

# Research Experiences for Teachers (RET) in Engineering and Computer Science Supplements and Sites

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## PROGRAM SOLICITATION NSF 17-575

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### REPLACES DOCUMENT(S): NSF 15-536

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#### National Science Foundation

Directorate for Engineering  
Engineering Education and Centers

Directorate for Computer & Information Science & Engineering

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

October 10, 2017

September 19, 2018

Third Wednesday in September, Annually Thereafter

## IMPORTANT INFORMATION AND REVISION NOTES

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This RET Site solicitation has been revised to:

- Change the due date.
- Strengthen language requiring a coherent intellectual focus related to ENG or CISE in the proposed research projects.
- Require community college faculty who participate be full-time faculty.
- Strengthen language to require that a lead PI be a tenure-track ENG or CISE discipline faculty member whose primary responsibilities are research and teaching and not administration or outreach.
- Add requirement that proposals contain samples of research projects with clearly labelled sections on the components appropriate for teachers.
- Expand language about including specific plans for activities to prepare the RET participants for the research activities. Specified that these activities cannot include significant pre-site studies and cannot include enrollment in on-line or on-site courses.
- Add language that requires letters of collaboration to be from persons at the school district level. Letters from individual teachers are not allowed.
- Add items to the Additional Solicitation Specific Review Criteria to cover the main components of the program.
- Add language on expectations about prior Site results for Sites submitting for renewal.
- Add language about expectations for academic year follow-up activities and expectations of school visits by PIs and graduate students.
- Add requirement for an explanation of how a cohort with mixed grade level groups of teachers (middle and high school, high school and community college) will be managed as a cohort.
- Add language about providing scientific professional development opportunities for the teachers, particularly opportunities for presentations of plans, methods, and results to various groups.

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

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### General Information

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#### Program Title:

Research Experiences for Teachers (RET) in Engineering and Computer Science  
Supplements and Sites

## Synopsis of Program:

NSF's Directorate for Engineering (ENG) and the Directorate for Computer and Information Science and Engineering (CISE) have joined to support the Research Experiences for Teachers (RET) in Engineering and Computer Science program. This program supports active long-term collaborative partnerships between K-12 Science, Technology, Engineering, Computer and Information Science, and Mathematics (STEM) in-service and pre-service teachers, full-time community college faculty, and university faculty and students to enhance the scientific disciplinary knowledge and capacity of the STEM teachers and/or community college faculty through participation in authentic summer research experiences with engineering and computer science faculty researchers. The research projects and experiences all revolve around a focused research area related to engineering and/or computer science that will provide a common cohort experience to the participating educators. The K-12 STEM teachers and/or full-time community college faculty also translate their research experiences and new scientific knowledge into their classroom activities and curricula. The university team will include faculty, graduate and undergraduate students as well as industrial advisors. Involvement of graduate students in support of academic-year classroom activities is particularly encouraged. Partnerships with inner city, rural or other high needs schools are especially encouraged, as is participation by underrepresented minorities, women, veterans, and persons with disabilities.

As part of the long-term partnership arrangements, university undergraduate/graduate students will partner with pre-college/community college faculty in their classrooms during the academic year to support the integration of the RET curricular materials into classroom activities.

This announcement features two mechanisms for support of in-service and pre-service K-12 STEM teachers and full-time community college faculty: (1) RET supplements to ongoing ENG and CISE awards and (2) new RET Site awards. RET supplements may be included outside this solicitation in proposals for new or renewed ENG and CISE grants or as supplements to ongoing ENG- and CISE-funded projects. RET in Engineering and Computer Science Sites, through this solicitation, are based on independent proposals from engineering and/or computer and/or information science departments, schools or colleges to initiate and conduct research participation projects for K-12 STEM teachers and/or full-time community college faculty.

## 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.*

- Mary F. Poats, Program Manager, Directorate for Engineering (ENG), Division of Engineering Education and Centers (EEC), 585N, telephone: (703) 292-5357, fax: 703-292-9051, email: [mpoats@nsf.gov](mailto:mpoats@nsf.gov)
- Harriet G. Taylor, Program Director, Directorate for Computer and Information Science and Engineering (CISE), Division of Computer and Network Systems (CNS), 1175N, telephone: (703) 292-8950, email: [htaylor@nsf.gov](mailto:htaylor@nsf.gov)

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

- 47.041 --- Engineering
- 47.070 --- Computer and Information Science and Engineering

## Award Information

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**Anticipated Type of Award:** Standard Grant or Continuing Grant

**Estimated Number of Awards:** 9

**Anticipated Funding Amount:** \$5,800,000

The total anticipated funding in FY 2018, FY 2019 and FY 2020 for both Sites and Supplements is approximately \$5,800,000 per year, subject to the availability of funds. It is anticipated that approximately 9 Site awards will be made per year. The maximum total request for a Site is \$600,000 for a duration of up to three years. Supplements are limited to a maximum of \$10,000 per teacher and/or community college faculty for a duration of one year subject to the availability of funds.

