

# Science, Technology, Engineering, and Mathematics Talent Expansion Program Centers (STEP Centers)

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## PROGRAM SOLICITATION NSF 10-569

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**National Science Foundation**

Directorate for Education & Human Resources  
Division of Undergraduate Education

Directorate for Biological Sciences

Directorate for Engineering

Directorate for Geosciences

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

August 04, 2010

**Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):

September 07, 2010

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

January 20, 2011

BY INVITATION ONLY

## IMPORTANT INFORMATION AND REVISION NOTES

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A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), [NSF 11-1](#), was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in [NSF 11-1](#) apply to INVITED FULL proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 18, 2011, must also follow the guidelines contained in [NSF 11-1](#).

**Cost Sharing:** The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* Chapter II.C.2.g(xi) for further information about the implementation of these recommendations.

**Data Management Plan:** The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

**Postdoctoral Researcher Mentoring Plan:** As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

### Revision Notes:

This Solicitation represents a new initiative within the Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP). The existing STEP Solicitation [NSF 08-569](#) also remains in effect, with a proposal deadline of September 28, 2010, for Type 1A, Type 1B, and Type 1C proposals that are directed at increasing the number of students receiving associate or baccalaureate degrees in STEM fields, and for Type 2 proposals that support educational research projects on associate or baccalaureate degree attainment in STEM. Further, it is expected that the competition described in STEP Solicitation [NSF 08-569](#) will continue into the future.

Applications to the STEP Centers competition are independent of applications under STEP Solicitation [NSF 08-569](#). Applications to the STEP Centers competition do not affect the number of proposals that may be submitted by institutions to the competition under STEP Solicitation [NSF 08-569](#), nor do applications submitted to STEP Solicitation [NSF 08-569](#) affect the number of proposals that may be submitted by an institution to the STEP Centers competition.

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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**Program Title:**

Science, Technology, Engineering, and Mathematics Talent Expansion Program Centers (STEP Centers)

**Synopsis of Program:**

The STEP Centers competition allows a group of faculty representing a cross section of institutions of higher education to identify a national challenge or opportunity in undergraduate education in science, technology, engineering, and mathematics (STEM) and to propose a comprehensive and coordinated set of activities that will be carried out to address that challenge or opportunity within a national context. In the current competition, efforts must be related to the biological sciences, engineering, or the geological sciences.

**Cognizant Program Officer(s):**

- EHR-BIO STEP Center, telephone: (703) 292-8670, email: [biostepcenter@nsf.gov](mailto:biostepcenter@nsf.gov)
- EHR-ENG STEP Center, telephone: (703) 292-8670, email: [engstepcenter@nsf.gov](mailto:engstepcenter@nsf.gov)
- EHR-GEO STEP Center, telephone: (703) 292-8670, email: [geostepcenter@nsf.gov](mailto:geostepcenter@nsf.gov)

**Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):**

- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.074 --- Biological Sciences
- 47.076 --- Education and Human Resources

## Award Information

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**Anticipated Type of Award:** Continuing Grant

**Estimated Number of Awards:** 3 The expectation is that 3 STEP Centers will be funded, one an EHR-BIO STEP Center, one an EHR-ENG STEP Center, and one an EHR-GEO STEP Center. However, the number and size of awards will depend on the quality of the proposals received and the availability of funds.

**Anticipated Funding Amount:** \$6,000,000 in FY 2011 for new awards subject to availability of funds.

## Eligibility Information

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**Organization Limit:**

Proposals may only be submitted by the following:

- Proposals are invited from academic institutions in the United States and its territories, and from consortia thereof. Academic institutions, as defined by the GPG, are universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. The academic institutions must offer either associate degrees or baccalaureate degrees in science, technology, engineering and/or mathematics (STEM). Projects are expected to include multiple academic institutions and may involve business and industrial partners, professional societies, or other stakeholders. A single institution must submit the proposal and other partners may be involved as sub-awardees. (Separately submitted collaborative proposals as defined in the GPG are not allowed.)

**PI Limit:**

None Specified

**Limit on Number of Proposals per Organization: 3**

An institution that awards associate or baccalaureate degrees is allowed to be the lead institution on only one proposal to the EHR-BIO STEP Center competition, only one proposal to the EHR-ENG STEP Centers competition, and only one proposal to the EHR-GEO STEP Centers competition. Thus, a given institution may be the lead institution on up to three proposal submissions in total. An institution may be a partner institution on any number of submissions.

