



*National Aeronautics and  
Space Administration*



*Missouri Space Grant Consortium*

**2019 Associates Award Competition**

May 21, 2019

## **NASA-Missouri Space Grant Consortium 2019 Associates Award Competition Announcement**

### **Introduction**

The NASA-Missouri Space Grant Consortium is requesting proposals to extend the Consortium's capabilities and enhance collaborations with Missouri academic institutions that are not permanent members. The MOSGC expects to award a total of approximately \$70,000 under this solicitation for proposals with anticipated funding levels ranging from \$7,500 to \$15,000 per proposal. Proposals for lesser amounts will be considered. Note that, excluding 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 accredited academic institutions and informal education providers in Missouri that are not permanent Affiliates of the Consortium.

### **Pertinent Dates**

Date of Announcement: May 21, 2019

**Proposal Due Date: July 1, 2019**

### **Anticipated Period of Performance**

August 15, 2019 – April 30, 2020

### **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 2015-2017 Areas of Emphasis:

1. 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.
2. 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.
3. Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.
4. Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.
5. 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).
6. Environmental Science and Global Climate Change – research and activities to better understand Earth's environments.
7. Diversity of institutions, faculty, and students.
8. Enhance the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.

### **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 an optional 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 name of the proposing institution along with the names, addresses, telephone numbers, and e-mail addresses of the principal investigators.

#### **Body of Proposal:**

The following items should be included in the description for each proposed project grouped according to their respective program elements:

- A brief summary of the general scope of the project; including how it ties to the NASA's specific educational outcomes and current areas of emphasis as prescribed in Appendix A. Note that proposed research activities should relate to one or more of NASA's Mission Directorates' research areas of interest as indicated in Appendix B.
- The qualitative and quantitative metrics used to measure the success of the project along with the project goals and anticipated outcomes.

- The number of each type of project participant (undergrad, grad, K-12 students, faculty advisors, K-12 teachers, technical/clerical staff, general public, etc.) along with female and minority participation targets. Please note that if any participant is involved in more than one project they may only be counted once. These participants should be accounted for in the project that they are most active in; or if directly supported, in the project that they receive the most compensation for.

Notes regarding project participant details within each program element:

#### Fellowships and Scholarships

Graduate Fellowship and Undergraduate Scholarship recipients are primarily involved with performing faculty mentored independent research. Project descriptions for independent student research activities do not need to be extensive, simply list the anticipated research topics with short descriptions.

#### Research Infrastructure

Graduate and undergraduate Research Assistants are primarily involved with the set-up and maintenance of research laboratory infrastructure. Project descriptions for student research infrastructure activities do not need to be extensive, simply list the anticipated research infrastructure topics with short descriptions.

#### Higher Education

Graduate and undergraduate Internships are primarily involved with performing faculty mentored independent research, curriculum development, and Pre-College/Informal Education outreach activities. Project descriptions for independent student research activities do not need to be extensive, simply list the anticipated research/academic topics with short descriptions.

Engineering Design Team/Scientific Research Group students are generally considered to be directly-participating/indirectly-supported participants. Students participating on team/group projects that are also receiving direct support should be enumerated with the participants in the program element that they receive the most compensation for only.

Curriculum and Academic Laboratory Development project descriptions should also include the course name and number and an indication as to whether this is a new or revised course.

#### Pre-College Education

Note that NASA continues its emphasis on teacher-oriented K-12 projects, primarily at the middle-school level (please see Area of Emphasis 2) above).

#### Informal Education

Direct participants are considered to be those that are involved in hands-on types of activities. Indirect participants are those that participate as in-person lecture audience or demonstration observers, or remotely as en-masse media audiences such as radio/television broadcasts, etc.

**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 2019 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 Fellowships and Scholarships.
- A one-to-one cost share match is required for all funds excluding 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 National Program Manager.
  - 2) Direct monetary support may be provided to U.S. citizens only.
  - 3) Funds may not be used to purchase equipment or acquire/construct facilities.
- A project expense by program element budget summary form using the FY 2019 MOSGC AAC Proposal Budget spreadsheet is required.

