The
National
Aeronautics
and
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Administration

National Space Grant College and Fellowship Program

Exploration Systems Mission Directorate Higher Education

2010 Announcement

November 4, 2009

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I. Introduction

The Exploration Systems Mission Directorate (ESMD) solicits competitive proposals for a higher education opportunity to provide ESMD-relevant education and training projects for the students and faculty throughout the nation. We invite Space Grant Consortia to submit proposals that demonstrate an integration of ESMD challenges and content into the proposed project. Under this solicitation NASA expects to award up to $600,000 for fiscal year 2010 with options for two additional years subject to performance and the availability of appropriations. Each Space Grant Consortium proposal will address the following opportunities individually: student, faculty, and innovative. See Section V for details on each opportunity. For all opportunities, matching funds are encouraged, and not required. NASA reserves the right to partially fund projects, limit the number of projects funded, and limit the funding level below the allocated amount. The following table provides the projected total investment for the three opportunities for 2010, but since awards will be made competitively, does not necessarily reflect the actual award totals that will be made.

Opportunity	Projected Investment	Estimated Range per Proposal	Expected Number of Awards
Student	$300,000	$20K - $70K	10-15
Faculty	$100,000	$10K - $35K	5-10
Innovative	$200,000	$50K - $150K	2-3

II. Pertinent Dates

Date of Announcement: **November 4, 2009**

Proposal Due Date: **January 25, 2010, 5 p.m. Pacific Time**

III. Eligibility Requirements

Proposals will be accepted from the lead institutions of the 52 Consortia of the National Space Grant College and Fellowship Program.

IV. Background and Purpose

The Exploration Systems Mission Directorate (ESMD) is dedicated to creating a constellation of new capabilities, supporting technologies and foundational research that enables sustained and affordable human and robotic exploration.

NASA delivers a comprehensive Agency education portfolio, implemented by the Office of Education, the Mission Directorates, and the NASA Field Centers. Through the portfolio, NASA contributes to our Nation's efforts in achieving excellence in science, technology, engineering and math (STEM) education. Three outcomes serve to align all Agency education activities. This announcement maps to Outcome 1: Contributing to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals.

Through this solicitation, NASA offers Space Grant Consortia opportunities to involve students (graduate and undergraduate) and faculty in opportunities for relevant hands-on training. NASA expects that participants will fully represent our Nation's vibrant and rich diversity and be fully engaged in the U.S. Space Exploration Policy.

The purpose of the ESMD Higher Education Grants is to train and develop the highly skilled scientific, engineering, and technical workforce of the future needed to implement the U.S. Space Exploration Policy. Through this solicitation, proposals should provide opportunities to involve a diverse group of students (graduate and undergraduate) in substantive, hands-on, engineering experiences to prepare them for future careers in the space industry, and opportunities to prepare a diverse group of faculty to enable their students to complete senior design projects with potential contribution to NASA ESMD objectives.

The following are areas critical to the future of space exploration. These are the design, engineering, and research areas that we will consider ESMD-relevant when we review your proposals:

> **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.
>
> **Lunar and Planetary Surface Systems**- Precision landing hardware, software, in-situ resource utilization (ISRU), navigation systems, extended surface operations, robotics, (specifically environmental scouting prior to human arrival, outpost maintenance with and without humans present, and assist astronaut with geologic exploration) environmental analysis, radiation protection, spacesuits, life support, power systems.
>
> **Ground Operations-** Pre-launch, launch, mission operations, command and control software systems, communications, landing and recovery.

V. Exploration Systems Higher Education Grants

Each proposal shall explicitly state which opportunities are being proposed (student, faculty, and/or innovative). The proposal must contain a comprehensive description of how successful implementation of each of the opportunities being proposed will be achieved.   Evidence must be provided of how the specific opportunity implementation addresses a compelling need for the Space Grant Consortium as well as the benefit the opportunity will provide the Space Grant Consortium, NASA, and ESMD.

A. Student Opportunities –

1. Senior Design Project: Integrate ESMD-provided mission challenges into university senior engineering design courses. ESMD-related design projects have been identified and are available at http://education.ksc.nasa.gov/ESMDspacegrant/Sr_Design.htm. Funds can be used to support student senior engineering design projects (e.g. to buy materials, build prototypes, etc.) or to bring in subject matter experts (non-civil servants) to consult with the class. The course must meet the quality standards of an ABET-accredited program. The Space Grant Consortium will provide NASA with information on students including name, school and project in semi-annual reports. The intent is to launch the program in time for the 2010-11 academic year.