## Eligibility Information

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### Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.

### Who May Serve as PI:

The principal investigator of a RET in Engineering and Computer Science Site proposal must have a full-time, tenured or tenure-track faculty appointment within a College/Department of Engineering or Engineering Technology or a College/Department of Computer and/or Information Science broadly defined (including e.g., Human-Computer

Interaction (HCI), Software Engineering, Networking Science, Informatics] within the submitting U.S. academic institution. The PI must be a full-time Engineering and/or Computer Science faculty member whose primary job responsibilities are research and teaching and not a faculty member who is involved in an administrative capacity such as a dean or outreach coordinator.

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

Three Site proposals may be submitted per competition by a U.S. academic institution, including a College/Department of Engineering, Engineering Technology, or Computer and/or Information Science as the lead institution. **No more than two of the three proposals may have an engineering focus and only one of the three proposals may have a computer and/or information science focus.**

Potential PIs are advised to contact their institutional office of research regarding processes used to select proposals for submission.

**Limit on Number of Proposals per PI or Co-PI: 1**

## Proposal Preparation and Submission Instructions

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### 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](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](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](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:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

### C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
  - October 10, 2017
  - September 19, 2018
  - Third Wednesday in September, Annually Thereafter

## 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:

Standard NSF reporting requirements apply.

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## I. INTRODUCTION

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Encouraging active participation of K-12 STEM teachers and/or full-time community college faculty in research projects is an excellent way to reach broadly into the teacher talent pool of the U.S. such that they can:

- have opportunities for professional development within the science disciplines and enhance their understanding of science and engineering principles through well-designed research experiences and associated background activities to develop a sound conceptual base of knowledge in engineering and/or computer science;
- enrich their teaching of engineering and/or computer science concepts to their students;
- encourage, stimulate, and guide their students more effectively to seek engineering and/or computer science careers; and
- share and disseminate what they have learned with other teachers in their field.

The Research Experiences for Teachers (RET) in Engineering and Computer Science program offers a framework by which these educators may engage in meaningful university research experiences in partnership with faculty, students, and industry mentors, and then adapt this new knowledge into their teaching practices. Support for these educators to engage in engineering and computer science research projects is through Site awards and Supplements to on-going research and education projects funded by ENG and CISE. Through these partnerships, the RET in Engineering and Computer Science Program aims to:

- Build long-term collaborative relationships between both in-service and pre-service K-12 science, technology, engineering, computer science, and mathematics (STEM) teachers, full-time community college faculty, and the engineering and computer science research community;
- Support the active participation of these teachers and future teachers and full-time community college faculty in research projects with a coherent intellectual focus related to engineering and computer science; the focused set of projects may be associated with projects funded by ENG and CISE as well as projects that are not NSF-funded.
- Facilitate professional development of K-12 STEM teachers and community college faculty through strengthened partnerships between institutions of higher education and local school districts;
- Engage industry in an advisory role to form meaningful partnerships with the K-12 and community college sectors;
- Provide instructional opportunities to graduate students who mentor teachers in the RET program and involve graduate students in K-12 classroom support activities during the academic year; and
- Provide leadership opportunities to teachers and community college faculty who participate in the program by requiring that they disseminate information about their research experience to a broader audience.

## II. PROGRAM DESCRIPTION

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The Research Experiences for Teachers (RET) in Engineering and Computer Science program encourages the active participation of both in-service and pre-service (education majors who are still pursuing their degrees) K-12 science, technology, engineering, computer science and mathematics (STEM) teachers and full-time community college faculty in ongoing engineering and computer science research activities through Site awards and Supplements. Encouraging active participation of teachers and community college faculty in NSF projects is an excellent way to reach broadly into the teacher talent pool of the U.S. facilitating the ability of teachers to teach engineering and computer science concepts to their students in a compelling way and inspiring more students to pursue engineering and computer science careers. ENG and CISE strongly encourage all their grantees, including grantees from the Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs, to make special efforts to identify talented teachers and community college faculty for participation in this RET opportunity.

**RET in Engineering and Computer Science Supplement.** A request for funding of a RET in Engineering and Computer Science Supplement should be made under an existing ENG or CISE award or within a proposal for a new or renewed ENG or CISE award. The description of the RET activity must clearly articulate in some detail the form and nature of the prospective K-12 STEM teacher and/or full-time community college faculty member's involvement in the PI's ongoing or proposed research. See Section V.A. (5), "Project Description," below for detailed information. For example, the teacher or community college faculty member may participate in the design of new experiments, modeling and analysis of experimental data, algorithm and software development, and other activities that will result in intellectual contributions to the project. It is expected that the RET in Engineering and Computer Science Supplement experience will also lead to the transfer of new knowledge to classroom activities. Therefore, the RET Supplement description must also indicate what type of sustained follow-up will be provided during the academic year to help in translating the teacher's research experience and new understanding of engineering and/or computer science concepts into classroom practice.