**Limit on Number of Proposals per PI:**

See Limit on Number of Proposals per Organization.

## Proposal Preparation and Submission Instructions

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**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 Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. 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](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide))

## B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **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):  
August 04, 2010
- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):  
September 07, 2010
- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):  
January 20, 2011

BY INVITATION ONLY

## Proposal Review Information Criteria

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**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

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**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

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Undergraduate education is central to the National Science Foundation's mission in human resource development. Whether preparing students to participate as citizens in a technological society, to enter the workforce with two- or four-year degrees, to continue their formal education in graduate school, or to further their education in response to new career goals or workplace expectations, undergraduate education provides the critical link between the Nation's secondary schools and a society increasingly dependent upon science and technology. To support the growth and effectiveness of undergraduate education, the America COMPETES Act, H.R.2272, has called for major efforts to increase the number of students completing undergraduate courses in science, technology, engineering, and mathematics, including the number of nonmajors, and to improve student academic achievement in those courses. This STEP Centers initiative provides an opportunity for the academic community and other stakeholders to work toward these goals.

## II. PROGRAM DESCRIPTION

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### All STEP Centers

The STEP Centers competition allows a group of faculty representing a cross section of institutions of higher education to identify a national challenge or opportunity in undergraduate education in science, technology, engineering, and mathematics (STEM) and to propose a comprehensive and coordinated set of activities that will be carried out to address that challenge or opportunity within a national context. Each STEP Center will be awarded jointly by the Directorate for Education and Human Resources (EHR) and one of the following: the Directorate for Biological Sciences (BIO), the Directorate for Engineering (ENG), or the Directorate for Geosciences (GEO).

Program activities for all STEP Centers should be designed to have a national impact on increasing the number of students, including STEM majors or non-STEM majors or both, enrolling in undergraduate courses in STEM, and to improve student learning and retention in those courses, by developing, evaluating, and disseminating one or more of the following:

- Educational materials for undergraduate courses, laboratories, curricula, or other aspects of the undergraduate experience;
- Teaching methods for undergraduate courses; and/or
- Professional development to improve the capacity of faculty and teaching assistants to provide effective instruction in undergraduate courses.

As examples, a STEP Center might propose a comprehensive effort that uses some combination of the following approaches:

- Creating model curricula and laboratory programs;
- Developing and demonstrating research-based instructional methods and technologies;
- Developing methods to train graduate students and/or faculty to be more effective teachers of undergraduates;
- Conducting programs to disseminate curricula, instructional methods, or training methods to faculty across the nation; or
- Other approaches to achieving the goals of the proposed Center.

The intent of a STEP Center should be to make a significant and national impact on the challenge or opportunity being addressed with the expectation that major portions of the impact will be sustained after NSF funding ends. The design of the project should reflect an awareness of the diversity of institutions and curricula that constitute the STEM undergraduate education community in the United States, and the project should include mechanisms for impacting a significant proportion of this community. Projects are expected to encourage broadening the participation of underrepresented students in STEM. All STEP Center proposals should be grounded in the relevant background literature and should show an awareness of relevant prior work in the area.

The STEP Center initiative offers an opportunity for exploring unique efforts in undergraduate STEM education. Thus, projects that are appropriate for existing programs at the National Science Foundation should not be submitted to the STEP Centers competition.

### Outcomes for all STEP Centers

The outcomes expected of all STEP Centers include the following:

- Significant progress toward addressing the national challenge or opportunity defined in the proposal;
- A contribution or potential contribution to expanding the number of students who enroll in undergraduate courses in STEM and to the enhanced learning and retention of students in the courses;
- A description of the activities that have been completed and are being sustained by a significant number of academic institutions or other relevant entities;
- A description of continued efforts that are expected to occur across the nation as outgrowths of activities undertaken by the project;
- A comprehensive evaluation, using the indicators and methods defined in the proposal, that informs the undergraduate STEM community and others about the effectiveness of the project; and
- Effective dissemination of the results and products of the project to the academic institutions and other entities that comprise the STEM undergraduate education community.

### Additional expectations and outcomes

In addition to the expectations and outcomes given above for all STEP Centers, more specific information pertains to each of the three categories of STEP Centers.

### DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES AND DIRECTORATE FOR BIOLOGICAL SCIENCES (EHR-BIO)

In addition to the expectations under **All STEP Centers** and **Outcomes for all STEP Centers**:

Proposals submitted to the EHR-BIO STEP Center competition are expected to focus on current issues that are central to fostering improvement in undergraduate biology education. Many of these issues were the subject of a recent national meeting of stakeholders in undergraduate biology education ("Transforming Undergraduate Biology Education: Mobilizing the Community for Change," also known as the [Vision & Change meeting](#)). All proposals submitted to the EHR-BIO STEP Center competition should be designed to acknowledge the breadth of the subdisciplines biology encompasses, the rapid changes in the discipline itself, and the diverse aspirations, interests and career goals of both STEM majors and the uniquely large numbers of non-STEM majors populating introductory and, to an extent, upper level biology courses.

Specifically, the EHR-BIO STEP Center should focus on either:

- Developing the pedagogical skills of higher education faculty; or
- Facilitating the work of teams of faculty and administrators to effect departmental or higher-level institutional improvements in undergraduate biology education.

Cohesive projects addressing both of these areas in a coordinated plan that will result in a significant, national impact will be considered as well.

Although projects including other relevant skills will be considered, projects that include one or more of the following areas are particularly encouraged in proposals focused on the development of pedagogical skills:

- Development of teaching approaches based on an understanding of current knowledge of how students learn;
- Use of assessment of student learning to document student progress toward learning goals, identification of conceptual areas or skills that are particularly challenging to students, followed by appropriate changes in instructional approaches, documenting improvements in student learning across a curriculum, and identifying ways to redesign curricula to meet goals for student learning and competencies;
- Use of course content and teaching approaches that reflect ongoing changes in biology including the increasing reliance on sophisticated instrumentation, and interdisciplinary, theoretical, quantitative, modeling, simulation, data integration, and systems approaches in biological discovery and analysis; or
- Design of curricula around overarching and unifying concepts, skills and competencies, including innovative ways to integrate scientific research experiences across undergraduate biology curricula.

Proposals focused on faculty-administrator teams acting as institutional agents of change should describe creative, innovative mechanisms for facilitating the work of teams to identify barriers to improvement in undergraduate biology education, and develop

and implement mechanisms to overcome the barriers.

## **DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES AND DIRECTORATE FOR ENGINEERING (EHR-ENG)**

In addition to the expectations under **All STEP Centers** and **Outcomes for all STEP Centers**:

Proposals submitted to the EHR-ENG STEP Center competition are expected to address the national imperative to create next generation engineers who are entrepreneurs and innovators. Innovation is crucial to maintaining the dynamism and resilience of the economy, and to harnessing science and technology to address the grand challenges of the 21st century. Entrepreneurs are responsible for a large fraction of new job creation. How can the next generation of engineers be encouraged to be innovators, entrepreneurs, and leaders who improve the quality of life and establish the industries and jobs of the future in the United States?

Proposals for the EHR-ENG STEP Center should:

- Draw upon the current research literature on the process of innovation, and the process of how people learn to become more innovative;
- Demonstrate that students will become more innovative through systematic instruction in innovation and through authentic opportunities that challenge their ability to imagine the future, and develop creative new products, services and processes which will improve that future. Proposals should explain how such opportunities can be offered to large numbers of engineering students throughout their undergraduate experience, and how a large cadre of faculty members functioning as a community will sustain and extend these opportunities. These efforts should go well beyond the traditional curriculum development and implementation effort.
- Include plans for dissemination, especially through new strategies for faculty development, widespread implementation and "commercialization" of materials and techniques, which will result in significant adoption in the majority of engineering schools in the United States. New types of partnerships among students, faculty, publishers, media, private foundations, companies, product designers, and venture capitalists are encouraged.

Additional outcomes for the EHR-ENG STEP Center:

- More innovative engineers graduating from our universities;
- More knowledge about the process of educating innovative engineers; and
- A set of instruments and processes for assessing students' innovation skills.

## **DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES AND DIRECTORATE FOR GEOSCIENCES (EHR-GEO)**

In addition to the expectations under **All STEP Centers** and **Outcomes for all STEP Centers**:

Projects submitted to the EHR-GEO STEP Center competition should be focused on essential concepts in Earth System Science and its foundational importance in areas such as the interplay of environment, energy, and economics. Global climate change and its attendant socio-economic impacts, contaminated and depleted fresh water systems, depleted energy and mineral resources, ocean acidification, declining fish stocks, and loss of biodiversity are among the important threats to sustainability and global economic stability. Difficult decisions that will require full understanding of the unintended consequences for the planet and its societies lie ahead. Undergraduate students majoring in STEM areas as well as students majoring in economics, business, finance, urban planning, political science and other programs need opportunities to gain a thorough understanding of Earth System Science and its relationship to non-STEM fields.

