduate students. Internships integrate participants with career professionals emphasizing mentor-directed, degree-related, project task completion. NASA internships shall consist of at least 400 contact hours (320 for H.S. students or teachers) of mentored, degree-relevant, work-activity.

- **Fellowships** are designed to support independently conceived or designed research by highly qualified faculty, and graduate students, in disciplines needed to help advance NASA’s missions. Fellowships afford students the opportunity to directly contribute to advancements in NASA’s STEM-related areas of study or STEM Education fields. NASA fellowship opportunities are focused on innovation and generate measurable research results that contribute to NASA’s current and future science and technology goals.
Appendix 10E – Sample Table of Consortia S.M.A.R.T. Goals, Objectives and Performance Measures Matrix

**Instructions:** Develop consortium unique S.M.A.R.T. goals, objectives, and indicators of success (performance measures), using the provided tables below. The format shown below shall be used and no other format will be accepted.

For each S.M.A.R.T. goal developed, it is required that the proposer show how it is in alignment with at least one of the OSTEM Performance Goals (listed below) and one associated Objective (listed under each of the aligned Performance Goals). The totality of the consortium S.M.A.R.T. goals should align with at least two of the Performance Goals. Each consortium S.M.A.R.T. goal does not need to align with two Performance Goals, but throughout the entirety of the list of the consortium’s S.M.A.R.T. goals, there shall be a focus encompassing at least two of the Performance Goals.

A total of 12 tables are shown below, outlining three tables for each of the four years of this multi-year cooperative agreement. Each of the four years has three tables which break down the focus of the SMART goals into three categories: NIF Activities, Mission Directorate/Competitive Projects, and Diversity.

Within the NIF S.M.A.R.T. goals matrix, the proposer shall develop S.M.A.R.T. goals, objectives, and indicators of success for the activities associated with the funds budgeted within the NIF category. The proposer shall do the same for the Mission Directorate/Competitive Projects.

In the third table of each proposed year, the proposer shall develop S.M.A.R.T. goals, objectives, and indicators of success (using the Diversity SMART goals matrix) showing how the consortium’s planned activities will broaden the diverse set of students with whom the consortium attracts and engages.

**Note:** Examples have been included in the tables shown below. These are examples only and these specific items are NOT required to be included in the final tables provided in the consortium’s proposal.

**Performance Goal 4.3.1:** Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery.

- **Objective 1.1:** Create opportunities that enable students to produce knowledge or products that will be used by NASA
- **Objective 1.2:** Create opportunities that enable students to support NASA mission work and research
- **Objective 1.3:** Establish and maintain a national network of universities that enable creates opportunities for students to contribute to NASA’s work in exploration and discovery

**Performance Goal 4.3.2:** Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.

- **Objective 2.1:** Enhance students’ STEM identity, skills, and knowledge by engaging them in NASA-based authentic STEM learning activities
Objective 2.2: 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

Objective 2.3: Broaden participation of students in Space Grant Programming that leverages authentic learning experiences with NASA’s people, content, and facilities

Performance Goal 4.3.3: Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work.

Objective 3.1: Expand the reach of individual Consortia to collaborate regionally on efforts that directly support middle and high school student participation in hands-on, NASA-aligned STEM activities

Objective 3.2: Attract diverse populations of traditionally underserved and underrepresented middle and high school students to STEM and equip them with the tools necessary for success in college STEM degree programs leading to STEM careers

Objective 3.3: Promote a strong STEM education base for middle and high school students while training teachers in these grade levels to become more effective at improving student academic outcomes.
**Consortium Goals:** Statements about overall intent or purpose of the program to which program objectives and activities are expected to contribute. Goal(s) focus on the desired outcomes and are broad (Your Destination). Note that these are consortium goals associated with the Performance Goals listed above, but should not be a copy/paste of those.

- What outcome do you hope to achieve?
- What will the results look like?
- Where do you want to be after each award year concludes?
- Think: SMART (Specific, Measurable, Achievable, Relevant/Realistic, and Time-based)
- *Example: Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.*

**Consortium Objectives:** Brief, clear statements that describe the actions and activities that contribute to achievement of the program goal(s). Objectives are the highest level result the program can affect or achieve towards accomplishment of the program goal(s). They are statements of the condition(s) or state(s) the program is expected to achieve within the timeframe and resources of the program.