**RET in Engineering and Computer Science Site Project.** A RET in Engineering and Computer Science Site project is an independent proposal, submitted under this solicitation at an annual deadline date, to provide groups of in-service and pre-service K-12 STEM teachers and/or full-time community college faculty with discovery and technology-based research experiences in engineering and/or computer science laboratories and facilities, which will then be incorporated into their classroom activities during the school year. A RET in Engineering and Computer Science Site project may be conducted during the summer, academic year, or both, and each must have a well-defined research focus, with clearly articulated projects and activities for 10 or more teachers and/or community college faculty per year.

A RET Site proposal must be submitted by a College, School, or Department of Engineering, Engineering Technology, or Computer and/or Information Science and must involve **10 or more teachers and/or full-time community college faculty** in an engineering and/or computer and/or information science research project for a duration of **at least six weeks during the summer**. In those cases where limited availability of specialized facilities, such as clean rooms, electron microscopes, etc., make it possible to offer an extraordinary experience in a shorter timeframe, a research component of a shorter duration may be proposed with appropriate justification. An orientation session must be included at the beginning of the program for the teachers and/or community college faculty to acquaint them with laboratory methods, safety procedures, analytical methods, etc., as appropriate to the proposal.

RET Site projects must be led by engineering and/or computer science faculty who are active researchers as well as faculty members. The PI must be an active engineering or computer science tenure-track faculty member who will serve as the intellectual leader for the project and will be engaged with the project and the participating teachers during the summer and academic year. While faculty who are in administrative support positions such as student outreach coordinators as well as faculty from the College of Education may be included in supporting roles, a disciplinary faculty member who is part of the tenure-track teaching and research faculty must be the lead principal investigator and must take the primary responsibility for the project and for providing sound research experiences as well as connections to fundamental engineering and/or computer science concepts to the participating teachers.

RET Site projects are based on the RET teachers and/or community college faculty conducting authentic research in engineering and/or computer science over the summer. RET Site proposals must include samples of research projects with clearly labeled sections identifying the aspects of the research on which the teachers and/or community college faculty will work. RET Site proposals must also clearly detail plans for activities to prepare the teachers and/or community college faculty with the disciplinary background needed to conduct the research. These activities must be done during the summer research weeks. The preparatory activities cannot involve enrollment in courses before or during the summer research. The activities should take place during the on-campus summer component and not rely on substantial prior preparatory work by the teachers and/or community college faculty. Projects should be aligned with core areas of engineering and/or computer science. The research projects themselves should not focus on education or curriculum development but rather focus on ENG and CISE disciplinary scientific concepts.

Because the RET experience also will lead to the transfer of new knowledge to classroom activities, the proposal must provide a plan for sustained academic year follow-up by the RET Site project team with the teachers and/or community college faculty to ensure that the research experience is translated into classroom practice during the academic year. Projects should include faculty and/or graduate student support for academic-year K-12 and/or community college classroom activities. Projects should include visits by faculty and graduate students to the K-12 and/or community college classrooms. Projects should include academic-year activities for the teachers and/or community college faculty to facilitate dissemination of their classroom modules to a broader audience and to provide opportunities for other teachers and/or community college faculty to incorporate the curricular materials and learning activities that the RET teachers and/or community college faculty develop during their RET participation. The Site proposal must include a request for support of a conference or other outreach activities designed to reach other local teachers and/or community college faculty not involved in a RET in Engineering and Computer Science Site project so as to inform them of the outcomes and materials developed as a result of the Site project.

The proposal must provide a detailed plan for evaluation of the proposed project and the classroom impact. Finally, the proposal must clearly identify an **external evaluator** and demonstrate the qualifications of the evaluator to develop and conduct a credible evaluation based on project and programmatic goals and outcomes. The external evaluator does not need to be from outside the host university. The evaluator should be someone from an academic unit other than engineering or computer science or any academic unit that is participating in some integral way in the RET Site project. Funding for the external evaluator should be included in the budget.

**Other Opportunities.** ENG and CISE strongly encourage the use of RET supplements to enable K-12 STEM teachers and full-time

community college faculty to participate in Research Experiences for Undergraduates (REU) programs. See [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5517&from=fund](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&from=fund) for a list of current, active REU Sites.

The RET in Engineering and Computer Science program will allow PIs to involve participating teachers and community college faculty in international research experiences in their proposals. PIs may contact NSF's Office of International Science and Engineering (OISE) staff, with expertise in the country or region of interest, for information about institutions and counterpart agencies. (Contacts for cognizant program managers(s) are available from the OISE webpage, (<https://www.nsf.gov/od/oise/country-list.jsp>).

