

This solicitation has been archived and replaced by [NSF 21-588](#).

EHR Core Research (ECR)

STEM Learning and Learning Environments, Broadening Participation, and Workforce Development

PROGRAM SOLICITATION

NSF 19-508

REPLACES DOCUMENT(S):

NSF 15-509



National Science Foundation

Directorate for Education & Human Resources
Division of Graduate Education
Division of Undergraduate Education
Division of Human Resource Development
Research on Learning in Formal and Informal Settings

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

January 24, 2019

October 03, 2019

First Thursday in October, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

This document is a program solicitation rather than a program description.

The Project Summary should now indicate the Research Track for the project and the proposal type: Level 1, Level 2, Level 3; synthesis; or conferences.

In Part II, under Program Description (Elements of ECR Proposals) the solicitation provides additional detail on expectations for the theoretical grounding, the research plan and methodology, a communication strategy, and external feedback for all proposals to ECR.

The Data Management Plan requirements for proposals submitted to the Directorate for Education and Human Resources (EHR) have been revised.

Clarifies that ECR supports research on evaluation methodologies including: (1) exploring innovative approaches for determining the impacts and usefulness of STEM education projects and programs (these can be qualitative or quantitative in nature, and may include computational methodologies where appropriate); (2) building on and expanding the theoretical foundations for evaluating STEM education and workforce development initiatives, including translating and adapting approaches from other fields; and (3) growing the capacity and infrastructure of the evaluation field. All evaluation methodology proposals should make clear linkages to one, or more, of the three research tracks as appropriate.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 19-1](#)), which is effective for proposals submitted, or due, on or after February 25, 2019.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

EHR Core Research (ECR)
Production Engineering Education and Research

Synopsis of Program:

The EHR Core Research program (ECR) invites proposals for fundamental research (basic research or use-inspired basic research) that advances knowledge in one or more of the three Research Tracks: Research on **STEM**

Learning and Learning Environments, Research on Broadening Participation in STEM fields, and Research on STEM Workforce Development.

The ECR program places emphasis on the rigorous development of theory and accumulation of knowledge to inform efforts to address challenges in STEM interest, learning, and participation, for all groups and all ages in formal and informal settings. This emphasis includes research on advancing evaluative methodologies to support research efforts funded through ECR.

ECR supports a wide range of research activities. ECR seeks to fund fundamental research that could involve the collection of new qualitative or quantitative data, secondary analyses using extant datasets, or meta-analyses. In addition, ECR supports research to develop innovative research methods, metrics, and conceptual models to measure existing and emerging phenomena, and to test theories that inform core scientific questions about STEM education and learning. The three levels of funding should align with the maturity of the proposed work, the size and scope of the empirical effort, and the capacity of the team to conduct the proposed research: (1) **Level I proposals**: have a maximum award size of \$500,000 and a maximum duration of 3 years; (2) **Level II proposals** have a maximum award size of \$1,500,000 and a maximum duration of 3 years; (3) **Level III proposals** have a maximum award size of \$2,500,000 and a maximum duration of 5 years.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Address questions to the program, telephone: (703) 292-2333, email: ECR@nsf.gov

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

- 47.076 --- Education and Human Resources

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 50

Subject to availability of funds.

Anticipated Funding Amount: \$35,000,000

Eligibility Information

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - 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: https://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:**

Not Applicable

C. Due Dates

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

January 24, 2019

October 03, 2019

First Thursday in October, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria apply.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The nation faces extraordinary opportunities and considerable challenges in aspiring to lead the world in science, technology, engineering and mathematics (STEM). Diversity in human capital, rapid and exciting scientific advances leading to new approaches to solving critical societal problems, and a national emphasis on the importance of innovation all point to unparalleled opportunities for the future. At the same time, we must ensure that the U.S. continues to have an adequate supply of STEM workers, including the skilled technical workforce, to remain competitive and grow the economy.

The mission of EHR is to achieve excellence in U.S. STEM education at all levels and in all settings (both formal and informal) to support the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians and educators and a well-informed citizenry that have access to the ideas and tools of science and engineering. The purpose of these activities is to enhance the quality of life of all citizens and the health, prosperity, welfare and security of the nation.