- What specific actions will help you to achieve your goal?
- What steps will you take to reach your goal?
- Also Think: SMART (but the time would be shorter, typically within a year)
- *Example: Increase the number of URMs participating in STEM engagement activities.*

**Consortium Performance Measures:** Parameters used to measure progress/success. Target quantitative measure (e.g., percentage, number, increase, etc.) if appropriate and/or evidence of success indicating objective(s) are achieved.

- How will you measure your progress toward the objective(s)?
- What variable (e.g., data/evidence) will you examine to see if you have actualized your objective?

**Consortium Deadline:** Target date for accomplishment/completion.

**Note:** The S.M.A.R.T. Goals, Objectives, and Performance Metrics Matrix tables shown on the next few pages are required to be included in Appendix E of the proposal. The format shown below is the required format, and no other format will be accepted.
Sample Table of Consortium S.M.A.R.T. Goals, Objectives, and Performance Metrics Matrix

<table>
<thead>
<tr>
<th>Performance Goal Alignment</th>
<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Goal 4.3.1</td>
<td>Objectives 1.1 and 1.2</td>
<td>X X X X X X</td>
<td>Enable students to contribute to NASA Mission Directorate activities through internships.</td>
<td>Support the placement of students at NASA centers where they will be able to directly support the NASA mission.</td>
<td>Successful placement of 2 fall, 2 spring, and 2 summer interns at NASA centers</td>
<td>4/1/2026</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Performance Goal Alignment</th>
<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
<th>Consortium Year 1 (FY 2025) Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Goal 4.3.2</td>
<td>Objectives 2.1</td>
<td>X X X X X X</td>
<td>Contribute to NASA Mission Directorate activities by engaging students with NASA’s people and facilities.</td>
<td>Provide students with team-based learning opportunities that promote real-world STEM experiences.</td>
<td>Support X collegiate student competition teams (i.e., Student Artemis Challenges, Student Launch, First Nations Launch, etc.)</td>
<td>4/22/2026</td>
<td></td>
</tr>
<tr>
<td>Performance Goal Alignment</td>
<td>Space Grant Objective Alignment</td>
<td>Mission Directorate Alignment</td>
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<td>ARMD  SMD  STMD  ESDMD  SOMD</td>
<td>Consortium Goal</td>
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</tr>
<tr>
<td><strong>Performance Goal 4.3.1</strong></td>
<td><strong>Objectives 1.3</strong></td>
<td>X  X  X  X  X</td>
<td>Broden participation from a more diverse set of participants across the consortium beyond those who have historically participated.</td>
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<td></td>
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<td>Actively engage students at affiliate member institutions who have historically not been involved with lead institution consortium events and awarding opportunities.</td>
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<td>Award a minimum of 40% female students from academic affiliates (non-lead institution)</td>
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<td>6/10/2026</td>
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<tr>
<td><strong>Performance Goal 4.3.2</strong></td>
<td><strong>Objectives 2.3</strong></td>
<td>X  X  X  X  X</td>
<td>Broden participation from a more diverse set of participants across the consortium beyond those who have historically participated.</td>
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<td></td>
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<td></td>
<td>Actively engage with student groups, across affiliate campuses, who are currently underrepresented participants in consortium activities</td>
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<td></td>
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<td>Reach out to and present at X number of student organizations who have a large percentage of underrepresented/underserved members.</td>
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<td>6/10/2026</td>
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### Year 2 (FY 2026) - NIF Activity SMART Goals, Objectives, and Performance Metric

<table>
<thead>
<tr>
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<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 2 (FY 2026) Performance</th>
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<tr>
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### Year 2 (FY 2026) – Mission Directorate/Competitive Project SMART Goals, Objectives, and Performance Metric

<table>
<thead>
<tr>
<th>Performance Goal Alignment</th>
<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 2 (FY 2026) Performance</th>
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### Year 2 (FY 2026) – Diversity SMART Goals, Objectives, and Performance Metric

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<th>Mission Directorate Alignment</th>
<th>Consortium Year 2 (FY 2026) Performance</th>
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<td>ESDMD</td>
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210
## Year 3 (FY 2027) - NIF Activity SMART Goals, Objectives, and Performance Metric

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<th>Mission Directorate Alignment</th>
<th>Consortium Year 3 (FY 2027) Performance</th>
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<td>STMD</td>
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## Year 3 (FY 2027) – Mission Directorate/Competitive Project SMART Goals, Objectives, and Performance Metric