### III. AWARD INFORMATION

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**Anticipated Type of Award:** Continuing Grant or Standard Grant

**Estimated Number of Awards:** 9

**Anticipated Funding Amount:** \$5,800,000

The total anticipated funding in FY 2018, FY 2019 and FY 2020 for both Sites and Supplements is approximately \$5,800,000 per year, subject to the availability of funds. It is anticipated that approximately 9 Site awards will be made per year. The maximum total request for a Site is \$600,000 for a duration of up to three years. Supplements are limited to a maximum of \$10,000 per teacher and/or community college faculty for a duration of one year subject to the availability of funds.

### IV. ELIGIBILITY INFORMATION

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#### Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.

#### Who May Serve as PI:

The principal investigator of a RET in Engineering and Computer Science Site proposal must have a full-time, tenured or tenure-track faculty appointment within a College/Department of Engineering or Engineering Technology or a College/Department of Computer and/or Information Science broadly defined [including e.g., Human-Computer Interaction (HCI), Software Engineering, Networking Science, Informatics] within the submitting U.S. academic institution. The PI must be a full-time Engineering and/or Computer Science faculty member whose primary job responsibilities are research and teaching and not a faculty member who is involved in an administrative capacity such as a dean or outreach coordinator.

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

Three Site proposals may be submitted per competition by a U.S. academic institution, including a College/Department of Engineering, Engineering Technology, or Computer and/or Information Science as the lead institution. **No more than two of the three proposals may have an engineering focus and only one of the three proposals may have a computer and/or information science focus.**

Potential PIs are advised to contact their institutional office of research regarding processes used to select proposals for submission.

#### Limit on Number of Proposals per PI or Co-PI: 1

#### Additional Eligibility Info:

Small businesses with an active SBIR or STTR grant are eligible to apply for a RET Supplement.

### V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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#### A. Proposal Preparation Instructions

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**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](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](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 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](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](mailto: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](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](mailto: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.

**Proposals for RET in Engineering and Computer Science Sites must include the following:**

1. **Cover Sheet.** Select the number for the RET in Engineering and Computer Science program solicitation from the pull-down list. (Grants.gov users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page.) The NSF organizational unit to which proposals should be directed is EEC - Research Experiences for Teachers (RET) in Engineering and Computer Science. In the title of the project, start with the label "RET Site."
2. **Information about Principal Investigators.** A single individual should be designated clearly as principal investigator. This individual must be a full-time, tenure track faculty member in engineering and/or computer science who is an active researcher as well as an educator. This individual will be responsible for overseeing all aspects of the RET Site award. However, the institution may designate one additional person as co-principal investigator, should developing and operating the RET Site involve such shared responsibility. Other anticipated research supervisors or mentors are listed as senior personnel. The principal investigator of a RET in Engineering and Computer Science Site proposal must have a full-time tenure or tenure-track faculty appointment, within a College/Department of Engineering or Engineering Technology or a College/Department of Computer and/or Information Science broadly defined (e.g., including HCI, Software Engineering, Networking Science, Informatics) of the submitting U.S. academic institution.
3. **Project Summary** (one-page limit). The Project Summary consists of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity.

Provide a description of:

- the engineering and/or computer science disciplinary research focus of the research experiences and the nature of the research experiences that the K-12 STEM teachers and/or community college faculty will participate in;
- plans for developing curricular modules linked to the research experiences and for sharing the modules with K-12 and/or community college students and teachers;
- the activities that would result if the project is funded, including objectives of the activities and the RET Site project,
- teachers and/or community college faculty to be recruited and identification of school districts that will be involved;
- intended impact on participating teachers and/or community college faculty and their students, and
- plans for academic-year follow-up and outreach activities and dissemination.

The project summary should include the following information at the beginning of the Overview section: name of the host institution/organization, school districts and other institutions involved; the major field and subfields that describe the proposal area; whether the Site is being submitted for ENG or CISE consideration; whether it is for a new or renewal Site; a project title that will permit a prospective participant to identify the research focus of the Site (the title will be used in web-based lists of RET in Engineering and Computer Science Sites); the number of teachers and/or community college faculty involved; the number of summer weeks on site and months of academic year activity; the name, telephone number, and email address of the point-of-contact for teacher and/or community college faculty recruitment; and a web address for Site information (if known). In addition, at the end of the Overview Box, please provide a list of key words or phrases following the text "Key Words:" that identify the areas of technical expertise and education-related activities that are involved in the proposed project(s).

4. **Table of Contents.** The Table of Contents is system-generated and cannot be edited.