EHR Goals

1. Prepare the *next generation of STEM professionals* and attract and retain more Americans to STEM careers.
2. Develop a robust research community that can conduct *rigorous research and evaluation* that will support excellence in STEM education and that *integrates research and education*.
3. Increase *the technological, scientific and quantitative literacy* of all Americans so that they can exercise responsible citizenship and live productive lives in an increasingly technological society.
4. Broaden participation (*individuals, geographic regions, types of institutions, STEM disciplines*) and close achievement gaps in all STEM fields.

There is a critical need to develop and accumulate knowledge based on fundamental research (whether basic or use inspired [1]) on STEM learning and learning environments, broadening participation in STEM, and STEM workforce development. Such a foundation is essential for strategically guiding the broader set of STEM education investments by the Federal government, and other funding agencies and foundations, and the informing the actions of policymakers, researchers, and practitioners.

The ECR research program is receptive to proposals that address these goals in any one or more of the STEM disciplines. ECR research questions and methods should be tailored to the context of the STEM disciplines under study.

[1] Stokes, Donald (1997). *Pasteur's quadrant – Basic Science and Technological Innovation*. Washington D.C.: Brookings Institution Press.

II. PROGRAM DESCRIPTION

ECR investments in fundamental research are designed to advance progress toward EHR's goals through the discovery and testing of new scientific knowledge based on rigorous research and evaluation. Moreover, the ECR program encourages projects that connect to any of the research strategic opportunities as outlined in the NSF Strategic Plan, [Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years \(FY\) 2018 - 2022](#).

To achieve these goals, ECR intends to fund research that can cumulatively be described as follows:

ECR is a fundamental research program. Proposals submitted to ECR must aim to advance relevant research knowledge pertaining to STEM learning and learning environments, broadening participation in STEM, or STEM workforce development (as outlined in the three Research Tracks described below). The implications of funded projects for practice is likely to be long-term and indirect, influencing other, intermediate, research literatures before affecting practice.

ECR is a multidisciplinary program. The ECR program seeks to create a multidisciplinary portfolio and fund projects from investigators representing a broad range of disciplinary backgrounds and approaches, even those from fields more typically associated with the other NSF directorates and offices. The program encourages investigators to draw on all relevant disciplinary literatures, and to create teams that reach across disciplinary bounds when appropriate. That said, ECR does not require that individual proposals be multidisciplinary. This effort is consistent with the NSF Big Idea on Convergence: https://www.nsf.gov/news/special_reports/big_ideas/convergent.jsp.

ECR supports theoretically, methodologically, and analytically rigorous research. Proposals must be theoretically coherent and build on relevant research. Research designs may be qualitative, quantitative, or mixed methods, and claims must be warranted by the research design proposed. The research design must be described in sufficient detail to allow the evaluation of its appropriateness to address the research questions or hypotheses proposed. To advance theory and methodology, ECR supports research to develop innovative research methods, metrics, and conceptual models to measure existing and emerging phenomena, and to test theory that informs core scientific questions about STEM education and learning, broadening participation in STEM and the STEM workforce. The NSF-Institute of Education Sciences (IES) Common Guidelines for research may serve as a guide in this regard: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126.

ECR focuses on research of all people in all learning environments. Proposals could study subjects of any population group (e.g.,

racial, ethnic, gender, linguistic, socio-economic status, disability status, or geography), any age level (from infancy through the lifespan), or in any learning environment, whether in virtual (e.g., on-line), formal (e.g., school-based), or informal (e.g., museum-based) settings.

