

NSF GRADUATE STEM FELLOWS IN K-12 EDUCATION (GK-12)

PROGRAM SOLICITATION NSF 09-549

REPLACES DOCUMENT(S):
NSF 08-556



National Science Foundation

Directorate for Education & Human Resources
Division of Graduate Education

Directorate for Biological Sciences

Directorate for Computer & Information Science & Engineering

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

Office of Polar Programs

Office of International Science and Engineering

Office of Cyberinfrastructure

Letter of Intent Due Date(s) (required) (due by 5 p.m. proposer's local time):

May 19, 2009

April 20, 2010

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

June 29, 2009

June 03, 2010

REVISION NOTES

The following changes have been made to the solicitation.

1. The program title has been modified to: NSF Graduate STEM Fellows in K-12 Education (GK-12), to better reflect program goals. The GK-12 acronym will remain unchanged.
2. Text has been edited to clarify program goals and outcomes in Synopsis of Program.
3. A change has been made to Indirect Cost (F&A) Limitations: The Indirect Cost (F&A) Limitation is 8% of total direct costs, excluding participant support and equipment.
4. Text has been edited in Introduction and Program Description to reflect the changes in Synopsis of Program.
5. Teacher stipend has been increased to \$5000 per year.
6. Text has been added to further clarify the lead PI's qualifications: Faculty members whose primary research is on science education (e.g. physics education, technology education, mathematics education, engineering education, etc.) are not eligible to serve as the lead PI.
7. Text has been added and/or edited to help clarify proposal preparation:
 - Results from Prior NSF Support: Wording was added to clarify the need to specify "the outcomes, lessons learned, best practices and sustainability efforts of prior projects" for "institutions that received prior GK-12 funding".
 - Project Plan: minor edits have been made to further clarify the requirements for the project plan. In particular,
 - Wording was added to expand on "how fellows will be prepared for all the activities involved in the project, particularly on the capabilities and skills of communicating STEM subjects to technical and non-technical

audiences, leadership, team building, and teaching. Clearly state what the fellows will be doing, how they will be trained to acquire the needed skills and what the anticipated outcomes and measures of success will be."

- Wording was added to clarify the inclusion of international activities: "For projects that involve international research collaborations, an additional 2-page section may be included in the Project Description. The PI should describe the procedures and arrangements for selecting, preparing, and sending Fellows and/or teachers to international research sites. Explain the nature and goals of the research collaboration, the expertise and resources to be made available by the international partner(s), and the expected benefit to the U.S. participants' research and professional development. The international collaboration may include the ways in which the international experience will be integrated into and enhance the overall GK-12 project, including K-12 classroom activities. Address the practical aspects of sending U.S. participants abroad, including logistical arrangements and language and cultural issues."
 - Budget
 - The evaluation cost has been reduced from "up to 5% of the total amount requested per year" to "up to 2.5 % of total direct cost over five years" in order to encourage the coordination of evaluation efforts of existing projects and to take advantage of the evaluation instruments developed by the GK-12 community.
 - Wording was added to the Budget Justification to clarify additional funds requested for international activities: "Describe in a separate table the requested amount and allocations over the project duration."
8. The "Additional Review Criteria" are clustered by "Intellectual Relevance of Research Theme", "Effectiveness of Selection, Training, and Preparation of Fellows", "Readiness and Sustainability of Partnership", "Sustainability and Feasibility of Evaluation", and "Impact on Graduate Education," to facilitate proposal preparation and subsequent review. A review criterion has also been added for those projects that choose to include an international component: "Quality of the international collaborative activities, benefits to the U.S. participants, and relevance of the international experience to the overall GK-12 project."
9. Information concerning the Communicating Research to Public Audiences (CPRA) program has been added.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

NSF GRADUATE STEM FELLOWS IN K-12 EDUCATION (GK-12)

Synopsis of Program:

This program provides funding for graduate students in NSF-supported science, technology, engineering, and mathematics (STEM) disciplines to bring their leading research practice and findings into K-12 learning settings. Through collaborations with other graduate fellows and faculty from STEM disciplines, teachers and students in K-12 environments, and community partners, graduate students can gain a deeper understanding of their own research and place it within a societal and global context. The GK-12 program provides an opportunity for graduate students to acquire value-added skills, such as communicating STEM subjects to technical and non-technical audiences, leadership, team building, and teaching while enriching STEM learning and instruction in K-12 settings. This unique experience will add value to the training of U.S. graduate students and will energize and prepare the students for a broad range of STEM careers in a competitive globalized marketplace. Furthermore, the GK-12 program provides institutions of higher education with an opportunity to transform the conventional graduate education by infusing and sustaining GK-12 like activities in their graduate programs.

Expected outcomes include:

1. For graduate fellows

Enhanced understanding of their own research subject area, and its societal and global contexts; improved communication skills of STEM subjects with technical and non-technical audiences, leadership, team building, and teaching capabilities.

2. For K-12 education

Professional development opportunities for teachers in both STEM content and pedagogy; and enhanced learning and STEM career interest for students.

3. For institutions of higher education

Transformation of graduate programs; strengthened and sustained partnerships with local school districts, industry, non-profit sector, etc.; and enhanced institutional impact of graduate education to society.