5. **Project Description.** The project description contains the following items "a" through "j" and is not to exceed 15 pages in length. **Please note that per guidance in the PAPPG, the Project Description must contain, as a separate section within the narrative, a section labeled "Broader Impacts". This section should provide a discussion of the broader impacts of the proposed activities. You can decide where to include this section within the Project Description.**
- a. **Overview.** Provide a brief description of the goals and objectives of the proposed RET in Engineering and Computer Science Site, targeted teacher and/or community college faculty participants, intellectual research focus, broader impact of the proposed activity, organizational structure, timetable, and institutional commitment to the RET activity.
  - b. **Nature of Teacher and/or Community College Faculty Research Activities.** A RET in Engineering or Computer Science project must have a **well-defined research focus** related to engineering and/or computer science with involvement of a PI and disciplinary faculty with related research expertise. The projects must all contribute to building a cohort experience for the teachers and/ or community college faculty so that they can then share as a group and individually with other educators and students. Proposals for RET Sites should address the considerations described below:
    - An orientation session must be included at the beginning of the program to acquaint the RET participants with laboratory methods and safety procedures as appropriate to the proposal.
    - RET Site projects must include a sound set of activities including hands-on lab experiences at the beginning of the RET program to provide necessary ENG and CISE disciplinary background for the research. These experiences must be integrated into the summer site plans. **These plans cannot involve registration in courses either online or on-site.** There should be minimal expectations for involvement or study by the teachers and/or community college faculty on the research topic prior to the beginning of the on-site experiences. Mentors will need training in working with teachers and/or community college faculty to develop the necessary background and skills to conduct credible research. Activities will need careful planning to provide adequate time for initial background activities as well as a focused research project.
    - Proposals must provide detailed descriptions of examples of research projects that the teachers and/or community college faculty will conduct and **clearly labeled descriptions** that highlight the teacher and/or community college faculty contribution to the project. Each project described must have a section labelled **"Teacher and/or Community College Faculty component."**
    - The teachers and/or community college faculty must participate in actual research and understand the connections to ENG and CISE as well as to their own subject areas. Teachers and/or community college faculty must be active participants and not just observers. Their research needs to have clear objectives and research questions. Experimentation is needed with evaluation of results.
    - Proposals must include plans that will ensure ENG and CISE participant-faculty interaction and communication. The RET participants must work closely in teams with university faculty and their students. RET participants should have multiple opportunities to present their research plans, progress, and results to audiences of other RET teachers and/or community college faculty and university faculty and students as well as any industry mentors who might be involved. RET participants should also be encouraged to participate in future scientific meetings related to their research and to share their projects as well as to strengthen their disciplinary knowledge.
  - c. **The Research Environment.** This subsection should describe the experience of the principal investigator, the faculty, graduate students and master teachers, who may serve as research mentors. It should also describe the institution and any related involvement by industry in the RET project. This should include information on the record of faculty/mentors in publishing research results and providing professional development opportunities for K-12 STEM teachers and/or community college faculty. It should describe activities to train/prepare mentors, particularly graduate students, to support the teachers during their summer and academic year activities. It must clearly discuss any prior engagement with the PI and participating faculty with K-12 and/or community college educators and demonstrate their capacity to lead an entire site of RET participants.
  - d. **Development of Curricular Modules.** During the summer of the RET Site, the RET Site participants should develop modules and curricular materials to bring their research back into the classroom. The modules should be directly related to the research and the intellectual focus of the RET Site. At the same time, the modules must be firmly connected to the K-12 and/or community college curricula that the teachers and or community college faculty must follow. Developing the modules will take careful guidance and collaboration between the RET Site participants and the disciplinary experts as well as possible support from educational experts. This activity is an integral part of the summer Site activities and should be completed during the summer. The planning and development of these materials should be woven into the timeline and plans for the summer activities. If possible connections should be made to state and/or national teaching standards. Proposals must describe the plans for the development of the curricular materials and how these materials will relate to known classroom curricula and learning standards. They should also describe any supporting experts or expertise that will assist in this process.
  - e. **Participant Recruitment and Selection.** The overall quality of the participant recruitment and selection processes and criteria will be an important element in proposal evaluation. The recruitment plan should be described with as much specificity as possible, including the types and/or names of institutions and school districts from which participants will be recruited and the efforts to be made to attract members of underrepresented groups (women, underrepresented minorities, veterans, and persons with disabilities). It is encouraged, but not required, that at least two STEM teachers and/or community college faculty be recruited for the program from the same K-12 school/community college in order to help ensure that outcomes of the program are more effectively disseminated to the participating institutions. Since a major goal of the RET Site program is to build a sustainable bond between school districts/community colleges and a college or university in the surrounding community, recruitment needs to focus on schools or school districts reasonably close to the college/university so that faculty, teachers, and student interactions are possible during the school year as well as during the summer. **RET Sites are normally not residence programs. Participants should be able to commute to a given site easily each day and not need funds for housing and meals.**

**RET Site participants must be currently teaching a STEM subject at their institution in order to participate in this program.**

- f. **Projects involving teachers at different levels.** RET sites that plan to include a mixture of teachers at different



levels, such as high school and community college teachers, high school and middle school teachers, or teachers from all grades, need to carefully discuss how the group will be managed to be appropriate and relevant to all, and to allow for all the participants to be fully engaged. Proposals involving elementary school teachers must carefully show the potential for the research to be woven into the elementary school curricula. Projects involving community college faculty must show how projects will provide for the deeper disciplinary background of the community college faculty and how the group can be managed as a cohort.

