



*National Aeronautics and
Space Administration*



Missouri Space Grant Consortium

2021 Affiliates Award Competition

NASA-Missouri Space Grant Consortium 2021 Affiliates Award Competition Announcement

Introduction

The NASA Missouri Space Grant Consortium is requesting proposals to expand student research training and enhance or establish outreach programs with the Consortium's permanent members. The MOSGC expects to award a total of \$100,000 under this solicitation for proposals with anticipated funding levels up to \$15,000 per proposal. Proposals for lesser amounts will be considered. Note that, excluding NASA-OSTEM Internships, Fellowships, and Scholarships, a one-to-one cost share match is required for all funds awarded as a result of this solicitation. The Missouri Space Grant Office reserves the right to partially fund proposals if deemed appropriate.

The main mission of the Consortium is to maintain and enhance, through the State's research universities and corporate partners, the Nation's workforce capabilities in aerospace and space related science, engineering, and technology; and to aid in the dissemination of NASA related information to students, faculty, researchers, and the general public. The primary goal of the Consortium is to inspire, motivate, recruit, educate, and train students to be competent researchers at all academic levels in order to help meet Missouri's and NASA's need for skilled, knowledgeable, diverse, and high-performing professional scientists, engineers, technologists, and educators specializing in the fields of interest to NASA.

Eligibility

Eligibility is limited to the permanent Affiliates of the Consortium.

Pertinent Dates

Date of Announcement: **May 21st, 2021**

Proposal Due Date: **June 30th, 2021**

Anticipated Period of Performance

August 15th, 2021 – April 30th, 2022

Proposals of Interest

Proposals should provide opportunities to involve a diverse group of participants in substantive hands-on research, training, and/or public outreach experiences. Proposed projects should mutually benefit the Consortium, the State of Missouri, and NASA. University-level projects should support higher education research training that prepares students for NASA-related careers and/or enhanced faculty research capabilities. Pre-college projects should focus on in-service and pre-service teacher training and/or resource capability enhancement. Informal education projects should encourage participants to pursue areas of relevance and interest to the aerospace and space science disciplines. Proposals that involve participants from underrepresented groups and underserved communities are highly desirable. Proposed projects should ultimately increase the number and diversity of students, faculty, and researchers that are involved in NASA-related science, technology, engineering, and mathematics (STEM) fields.

The projects proposed through this opportunity should relate to one or more of the National Space Grant College and Fellowship Program's objectives:

- Establish and maintain a national network of universities with interests and capabilities in aeronautics, space, and related fields.
- Create cooperative programs among universities, aerospace industry, and Federal, state, and local governments to foster STEM ecosystems.
- Attract, recruit and train U.S. citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology.
- Encourage interdisciplinary training, research, and public service programs related to aerospace.
- Create opportunities that enable student contributions to the development of solutions addressing NASA Mission Directorate challenges.
- Promote a strong STEM education base from elementary through secondary levels while providing support to teachers in these grade levels toward more effectively improving student academic outcomes.
- Advance aerospace knowledge and expand related activities.

Please see Appendix A: NASA's Office of STEM Engagement Priorities, Goals, and Objectives for additional information.

Proposal Format and Content

Proposals are limited to three descriptive pages excluding the title page, detailed budget narrative, budget summary form, summary of performance measures form, and supporting documents. With the exception of the signed cover page, scanned pages may not be submitted in the electronic version. Proposals should be prepared in the following format:

Title Page:

Include the project title and the name of the proposing institution along with the names, addresses, telephone numbers, and e-mail addresses of the principal investigators. Also include the solicitation number given on the cover page of this solicitation and the date of submission.

Body of Proposal:

The following items should be included in the descriptions for each planned project grouped according to their respective NASA Mission Directorate alignment(s) as specified by section:

- A brief summary of the general scope of the project, including how it ties to the NASA's Office of STEM Engagement current areas of emphasis and the specific educational outcomes as prescribed in Appendix A.
- Planned research activities should relate to one or more of NASA's Mission Directorates' research areas of interest as indicated in Appendix B.
- Method for the competitive recruitment and selection of directly supported students.
- The project goals and anticipated outcomes along with the qualitative and quantitative metrics used to measure the success of the project.