ECR seeks to fund research that will foster the capacity to conduct research. ECR will fund projects that support developing the capacity of the nation to conduct this type of research, by drawing in, engaging, and supporting members of a range of disciplines, communities, and populations. When feasible, proposals should include new researchers (e.g., pre-tenured faculty, postdoctoral associates, and graduate students) and researchers who are members of populations under-represented in STEM fields. In addition, ECR supports research on evaluation methodologies including: (1) exploring innovative approaches for determining the impacts and usefulness of STEM education projects and programs (these can be qualitative or quantitative in nature, and may include computational methodologies where appropriate); (2) building on and expanding the theoretical foundations for evaluating STEM learning, broadening participation, and workforce development initiatives, including translating and adapting approaches from other fields; and (3) growing the capacity and infrastructure of the evaluation field (e.g., through summer institutes, or other means – see the ECR call for Capacity Building). All evaluation methodology proposals should make clear linkages to one or more of the three research tracks as appropriate.

ECR seeks to support STEM education research that has been called for in relevant national studies and reports. For example, ECR is interested in research to address the recommendations for graduate education identified in multiple professional reports, and in particular, the recent National Academies study: *Graduate STEM Education for the 21st Century* (<https://www.nap.edu/resource/25038/Graduate%20STEM%20Education-ReportHighlights.pdf>). A partial list of relevant recent national reports is included in this solicitation under *References of Potential Interest*.

Research Tracks

The ECR portfolio spans three broad and overlapping Research Tracks that map to the organizational structure of EHR investments: (1) Research on STEM Learning and Learning Environments, (2) Research on Broadening Participation in STEM fields, and (3) Research on STEM Workforce Development.

Track I – Research on STEM Learning and Learning Environments

ECR supports multidisciplinary rigorous research projects that seek to advance the fundamental knowledge necessary to improve STEM learning in the many environments and contexts in which such learning takes place.

ECR welcomes a broad range of inquiries including, but not limited to:

- novel characterizations or formal models and assessments of learner or teacher conceptual knowledge;
- neural, cognitive, behavioral, social, and affective aspects of learning and teaching;
- the role of group composition and interaction in STEM learning;
- studies of STEM practice (in and out of laboratories) with implications for learning and teaching;
- structures of the environment in which learning takes place (e.g., the classroom, online, or home);
- roles and impacts of institutions and organizations or effects of education policy;
- STEM learning and teaching for persons with and without specific learning disabilities;
- design of technology-based STEM learning environments;
- the relation of instructor knowledge to the implementation of innovative curricula, materials, and assessments;
- the structure of learning sequences including the selection, ordering, and evaluation of learning-trajectories, or progressions for students with and without specific STEM learning disabilities;
- the development and testing of research-based learning tools that test theories of learning;
- the development, refinement and testing of new education research, measurement and evaluation methodologies; and
- studies of the diffusion of STEM learning innovation (e.g., the flow of research knowledge across disciplinary bounds or to practice).

Track II – Research on Broadening Participation in STEM

ECR supports fundamental research investigating issues related to the learning and participation of groups underrepresented in STEM fields, at both the individual and institutional levels.

Broadening Participation research proposals may focus on various factors including, but not limited to:

- institutional and organizational factors (e.g., studies of formal and informal organizational, structural, or environmental factors that impact access to quality STEM education and training and STEM interest, participation, and achievement of STEM learners and STEM workers);
- cultural, psychological, social, demographic and community factors (e.g., studies of how individual, behavioral, family, school or neighborhood factors affect STEM interest, participation, and achievement of STEM learners and STEM workers); and
- policy-related factors (e.g., studies of workplace and educational policies that impact STEM access and participation, and the relationship between broader participation in STEM and STEM innovation and STEM literacy).

Topics may include, but are not limited to, research on:

- underlying organizational, psychological and social issues affecting the different participation and graduation rates in STEM of women, men, individuals with disabilities, and racial and ethnic minorities;
- behavioral and sociological factors that influence recruitment and retention in STEM education and workforce across any, or all, organizational levels, along with interactions across levels;
- aspects of preK-12, informal, and higher education learning environments or workplace cultures that moderate the factors impacting the participation and success of groups underrepresented in STEM;
- impacts of a diverse STEM workforce on scientific productivity, innovation, and the national economy;
- measures, processes, and metrics to assess impacts and outcomes of broadening participation initiatives and programs; and
- impacts of learning technologies and cyberlearning on underrepresented groups in STEM.