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<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 3 (FY 2027) Performance</th>
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<td>STMD</td>
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</table>

## Year 3 (FY 2027) – Diversity SMART Goals, Objectives, and Performance Metric

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<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 3 (FY 2027) Performance</th>
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<table>
<thead>
<tr>
<th>Performance Goal Alignment</th>
<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Year 4 (FY 2028) Performance</th>
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<td>Consortium Goal  Consortium Objective  Consortium Performance Measure  Consortium Deadline</td>
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<table>
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<th>Year 4 (FY 2028) – Diversity SMART Goals, Objectives, and Performance Metric</th>
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<td>Performance Goal Alignment</td>
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Appendix 10F – Sample Milestone Chart

Notes:

a. This table is required to be included in Appendix D of the proposal. The **format shown below is the required format**, and a separate table must be completed for each of the funding years (1 thru 4).

b. Provide an estimate as to when a proposed activity will occur/be awarded, within the period of performance (dates should be adjusted to align with the specific consortium’s period of performance). The items listed below shall align with the content of the proposal, budget, and budget narrative.

c. Provide a separate chart for each of the four years of the award period, such that they align with the consortium’s period of performance.

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<tbody>
<tr>
<td>1</td>
<td>Example: Graduate Student Awards</td>
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<td>2</td>
<td>Example: TBD Award</td>
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GUIDELINES FOR SUBMITTAL OF EVALUATION PLANS

NASA’s Office of STEM Engagement requires recipients of its cooperative agreements to conduct an independent evaluation of its sponsored activities. To facilitate awardees efforts to meet this obligation they will use the uniform format presented here in reporting their evaluation results to the Office of STEM Engagement. This template benefits awardees by providing clarity on report elements and standardization of the types of information required to assist in comparing outputs and outcomes.

This template is the result of the Office of STEM Engagement Performance and Evaluation Strategy (Learning Agenda). Among the priorities of this learning agenda, is to improve the overall data quality, integrity and analysis/reporting capabilities. In pursit of this goal the components, format, and reporting requirements laid out below focus data collection in alignment with Federal, Agency and Office of STEM Engagement (OSTEM) legislative directives, priorities, and metrics of interest while reducing the volume of data collected by eliminating duplication, reducing the burden placed on recipients of cooperative agreements, and standardization.

In compiling and submitting their evaluation reports cooperative agreements recipients are expected to adhere to the instructions and requirements developed for each component of their report as outlined but may provide additional site-specific information as necessary.

Evaluation Plan Elements

The cooperative agreement awardees shall submit a Comprehensive Evaluation Plan within 45 days of the start of the period of performance via email to NASA Shared Service Center (NSSC), the NASA Space Grant Project Management Team personnel, and NASA Performance & Evaluation (P&E) Team personnel.

All Evaluation Plans submitted to NASA’s Office of STEM Engagement by cooperative agreement awardees must include the following elements:

- Cover Page
- Table of Contents
- Introduction
- Evaluation Design Methodology
- Timeline
- Risk Mitigation Strategy
- Works Cited
- Appendices
Cover Page

All evaluation plans submitted to NASA’s Office of STEM Engagement must contain a title page with the following elements:

- Project Title
- Institutional Affiliation
  - College/Department
  - Address
- Federal Award Identification Number (FAIN) or Other Identifying Number
- Project Principal Investigator (PI)
  - Name
  - Title
  - Contact Information (Email Address and Phone Number)
- Project Independent Evaluator
  - Name
  - Title
  - Contact Information (Email Address and Phone Number)
- Submission Date
- Cooperative Agreement Period (Start Date, End Date)

A template outlining how awardees are to organize and present these elements is located on the following pages.

Table of Contents

The table of contents is a formatted list of the report’s sections and subsections, including References and Appendices with page numbers. In drafting your Table of Contents please:

- List only pages that appear after the table of contents
- Ensure the table of contents is number correctly and match the actual page each section/subsection is found on
- Do not include Tables and Figures in your Table of Contents
  - These may optionally be listed in their own “List of Table” and “List of Figures” each in their own tables and on their own successive pages

A template outlining how awardees are to organize and present the Table of Contents is located on the following pages.
Comprehensive Evaluation Plan