- The number of each type of project participant (graduate, undergraduate, and K-12 students, faculty advisors, K-12 teachers, technical/clerical staff, general public, etc.) according to their type of participation (direct or indirect) and type of support (direct or indirect) along with female and minority participation targets.

Direct Participants are those who are participating in or are facilitating hands-on activities.

Indirect Participants are those who are simply in attendance as lecture audience members, demonstration/exhibit observers, mass media recipients, etc.

Directly Supported participants are those that receive student aid, stipends, or monetary compensation for their work and are presumed to be directly participating.

Indirectly Supported participants are those that receive funding for materials, supplies, services, and/or travel and lodging only.

Please note that if a participant is involved in more than one project they may be *enumerated only once* in the performance measures table in order to avoid double-counting. These participants should be accounted for in the performance measure category that they are most active in.

- Strategy for the longitudinal tracking of significantly engaged students (\$3,000 or more in direct support and/or 160 or more contact hours) to their ‘first-step’ employment or advanced education beyond the Consortium.

NOTE: If you have a project that encompasses more than one Mission Directorate priority activity, please provide a general narrative of that project in its primary project Mission Directorate section along with a description of how the project relates to the other Mission Directorate(s).

NASA OSTEM Internships and Fellowships (NIF)

The following definitions are representative of the types of direct student awards that NASA’s Office of STEM Engagement offers:

- **NASA-OSTEM 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.
- **Graduate 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. Graduate 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.

NASA-Missouri Space Grant Consortium Scholarships and Internships

- **MOSGC Undergraduate Scholarships** may be academic or research related student aid.
- **MOSGC Internships** may be offered to both graduate and undergraduate students for the purpose of hands-on faculty-mentored research/research training and/or to facilitate curriculum development and pre-college or general public outreach activities.

NOTES:

Internship, Fellowship, and Scholarship projects and opportunities should be described in detail. Identify the STEM disciplines for graduate and undergraduate support. The proposals must clearly demonstrate how directly funded students will be competitively awarded. A description of the recruitment of applicants, student eligibility, and the selection process must be included. This section should clearly identify the number of projected awards and a plan to longitudinally track all directly supported students receiving significant awards. Additionally, it is the policy of the Space Grant Program that the awardee cannot charge management fees nor indirect F&A costs to NASA-OSTEM Internships, Graduate Fellowships, or Undergraduate Scholarships under this Educational Cooperative Agreement. All directly funded participants must be U.S. Citizens.

Engineering Design Team/Scientific Research Group students are generally considered to be directly-participating/indirectly-supported participants, unless they are receiving direct support for this project. Students participating on team/group projects that are also receiving direct support for independent research/research training should be enumerated only with the participants in the category that they are most active in.

Curriculum and Academic Laboratory Development project descriptions should also include the course number and an indication of whether this is a new or revised course. Students that attend the new or revised course are considered to be indirect participants.

Minority Participation

Please collect the following information for all direct participants:

1) Race

- a) African American
- b) Native American/Alaskan Native
- c) Pacific Islander/Hawaiian Native
- d) Asian American
- e) Other

2) Ethnicity

- a) Hispanic
- b) Non-Hispanic

If a participant is both Hispanic and a member of a recognized minority race, please be sure to include them only once for your minority statistics. Also note that NASA does not consider Asian Americans to be a minority population in STEM fields.

Summary of Performance Measures and Targets:

In addition to the qualitative and quantitative metrics and goals included in each project description, please provide a summary of quantifiable performance measures and targets using the FY2021 AAC Performance Measures form.

Budget:

- The budget narrative should contain sufficient project cost detail and supporting information to facilitate a timely evaluation and selection of the award. Matching funds and indirect costs should be sufficiently explained (including amounts and sources) so that evaluators can easily understand the basis of the proposed matching income and expenditures. Dollar amounts proposed with no explanation may reduce proposal acceptability.
- The total amount of funding requested may not exceed \$15,000, including indirect costs.
- The total Consortium sponsored indirect costs may not exceed 11% of the total proposed Consortium sponsored direct cost exclusive of NASA-OSTEM Internships, Fellowships, and Scholarships.
- A one-to-one cost share match is required for all funds excluding NASA-OSTEM Internships, Fellowships, and Scholarships.
- Note that institutional indirect cost waivers on NASA direct funds and indirect costs on direct shared costs may be included as cost share matching funds.
- The following restrictions apply to all Space Grant funds (please see Appendix C for details).
 - 1) Foreign travel requires prior approval from the NASA-OSTEM Program Manager.
 - 2) Direct monetary support may be provided to U.S. citizens only.
 - 3) Funds used to purchase equipment are subject to provisional constraints.
- A project expense by program element budget summary form using the FY2021 MOSGC AAC Proposal Budget spreadsheet is required.