Cognizant Program Officer(s):

- Sonia Ortega, Program Director, Division of Graduate Education, Directorate for Education and Human Resources, telephone: (703) 292-8697, fax: (703) 292-9048, email: sortega@nsf.gov
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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.078 --- Office of Polar Programs
- 47.079 --- Office of International Science and Engineering
- 47.080 --- Office of Cyberinfrastructure

Award Information

Anticipated Type of Award: Continuing Grant

Estimated Number of Awards: 20 to 25 The number of awards will vary depending upon the scope of projects and availability of funds. It is anticipated that approximately 20-25 new awards will be made, depending upon the quality of proposals and availability of funds. The size for the new projects will be for up to \$600,000 per year for 5 years.

Anticipated Funding Amount: \$15,000,000 Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- Academic institutions in the United States and its territories that grant masters or doctoral degrees in STEM disciplines supported by the National Science Foundation.

PI Limit:

The lead Principal Investigator (PI) must be a STEM discipline faculty member actively conducting STEM research at the lead institution.

Faculty members whose primary research is on science education (e.g. physics education, technology education, mathematics education, engineering education, etc.) are not eligible to serve as the lead PI.

Limit on Number of Proposals per Organization: 1

One proposal per institution. Institutions having an active or past GK-12 project are eligible to submit a new proposal, but they must coordinate evaluation efforts of any projects located on the same campus or working with the same school districts. They must also specify the outcomes, lessons learned, best practices, and sustainability efforts of prior projects. Renewal proposals will not be accepted.

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:**
Partial reimbursement of indirect costs not to exceed 8% of total direct costs, excluding participant support and equipment.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):
May 19, 2009
April 20, 2010
- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

June 29, 2009

June 03, 2010

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The National Science Foundation (NSF) recognizes that graduate students in science, technology, engineering and mathematics (STEM) must be prepared with the necessary skills to face the career challenges of the 21st century. In addition to research competencies, STEM graduate students must be able to communicate their research findings not only to other STEM professionals but also to the general public. NSF also recognizes that STEM graduate students can contribute to the national effort to advance STEM knowledge in K-12 learning settings through partnerships between institutions of higher education and K-12 schools. These partnerships offer graduate students an opportunity to bring leading-edge research practices and findings to K-12 learning settings. Graduate students are role models to K-12 students and help stimulate their interest in STEM disciplines. To support these opportunities, NSF offers the Graduate STEM Fellows in K-12 Education (GK-12) program (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5472&from=fund)

Through the GK-12 program, institutions of higher education have an opportunity to make a permanent change in STEM graduate education programs by developing and sustaining strong partnerships with K-12 schools.

GK-12 is one of three major fellowship/traineeship programs offered and managed by NSF's Division of Graduate Education (DGE) in the Directorate for Education and Human Resources (EHR). GK-12 is an NSF-wide activity supported by the Directorates for Education and Human Resources (EHR), Biological Sciences (BIO), Computer and Information Science and Engineering (CISE), Engineering (ENG), Geosciences (GEO), Mathematical and Physical Sciences (MPS), Social, Behavioral and Economic Sciences (SBE), the Office of Polar Programs (OPP), the Office of International Science and Engineering (OISE), and the Office of Cyberinfrastructure (OCI). Information concerning program and project activities can be found on the American Association for the Advancement of Science (AAAS) GK-12 website (<http://www.gk12.org>).

II. PROGRAM DESCRIPTION

The objectives of the GK-12 program are: 1) to support highly qualified U.S. graduate students in NSF-supported STEM disciplines through fellowships to provide them with an opportunity to gain a deeper understanding of their own research, its societal and global contexts, and acquire value-added skills (such as communicating STEM subjects to technical and non-technical audiences, leadership, team building, and teaching) that normally are not emphasized in a more traditional STEM graduate program, and to broaden their options for STEM careers in a competitive global marketplace; 2) to enrich STEM learning and instruction in K-12 settings through strong partnerships with institutions of higher education to bring the excitement and the results of leading STEM research practice and findings to K-12 settings; and 3) to provide institutions of higher education with an opportunity to make a permanent change in their graduate programs by incorporating GK-12 like activities in the training of their STEM graduate students.

Expected outcomes include:

1. For graduate fellows

Enhanced understanding of their own research subject area, and its societal and global contexts; improved communication skills of STEM subjects with technical and non-technical audiences, leadership, team building, and teaching capabilities.

2. For K-12 education

Professional development opportunities for teachers in both STEM content and pedagogy; and enhanced learning and STEM career interest for students.

3. For institutions of higher education

Transformation of graduate programs; strengthened and sustained partnerships with local school districts, industry, and non-profit sector, etc.; enhanced institutional impact of graduate education to society.

In essence, fellows will bring their STEM research practice and findings to K-12 learning settings so that teachers and K-12 students are more directly exposed to what science and engineering is all about, how it is done, how discoveries happen and what STEM professionals do. For example, GK-12 fellows from STEM disciplines, selected by awardee institutions, may work directly with K-12 teachers to integrate current scientific research practice and findings in the teaching and learning of STEM disciplines; act as role models to K-12 students and help stimulate their interest in future STEM careers; enhance K-12 teachers' STEM content knowledge and pedagogy; and jointly design and deliver K-12 STEM instruction.