Program Title

Grant: NX############

Cooperative Agreement Awarded Month Day, Year - Month Day, Year

Institution Name

Department/College

##### Street Name, Building ##

City, State Zip code

Period of Performance: Month Day, Year - Month Day, Year

Submitted Month Day, Year

By

Principal Investigator:
Name
Origination
Email & Phone Number

Independent Evaluator:
Name
Origination
Email & Phone Number
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Evaluation Design and Methodology .................................................................................... 220
Timeline .................................................................................................................................. 221
Risk Mitigation Strategy ........................................................................................................ 222
Works Cited ............................................................................................................................. 222
Appendices .............................................................................................................................. 223
  **Copies of Instruments** ........................................................................................................ 223
  **Independent Evaluator’s Resume or CV** ............................................................................ 223
Introduction
Provide background information on the Space Grant Consortium Program; outline consortium goals, objectives, and outcomes; and place the evaluation plan in context of operations.

Background
Program Information
Provide a brief description and background of the program being evaluated including (re: milestones):

- Proposed implementation dates, timing, and frequency of activities
- Proposed type of content and how the content is delivered (e.g. Saturday, summer, or after school)
- The goals and objectives or performance measures of your program as they relate to those of the agency-wide initiative, note each laid for the initiative by the Office of STEM Engagement must relate to one or more goals or performance measures specific to your program
- The target audience of this project (if multiple activities were held, include all target audiences; e.g. Students, Teachers, Parents/caregivers)

For each consortium milestone, please use Table 1 to describe the status (on-target, delayed, or cancelled), progress, and (if applicable) the reason for delay or cancellation.

Table 1: Consortium Milestones Table

<table>
<thead>
<tr>
<th>Consortium Milestones</th>
<th>Status (on-target, delayed, cancelled)</th>
<th>Describe Progress towards achieving milestones</th>
<th>Indicate reason for delay or cancellation (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milestone #1</td>
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<tr>
<td>Milestone #2</td>
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<td></td>
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<tr>
<td>Milestone #3</td>
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</tr>
</tbody>
</table>

SMART Goals Table
Space Grant PIs should work with the Independent Evaluator to develop SMART goals unique to their consortium (see Table 3). As a reference, the following SMART Goals Matrix (see Table 2) provides a poor, good, and strong example.
Table 2: Example SMART Goals Matrix

<table>
<thead>
<tr>
<th>Strategic/Performance Goal Alignment</th>
<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Goal</th>
<th>Consortium Year 5 Performance Measure</th>
<th>Consortium Deadline</th>
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</thead>
<tbody>
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</tbody>
</table>

Instructions:

- Select one Strategic Goal/Performance Goal
- Select one relevant Space Grant Objective
- Select at least one (or more) of aligned NASA Mission Directorates. (Not all MDs need to be selected).
- Write in your consortium objective that aligns to the goal
- Write how you will measure this objective
- Write in the target deadline for this goal/objective

Poor Example

- Strategic Goal 3.0 (Performance Goal 4.3.3)
  - Attract diverse groups of students to STEM through learning opportunities that spark interest and provide connections to NASA’s mission and work
  - Objective 3.1
    - Expand the reach of individual consortia to collaborate regionally on efforts that directly support middle and high school student participation in hands-on, NASA-aligned STEM activities
  - Involve students in STEM
  - Balloons were launched
  - End of PoP

Good Example

- Strategic Goal 1.0 (Performance goal 4.3.1)
  - Create unique opportunities for a diverse set of students to contribute to NASA’s work in exploration and discovery
  - Objective 1.1
    - Create opportunities that enable students to produce knowledge or products that will be used by NASA
  - Support authentic undergraduate and graduate STEM learning experiences that will enhance NASA and the STEM workforce
  - Fund 10 college students with research fellowship awards
  - Annually

Strong Example

- Strategic Goal 2.0 (Performance goal 4.3.2)
  - Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content, and facilities.
  - Objective 2.2
    - 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.
  - Support authentic undergraduate and graduate STEM learning experiences that will enhance NASA and the STEM workforce
  - Fund 5 college students with a NASA internship each year, including at least 2 internships awarded to women
  - Annually

Table 3. Blank SMART Goals Matrix for Independent Evaluators

<table>
<thead>
<tr>
<th>Strategic/Performance Goal Alignment</th>
<th>Space Grant Objective Alignment</th>
<th>Mission Directorate Alignment</th>
<th>Consortium Goal</th>
<th>Consortium Year X Performance Measure</th>
<th>Consortium Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Purpose of the Evaluation