2. Industry Internship: Provide students ESMD-relevant work experience in the commercial space industry. Placement within industry is of vital importance to the exploration vision. Students should be engaged in hands-on engineering projects with a strong, technically competent, and involved mentor. Internships are open to undergraduate students with 30 or more credit hours and graduate students. Internships can be short duration, full-time (e.g., 10-16 weeks) or longer duration, part-time (full academic year) placement. We encourage the Space Grant Consortium to partner with an industry within the region. There is a list of additional industry partners at http://secureworkgroups.grc.nasa.gov/esmd-space-grant?go=226442. The Space Grant Consortium will provide NASA information on selected interns including name, school, placement location, and project in semi-annual reports. Interns will be required to provide an end of internship exit survey. The intent is to launch the program in time for the 2010-11 academic year.

3. Create Your Own: Propose the implementation of a student opportunity that provides ESMD-relevant education and training that addresses specific needs for the Space Grant Consortium. The proposal must provide a detailed description of the student opportunity and evidence of how it addresses the Space Grant Consortium needs.

B. Faculty Opportunities –

    1. <u>Senior Design Course Implementation</u>: Implementation of an ESMD Senior Design Course. The courses are available for download from the following website: http://education.ksc.nasa.gov/ESMDspacegrant/CoursesIndex.htm. These courses meet the quality standards of an ABET-accredited program and have been pilot tested. The intent is to launch the program in time for the 2010-11 academic year.

    2. <u>Create Your Own:</u> Propose the implementation of a faculty opportunity that provides ESMD-relevant education and training that addresses specific needs for the Space Grant Consortium. The proposal must provide a detailed description of the faculty opportunity and evidence of how it addresses the Space Grant Consortium needs.

C. <u>Innovative Opportunity</u> –

Propose the implementation of an innovative project to introduce disciplines or promote opportunities for underserved and underrepresented students in STEM. The project must demonstrate meeting a compelling need of the state or region while focusing on NASA and ESMD goals. The project must offer unique methods, approaches, and concepts to address one or more of the Performance Assessment Rating Tool (PART) measurements defined in the Appendix. The project shall not duplicate any existing NASA education project. A listing of all current NASA education projects can be found at: http://www.nasa.gov/offices/education/programs/descriptions/All_Alpha.html.

Collaborative opportunities for students and faculty at Minority Serving Institutions (MSI), other Space Grant Consortia and organizations that support MSIs and underserved/underrepresented students are highly encouraged. MSIs include the Department of Education designated Historically Black College or University (HBCU), Hispanic Serving Institution (HSI), Tribal College or University (TCU), or MSIs that offer degrees in STEM disciplines. Please check http://www.ed.gov/about/offices/list/ocr/edlite-minorityinst.html for a complete listing of the minority institutions.

VI. Reporting and Supplemental Program Information

In the semi-annual status reports, each Space Grant Consortium shall provide a summary of participant names, participant email addresses, participant demographics, number of underrepresented and underserved students participating, project summary and status, media coverage, participant feedback, and lessons learned. The format for this report is available at https://secureworkgroups.grc.nasa.gov. Reporting will migrate to the NASA Office Education Performance Measurements (OEPM) when the system becomes available.

The Education Programs and University Research Division at Kennedy Space Center will manage this grant. Gloria Murphy will be the point of contact for day-to-day communications and reporting:

> Gloria Murphy
> ESMD SG Project Manager
> Phone: (321) 867-8934
> E-mail: Gloria.A.Murphy@nasa.gov

The NASA Grants and Cooperative Agreements Handbook, Sections A and B, located at http://prod.nais.nasa.gov/portals/pl/index.html, provides additional information on uniform administrative requirements for grants and cooperative agreements with institutions of higher education. The Space Grant Consortium must comply with all of the same rules and regulations as any other Space Grant Consortium agreement even if not stated here.

VII. Proposal Format and Content

Proposals should not exceed 20 pages and be single-spaced on standard 8 ½ x11 paper, no smaller than 12 point font and with one inch margins throughout. Proposals should be prepared in the following format:

   A. Title Page (1 page maximum) - include the name of the Consortium and the name, address, phone/fax numbers, e-mail and original signature of the director.