The GK-12 program is an opportunity to create changes both in institutions of higher education and in K-12 schools through their strong partnerships. PIs from STEM disciplines, university and school administrators, K-12 teachers and other STEM faculty may work together in the development of the GK-12 proposal. It is important that the fellows' major research advisors will be supportive of fellows' activities in K-12 settings. PIs may also involve education faculty in the proposal development process. It is strongly recommended that a partnership among all potential parties involved in the proposed project be developed early. For example, PIs and school administrators are encouraged to discuss such issues as the types of incentives and resources necessary to support participation of teachers in GK-12 projects and the projects that will best serve the needs of the participating teachers and schools, especially those serving students from underrepresented groups.

The GK-12 program offers opportunities to PIs to include a cyberinfrastructure component in their proposals (see *Revolutionizing Science and Engineering Through Cyberinfrastructure: Report of the National Science Foundation Blue Ribbon Advisory Panel on Cyberinfrastructure*, <http://www.nsf.gov/od/oci/reports/toc.jsp>). For example, PIs may incorporate their fellows' cyberinfrastructure research activities and tools, such as those involving high performance computing, digital data collection and observation tools, advanced data curation and visualization technologies, and virtual interaction and collaboration, to support learning, discovery, and broadening participation in K-12 schools.

The GK-12 program encourages PIs to involve fellows and teachers in international research collaborations as part of their new proposals. In addition, the program will continue to offer supplementary funding to currently active awards for international research activities. PIs should contact GK-12 program officers and also NSF's Office of International Science and Engineering (OISE) staff with expertise in the country or region of interest for information and guidance about establishing international collaborations. (Contacts for cognizant program manager(s) are available from the OISE Home Page, <http://www.nsf.gov/div/index.jsp?div=OISE>.)

III. AWARD INFORMATION

A. Number and Size of Awards

The number of awards will vary depending upon the scope of projects and availability of funds. It is anticipated that approximately 20-25 new awards will be made, depending upon the quality of proposals and availability of funds. The size for the new projects will be for up to \$600,000 per year for 5 years.

If proposed, additional funding up to a total of \$100,000 PER AWARD may also be provided for GK-12 projects that include international activities. These activities should be designed to significantly enhance the research and training experiences of the Fellows.

The anticipated funding amount in FY2010 is \$ 15,000,000, pending availability of funds.

B. Stipends and Allowances

The stipend for a graduate student will be \$30,000 over a 12-month tenure. NSF also provides a cost-of-education allowance for tuition, health insurance, and normal fees of \$10,500 per year per student (for 12 months). If this allowance is not fully required, then it may be used to support other GK-12 related activities, such as professional development training for fellows. All fellows will spend a maximum of fifteen hours per week directly involved in GK-12 projects. It is recommended that fellows spend ten of the fifteen hours in a physical location where learning takes place.

The recommended stipend for a K-12 teacher is \$5000 per year. The stipends for K-12 teachers may support

participation in summer educational institutes, travel to professional meetings, involvement in weekend and evening workshops, and after-hours mentoring of fellows through the project.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- Academic institutions in the United States and its territories that grant masters or doctoral degrees in STEM disciplines supported by the National Science Foundation.

PI Limit:

The lead Principal Investigator (PI) must be a STEM discipline faculty member actively conducting STEM research at the lead institution.

Faculty members whose primary research is on science education (e.g. physics education, technology education, mathematics education, engineering education, etc.) are not eligible to serve as the lead PI.

Limit on Number of Proposals per Organization: 1

One proposal per institution. Institutions having an active or past GK-12 project are eligible to submit a new proposal, but they must coordinate evaluation efforts of any projects located on the same campus or working with the same school districts. They must also specify the outcomes, lessons learned, best practices, and sustainability efforts of prior projects. Renewal proposals will not be accepted.

Limit on Number of Proposals per PI:

None Specified

Additional Eligibility Info:

A. Academic Institutions*

Academic institutions in the United States and its territories that grant masters or doctoral degrees in STEM disciplines supported by NSF are eligible to apply. Projects may involve more than one institution, but a single institution must accept overall management responsibility. An institution may submit only one proposal as lead from either a single-institution or from a multi-institutional proposal.

Non-academic institutions, industry, non-profit organizations and museums may serve as collaborating organizations.

*An academic institution is defined as a separate legal and fiscal entity, whether at the central or system level, or branch campus level, which can receive awards and which is separately and consistently identified at that level for federal research and development reporting purposes through a Federal Entity Number. NSF institution codes ARE NOT entity numbers.

B. Project Focus

Projects involving any of the STEM fields normally supported by NSF are eligible. Projects may draw participants from two or more departments within one institution or from more than one institution. Projects may be organized on a single, multidisciplinary, or interdisciplinary STEM theme. Theme(s) should involve a diverse group of fellows and faculty from STEM disciplines. Projects focused on multidisciplinary or interdisciplinary themes are encouraged.

C. Principal Investigator

The lead Principal Investigator (PI) must be a STEM discipline faculty member actively conducting STEM research at the lead institution and should serve as the director of the GK-12 project. Any appropriate faculty or administrator at universities, K-12 schools, or partnership institutions may serve as a non-lead PI. Faculty members whose primary research is on science education (e.g. physics education, technology education, mathematics education, engineering education, etc.) are not eligible to serve as lead PI.

D. Graduate Fellows

GK-12 fellows will be selected by awardee institutions. During their tenure as fellows, they must be full-time graduate students pursuing degrees (PhD and/or master's) and conducting research in STEM disciplines. The GK-12 program is intended for fellows who have completed their basic graduate course work and who have experience conducting STEM research.