State the purpose of the evaluation; consider the stakeholders who will receive the report and how each will use the results (for example ensuring accountability, documenting progress, identifying successes, compile recommendations for continued improvement). Additionally, this section of the report should include:

- A Logic Model that summarizes program inputs, activities, outputs and outcomes, you may optionally divide outcomes between short and long term

Evaluation Design and Methodology

This section details the evaluation plan and includes the following elements:

- Evaluation Questions
- Data Collection Strategy
- Evaluation Methods

Evaluation questions

Layout each of the evaluation question assessed in the proposed evaluation. Each question must:

- Must relate to a specific site goal or objective/performance measure
  - Note that each site goal or objective/performance measure must have at least one associated evaluation question.
- Are clear, concise, and falsifiable
- Do not contain normative or subjective language
- Address measurable concepts
- Focus on a specific program component.

Data Collection Strategy

This component lays out the strategy for obtaining the data necessary to address the proposed evaluation questions. This includes:

- Clearly defined indicators for each concept identified in evaluation questions
- Each indicator clearly operationalized and associated with specific data collection instruments/protocols
- Instruments are valid and reliable
- Adequately described the strategy or method used to recruit respondents
- A statement of the proposed sampling method (e.g. convenience, random, PPS, Snowball, etc.)

Evaluation Methods

This section lays out the proposed evaluation methods to analyze the data collected for the evaluation. For each of the proposed instruments listed above provide a detailed discussion of
the analysis process and should:

- Be based upon reputable models and techniques that are appropriate to the content and scale of the Space Grant Program
- Detail the methods used to analyze the data (e.g. descriptive statistics, T-test, ANOVA, Regression, etc.)
- Indicate the variable(s) derived from the instrument that will be analyzed using the method(s) discussed
- An explicit indication of the unit of analysis

Using Table 4, provide a description of the evaluation questions, instrument(s) used, data collection method(s) and sampling strategy, and data analysis method(s) and approach.

**Table 4. Data Collection Summary Table**

<table>
<thead>
<tr>
<th>Evaluation Question</th>
<th>Instrument(s) Used</th>
<th>Data Collection Method(s) &amp; Sampling Strategy</th>
<th>Data Analysis Method(s) &amp; Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>[To what degree does the program attract and serve historically underserved and underrepresented students?]</td>
<td></td>
<td>[-Sign in sheets at weekly events and summer camp registration logs. -Initial registration demographic survey filled out by parents. -Field observations, and journaling]</td>
<td>[Descriptive Statistics, coding themes qualitatively using MaxQDA software]</td>
</tr>
<tr>
<td>[To what extent does the collaboration result in a valued experience by the organization?]</td>
<td></td>
<td>[Researcher will conduct semi-structured interviews with various stakeholders including parents, teachers, administrators, assistant superintendent, and school board members. Teachers will complete survey questionnaire assessing student groups during the Summer course.]</td>
<td>[Open coding and coding themes qualitatively using MaxQDA software.]</td>
</tr>
</tbody>
</table>

**Timeline**

This section lays out the proposed timing of the evaluation and should include a Gantt chart (Table 5) or similar figure that:

- Includes all evaluation activities and milestones
  - Data collection
  - Data analysis
  - Periodic reporting of evaluation findings to stakeholders
  - Drafting of the Evaluation Report
- Indicates the responsible party for each activity or milestone
- Activities and milestones are scheduled with a resolution at the quarterly level
Table 5. Example Gantt Chart for Evaluation Milestones

<table>
<thead>
<tr>
<th>Activity</th>
<th>2025</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>Spring</td>
</tr>
<tr>
<td>Data Collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disseminate student pre-surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disseminate student post-surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct student interviews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis of data collected in 2025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis of data collected in 2026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis of interview data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statewide Meeting/Reporting to Stakeholder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1 Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 2 Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 3 Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 4 Report</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: This example table reflects a trimester academic schedule. Please change the intervals and milestones to match your consortium’s unique timelines.

Risk Mitigation Strategy
This section outlines contingency plans to respond to events and or changes in the implementation of the program that poses a risk to the successful completion of the evaluation consider:

- How data collection activities will be rescheduled if activities are canceled or postponed
- Will any of the evaluation activities require IRB approval, if so specify which activities will require submission to the IRB and the timing of that submission as a strategy to overcome any delays obtaining clearance
- How analysis methods will be affected by the potential of low response rates
- How to ensure continuity in the event of turnover in evaluation staff
- How you will communicate to stakeholders at NASA’s Office of STEM Engagement or others in the event these or other unforeseen adversities materialize

Works Cited
A reference section lists any research or instruments used in the Evaluation Report.