- g. **Academic Year Follow-up Plan.** A major goal of the RET in Engineering and Computer Science Site program is to help encourage and develop long-term relationships between the teacher and/or community college faculty participants, the RET Site project faculty team, the participating school districts, particularly during the academic year, and industry. The RET experience also will lead to the transfer of new knowledge to classroom activities; therefore, the proposal must provide a plan for **sustained academic-year follow-up** by the RET in Engineering and Computer Science Site project team with the teachers and/or community college faculty to ensure that the research experience is translated into classroom practice during the academic year. In particular, it is encouraged to have graduate students support academic-year classroom activities related to the summer research. Faculty and graduate students should visit the K-12 and/or community college classrooms. The proposal must include a credible plan for ongoing interaction that supports classroom implementation of lesson plans, curricula, or skills developed in the RET in Engineering and Computer Science Site project. Plans must be included for academic-year conferences or other outreach activities such that the RET teachers and/or community college faculty can disseminate their curricular materials and modules as well as details of their RET participation to a broader audience of teachers/community college faculty in their own communities.

Proposals for renewal support of a previously funded RET in Engineering and Computer Science Site must provide documentation on follow-up and dissemination activities conducted during the prior RET Site program.

- h. **Project Evaluation and Reporting.** This subsection should provide a detailed plan for formative and summative evaluation of the proposed project. It should include identification of the external evaluator and a brief description of the qualifications of the evaluator. Note that the PI, Co-PI, and main project personnel cannot be the evaluator. The objective of the evaluation process is to measure qualitatively and quantitatively the progress and impacts of the project in achieving its goals, particularly the degree to which the participants have learned and their perspectives on science, engineering, or computer science have been expanded, as well as the impact on K-12 and community college students and their curricula. The evaluation plan is an important part of the RET in Engineering and Computer Science Site proposal, but proposers have much latitude in designing a plan that best suits their particular project. Although not required, RET Site project directors may wish to engage educational research specialists from their or another institution in planning and implementing the project evaluation. Formative evaluation will involve periodic measures throughout the project to ensure that it is progressing satisfactorily according to the project plan, and it will involve pre-project and post-project measures aimed at determining the degree of teacher/community college faculty and student learning that has been achieved as a result of the project. Additionally, it is highly desirable to have a structured means of tracking participants with the aim of gauging the degree to which the RET in Engineering and Computer Science Site experience has been a lasting influence as they follow their career paths.
- i. **Results from Prior Support (if applicable; essential for a RET Site renewal proposal).** If no prior support has been received by the submitting institution through an RET Site award, then "N/A" should be entered in this subsection and the maximum of 15 pages may be employed for items "a" through "h" above.

If this is a proposal for renewal of a RET Site or if the submitting institution has received a prior RET Site award in the disciplinary area(s) of the proposal, the proposal must include a section (limited in length to five pages) entitled Results from Prior NSF Support within the 15-page narrative description of the project. This section must describe the earlier RET project(s) and outcomes(s) in sufficient detail to permit reviewers to reach an informed conclusion regarding the value of the results achieved. This will likely include results from the project evaluation, summary information on recruiting efforts and number of applicants, demographic composition of participants and their home institutions, follow-up and dissemination activities, lessons learned, modifications and changes to the proposed Site, and a list of publications or reports (if to be submitted for publication) resulting from the original NSF award.