Fellows are expected to be supported on any GK-12 award for a minimum of one year and a maximum of two years. Fellows must be citizens, nationals or permanent residents of the United States. Foreign students who hold student visas are not eligible.

Graduate students pursuing degrees and conducting research in science education (e.g., physics education, technology education, engineering education, and mathematics education, etc.) are not eligible.

Institutions are encouraged to recruit, mentor, and retain fellows that are women, underrepresented minorities, or persons with disabilities.

E. K-12 Teachers

K-12 teachers should have sufficient teaching experience and knowledge of pedagogy to help improve the communication and teaching skills of the GK-12 fellows.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent (required):

- A Letter of Intent (LOI) is required for all new proposals including those that were declined in previous years and are re-applying to the program. The LOI is not a preliminary proposal.

Include in the "Synopsis" section of the LOI Fastlane template, an overview of the proposed project, its goals and objectives, and innovative aspects of the project. Indicate how STEM knowledge and research experience will be brought to the classrooms by the fellows.

The LOI must also contain the following in the "Other Comments" section of the Fastlane template:

Title of Project:

(co) PI(s):

STEM Faculty advisors and departments involved:

Number of STEM graduate fellows per year:

Number of K-12 teachers working with the fellows per year:

Number of K-12 classes anticipated to be served per year:

Number of Schools and School District Partners:

Target audience of the project (elementary, middle, and high school grades):

Setting: Urban, suburban, or rural

NSF-supported STEM discipline(s) or theme(s) involved:

If an international collaboration will be proposed, the countries involved:

The GK-12 Program Directors will use the Letters of Intent to guide the selection of reviewers. PIs should not expect feedback on their Letters of Intent beyond acknowledgement of their receipt.

Letters of Intent should serve as a basis for the Project Summary section (below).

Institution name and lead PI name are required when submitting the Letter of Intent.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Sponsored Projects Office (SPO) Submission is required when submitting Letters of Intent
- Submission of multiple Letters of Intent is not allowed

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-PUBS (7827) or by e-mail from pubs@nsf.gov.

The following information supplements the Grant Proposal Guide.

Proposals must contain the following elements in the order indicated. Proposals that do not strictly adhere to the specified page and font limitations (given below) will be ineligible for consideration and will be returned without review.

1. **COVER SHEET FOR PROPOSALS:** Proposers must identify the program solicitation number stated at the beginning of this document in the program solicitation block on the proposal Cover Sheet. In the title section of the Cover Sheet, enter "New, GK-12" at the beginning of the proposal title. If international activities requiring funding are proposed, the international cooperative activities box should be checked and the countries involved listed.
2. **PROJECT SUMMARY:** This section, limited to one single-spaced page, prepared in a standard font according to GPG guidelines, must be suitable for publication and should contain two sections (see below): 1) a List of Project Elements, followed by 2) a Project Summary.

List of Project Elements

Title of Project:

Institution:

PI and Co-PI(s):

STEM faculty advisors and departments involved:

Number of STEM graduate fellows per year:

Number of K-12 teachers working with the fellows per year:

Number of K-12 classes anticipated to be served per year:

Number of Schools and School District Partners:

Target audience of the project (elementary, middle, and high school grades):

Setting: Urban, suburban, or rural

NSF-supported STEM discipline(s) and theme(s) involved:

If an international collaboration is proposed, the countries involved:

Project Summary: Include a brief description of the project, objectives, STEM research theme(s), disciplines involved, and innovative aspects of the project. Describe how the fellows will integrate their STEM research practice and findings into the K-12 STEM learning settings. Indicate how fellow-teacher partnerships will be initiated and enhanced during the lifetime of the project. **Explicitly indicate in separate statements the intellectual merit and broader impacts of the project proposed. NSF will return without review proposals that fail to address both of these criteria in the summary.** Include benefits to be achieved by all participants in the project: the fellows, teachers, K-12 students, STEM faculty, and K-12 and higher education institutions.

3. **PROJECT DESCRIPTION:** The Project Description includes sections a-i and must be prepared according to GPG guidelines. Sections a through h are limited to a combined total length of 15 single spaced pages including any visual materials. Section i, which may be up to 2 pages in length, is only allowed if an international component is proposed.

a. **Results from Prior NSF Support:** Provide information about relevant funding that the PI or Co-PI(s) received during the past five years related to GK-12 activities. For each project cited indicate the NSF award number, amount and period of support and PIs, Co-PIs, and/or partner organizations involved. Indicate how the proposed project is different from previously funded NSF proposals.

Institutions that received prior GK-12 funding must provide project outcomes, lessons learned, best practices, and sustainability efforts of their prior projects. Proposals must clearly indicate how the new project differs from the prior projects.

b. **Goals and Objectives:** Provide the intellectual focus, goals, and objectives of the project. Describe the STEM research theme(s), relevance of the disciplines involved, and activities that will form the foundation for the project. Clarify in sufficient detail the benefits to fellows in STEM disciplines, K-12 teachers, universities and K-12 schools, respectively.

c. **Project Plan:** It is important to indicate in this section not only what activities are planned but also how they will be implemented to deliver the Goals and Objectives in b. Important activities include but not limited to the following:

Describe the intellectual basis for the project's disciplinary, multi-disciplinary, or interdisciplinary STEM research theme(s), if applicable. Clarify the linkage(s) between the fellow's individual research work with the project's research theme(s). Describe how fellows will incorporate their STEM research practice and findings into targeted K-12 STEM learning settings, and how the fellows' activities will enhance and/or enrich the content and context of their own research. Describe how they will enhance K-12 STEM knowledge and instruction in the specified schools and school district, including as appropriate their role in implementing inquiry-based instructional strategies and materials.