Proposals for the EHR-GEO STEP Center should:

- Draw upon current research and literature on STEM learning, particularly as it relates to understanding complex, interdisciplinary content and geosciences-relevant concepts such as deep time and evolution;
- Seek to incorporate authentic geoscience data in the learning process and illustrate that our understanding of Earth Systems comes through a combination of observation, theoretical studies, and modeling; and,
- Serve to educate students about the essential principles and fundamental concepts in the geosciences. These "big ideas" have been articulated in several community-developed framework documents, including "Ocean Literacy: The Essential Principles of Ocean Sciences"; "Climate Literacy: The Essential Principles of Climate Science"; "Earth Science Literacy"; and "Atmospheric Science Literacy" [available at <http://www.nsf.gov/geo/adgeo/education.jsp>].

Expected components for the EHR-GEO STEP Center include:

- Development and testing of new, and scalable, model programs that provide undergraduate students and faculty with substantial exposure to core concepts within the Earth, Atmospheric, and Marine sciences;
- Creation and evaluation of learning materials that link the fundamental concepts of Earth System Science to core theories and information in non-STEM fields;
- Evaluation of appropriate pedagogies for teaching Earth System Science linked to other non-STEM disciplines; and,
- Professional development opportunities to improve the capacity of faculty and teaching assistants in STEM and non-STEM areas to fully understand the linkages between Earth System Science and other non-STEM fields.

## **III. AWARD INFORMATION**

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Grant duration for each STEP Center is expected to be 5 years, with the final 2 years of funding contingent on determination that satisfactory progress has been made by the awardee during the first 3 years. Proposals may request up to \$2 million per year, with a total request of up to \$10 million over the five years. Awards will be made as continuing grants. Each award will be made to a single institution and partners may be involved as sub-awardees. (Collaborative awards as defined in the Grant Proposal Guide will not be made.)

## **IV. ELIGIBILITY INFORMATION**

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### **Organization Limit:**

Proposals may only be submitted by the following:

- Proposals are invited from academic institutions in the United States and its territories, and from consortia thereof. Academic institutions, as defined by the GPG, are universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. The academic institutions must offer either associate degrees or baccalaureate degrees in science, technology, engineering and/or mathematics (STEM). Projects are expected to include multiple academic institutions and may involve business and industrial partners, professional

societies, or other stakeholders. A single institution must submit the proposal and other partners may be involved as sub-awardees. (Separately submitted collaborative proposals as defined in the GPG are not allowed.)

**PI Limit:**

None Specified

**Limit on Number of Proposals per Organization: 3**

An institution that awards associate or baccalaureate degrees is allowed to be the lead institution on only one proposal to the EHR-BIO STEP Center competition, only one proposal to the EHR-ENG STEP Centers competition, and only one proposal to the EHR-GEO STEP Centers competition. Thus, a given institution may be the lead institution on up to three proposal submissions in total. An institution may be a partner institution on any number of submissions.

**Limit on Number of Proposals per PI:**

See Limit on Number of Proposals per Organization.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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**Letters of Intent (required):**

A letter of intent is required before submitting a Preliminary Proposal. Letters of intent must be prepared and submitted via FastLane. Please note that NSF will not comment on the Synopsis text, so do not include questions within that section. Please contact program officers directly with any questions that you may have.

An organization may submit a Letter of Intent for each type of STEP Center project, however **submission of multiple Letters of Intent by the same organization for the same type of STEP Center is not allowed.**

**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
- Indication of type of project (EHR-BIO, EHR-ENG, or EHR-GEO STEP Center) is required when submitting Letters of Intent
- List of likely participating organizations (partners) is required when submitting Letters of Intent
- Submission of multiple Letters of Intent is allowed

**Preliminary Proposals (required):** Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

A preliminary proposal is required in order to be considered for an invitation to submit a full STEP Center proposal.

**Preliminary Proposal Preparation Instructions:**

Preliminary 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](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 [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

The following instructions supplement the GPG guidelines:

The Project Description may not exceed six pages. The Project Description should explain how the proposed project will address the priorities articulated in the program solicitation for the STEP Center for which you are applying, and should make clear how the Center will be managed. In the management plan a paragraph or two or a small table should provide information about the expected annual budgets and the general distribution of funds among major budget categories and among participating institutions. The Preliminary Proposal should include the usual sections for an NSF proposal, except that no Budget section should be included.