For the purposes of this solicitation, groups underrepresented in STEM may include but are not limited to: women and girls, individuals with disabilities, underrepresented racial and ethnic minorities (e.g., African Americans, Hispanics, Native Americans, Alaska Natives,

Native Hawaiians, and Pacific Islanders), English-language learners, veterans and students from rural or lower socio-economic backgrounds. Proposers must document the STEM disciplinary underrepresentation of the groups they wish to study. ECR is particularly interested in supporting a robust portfolio of research on individuals with disabilities in STEM and research on gender in STEM. ECR broadening participation research projects are expected to address issues related to the generalizability and applicability of research findings to different groups.

Track III – Research on STEM Workforce Development

ECR supports fundamental research on STEM workforce development and invites proposals for studies that will strengthen the research base that informs investments in STEM workforce preparation and development at all levels of education, from K-12 through higher education and the workplace. ECR investments provide the evidence on how best to prepare a STEM workforce that is ready to capitalize on the latest advances in technology and science, and to address current and future social and economic challenges. ECR is also interested in studies of reskilling and upskilling workers for STEM positions in a variety of contexts including workplaces and online environments and that advance the knowledge base of personalized learning in these contexts. Finally, ECR STEM workforce development research should address, where sensible, questions of STEM workforce innovation, entrepreneurship, and invention.

Research directions for this Track may include, but not be limited to, research on:

- technical training in community colleges; career preparation at the high school, undergraduate, graduate, or postdoctoral levels;
- on-the-job training, or the re-training, of experienced workers with skills that allow them to meet evolving workforce needs;
- emerging practices and changing contexts of the STEM workforce;
- the learning, skills, and training necessary to be successful in current and future STEM workplaces, whether academic or non-academic;
- STEM career pathways and transitions including those for STEM teachers;
- the changing institutional capacity for reforming STEM workforce development efforts;
- impact of different funding models at the K-12, community college, undergraduate, and graduate levels on the preparation of STEM workers (e.g., career technical education, co-operative internships, teaching assistantships, fellowships, traineeships, research assistantships, work-for-pay, loans);
- the impact of technology, demographics, and social media on the STEM labor market and on-the-job education and training; persistence and mobility in STEM careers; influence of public/private partnerships on workforce preparation;
- implications of state level labor market trends on STEM education and training of STEM teachers;
- the impacts of STEM teacher turnover on schools and students, particularly on populations currently underrepresented in STEM fields; and
- the recruitment of STEM teachers.

ECR Proposal Types

ECR research projects may fall within or cut across any of the Research Tracks described above. The three levels of funding should align with the maturity of the proposed work, the size and scope of the empirical effort, as well as the capacity of the team to conduct the proposed research: (1) **Level I proposals**: have a maximum award size of \$500,000 and a maximum duration of 3 years; (2) **Level II proposals** have a maximum award size of \$1,500,000 and a maximum duration of 3 years; (3) **Level III proposals** have a maximum award size of \$2,500,000 and a maximum duration of 5 years.

ECR also supports synthesis projects and conferences related to advancing knowledge in one or more of the three research Tracks.

Synthesis proposals seek support for the synthesis and/or meta-analysis of existing knowledge on a topic of critical importance to STEM learning and/or education, or for the diffusion of research-based knowledge. Investigators are permitted to propose conferences and other meetings as one of the means of completing the syntheses and diffusing the research-based knowledge that is developed. Additional emphasis will be placed on the proposed dissemination plan. Synthesis proposals may be budgeted at Level 1 or Level II.

Conference proposals seek support to conduct well-focused conferences related to the goals of the program. Budgets should be commensurate with the duration of the event and the number of participants. Proposals should include a conceptual framework for the conference, draft agenda, possible participant list, the outcomes or products that will result from the conference, and how these products serve the fundamental research goals of the ECR program. Investigators are encouraged to contact a cognizant EHR Program Officer prior to submission. Typical costs are \$25,000 to \$100,000.