Describe the criteria, and procedure on how the fellows will be recruited, selected, mentored, and assigned to targeted K-12 settings (also see d). Indicate the number of fellows that will be available in any given school district and the specific schools involved. Describe how the teachers will be partnered with the fellows. Describe how the fellows will collaborate with the teachers to bring leading-edge STEM research practice and findings into K-12 schools, and how this collaboration will benefit the professional development of fellows and teachers. Describe training workshops and professional development activities for GK-12 fellows and teachers if any.

Describe how the fellows will be prepared for all the activities involved in the project, particularly on the capabilities and skills of communicating STEM subjects to technical and non-technical audiences, leadership, team building, and teaching. Clearly state what the fellows will be doing, how they will be trained to acquire the needed skills and what the anticipated outcomes and measures of success will be. Projects may also plan for activities that will contribute to fellows' understanding of students from different cultural background (where appropriate).

Describe the level and type of participation by the institution(s) of higher education, K-12 school district(s), and any collaborating organization(s), such as an industrial partnership. Indicate any relevant history of the higher education unit(s) in K-12 involvement and how the proposed activities will be aligned with educational needs of K-12 schools. Describe implementation plans involving special populations in K-12 schools (e.g. women, underrepresented minorities, students at risk, students with disabilities, English language learners, etc.).

Indicate what is a sustainability plan to implement GK-12 type activities as an integral part of the institution's STEM graduate education program(s); how you plan to establish K-12 and university partnerships; and how they will serve as a mechanism to advance STEM education. Indicate strategies to develop partnerships with other organizations (e.g., industry partners) as potential collaborators and future sources of funding for project sustainability.

Indicate how participating fellows, K-12 teachers and schools will be followed longitudinally to determine indicators of project impact and sustainability such as: length of time that fellows take to degree completion compared to other graduate students; career choices and the use of newly acquired skills; increased communication skills and professional competence in STEM disciplines; participation in professional development activities in STEM. Include number of schools or teachers requesting GK-12 partnerships; changes in student STEM interest and competence level; number of faculty and students participating in GK-12 activities; changes in faculty and/or department support and practices related to GK-12 activities; and overall impact on the institution.

For projects that include a cyberinfrastructure component, PIs must clearly describe how they plan to integrate fellows' cyberinfrastructure research activities and tools, such as those relating to high-performance computing and virtual interaction and collaboration, in GK-12 project activities. Discuss the

benefits for including the cyberinfrastructure component for both graduate fellows and K-12 teachers and students.

- d. **Recruitment and Selection:** Describe specific plans, procedures, and criteria for the recruitment and selection of fellows, including specific provisions for success with women, underrepresented minorities and persons with disabilities. Provide reasonable estimates of the number of potential fellows eligible and likely to be interested in participating (demographic data of potential fellow candidate pool is recommended). Describe the nature and extent of connections with existing programs at their institutions, particularly those supported by NSF, that involve recruitment, mentoring, retention and professional development of students such as Alliances for Graduate Education and the Professoriate (AGEP), Louis Stokes Alliances for Minority Participation (LSAMP), Tribal Colleges and Universities Program (TCUP), Historically Black Colleges and Universities Undergraduate Program (HBCU-UP), and the Centers for Research Excellence in Science and Technology (CREST). Also describe plans for the recruitment and selection of K-12 teachers.
- e. **Organization, Management, and Institutional Commitment:** The PI will have overall responsibility for the administration of the award, the management of the project, and interactions with the NSF. The PI and the home institution are expected to develop an administrative structure that enables faculty, K-12 teachers, school administrators, fellows, and others involved in the group effort to interact productively during the award period. The PI is expected to be an integral participant in the education and training activities of the GK-12 project. Include plans and procedures for the development of a management team for the proposed activity indicating how the responsibilities among team members will be allocated (e.g. who will select the fellows, who will coordinate activities of fellows and K-12 teachers, how fellows' advisors will be involved).

A signed statement from the institution of higher education (such as from the provost or a dean) indicating that the NSF funds will not replace financial resources already assigned to STEM education must be included in the Supplementary Documentation (see **item 7** below). A similar statement from the superintendent(s) of the K-12 district(s) or chief school officer(s) who are authorized to represent the school district and honor its financial commitments also must be provided in the Supplementary Documentation. The statement(s) with original signatures may be electronically scanned and incorporated as a PDF file into the Supplementary Documentation.

Describe how the activities will be sustained after the period of NSF funding. Provide a clear statement elaborating which of the proposed activities are likely to be institutionalized by the end of the grant period, and which of the proposed activities will require further sources of support in order to be continued.