- All works cited in the body of the report should have a corresponding entry in the works cited list
- All citations must follow MLA, Chicago, APA, APSA or other commonly used formatting guidelines
- Entries must appear in alphabetical order
- Entries are single-spaced and spacing between entries is double spaced
Appendices
Appendices provide additional information and reference material. There are two required elements to be included although additional elements may be included as required.

Copies of Instruments
Include copies of your instruments (i.e. surveys, interview protocols, coding guidelines, etc.). Each instrument used must be placed in its own Appendix and appear in the Table of Contents.

Independent Evaluator’s Resume or CV
Include a copy of the Independent Evaluator’s resume or CV highlighting qualifications, past achievements, prior work, and any published reports.
GUIDELINES FOR SUBMITTAL OF SPACE GRANT ANNUAL/FINAL EVALUATION REPORT

NASA's Office of STEM Engagement requires recipients of its cooperative agreements to conduct an independent evaluation of its sponsored activities. To facilitate awardees efforts to meet this obligation they will use the uniform format presented here in reporting their evaluation results to the Office of STEM Engagement. This template benefits awardees by providing clarity on report elements and standardization of the types of information required to assist in comparing outputs and outcomes.

This template is the result of the Office of STEM Engagement Performance and Evaluation Strategy (Learning Agenda). Among the priorities of this learning agenda, is to improve the overall data quality, integrity and analysis/reporting capabilities. In pursit of this goal the components, format, and reporting requirements laid out below focus data collection in alignment with Federal, Agency and Office of STEM Engagement (OSTEM) legislative directives, priorities, and metrics of interest while reducing the volume of data collected by eliminating duplication, reducing the burden placed on recipients of cooperative agreements, and standardization.

In compiling and submitting their evaluation reports cooperative agreements recipients are expected to adhere to the instructions and requirements developed for each component of their report as outlined but may provide additional site-specific information as necessary.

Annual/Final Evaluation Report Elements
The cooperative agreement awardees shall submit the annual evaluation report 60 days prior to the Anniversary Date and the final evaluation report 90 days after the Anniversary Date via email to NASA Shared Service Center (NSSC), the NASA Deputy Space Grant Manager, the NASA Performance Assessment and Evaluation Program Manager (Rick Gilmore – richard.l.gilmore@nasa.gov) and appropriate support personnel. The purpose of the annual/final evaluation report is to 1) Document project activities and accomplishments measured against proposed goals and objectives over the period of performance of the award. 2) Provide evidence the project has advanced stakeholder priorities. 3) Report the extent to which awardees have fostered and developed collaborations and/or partnerships. 4) Summarize data collection activities and relevant evaluation findings. 5) Establish a set of recommendations based on empirical evidence findings to enhance the program.

All annual/final evaluation reports submitted to NASA’s Office of STEM Engagement by Space Grant Program-Level Independent Evaluation cooperative agreement awardees must include the following elements:

- Cover Page
- Table of Contents
- Executive Summary
- Introduction
- Accomplishments and Preliminary Results
Appendix 10H – Example Template for IE Evaluation Report

- Preliminary Conclusions and Recommendations
- Works Cited
- Appendices

**Cover Page**
All final evaluation reports submitted to NASA’s Office of STEM Engagement must contain a cover page with the following elements:

- Report Term (Annual/Final)
- Project Title
- Institutional Affiliation
  - College/Department
  - Address
- Federal Award Identification Number (FAIN) or Other Identifying Number
- Project Principal Investigator (PI)
  - Name
  - Title
  - Contact Information (Email Address and Phone Number)
- Project Independent Evaluator
  - Name
  - Title
  - Contact Information (Email Address and Phone Number)
- Submission Date
- Cooperative Agreement Period (Start Date, End Date)

Please note that when submitting a final report, the cooperative agreement period and the performance period will have the same start and end dates. A template outlining how awardees are to organize and present these elements is located on the following pages.