References of Potential Interest

National Research Council. (2012a). *Education for life and work: Developing transferable knowledge and skills in the 21st century*.

Committee on Defining Deeper Learning and 21st Century Skills, J.W. Pellegrino and M.L. Hilton, Editors. Board on Testing and Assessment and Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Research Council. (2012b). *A framework for K-12 science education practices, crosscutting concepts, and core ideas*. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Research Council. (2012c). *Discipline-based education research: Understanding and improving learning in undergraduate science and engineering*. Committee on the Status, Contributions, and Future Directions of Discipline-Based Education Research. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

National Research Council (2012d). *Monitoring progress toward successful K-12 STEM education: A nation advancing?* Committee on the Evaluation Framework for Successful K-12 STEM Education. Board on Science Education and Board on Testing and Assessment, Division of Behavioral and Social Sciences and Education

National Science Board. (2018). *Our Nation's Future Competitiveness Relies on Building a STEM-Capable U.S. Workforce: A Policy Companion Statement to Science and Engineering Indicators 2018*. Arlington, VA: National Science Foundation.

- National Science Board. (2018) *Science and Engineering Indicators*. Arlington, VA: National Science Foundation
- National Academies of Sciences, Engineering, and Medicine. 2018. *Data Science for Undergraduates: Opportunities and Options*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25104>.
- National Academies of Sciences, Engineering, and Medicine. 2018. *Graduate STEM Education for the 21st Century*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25038>.
- National Academies of Sciences, Engineering, and Medicine. 2018. *Measuring the 21st Century Science and Engineering Workforce Population: Evolving Needs*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24968>.
- National Academies of Sciences, Engineering, and Medicine. 2018. *Indicators for Monitoring Undergraduate STEM Education*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24943>.
- National Academies of Sciences, Engineering, and Medicine. 2017. *Supporting Students' College Success: The Role of Assessment of Intrapersonal and Interpersonal Competencies*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24697>.
- National Academies of Sciences, Engineering, and Medicine. 2017. *Promoting the Educational Success of Children and Youth Learning English: Promising Futures*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24677>.
- National Academies of Sciences, Engineering, and Medicine. 2017. *Undergraduate Research Experiences for STEM Students: Successes, Challenges, and Opportunities*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24622>.
- National Academies of Sciences, Engineering, and Medicine. 2017. *Building America's Skilled Technical Workforce*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/23472>.
- National Academies of Sciences, Engineering, and Medicine. 2017. *Communicating Science Effectively: A Research Agenda*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/23674>.
- National Academies of Sciences, Engineering, and Medicine. 2016. *Science Literacy: Concepts, Contexts, and Consequences*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/23595>.
- National Academies of Sciences, Engineering, and Medicine. 2016. *Barriers and Opportunities for 2-Year and 4-Year STEM Degrees: Systemic Change to Support Students' Diverse Pathways*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/21739>.
- National Academies of Sciences, Engineering, and Medicine. 2015. *Science Teachers' Learning: Enhancing Opportunities, Creating Supportive Contexts*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/21836>.
- National Research Council. 2015. *Identifying and Supporting Productive STEM Programs in Out-of-School Settings*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/21740>.
- National Research Council. 2015. *Enhancing the Effectiveness of Team Science*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/19007>.

III. AWARD INFORMATION

NSF expects to make standard or continuing grant awards. The ECR program anticipates having \$35,000,000 for new awards in FY 2019, subject to availability of funds. The maximum award amount Level I research proposals is \$500,000, with duration of up to three years. The maximum award amount for Level II research proposals is \$1,500,000, with duration of up to three years. The maximum award amount for Level III research proposals is \$2,500,000, with duration of up to five years. Synthesis proposals may be budgeted at Level I or Level II. The typical award amount for Conferences is \$25,000 to \$100,000.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), Chapter I.E.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

There are no restrictions or limits.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via FastLane, Research.gov, or Grants.gov.

- 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 Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from 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 Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Proposal and Award Policies and Procedures Guide (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- 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: (https://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.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

The following instructions supplement guidelines in the PAPPG and NSF *Grants.gov Application Guide*:

Cover Sheet.