   B. Body of Proposal (19 pages maximum)

   1. **Executive Summary of Proposal (1 page maximum)**
   2. **Student Opportunity (6 pages maximum) – for each student opportunity being proposed provide the following information. State "no student opportunity being proposed" for this section if none is proposed.**

      a) Project Description **–** Define project goals and apply Specific, Measurable, Appropriate, Realistic, Time Specific (SMART) objectives. Describe the project, implementation strategies and assessment criteria.
      b) Management Plan – Identify roles and responsibilities of team members involved in the development and execution of proposed activity.
      c) Selection Plan **–** Describe recruitment methods and award process that will be used to select student participants to ensure involvement of a broad range of Consortium affiliates and to attract and stimulate a

cross-section of highly qualified individuals from an array of institutions.

d) <u>Participants</u> **–** Include anticipated number of project participants (students)

e) <u>Collaborations and Partnerships</u> **–** Identify collaborations and partnerships with industry, government, and academia that will be established through this opportunity. Partnerships must be confirmed prior to submitting the proposal. A signed letter of support from the partner must be provided in the proposal under Appendix A.

f) <u>Assessment Plan</u> **–** Include your evaluation approach (quantitative metrics and expected qualitative outcomes) and potential impacts.

g) <u>Other Resources</u> **–** Include leveraging opportunities, unique capabilities, matching funds, and in-kind support.

h) <u>Schedule</u> – One-page overview of the proposed schedule should include achievement milestones, expected dates of tangible outcomes and semi-annual reports to NASA.

i) <u>Budget</u> **–** Budget should contain sufficient supporting information to facilitate a speedy evaluation and award for this opportunity. This section should include separate budgets for Years One, Two, and Three and a Summary Budget for all three years. Administration costs up to 10% of the project are permitted.

3. **Faculty Opportunity (6 pages maximum) – for each faculty opportunity being proposed provide the following information. State "no faculty opportunity being proposed" for this section if none is proposed.**

a) <u>Project Description</u> **–** Define project goals and apply Specific, Measurable, Appropriate, Realistic, Time Specific (SMART) objectives. Describe the project, implementation strategies and assessment criteria.

b) <u>Management Plan</u> – Identify roles and responsibilities of team members involved in the development and execution of proposed activity.

c) <u>Selection Plan</u> **–** Describe recruitment methods and award process that will be used to select faculty participants to ensure involvement of a broad range of Consortium affiliates and to attract and stimulate a cross-section of highly qualified individuals from an array of institutions.

d) <u>Participants</u> **–** Include anticipated number of project participants (faculty and students)

e) <u>Collaborations and Partnerships</u> **–** Identify collaborations and partnerships with industry, government, and academia that will be established through this opportunity. Partnerships must be confirmed prior to submitting the proposal. A signed letter of support from the partner must be provided in the proposal under Appendix A.

f) <u>Assessment Plan</u> **–** Include your evaluation approach (quantitative metrics and expected qualitative outcomes) and potential impacts.

g) <u>Other Resources</u> **–** Include leveraging opportunities, unique capabilities, matching funds, and in-kind support.

h) <u>Schedule</u> – One-page overview of the proposed schedule should include achievement milestones, expected dates of tangible outcomes and semi-annual reports to NASA.

i) <u>Budget</u> **–** Budget should contain sufficient supporting information to facilitate a speedy evaluation and award for this opportunity. This section should include separate budgets for Years One, Two, and Three and a Summary Budget for all three years. Administration costs up to 10% of the project are permitted.

4. **Innovative Opportunity (6 pages maximum) – To propose for this opportunity, provide the following information. State "no innovative opportunity being proposed" for this section if none is proposed.**

a) <u>Project Description</u> **–** Define project goals and apply Specific, Measurable, Appropriate, Realistic, Time Specific (SMART) objectives. Describe the project, implementation strategies and assessment criteria. Include the compelling state or regional need being addressed.

b) <u>Management Plan</u> – Identify roles and responsibilities of team members involved in the development and execution of proposed activity.

c) <u>Selection Plan</u> **–** Describe recruitment methods and award process that will be used to select participants (students and/or faculty) to attract and stimulate a cross-section of highly qualified individuals from targeted institutions.

d) <u>Participants</u> **–** Include anticipated number of project participants (students, faculty)

e) <u>Collaborations and Partnerships</u> **–** Identify collaborations and partnerships with industry, government, and academia that will be established through this opportunity. Partnerships must be confirmed prior to submitting the proposal. A signed letter of support from the partner must be provided in the proposal under Appendix A.