- f. **Evaluation:** Describe an evaluation plan, including a timeline, to assess the project's success in meeting its goals and objectives (see b). Each project should include an external evaluator to develop an evaluation plan. This evaluator must be external to the project to provide an objective evaluation. The project must include formative and summative evaluations. The purpose of the formative evaluation is to assess initial and ongoing project activities and to allow for mid-course corrections. The purpose of the summative evaluation is to assess the quality and impact of the project in reaching its stated goals and objectives. The proposal must clearly describe the qualifications of the evaluator.

Both the formative and summative evaluations should include qualitative and quantitative components. The qualitative and quantitative components should capture the perspectives and benefits for the fellows and the K-12 teachers. It is also recommended that the involvement of STEM faculty advisors and K-12 administrators participating in the project be evaluated. The evaluation plan should describe performance indicators and other specific measures that will be used by the project team to assess the project's success in meeting its goals and objectives. Although each project should propose its own types of specific qualitative and quantitative measures, some later standardization is anticipated so that NSF can conduct a program-wide evaluation of effectiveness.

- g. **List of Faculty Participants:** Include STEM departmental and institutional affiliation of all faculty participants expected to mentor fellows or to otherwise play an important role in the project. Indicate what the fellows' research advisors will bring to the project, how they will be involved, and how they will provide feedback to the fellows. Fellows' research advisors are expected to observe how fellows present their research findings, concepts, and methodology to K-12 students. In addition, research advisors are encouraged to attend fellows' presentations on their GK-12 experience at the end of their tenure. Research advisors are encouraged to engage with the fellows in discussions regarding career development opportunities. They are also encouraged to collaborate with the GK-12 external evaluator in the assessment of fellows' development of professional skills (communication, team building, leadership, and teaching capabilities).
- h. **School District Involvement:** Include a brief summary of school district participation and a list of participating schools. In addition, a signed statement of support from the superintendent(s) of the participating K-12 school district(s) or chief school officer(s), authorized to represent the school district, must also be included with the application as described in Supplementary Documentation (see **item 7** below). The statement(s) with the original signature may be electronically scanned and incorporated as a PDF file into the Supplementary Documentation (see **item 7** below).
- i. **International Collaboration:** For projects that request funds for international research collaboration, an additional 2-page section may be included in the Project Description. The PI should describe the procedures and arrangements for selecting, preparing, and sending fellows and/or teachers to international research sites. Explain the nature and goals of the research collaboration, the expertise and resources to be made available by the international partner(s), and the expected benefit to the U.S. participants' research and professional development. The international collaboration may include the ways in which the international experience will be integrated into and enhance the overall GK-12 project, including K-12 classroom activities. Address the practical aspects of sending the U.S. participants abroad, including logistical arrangements and language and cultural issues. Additional information concerning international research collaborations can be found in the appropriate section of the GK-12 Program website: <http://www.gk12.org/>.

4. **REFERENCES CITED:** Any literature cited should be specifically related to the proposed project, and the Project Description should make clear how each reference has played a role in the motivation for or design of the project.

5. **BIOGRAPHICAL SKETCHES:** This section must not exceed 2 pages per individual. For each of the personnel listed by name on the budget page, provide a Biographical Sketch highlighting information that will help in understanding the qualifications that this individual will bring to the GK-12 project. This Biographical Sketch should include information about recent training activities such as the number and names of graduate students who carried out STEM research under the faculty member's direction in each of the last three years. List the titles of courses taught by the faculty member during the

past three years and include other relevant activities, such as organization of workshops or special courses. Include information related to activities conducted in collaboration with K-12 schools or other educational organizations. List current and past collaborators including those with whom the faculty member has co-authored papers within the past four years.

6. **CURRENT AND PENDING SUPPORT:** For each PI and Co-PI, time commitments for all current and pending support from all agencies must be indicated. This is not limited to NSF or other federal agency support.

7. **SUPPLEMENTARY DOCUMENTATION:**

This section should not exceed 10 pages. It must include signed statements from both the institution of higher education and the superintendent(s) or chief school officer(s) of the local K-12 school district(s) involved who can represent the school district and honor its financial commitments (see **item 3.e.** above).

The signed statement regarding School District Involvement (see **item 3.h.** above) should include background information about participating schools, demographics of the student population, specific STEM needs of participating schools or of the district in general, specific conditions in the K-12 schools in which fellows are expected to operate (e.g., availability of technology and/or scientific materials), coordinated plans of the district to receive GK-12 fellows into its schools, financial commitments or other support to be provided for K-12 teachers (e.g., release time, conference attendance, workshop participation, professional development units), and incentives, recognition and awards to be provided to K-12 teachers for their participation in the GK-12 project. Other relevant information and additional letters of support may also be included in this section.

The required statement(s) with the original signature(s) may be electronically scanned and incorporated as a PDF file into the Supplementary Documentation.

Proposers are reminded to identify the program solicitation number (NSF 09-549) in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing: Cost sharing is not required under this solicitation.

Indirect Cost (F&A) Limitations:

Partial reimbursement of indirect costs not to exceed 8% of total direct costs, excluding participant support and equipment.

Other Budgetary Limitations:

- The costs of participants' (STEM graduate fellows, K-12 teachers) travel, stipends, the costs of workshops, and the cost of education for fellows should be listed under Participant Support Costs. Separate the costs for fellows and K-12 teachers in the Budget Justification. Also indicate the number of fellows and teachers anticipated. None of these costs should be included in the base used to calculate Indirect Costs.