- Select the **ECR solicitation number**.
- **The box for Human Subjects must be checked**; this box should not be left blank. The Human Subjects box should be marked as pending if an Institutional Review Board (IRB) is either (1) reviewing the project plan and has not yet determined a ruling of "approved" or "exempt", or (2) the project plan has not yet been submitted to an IRB for review. If human subjects activities are exempt from IRB review, enter appropriate exemption number in the space provided.
- To avoid delays in processing award recommendations, **it is strongly recommended that PIs begin the process of obtaining appropriate IRB approvals or exemptions** as needed for projects involving human subjects. No awards will be made without such approvals or exemptions.

Project Summary. The Project Summary should specify the Research Track of interest (i.e., STEM Learning and Learning Environments, Broadening Participation in STEM, or STEM Workforce Development). More than one Track may be specified. If the proposal is a conference or synthesis, that also should be noted in the Project Summary. In addition, the Project Summary should state the specific STEM disciplinary content that is to be studied (e.g., algebra) and the age or grade levels, if appropriate.

Proposals that do not contain the Project Summary, including an overview and separate statements on Intellectual Merit and Broader Impacts, will not be accepted or will be returned without review as outlined in the PAPPG.

Project Description. The Project Description is limited to 15 pages and must comply with all formatting requirements of the PAPPG in effect at the time of submission. Proposals funded under this solicitation must focus on research questions or hypotheses related to one or more of the three Research Tracks described above.

Elements of ECR Proposals: Proposals **must** address the following elements in the 15 -page Project Description:

- **Logical connections to an established research base.** All research proposals must be grounded in the relevant disciplinary literatures. The proposal should make the case for how the established research base and its theoretical underpinnings: (a)

justify new investment in the proposed line of inquiry; (b) why insights from the research are likely to significantly impact scientific progress in the area, and (c) and how the project and its findings are likely to improve relevant theory or practice.

- **A rigorous research plan.** Proposals must include well-focused research questions or testable hypotheses that reflect the current state of knowledge in the area and the theory or conceptual framework being used. The proposal must discuss in detail the methods used to answer the research questions or test the hypotheses posed, along with the types of data to be collected and methods for data collection. Methods should directly link to the theory or theories being used. If a population sample is used, the sample must be described along with the rationale for sample selection, and the investigator's access to the sample. The proposal must address whether the design is premised on special needs and interests due to educational level, gender, race, ethnicity, economic status, or disability, and to what extent data will be disaggregated for multiple characteristics. Proposals must include a detailed and appropriate plan for how all data will be analyzed to address the research questions or hypotheses. The above must be presented with enough detail to allow for their evaluation during review.
- **A plan to assess success of the project.** Plans for carrying out proposed activities must be well-reasoned, well-organized, based on a sound rationale, and incorporate a mechanism to assess success. Projects are expected to document, and report progress toward the accomplishment of intellectual merit and broader impact goals, objectives and outcomes defined in the proposal. Proposals must include plans for soliciting—and addressing—objective external feedback (e.g., through an advisory board, peer review, or other mechanisms).
- **A plan for dissemination.** Proposals must include a strategy for reaching a broad audience with the findings of the project including, where appropriate, researchers in other fields, practitioners, policy makers, and public audiences. The potential results of the proposed research are expected to be of sufficient significance to merit peer-review and broader publication. (For additional information on dissemination and communication see the resources available from the American Association for the Advancement of Science's Center for Public Engagement with Science & Technology; and the Dissemination and Communication Resources available from the Center for Advancing Research & Communication.)

Other Required Sections: Per guidance in the PAPPG, the Project Description must contain, as a separate section within the narrative, sections labeled "Intellectual Merit" and "Broader Impacts". Proposers can decide where to include these sections within the Project Description. The proposal must also describe "Results of Prior NSF Support" for related projects in which the PI or co-PI have been involved, as outlined in the PAPPG.