f) <u>Assessment Plan</u> **–** Include your evaluation approach (quantitative metrics and expected qualitative outcomes) and potential impacts. Indicate to which PART measure the activity contributes.

g) <u>Other Resources</u> **–** Include leveraging opportunities, unique capabilities, matching funds, and in-kind support.

h) <u>Schedule</u> – One-page overview of the proposed schedule should include achievement milestones, expected dates of tangible outcomes and semi-annual reports to NASA.

i) <u>Budget</u> **–** Budget should contain sufficient supporting information to facilitate a speedy evaluation and award for this opportunity. This

section should include separate budgets for Years One, Two, and Three and a Summary Budget for all three years. Administration costs up to 10% of the project are permitted.

C. Appendix A – Partnership Support Letters (not included in the page count) - Partnerships with industry, government and academia must be confirmed prior to submitting the proposal. A signed letter of support from the partner is required in the proposal.

D. Appendix B – NASA Point of Contact (POC) Statement of Commitment (not included in the page count) – For opportunities involving NASA center technical points of contact, a statement of commitment from the NASA POC, indicating their intent to participate, is required to be provided in the proposal.

VIII. Proposal Evaluation Criteria

NASA reserves the right to partially fund proposals. Each opportunity within each proposal will be evaluated and awarded on its own merit. A Consortium may be awarded for any combination of opportunities in their proposal. The following criteria will be used in the evaluation process:

A. Overall Merit
1. Comprehensive educational benefit of proposed opportunity
2. Demonstrate alignment with ESMD objectives
3. Partnerships/linkages to industry, government, and academia to support the project objectives
4. Identification of useful benefits to NASA
5. Ingenuity of innovative ideas
6. Contribution to the PART measures
7. Management Plan

B. Contribution to NASA Workforce Development
1. Content- Ability to connect students with meaningful hands-on ESMD-relevant experiences.
2. Continuity- Participants drawn from audiences that have already demonstrated interest in NASA and connect participants to the next level of engagement. Efforts promulgate linkages to subsequent STEM-related activities for the participant to ensure continued engagement.
3. Training- Projects provide skills for scientific, engineering, and technical workforce of the future needed to implement the U.S. Space Exploration Policy.
4. Diversity- A demonstrable effort is made to attract a diverse group of students and faculty member participants, including underserved and underrepresented individuals; where appropriate, the projects promote opportunities for students and faculty at minority serving institutions.

     5. <u>Evaluation</u>- Use of appropriate quantitative metrics and qualitative outcomes.

C. Budget
     1. <u>Requirements</u>- Adequate, appropriate, reasonable, and realistic and separate budget for each opportunity.
     2. <u>Resources</u>- Ability to leverage opportunities and define unique capabilities.
     3. <u>Travel</u>- Include faculty and student travel expenses as applicable.
     4. <u>Administrative Costs</u>- Limited to 10% of total budget.

IX. Proposal Submission

Signed electronic copies of proposals must be received no later than: **5 p.m. Pacific Time, January 25, 2010**. The proposal must be submitted online at http://secureworkgroups.grc.nasa.gov/esmd-space-grant?go=379149. Membership at that site is required to submit the proposal. The proposal may be saved as a draft before the final submission. Full details and instructions, as well as a copy of this solicitation are available at that site.

A series of telecons will be scheduled to answer specific questions. FAQ's will be posted often on PBMA and it is the responsibility of the Space Grant Consortium to check for updates. Applicants will be advised by electronic mail when selections are made. Announcement of awardees will be in April 2010. Awards will be new grants in 2010 processed by the NASA Shared Service Center (NSSC) and managed by KSC.

Appendix A - NASA Performance Assessment and Rating Tool (PART)

Outcome 1 of the NASA Education portfolio includes six NASA Performance Assessment and Rating Tool (PART) higher education metrics. This announcement is intended to focus on projects specifically designed to contribute to these measures:

    A. Number of new or revised courses targeted at STEM skills needed by NASA that are developed with NASA support.
    B. Number of institutions served in designated EPSCoR states.
    C. Number of underrepresented and underserved students participating in NASA education programs.
    D. Percentage of student participants employed by NASA, aerospace contractors, universities, & other educational institutions.
    E. Percentage of undergraduate students who move on to advanced education in NASA related disciplines.
    F. Percentage of higher education program participants who have participated in NASA elementary or secondary programs.