Once a project is being recommended for funding, each STEP Center will be expected to establish an External Advisory Committee of 8 to 12 members from outside the project institution(s). In order to avoid conflicts of interest during the reviewing process, do not contact potential External Advisory Committee members until after negotiations to fund an award have begun, and do not list suggested External Advisory Committee members in the Preliminary Proposal.

**Special Information and Supplementary Documentation for Preliminary Proposals**

Only Letters of Support that include specific commitments of effort or resources are allowed in the Special Information and Supplementary Documentation Section. Other documents are allowed in this section only as specified in the [NSF Grant Proposal Guide](#) and in this solicitation.

After a Letter of Intent is submitted, the submitting institution will receive confirmation that the Letter of Intent was received. This confirmation notice must be uploaded into the Supplementary Documentation section of the Preliminary Proposal.

In order for NSF to avoid conflicts of interest during the review process, an Excel document must be created and then converted to a PDF file and uploaded to the Supplementary Documentation Section. The Excel document should list the names of all individuals participating in the project along with their Institution, City, and State in separate columns. Any participating institutions or organizations that are not represented by named individuals, should be listed with the name column blank.

**Additional Instructions for Preliminary Proposals**

A Project Data Form must be submitted as part of all Preliminary Proposals. The information on this form is used to direct proposals to appropriate reviewers and to determine the characteristics of projects supported by the Division of Undergraduate Education (DUE). In FastLane, this form will appear in the list of forms for your proposal only after you have (1) selected the "STEP" program announcement/solicitation number on the Cover Sheet and (2) saved the Cover Sheet.



Proposers are reminded to identify the program solicitation number NSF 10-569 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.

**Full Proposal Preparation Instructions:** Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained 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](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) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov). Proposers are reminded to identify this program solicitation number 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.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

Submission of Full Proposals is BY INVITATION ONLY. This solicitation contains information that supplements the standard NSF GPG or NSF Grants.gov Application Guide proposal preparation guidelines. Please see the full text of this solicitation for further information.

### Project Description for Full Proposals

Full proposals for all STEP Centers are expected to include within the 15 pages of the Project Description:

- A statement of the national challenge or opportunity that is being addressed;
- A description of the planned project activities;
- A statement of the ways in which the project is addressing the diversity of institutions and curricula that constitute the STEM undergraduate education community;
- A description of the courses that are expected to see expanded enrollments of students, enhanced learning by students in the courses, and increased retention of students in the courses;
- A projection of the project activities and outcomes that are expected to be sustained by a significant number of academic institutions or other relevant entities;
- A description of continued efforts that are expected to occur across the nation as outgrowths of activities undertaken by the project;
- A management plan that includes a timeline and a description of the project personnel who are responsible for key areas of effort under the project;
- A description of the indicators and methods that will be used to measure the success of the project and to inform the undergraduate STEM community and others about the effectiveness of the project; and
- A plan for disseminating the results and products of the project to the academic institutions and other entities that comprise the STEM undergraduate education community.

For only those proposals being submitted to the STEP EHR-ENG Centers competition, in addition to addressing the topics above, the proposals also should include:

- A statement of the characteristics expected for the more innovative engineers being graduated;
- A prediction of areas in which information may be learned about the process of educating innovative engineers; and
- A description of the types of instruments and processes that are expected to be developed for assessing students' innovation skills.

Once a project is being recommended for funding, each STEP Center will be expected to establish an External Advisory Committee of 8 to 12 members from outside the project institution(s). This committee is expected to meet with project personnel within three months of the start of the project and then at yearly intervals in order to provide advice to the project. In order to avoid conflicts of interest during the reviewing process, do not contact potential External Advisory Committee members until after negotiations to fund an award have begun, and do not list suggested External Advisory Committee members in the proposal.

### Special Information and Supplementary Documentation for Full Proposals

Only Letters of Support that include specific commitments of effort or resources are allowed in the Special Information and Supplementary Documentation Section. Other documents are allowed in this section only as specified in the [NSF Grant Proposal Guide](#) and in this solicitation.

In order for NSF to avoid conflicts of interest during the review process, an Excel document must be created and then converted to a PDF file and uploaded to the Supplementary Documentation Section. The Excel document should list the names of all individuals participating in the project along with their Institution, City, State, and the proposal number of the Preliminary Proposal in separate columns. Any participating institutions or organizations that are not represented by named individuals, should be listed with the name column blank.