Budget Preparation Instructions:

Provide a Summary Proposal Budget for each year of support requested. The maximum allowed for each year is \$600,000, which includes both direct and indirect costs. FastLane will create the cumulative budget automatically.

Recognizing the importance of infrastructure support and the significant involvement of faculty and K-12 teachers, up to 30% of the total budget may be designated for direct costs other than fellows' stipends, K-12 teacher stipends and cost-of-education allowances. These funds are intended to supplement institutional and school district resources in support of GK-12 activities. The budget should plan for funds to conduct the project evaluation in the amount up to 2.5 % of total direct cost over five years.

For projects that include an international component, additional funds not to exceed a total of \$100,000 per award may be included to support this effort. The additional funding is intended to benefit participants from the United States (e.g., STEM graduate fellows and K-12 teachers) through collaborative research conducted with foreign partners at foreign sites. Time spent abroad should be of sufficient duration to acculturate the participants and should provide a meaningful research experience. Funds may be used for U.S. participants' international and in-country travel, living expenses, and limited research-related costs abroad. Funds also may be used to prepare participants to be successful in international settings (pre-departure orientations, language or special training). In addition, funds may be used for short-term visits by GK-12 faculty to foreign sites for supervising fellows and coordinating research. Reciprocal visits by foreign researchers and students to the U.S. institutions are encouraged, but in most cases NSF funds cannot be used to support such visits. Requests for travel for the sole purpose of attending international conferences or workshops are not appropriate.

Funds may be requested for personnel to develop and construct special instruments, for the purchase of software, or for other special-purpose materials related to the project for use by the STEM graduate fellows and K-12 teachers and students. Projects may use inquiry-based educational materials such as those developed under NSF support. The total requested for software and special-purpose materials may not exceed \$10,000 for the duration of the project.

Funds may be requested for professional development, training or workshop participation for K-12 teachers. These expenses should be listed under Participant Support Costs. Projects may use NSF-supported teacher professional development models.

Funds should be included for the PI and up to three participants to attend an annual meeting convened by NSF in the Washington, D.C. area. The participants should include at least one current GK-12 fellow and one current K-12 teacher. Travel for PIs should be listed under Domestic Travel. Travel for fellows and teachers should be listed under Participant Support Costs.

Budget Justification: This section must not exceed 3 pages. A clear justification for funds in each budget category should be provided. List next to each item commented upon in the Budget Justification the corresponding letter and number of that item on the Budget Page. If additional funds are requested for international activities, describe in a separate table the requested amount and allocations over the project duration.

C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):

May 19, 2009

April 20, 2010

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

June 29, 2009

June 03, 2010

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria:

In light of the GK-12 program's objectives, reviewers will be asked to consider the above two merit review criteria with emphasis placed on:

Intellectual Relevance of Research Theme

- Plan and mechanisms for incorporating fellows' individual research with GK-12 project's research theme(s) if applicable. Specific examples are highly recommended.
- Plan and mechanisms for incorporating fellows' research into K-12 settings. Specific examples are highly recommended.

Effectiveness of Selection, Training, and Preparation of Fellows

- Intellectual basis, quality and effectiveness of the planned training activities for fellows to achieve improved capabilities and skills of communicating STEM subjects to both technical and non-technical audience, leadership, teambuilding, and teaching.
- Effectiveness of the plans, criteria, and procedures for the recruitment, selection, and mentoring of fellows and K-12 teachers to ensure professional development for both, including attention to diversity.
- Plans to engage the fellows' major research advisors in the GK-12 project to support the fellows' activities.

Readiness and Sustainability of Partnership

- Team composition and extent of collaboration between the proposing institution(s) of higher education and the participating K-12 school district(s).
- Extent of leveraging existing local resources (such as prior GK-12 project, and other NSF funded projects) to benefit the new GK-12 project.

Suitability and Feasibility of Evaluation

- Plans for evaluation, assessment of project performance and dissemination of results.
- The extent of coordination of evaluation efforts for projects at the same institution if applicable.

Impact on Graduate Education

- Plan and institutional commitment for sustaining GK-12 activities in graduate programs

For Projects that Choose to Include an International Component (Optional)

- Quality of the international collaborative activities, benefits to the U.S. participants, and relevance of the international experience to the overall GK-12 project.

Priority will be given to proposals from institutions that have not received a previous GK-12 award.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements.

Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report.

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

The GK-12 program provides specific guidelines related to the preparation of annual and final reports, and they are available in the appropriate section of the GK-12 program website: <http://www.gk12.org/>.

PIs, fellows, and teachers are also required to submit information to a web-based, project-level data collection system used to monitor and track progress of individual projects on an annual basis.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Sonia Ortega, Program Director, Division of Graduate Education, Directorate for Education and Human Resources, telephone: (703) 292-8697, fax: (703) 292-9048, email: sortega@nsf.gov
- Ping Ge, Program Director, Division of Graduate Education, Directorate for Education and Human Resources,, telephone: (703) 292-8697, fax: (703) 292-9048, email: pge@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

Members of the NSF-wide GK-12 Committee represent their respective NSF organizations. They contribute funds as well as intellectual and labor capital to the program. In addition to the GK-12 staff, members of the GK-12 committee are:

- Denise Barnes, Office of Integrative Activities
- Renee D. Crain, Office of Polar Programs
- Fahmida N. Chowdhury, Directorate for Social, Behavioral and Economic Sciences
- Sally E. O'Connor, Directorate for Biological Sciences
- Kathleen McCloud, Directorate for Mathematics and Physical Sciences
- Celestine H. Pea, Directorate for Education and Human Resources
- Jessica Robin, Office of International Science and Engineering
- Mary F. Poats, Directorate for Engineering
- Diana R. Rhoten, Office of Cyberinfrastructure

- Elizabeth L. Rom, Directorate for Geosciences
- Maria Zemankova, Directorate for Computer and Information Sciences and Engineering

General inquiries regarding this program should be made to the GK-12 staff at gk-12@nsf.gov.