**Table of Contents**
The table of contents is a formatted list of the report’s sections and subsections, including References and Appendices with page numbers. In drafting your Table of Contents please:

- List only pages that appear after the table of contents
- Ensure the table of contents is number correctly and match the actual page each section/subsection is found on
- Do not include Tables and Figures in your Table of Contents
  - These may optionally be listed in their own “List of Table” and “List of Figures” each in their own tables and on their own successive pages

A template outlining how awardees are to organize and present the Table of Contents is located on the following pages. NOTE, the Table of Contents has sample page numbers included that should be updated after removal of the Guidelines information (pages 1-2).
Appendix 10H – Example Template for IE Evaluation Report

Annual/Final Evaluation Report

Program Title

Grant: 80NSSC########

Cooperative Agreement Awarded Month Day, Year - Month Day, Year

Institution Name

Department/College

#### Street Name, Building ##

City, State Zip code

Period of Performance: Month Day, Year - Month Day, Year

Submitted Month Day, Year

By

Principal Investigator:
Name
Origination
Email & Phone Number

Independent Evaluator:
Name
Origination
Email & Phone Number
Executive Summary
The Executive Summary is an abstract or report synopsis of the program description, population reach, evaluation, and performance results with highlights and recommendations. This section provides a brief overview of the information located in the body of the report.

Overview
Briefly describe the project and outline the major activities during the reporting period, answering the following questions:

- What was the target audience of this project?
- What activities were conducted as part of this project (e.g. afterschool, summer program, professional development workshops)?
Appendix 10H – Example Template for IE Evaluation Report

- What was the frequency and timing of these activities?
- What consortia participated in the evaluation?
- What were the goals and objectives of this project?

Summary of Accomplishments and/or Preliminary Results
Briefly review the accomplishments and/or preliminary results of the evaluation, discussing key outcomes and preliminary findings. Present each evaluation question in turn and for each include:

- An explicit statement of the evaluation question
- List instrument(s) used to collect data
- Describe methods used to analyze these data
- Present the accomplishments and/or preliminary results of this analysis in a bulleted list

You may include downsized Tables and Figures in the Executive Summary as appropriate if 1) used sparingly 2) included in the body of the report in their full size 3) have their own numbering system (e.g. Table ii or Figure i) and 4) not be listed in the List of Figures or List of Tables if included.

Summary of Preliminary Conclusions and Recommendations
Briefly review the preliminary accomplishments and/or results framing them in a discussion of their relation to the stated goals of the project (both meet and not meet). Discuss any obstacles in implementing this activity as well as conducting the evaluation. Include any recommended enhancements to evaluation plan. Finally, include a bulleted list summarizing lessons learned and/or recommendations for improving the activity. Recommendations should:

- Address specific obstacles or undesirable results
- Be specific, comprehensive, and evidence-based

The primary purpose of providing lessons learned and/or recommendation is to facilitate continual improvement and therefore, must include recommendations for refining program implementation. You may optionally include additional recommendations at refining the evaluation process.

Introduction
Provide background information, outline the major activities and accomplishments during the reporting period, and place the evaluation in context.

Background
Office of STEM Engagement
Briefly discuss and review the Space Grant Program and its major goals and objectives.

Program Information
Appendix 10H – Example Template for IE Evaluation Report

Provide a brief description and background of your program including but not limited to the following:

- Implementation dates, timing, and frequency of activities
- Type of content and how the content is delivered (e.g. Saturday, summer, or after school)
- Frequency and timing of these activities
- Target audiences (e.g. Students, Teachers, and Parents/caregivers, etc.)
- The goals and objectives or performance measures of your program as they relate to those of the agency-wide initiative, note each laid for the initiative by the Office of STEM Engagement must relate to one or more goals or performance measures specific to your program

Purpose of the Evaluation

State the purpose of the evaluation; consider the stakeholders who will receive the report and how each will use the results (for example ensuring accountability, documenting progress, identifying successes, compile recommendations for continued improvement). Additionally, this section of the report should include but not be limited to the following element:

- A Logic Model that summarizes program inputs, activities, and outcomes, you may optionally divide outcomes between short and long term

Evaluation Design and Methodology

This section summarizes the evaluation design and methodology. Additionally, this section of the report should include but not be limited to the following element:

- A Table detailing each evaluation question and its connection to your program goals and objectives or performance measures, as well as the instruments or data collection activities associated with each question

Accomplishments and Results

This section details the accomplishments and results of the evaluation with a subsection dedicated to each evaluation question assessed. These subsections may include:

- A statement of the evaluation question; this requirement may be met by titling each subsection with the text of the question.
- Discuss the status of milestones
- Discuss the status of SMART goals
- Discuss the instruments or protocol used
- Provide details of the data collection strategy or method used to recruit respondents
- State the sampling method used (e.g. continence, random, PPS, Snowball, etc.)
- Detail the methods used to analyze the data (e.g. descriptive statistics, T-test, ANOVA, Regression, etc.)
- State the results of the analysis
- Include figures and tables where appropriate.
  - Each Figure or Table should be consecutively numbered (e.g. Table 1, Figure 1)
Appendix 10H – Example Template for IE Evaluation Report

- Each Figure or Table should include a caption with a brief title and its number (e.g. Figure 1 Pre and Post Student STEM Interest)
- A narrative to explain the diagram should accompany each Figure or Table.
- A reference to Figure or Table discussed should appear in the narrative (e.g. Table 2 reviews, Results indicate an increase in STEM knowledge (Figure 2))
- Interpret the empirical results and state how they answer the evaluation question.

Conclusions and Recommendations
This section summarizes the evaluation process and its results providing information on the cumulative findings of the project as well as outlining recommendations for continued improvement based on the empirical findings.

Summary
Review evaluation findings and integrate results into a cohesive statement on the progress made and success to date of your program.
- Use empirical results to summarize which of the site's milestones and SMART goals and objectives/performance measures your program achieved and which it did not
- Connect site's achievement of its goals and objectives/performance measures to goals and objectives of the overall initiative as laid out by the NASA's Office of STEM Engagement
- Discuss the limitations (methodological and/or data collection) in conducting this evaluation and indicate what if any impacts these limitations have in the interpretation of the empirical results and the overall findings presented in the report

Recommendations & Lessons Learned
Finally, include a bulleted list of lessons learned and/or recommendations for improving the activity and/or the evaluation. Recommendations should:
- Address specific obstacles or undesirable results
- Be specific, comprehensive, and evidence-based
- Include a statement of what the proposed recommendation will address, its goal or purpose, how it will accomplish that goal or purpose.
- Include, to the extent possible a link to research demonstrating the efficacy of the proposal.

For example, consider the following template:
In our interviews with parents/caregivers, 55 percent indicated a need for more information about the resources available in making their child's college aspirations financially obtainable. To meet this need we suggest bolstering support and access to financial aid information by:
- Providing additional training on Federal Student Aid programs to staff facilitating family events
- Dedicating one family event to financial planning for college, inviting if possible, a representative from the financial aid office to give a presentation, research has shown that children of parents who have attended at least one similar presentation are 35 percent more likely enroll in college (Citation 2010).

The primary purpose of providing lessons learned and/or recommendation is to facilitate continual improvement and therefore must include recommendations for refining program
implementation. You may optionally include additional recommendations at refining the evaluation process.

Works Cited
A reference section lists any research or instruments used in the Evaluation Report.

- All works cited in the body of the report should have a corresponding entry in the works cited list
- All citations must follow MLA, Chicago, APA, APSA or other commonly used formatting guidelines
- Entries must appear in alphabetical order
- Entries are single-spaced and spacing between entries is double spaced

Appendices
Appendices provide additional information and reference material (e.g., S.M.A.R.T. Goals, milestone charts, survey instruments, etc.). There are two required elements to be included although additional elements may be included as well.

Performance Indicator Matrix
The first appendix must be a performance indicator matrix as outlined on the following page. This table summarizes the evaluation results and provides explicit linage to the program's goals and objectives (see example matrix on the next page).

Copies of Instruments
Include copies of your instruments (i.e. surveys, interview protocols, coding guidelines, etc...). Each instrument used must be placed in its own Appendix and appear in the Table of Contents
## Example of Summary Performance Indicator Matrix

<table>
<thead>
<tr>
<th>Initiative Goal 1</th>
<th>NASA’s (Initiative) Objective</th>
<th>Site Goal or objective /Performance Target</th>
<th>Evaluation Question</th>
<th>Instrument(s) Used</th>
<th>Data Collection Method(s) &amp; Sampling Strategy</th>
<th>Data Analysis Method(s)</th>
<th>Results</th>
<th>Goal/Objective Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiative Goal 2</td>
<td>[TEXT OF THE OBJECTIVE]</td>
<td>Yes/No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[Yes]</td>
</tr>
</tbody>
</table>