Review and Evaluation

Proposals will be reviewed, evaluated, and selected based upon following criteria:

Ties to NASA: Proposed projects should relate to one or more of the NASA's educational outcomes and current areas of emphasis (please see Appendix A). Proposed research activities should relate to one or more of NASA's Mission Directorates' research areas of interest (please see Appendix B). Projects that establish sustainable collaborations with NASA Field Research Centers and provide cooperative research training opportunities for students are highly desirable.

Diversity: Proposals should make a demonstrable contribution to attracting under-represented minorities, persons with disabilities, and women, to NASA-related careers in science, technology, engineering, and/or mathematics.

Partnerships: The involvement of appropriate local, state, regional, or national partners in the execution and dissemination of the proposed work is desirable. Industry relations that produce an ongoing connection involving undergraduate and graduate student research training, and include significant cost sharing, are of considerable interest.

Overall Merit: The overall merit of the proposal includes the feasibility to achieve the proposed project goals with a high degree of impact with regard to the stated objectives. Program outcomes that justify the total program costs and evidence that the scale of the proposed activity is commensurate with program funding will be used as a primary consideration in project selection.

Project Execution: A plan and structure for efficient operation of the proposed work must be evident.

Budget: An appropriate and realistic budget that demonstrates of the effective use of funds and includes sufficient and effective cost share matching must be given.

Reporting

An annual report providing the outcomes of the funded activities will be required using templates that will be provided. Reports shall include the following information:

- Results and achievements of the initiative(s) as defined by the metrics and expected outcomes stated in the proposal.
- Final financial summary including all income and expenses related to the project.
- Participant information – number, type, and demographics of all participants.

All Consortium supported students are expected to submit a written technical report and present the results of their work at an MOSGC Annual Spring Meeting.

Additional reporting data as required by NASA will be provided as it becomes available.

Proposal Submission

Please submit an electronic version of your proposal in MS Word or converted (not scanned) PDF format, using the filename format “2021 AfAC Proposal for <INSTITUTION ABBREVIATION> - <PI LAST NAME>”, by email attachment to Dr. K. M. Isaac at isaac@mst.edu, with copy to sbhaug@mst.edu, no later than **June 30th, 2021**. Late proposals will not be considered.

Appendix A: NASA Education Strategic Coordination Framework

I. Overview

As identified in the 2006 NASA Strategic Plan, education is one of the Agency's cross-cutting management strategies. High achievement in STEM education is essential to the accomplishment of NASA's mission. NASA contributes to national efforts for achieving excellence in STEM education through a comprehensive education portfolio implemented by the Office of Education, the Mission Directorates, and the NASA Centers. NASA will continue the Agency's tradition of investing in the Nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, exciting, encouraging, and nurturing the young minds of today that will manage and lead the Nation's laboratories and research centers of tomorrow.

The *NASA Education Strategic Coordination Framework: A Portfolio Approach* describes the alignment of NASA's education portfolio with the *2006 NASA Strategic Plan* and creates an agency-wide strategic planning, implementation and evaluation framework for NASA's investments in education. The plan encompasses all education efforts undertaken by NASA and guides the Agency's relationships with external education partners.

This Framework establishes three educational outcomes:

- **Outcome 1 – Higher Education:** Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goal through a portfolio of investments.
- **Outcome 2 – Elementary and Secondary Education:** Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.
- **Outcome 3 – Informal Education:** Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.

NOTE: The Space Grant program's primary investments are to be in Outcome 1, while Outcomes 2 and 3 are secondary and tertiary investments, respectively.