Budget and Budget Justification. Budgets should be in NSF format and include up to five pages of budget justification. The budget justification should be in narrative form and include detailed explanations for each line item with budget resources listed in the budget. Information about what may or may not be included in the budget or budget justification is outlined in the NSF PAPPG or NSF *Grants.gov Application Guide*. For proposals with subawards, each subaward must include a separate budget and budget justification of no more than five pages.

Funds should be budgeted for the principal investigator or a project member to attend a two-day grantees' meeting in the Washington, D.C. area each award year.

Supplementary Documentation.

Supplementary documents should include **Letters of Collaboration** from project partners, the **Postdoctoral Mentoring Plan** (*if applicable*) and the **Data Management Plan (DMP)** as described in the PAPPG. Letters of support from persons endorsing the project but not making a substantial commitment to the project are not allowed. Inclusion of any other information in the supplementary documents or as an appendix will result in the proposal being returned without review.

Data Management Plans: All data collected for ECR projects must accord with the revised EHR Data Management Guidance, which may be found here: <https://www.nsf.gov/bfa/dias/policy/dmpdocs/ehr.pdf>. DMPs will be reviewed by panelists and program directors and should be written with sufficient clarity and detail to support proposal processing and the merit review process. Generic DMPs should be avoided. Each DMP should describe the data, metadata, samples, software, curricula, documentation, publications, and other materials generated during the proposed research. DMPs should reflect the best practices and standards for the proposed research and types of data being generated, whether experimental, computational, text-based, media or physical materials. ECR expects its awardees to describe how data and related materials are generated to allow others to reproduce the research study. Further the DMP should support the sharing of data, products and methods in such a way that others can understand, validate, and replicate research findings.

In addition to guidance provided in the PAPPG on required Special Information and Supplementary Documents, please provide a **list of all project personnel** in the Supplementary Document section. Include current, accurate information for all personnel and institutions involved in the project. NSF staff will use this information in the merit review process to manage reviewer selection. The list should include all PIs, co-PIs, senior personnel, paid/unpaid consultants or collaborators, subawardees, postdoctoral researchers (if known), and project-level advisory committee members. This list should be numbered and include (in this order) Full name, Organization(s), and Role in the project, with each item separated by a semi-colon. Each person listed should start a new numbered line. For example:

1. Mary Smith; XYZ University; PI
2. John Jones; University of PQR; Senior Personnel

Appendix: Not permitted. The 15 pages of the Project Description should contain all the information needed to describe the project. Proposals submitted with an Appendix will be returned without review.

Single Copy Documents.

Collaborators and Other Affiliations Information: Collaborators & Other Affiliations (COA) information specified in the PAPPG should be submitted using the instructions and spreadsheet template found at <https://nsf.gov/bfa/dias/policy/coa.jsp>.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

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

January 24, 2019

October 03, 2019

First Thursday in October, Annually Thereafter

D. FastLane/Research.gov/Grants.gov Requirements

For Proposals Submitted Via FastLane or Research.gov:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For FastLane or Research.gov user support, call the FastLane and Research.gov Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov or rgov@nsf.gov. The FastLane and Research.gov Help Desk answers general technical questions related to the use of the FastLane and Research.gov systems. 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.

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. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <http://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical 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. 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.

Proposers that submitted via FastLane or Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. 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 either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with 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. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Building the Future: Investing in Discovery and Innovation - NSF Strategic Plan for Fiscal Years (FY) 2018 – 2022*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs,

projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i), contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. 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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

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 notice, 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 notice; (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 notice. 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 https://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.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF

Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

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 no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following 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 all identified PIs and co-PIs on a given award. 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 Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also 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.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Address questions to the program, telephone: (703) 292-2333, email: ECR@nsf.gov

For questions related to the use of FastLane or Research.gov, contact:

- FastLane and Research.gov Help Desk: 1-800-673-6188
FastLane Help Desk e-mail: fastlane@nsf.gov
Research.gov Help Desk e-mail: rgov@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.

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, "NSF Update" is an information-delivery system 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 [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this 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 55,000 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 Arctic 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 (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 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 <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **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
 - 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
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314



National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (703) 292-5090 or (800) 281-8749

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