- j. **Dissemination.** To fulfill NSF dissemination requirements, as well as to ensure long-term, free teacher/community college faculty access to the K-12 and/or community college engineering and computer science curricular materials that are created, RET Site awardees are strongly encouraged to publish the lessons or hands-on activities developed through the awards in the *TeachEngineering* digital library (<http://teachengineering.org/>) or other repositories that reach a national audience. While posting to a national portal is required, other means of dissemination of K-12 and/or community college engineering and computer science curricula may include posting lessons to the individual RET web site or portal and ensuring free access to educators. All dissemination methods should be described in this subsection.
6. **References Cited.** A listing of references to pertinent literature is required. It is particularly important to have references related directly to the focused research of the projects. Note that incomplete or minimal references often indicate lack of capacity to deliver a compelling research experience to the participants. **Proposals with no references cited or listed will be Returned without Review.**
7. **Current and Pending Support.** This form should be provided for all persons listed as senior personnel (up to a total of 12 people).
8. **Facilities, Equipment, and Other Resources.** This section is required and must be completed in accordance with the instructions in the PAPPG.
9. **Biographical Sketches.** The basic guidelines for biographical material apply; however, senior personnel are encouraged to include activities or accomplishments relevant to a successful RET Site. Senior personnel are the principal investigator; the co-principal investigator if one has been designated; and other faculty/professionals who are anticipated to serve as research mentors. The number of biographical sketches is limited to 12.
10. **Project Budget.** The focus of RET Sites is the teacher/community college faculty participant experience, and the budget must reflect this principle. The proposal should include a detailed project budget and budget justification, as described in the PAPPG or the NSF Grants.gov Application Guide. The budget justification should explain and justify major cost items and any unusual situations/inclusions and address the cost-effectiveness of the project. Project costs may include such items as teacher/community college faculty stipends, and travel. A Site may not charge the participant an application fee. These costs

must be listed as Participant Support costs (lines F1-F4 in FastLane and Field E in Grants.gov) in the NSF proposal budget.

The total amount which may be requested for a RET Site may not exceed \$600,000, with a program duration of up to three years, including no more than \$200,000 per year. The program may be carried out during summer months, the academic year, or both. RET Sites must include funds for 10 or more teachers/community college faculty totaling at least \$100,000 per year of the budget. The total cost per teacher and/or community college faculty is limited to \$10,000 per year, which includes funds for the teacher and/or community college faculty stipend and up to \$2,000 for the cost of materials, equipment, software, and other supplies for developing classroom instructions and experiments. The remaining funds, which when combined with teacher/community college faculty support may not exceed a total budget of up to \$200,000 per year, may be requested for activities in other cost categories (e.g., salaries, wages and fringe benefits, travel, materials and supplies, and applicable indirect costs) that contribute to the effectiveness of the RET program; any such costs must be listed under the appropriate NSF budget categories and must be explained in the Budget Justification. It is expected that teacher and community college faculty stipends will be adjusted according to their length of residency at the university site and that stipends for in-service teachers will generally be higher than those for pre-service teachers (education majors who are still pursuing their degrees).

Funds requested to conduct conferences should be included in the yearly proposal budget and fully itemized and described in the budget justification.

Note that RET Site proposals cannot support funds for social activities or special meals, including meals related to weekly team meetings. No graduate student or other student tuition can be included in the budget. Travel supported should be directly related to the activities of the site for dissemination of the research results or classroom materials as well as the impact of the site. The Budget Justification should clearly detail the purpose of any requested travel funds and identify the possible conference or conferences that might be attended.

11. **Supplementary Documentation.** In addition to those listed in the PAPPG, the following documents must be provided.

**Letters of Collaboration.** Signed letters of collaboration documenting collaborative arrangements of significance to the proposal must be scanned and placed in this section. **Letters of collaboration from participating school districts and community colleges are required. If these letters are not included, the proposal will be returned without review.** The letters must come from someone in a leadership position in the school districts and/or community colleges involved, normally from someone in the main school district/community college administrative office rather than from individual teachers/community college faculty at the district schools/community colleges. Letters may be relevant where the awardee and performing organizations are different, where faculty or facilities of more than one institution are to be employed, or where international activities are arranged. **Letters of endorsement from individual teachers/community college faculty are not permitted. Proposals without the required school district/community college level letter or letters will be Returned without Review.**

**Requests for RET Supplements must include the following:**

RET Supplements are supported by the various disciplinary research programs within the ENG and CISE. A RET Supplement request may be included in a proposal for a new or renewal ENG or CISE grant or cooperative agreement, or a request may be submitted later as a supplement to an ongoing award. Guidance for use of either mechanism is given below. In either case, the description of the RET activity should clearly articulate in some detail the form and nature of the prospective teacher and/or community college faculty's involvement in the principal investigator's ongoing or proposed research. For example, the teacher and/or community college faculty member may participate in the design of new experiments, modeling and analysis of experimental data, algorithm and software development, and other activities that will result in intellectual contributions to the project. The RET Supplement description is to indicate what type of sustained follow-up could be provided to help in translating the teacher and/or community college faculty research experience into classroom practice. The request should also discuss the experience of the principal investigator (or other possible research mentors) in involving K-12 teachers and/or community college faculty in research, including any previous RET Supplement support; the outcomes from that support; and the process and criteria for selection of the teachers and/or community college faculty. A brief biographical sketch of the teacher and/or community college faculty should also be included, if available.

The duration of the RET Supplement will be one year and the project may be carried out during summer months, the academic year, or both. The total cost of the supplement is limited to \$10,000 per teacher/community college faculty. The budget includes a teacher's/community college faculty stipend and up to \$2,000 for the cost of materials, equipment, software and other supplies for developing classroom instructions and experiments. The participant may not be charged an application fee. These costs must be listed as Participant Support costs (lines F1-F4 in FastLane and Field E in Grants.gov) in the NSF proposal budget.