NASA Education Outcomes and Objectives

Outcome 1 Objectives

- **Objective 1.1 – Faculty and Research Support:** Provide NASA competency-building education and research opportunities for faculty, researchers, and post-doctoral fellows.
- **Objective 1.2 -- Student Support:** Provide NASA competency-building education and research opportunities to individuals to develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, industry, and higher education.
- **Objective 1.3 -- Student Involvement, Higher Education:** Provide opportunities for groups of post-secondary students to engage in authentic NASA-related mission-based research and development activities.
- **Objective 1.4 -- Course Development:** Develop NASA-related course resources for integration into STEM disciplines.
- **Objective 1.5 -- Targeted Institution Research and Academic Infrastructure:** Improve the ability of targeted institutions to compete for NASA research and development work.

NOTE: Space Grant Program Elements as related to Outcome 1 include:

- 1) Fellowships & Scholarships**
- 2) Higher Education** (Student Research Internships, Engineering Design Teams, and Scientific Research Groups)
- 3) Research Infrastructure** (Student Research Assistantships and Faculty Support)

Outcome 2 Objectives

- **Objective 2.1 Educator Professional Development—Short Duration:** Provide short duration professional development training opportunities to educators, equipping them with the skills and knowledge to attract and retain students in STEM disciplines.
- **Objective 2.2 Educator Professional Development—Long Duration:** Provide long duration and/or sustained professional development and training opportunities to educators that result in deeper content understanding and/or competence and confidence in teaching STEM disciplines.
- **Objective 2.3 Curricular Support Resources:** Provide curricular support resources that use NASA themes and content to a) enhance student skills and proficiency in STEM disciplines; and/or b) inform students about STEM career opportunities; and/or c) communicate information about NASA’s mission activities.
- **Objective 2.4 Student Involvement K-12:** Provide K-12 students with authentic, firsthand opportunities to participate in NASA mission activities, thus inspiring interest in STEM disciplines and careers; and/or provide opportunities for family involvement in K-12 student learning in STEM areas.

NOTE: The Space Grant Pre-College Program Element is associated with Outcome 2.

Outcome 3 Objectives

- **Objective 3.1 Resources:**
 - 1) Provide informal education support resources that use NASA themes and content to 1) enhance participant skills and proficiency in STEM disciplines; 2) inform participants about STEM career opportunities; 3) communicate information about NASA’s mission activities
 - 2) Develop a significant pool of qualified presenters of NASA aerospace content interacting with a large number of participants.
- **Objective 3.2 Professional Development for Informal Education Providers:**

Provide opportunities to improve the competency and qualifications of STEM informal educators, enabling informal educators to effectively and accurately communicate information about NASA activities and access NASA data for programs and exhibits.
- **Objective 3.3 Informal Education Provider Involvement Opportunities**
- Develop a national pool of qualified informal educators with experience in NASA-mission and related activities.
- Engage informal educators using NASA themes to enable them to 1) enhance participant skills and proficiency in STEM disciplines; 2) inform participants about STEM career opportunities; 3) communication information about NASA’s mission activities.
- Establish and maintain a single informal education network for accessing NASA materials that has the flexibility for Special Interest Groups to function as a subset of the larger network.

NOTE: The Space Grant Informal Education Program Element is associated with Outcome 3.

II. NASA Education Priorities

The *NASA Education Strategic Coordination Framework: A Portfolio Approach* describes the alignment of NASA's education portfolio with the *2006 NASA Strategic Plan* and creates an agency-wide strategic planning, implementation and evaluation framework for NASA's investments in education.

Current Areas of Emphasis

- Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.
- Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines.
- Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.
- Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.
- Aeronautics research – research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen).
- Environmental Science and Global Climate Change – research and activities to better understand Earth's environments.
- Diversity of institutions, faculty, and student participants.
- Enhance the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.

III. 2018 PERFORMANCE GOALS AND ANNUAL PERFORMANCE INDICATORS:

- **Performance Goal 3.3.3** - Provide opportunities for students to engage with NASA's aeronautics, space, and science people, content, and facilities in support of a diverse future NASA and aerospace industry workforce.

- * **Annual Performance Indicator 18-1 (API 18-1):**

Provide significant, direct student awards in higher education to:

- (1) Students across all institutional categories and levels (as defined by the U.S. Department of Education),
- (2) Racially or ethnically underrepresented students,
- (3) Women, and
- (4) Persons with disabilities

at percentages that meet or exceed the national percentages for these populations, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics for a minimum of two of the four categories.