## **Review and Evaluation**

Proposals will be reviewed and evaluated by members of the NASA-Missouri Space Grant Consortium Executive Board. The following criteria shall be used in the evaluation process:

**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**

Award recipients will be expected to present brief report describing the status of their funded activities at the following MOSGC Annual Spring Executive Board Meeting. A final written report describing the outcomes of the funded activities will be required. Reports must 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 “2019 AAC Proposal for <INSTITUTION ABBREVIATION> - <PI LAST NAME>”, by email attachment to Dr. S. N. Balakrishnan at [bala@mst.edu](mailto:bala@mst.edu), with copy to [sbhaug@mst.edu](mailto:sbhaug@mst.edu), no later than **July 1, 2019**. 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.

### II. 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.**

### **III. 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.

## 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 Exploration Systems Mission Directorate (ESMD) Agency role is to develop a sustained human presence on the moon; to promote exploration, commerce, and U.S. preeminence in space; and to serve as a stepping-stone for the future exploration of Mars and other destinations. ESMD establishes the NASA exploration research and technology development agenda. Specifically, ESMD develops capabilities and supporting research and technology that will enable sustained and affordable human and robotic exploration. It also works to ensure the health and performance of crews during long-duration space exploration. In the near-term, ESMD does this by developing robotic precursor missions, human transportation elements, and life-support systems. (<http://www.exploration.nasa.gov>)
- 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>)
- The Space Operations Mission Directorate (SOMD) provides the Agency with leadership and management of NASA space operations related to human exploration in and beyond low- Earth orbit. SOMD enables current space exploration in low earth orbit through its Space Shuttle and International Space Station Programs. SOMD is also 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. (<http://www.spaceoperations.nasa.gov>)

## Appendix C: Restrictions on NASA Training Grants

National Space Grant College and Fellowship funding is administered through a NASA Training Grant as is subject to the following restrictions.

### Foreign Travel

All foreign travel must be Space Grant-related, requires prior approval from the National Space Grant Program Manager, and cannot exceed \$1,000/year per Consortium. "Space Grant" should be included in all foreign travel related verbal and written acknowledgments when making presentations and writing reports and publications. In addition, a post-trip report must be submitted to the Space Grant office describing the benefits gained as a result of the trip. Requested foreign travel should include justification, purpose, the number of trips and expected locations, duration of each trip, airfare, and per diem.

The following restrictions exist on the use of the Space Grant funds according to NASA Grants and Cooperative Agreements Handbook Part A, § 1260.12 Choice of Award Instrument, (3) Training Grant: [http://prod.nais.nasa.gov/pub/pub\\_library/granta.html#126012](http://prod.nais.nasa.gov/pub/pub_library/granta.html#126012)

### Awards to U.S. Citizens

*§ 1260.12 (3) (iii) Students and faculty receiving direct support under a NASA training grant must be U.S. citizens, except for those supported by the NASA Earth and Space Science Fellowship Program, the NASA Earth System Science Fellowship Program, the Graduate Student Fellowship in Global Change Research Program, and the GLOBE Program.*

This means that Space Grant funds may not be used to provide direct monetary support to non-U.S. citizens in the form of stipends, wages, student aid, 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

*§ 1260.12 (3) (vi) The use of training grant funds to acquire equipment, or to acquire or construct facilities will not be permitted. Government furnished equipment will not be provided.*

Note that while this document defines equipment to be any item with a unit cost of \$5,000 or more, the National Space Grant Program Manager has further restricted this to mean that the purchase of components for a completed unit may not exceed \$5,000. However, consumable supplies may be purchased with Space Grant funds for use in conjunction with permanent equipment. Items valued under \$5,000 are classified as "materials and supplies", unless the recipient's institution has established a lower threshold. Please refer to your institution's policies and guidelines for a potentially more restrictive definition of equipment.