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

Research and Evaluation on Education in Science and Engineering (REESE)

The Division of Graduate Education is calling your attention to the opportunity to request support for research and evaluation projects focused on graduate education. This opportunity is embedded in the Research and Evaluation on Education in Science and Engineering Program Solicitation, which can be viewed at: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13667&org=DRL&from=home

In addition to other important goals, REESE seeks to build a research community that can more effectively address current issues, trends and questions in STEM graduate education, such as:

- How to increase participation by students in STEM graduate education;
- Efforts to improve the retention and graduation rates of STEM graduate students;
- The impact of increased mentoring on the success of graduate students;
- Emerging STEM research fields, particularly cross-disciplinary ones;
- Changes in skills expected for STEM professionals and how these are communicated to graduate programs;
- The effects on graduate education of growing international cooperation in research and education;
- Uses of new technologies (including new cyberinfrastructure developments) in both education and research;
- The speed of diffusion of new methods of graduate education, or the diffusion of new programs in emerging STEM disciplines; and
- Advancing the understanding of the causes and effects of progress in and barriers to broadening participation in STEM graduate education.

REESE encourages both synthesis projects (e.g., workshops, exploratory research, planning and design projects) for durations of one to three years not to exceed \$200,000 and larger empirical projects for durations of three to five years with project budgets up to \$1 million. Proposers should review the REESE Program Solicitation to ensure that eligibility requirements are met. The Dear Colleague Letter for REESE may be viewed at: <http://www.nsf.gov/pubs/2007/nsf07015/nsf07015.jsp>.

Discovery Research K-12 (DR-K12)

The Discovery Research K-12 (DR-K12) program seeks to enable significant advances in K-12 student and teacher learning of the STEM disciplines through research about, and development and implementation of, innovative resources, models, and technologies for use by students, teachers, and policy makers. Activities funded under DR-K-12 begin with a research question or hypothesis about K-12 STEM learning or teaching; develop, adapt, or study innovative resources, models, or technologies; and demonstrate if, how, for whom, and why their implementation affects learning.

More information may be found on the NSF website: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=500047&org=DRL&from=home

Online Evaluation Resource Library (OERL)

The Online Evaluation Resource Library, funded by NSF, provides guidelines for how to improve evaluation practice using Web site resources. It provides a large collection of sound plans, reports and instruments from past and current project evaluations in several content areas.

OERL resources include instruments, plans, and reports from evaluations that have proven to be sound and representative of current evaluation practices. It also includes alignment tables that contain criteria and a glossary to help with the development of your own plans, reports and instruments.

PIs and GK-12 project evaluators are encouraged to consult OERL at: <http://oerl.sri.com/>.

Partnerships for International Research and Education (PIRE)

The Partnerships for International Research and Education program, which is managed by the Office of International Science and Engineering (OISE), enables U.S. institutions to establish collaborative relationships with

international groups or institutions in order to engender new knowledge and discoveries at the frontier and to promote the development of a globally-engaged, U.S. scientific and engineering workforce. The PIRE Program Solicitation may be viewed at:

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf09505

Cyberinfrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce (CI-TEAM)

The Cyberinfrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce program is managed by the Office of Cyberinfrastructure (OCI). The Information technology (IT)-enabled systems, tools, and services have had profound impact on the practice of science and engineering research and education. Integrated to create a national cyberinfrastructure, these systems, tools and services are enabling individuals, groups and organizations to advance science and engineering in ways that revolutionize *who can participate, what they can do, and how they do it*. To harness the full power of cyberinfrastructure, and the promise it portends for discovery, learning and innovation across and within all areas of science and engineering, requires focused investments in the preparation of a science and engineering workforce with the knowledge and skills needed to create, advance and take advantage of cyberinfrastructure over the long-term. Further information about the CI-TEAM Program Solicitation may be obtained via the NSF OCI website (<http://www.nsf.gov/dir/index.jsp?org=OCI>).

Communicating Research to Public Audiences (CPRA)

Communicating Research to Public Audiences is a component of the Informal Science Education program (ISE) in the Division of Research on Learning in Formal and Informal Settings. CPRA projects provide rich and stimulating contexts and experiences for individuals of all ages, interests, and backgrounds to increase their appreciation for, and understanding of, science, technology, engineering, and mathematics (STEM) in *out-of-school settings*. Requests for up to \$75,000 will be considered to support projects that communicate to public audiences the process and results of current research that is being supported by any NSF directorate through informal science education activities, such as media presentations, exhibits, or youth-based activities. The purpose of these efforts is to disseminate research results, research in progress, or research methods. The CPRA Program Solicitation may be viewed at:

http://nsf.gov/funding/pgm_summ.jsp?pims_id=5362

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: pubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records, " 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

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