### Additional Instructions for Full Proposals

A Project Data Form must be submitted as part of all proposals. The information on this form is used to direct proposals to appropriate reviewers and to determine the characteristics of projects supported by the Division of Undergraduate Education (DUE). In FastLane, this form will appear in the list of forms for your proposal only after you have (1) selected the "STEP" program announcement/solicitation number on the Cover Sheet and (2) saved the Cover Sheet. Grants.gov users should refer to Section VI.5 of the NSF Grants.gov Application Guide for specific instructions on how to submit the DUE Project Data Form.

After review of full proposals, selected projects may be required to attend a reverse site visit at the NSF prior to final funding decisions.

## B. Budgetary Information

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**Cost Sharing:** Inclusion of voluntary committed cost sharing is prohibited

**Other Budgetary Limitations:**

Grant duration for STEP Center awards is expected to be 5 years, with the final 2 years of funding contingent on determination that satisfactory progress has been made by the awardee during the first 3 years. The budget should include provisions for the Principal Investigators and several additional project personnel to attend a third year reverse site visit in the Washington, DC area, to attend annual meetings of STEP Grantees in the Washington, DC, area, and to support the annual External Advisory Board meetings.

## C. Due Dates

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- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):  
August 04, 2010
- **Preliminary Proposal Due Date(s) (required)** (due by 5 p.m. proposer's local time):  
September 07, 2010
- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):  
January 20, 2011  
BY INVITATION ONLY

## D. FastLane/Grants.gov Requirements

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- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://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](mailto: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>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. The Grants.gov's Grant Community User Guide is a comprehensive reference document that provides technical information about Grants.gov. Proposers can download the User Guide as a Microsoft Word document or as a PDF document. The Grants.gov User Guide is available at: <http://www.grants.gov/CustomerSupport>. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: [support@grants.gov](mailto:support@grants.gov). The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

**Submitting the Proposal:** Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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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

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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>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

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 considering the above criteria, reviewers will be asked to comment on the following for all STEP Center proposals:

- How significant is the national challenge or opportunity that is being addressed?
- To what extent are the proposed project activities likely to successfully impact the national challenge or opportunity?
- To what extent is the proposed project addressing the diversity of institutions and curricula that constitute the STEM undergraduate education community?
- How realistic are the expectations for the courses that are expected to see expanded enrollments of students, enhanced learning by students in the courses, and increased retention of students in the courses?
- To what extent is the proposed project encouraging broadening the participation of underrepresented students in STEM?
- How likely are the project activities and outcomes to be sustained by a significant number of academic institutions or other relevant entities?
- To what extent are continued efforts likely to occur across the nation as outgrowths of activities undertaken by the project?
- Is the management plan appropriate to accomplish the goals of the proposed project?
- Are the proposed indicators and methods appropriate for measuring the success of the project and informing the undergraduate STEM community and others about the effectiveness of the project?
- To what extent is the plan for dissemination likely to spread the results and products of the project to the academic institutions and other entities that comprise the STEM undergraduate education community?

For only those proposals being submitted to the EHR-ENG STEP Center competition, in addition to addressing the questions above, the reviewers will be asked to comment on the following:

- To what extent is the project likely to lead to the graduation of more innovative engineers?
- How likely is information to be learned about the process of educating innovative engineers?
- How appropriate are the types of instruments and processes that are expected to be developed for assessing students' innovation skills?

## **B. Review and Selection Process**

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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**

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### **A. Notification of the Award**

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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

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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](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 [nsfpubs@nsf.gov](mailto:nsfpubs@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](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

## C. Reporting Requirements

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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, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report 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 project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

Principal Investigators will be required to participate in evaluation activities related to NSF's program evaluations.

## VIII. AGENCY CONTACTS

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General inquiries regarding this program should be made to:

- EHR-BIO STEP Center, telephone: (703) 292-8670, email: [biostepcenter@nsf.gov](mailto:biostepcenter@nsf.gov)
- EHR-ENG STEP Center, telephone: (703) 292-8670, email: [engstepcenter@nsf.gov](mailto:engstepcenter@nsf.gov)
- EHR-GEO STEP Center, telephone: (703) 292-8670, email: [geostepcenter@nsf.gov](mailto:geostepcenter@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: [support@grants.gov](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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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>.

## 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: [nsfpubs@nsf.gov](mailto:nsfpubs@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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The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA  
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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