- **Performance Goal 3.3.5** - Provide opportunities for students to contribute to NASA's aeronautics, space, and science missions and work in exploration and discovery.

- * **Annual Performance Indicator 18-5 (API 18-5):** Space Grant, EPSCoR, and MUREP investments will contribute to American technical capability through at least 1,200 paper presentations and peer-reviewed research publications.

Appendix B: Strategic Framework for NASA Research

NASA Mission Directorates

NASA's Mission *to pioneer the future in space exploration, scientific discovery, and aeronautics research*, draws support from four Mission Directorates, each with a specific responsibility.

- The Aeronautics Research Mission Directorate (ARMD) conducts vital research to make air travel more efficient, safe, green, and to uncover leading-edge solutions for the Next Generation Air Transportation System (NextGen) in the United States. ARMD's fundamental research in traditional aeronautical disciplines and emerging disciplines helps address substantial noise, emissions, efficiency, performance and safety challenges that must be met in order to design vehicles that can operate in the NextGen: <http://www.aeronautics.nasa.gov>

- The Human Exploration and Operations Mission Directorate (HEOMD) provides the Agency with leadership and management of NASA space operations related to human exploration in and beyond low-Earth orbit. HEOMD also oversees low-level requirements development, policy, and programmatic oversight. The International Space Station (ISS), currently orbiting the Earth with a crew of six, represents the NASA exploration activities in low-Earth orbit. Exploration activities beyond low Earth orbit include the management of Commercial Space Transportation, Exploration Systems Development, Human Space Flight Capabilities, Advanced Exploration Systems, and Space Life Sciences Research & Applications. The directorate is similarly responsible for Agency leadership and management of NASA space operations related to Launch Services, Space Transportation, and Space Communications in support of both human and robotic exploration programs. Additional information on HEOMD can be found at: <http://www.nasa.gov/directorates/heo/home/index.html>

- The Science Mission Directorate (SMD) leads the Agency in four areas of research: Earth Science, Heliophysics, Planetary Science, and Astrophysics. SMD works closely with the broader scientific community, considers national initiatives, and uses the results of National Research Council studies to define a set of "Big Questions" in each of these four research areas. These questions, in turn, fuel mission priorities and the SMD research agenda. The SMD also sponsors research that both enables, and is enabled by, NASA's exploration activities. SMD has a portfolio of Education and Public Outreach projects that are connected to its research efforts: <http://nasascience.nasa.gov>

- **Space Technology Mission Directorate Research**

Space Technology Mission Directorate (STMD) is responsible for developing the crosscutting, pioneering, new technologies, and capabilities needed by the agency to achieve its current and future missions. 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 take place within NASA Centers, 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 the Space Technology Mission Directorate (STMD) can be found at: http://www.nasa.gov/directorates/spacetech/about_us/index.html

Appendix C: Restrictions on NASA OSTEM Cooperative Agreements

Foreign Travel

Foreign travel shall be related to the goals of National Space Grant College and Fellowship Program. Foreign travel requires prior approval from the National Space Grant Program Manager, and shall not exceed \$5,000 per Consortium 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 Consortium’s Lead Institution’s representative shall submit a post-trip summary report that describes the benefits gained as a result of the trip to the National Space Grant Program Office.

Awards to U.S. Citizens

Space Grant funds may not be used to provide direct monetary support to non-U.S. citizens in the form of student aid, stipends, wages, or reimbursements. The National Program Manager has extended this restriction to apply to cost share funds as well. Note that non-U.S. citizens may benefit from indirect support as direct participants on engineering design teams and in scientific research groups with the use of Space Grant provided materials, supplies, group travel, etc.

Equipment

List all equipment items separately. General-purpose equipment (i.e., personal computers and/or commercial software) valued below \$5,000 must be purchased from the organizational overhead (indirect costs or F&A) and is not allowable as a direct cost unless it can be demonstrated that such items are to be used uniquely and only for the proposed research. Any equipment purchase valued at or above \$5,000 to be made as a direct charge requires prior approval by the NASA Grant Officer. Proposals must include the equipment description, an explanation of how it will be used in the conduct of the research proposed, and a written certification that the equipment will be used exclusively for the proposed research activities and not for any other general business or administrative purposes.