Normally, funds may be available for one to two teachers/community college faculty, but exceptions will be considered. Participation of teachers and/or community college faculty who are members of underrepresented groups (women, underrepresented minorities, and persons with disabilities) is strongly encouraged. Center or large research efforts may request support for a number of teachers /community college faculty commensurate with the size and nature of the project. For guidance concerning RET Supplement requests, please consult with the cognizant ENG or CISE program director of the particular research program of the proposal or award.

An award decision will be based on internal review by the cognizant ENG or CISE program director and availability of funds in a particular program.

**A request for a RET Supplement to an existing award** must be submitted via the NSF FastLane System. After login to FastLane, choose Award and Reporting Functions, then Supplemental Funding Request. Next choose the award to be supplemented. In the form entitled Summary of Proposed Work, state that this is a request for an RET Supplement. In the form entitled Justification for Supplement, include the information requested above, limited to three pages. If a RET participant has been pre-selected, then a brief biographical sketch should be placed in supplementary documentation. Prepare a budget, including justification of the funds requested for teacher and/or community college faculty support and their proposed use. All teacher and/or community college faculty costs must be listed as Participant Support costs (lines F1-F4 in FastLane and Field E in Grants.gov) in the NSF proposal budget. The term of a RET Supplement may not exceed that of the underlying research project. The request is then forwarded to the institution's Authorized Organizational Representative for submission to NSF.

A request for a RET Supplement submitted as part of a proposal for a new or renewal grant or cooperative agreement is embedded in the proposal as follows. The description of the RET activity, as specified above and limited to three pages, is entered in FastLane or Grants.gov in the section for supplementary documentation. The budget for the RET Supplement is included in the yearly project budget. All teacher and/or community college faculty costs must be listed as Participant Support costs (lines F1-F4 in FastLane and Field E in Grants.gov) in the NSF proposal budget. The budget justification for the proposal must contain a separate explanation of the RET Supplement request, with the proposed teacher and/or community college faculty costs itemized and justified, and a total given for all proposed costs.

## B. Budgetary Information

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### Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

### Other Budgetary Limitations:

Total budget amount for an RET Site may not exceed \$600,000 for up to three years, for up to \$200,000 per year. Total cost of an RET supplement is limited to \$10,000 per teacher per year. For both the RET Site and RET supplement the budget includes a teacher and/or community college faculty stipend and up to \$2,000 for the cost of materials, equipment, software and other supplies for developing classroom instructions and experiments.

Funds awarded to teacher/community college faculty participants in the RET in Engineering and Computer Science program for stipends, fees, lodging, travel and other miscellaneous expenses must be listed as Participant Support Costs (lines F1-F4 in FastLane and Field E in Grants.gov) in the NSF proposal budget. RET Sites must include funds for 10 or more teachers totaling at least \$100,000 per year of the budget. The remaining funds, which when combined with teacher support may not exceed a total of \$200,000 per year, may be requested for activities in other cost categories (e.g., salaries, wages and fringe benefits, travel, materials and supplies, and applicable indirect costs) that contribute to the effectiveness of the RET program; any such costs must be listed under the appropriate NSF budget categories and must be explained in the Budget Justification.

## C. Due Dates

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

October 10, 2017

September 19, 2018

Third Wednesday in September, Annually Thereafter

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

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### 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](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](mailto:fastlane@nsf.gov) or [rgov@nsf.gov](mailto: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](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.

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

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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/](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

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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.

### Additional Solicitation Specific Review Criteria

- Must have a well-defined research focus related to engineering or computer science with clearly articulated research projects with clearly labeled components appropriate for the RET teachers and/or community college faculty. Research projects must have significant engineering and/or computer science relevance and not simply involve computation or computational science across a broad range of scientific disciplines.
- Should engage industry as possible in the program to assure the work is relevant to future workforce needs in engineering and computer science.
- Must include sound plans for activities during the summer experience to prepare the RET teachers and/or community college faculty with the ENG and CISE background knowledge and methods that are needed to conduct the research.
- Must provide in-service and/or pre-service K-12 STEM teachers and/or community college faculty with discovery and technology based research experiences in high quality engineering or computer science labs/research facilities, which can be incorporated into classroom activities.
- Must provide for ongoing communications between the university faculty, graduate students, and the RET teachers and/or community college faculty. RET teachers and/or community college faculty must be integrated into the research projects and given several opportunities to present plans, methods, outcomes, and other relevant details to faculty and student groups as well as among themselves.
- Must recruit K-12 teachers and/or full-time community college faculty who currently teach STEM subjects at their institutions for participation in the RET activities. It is recommended but not required that at least two teachers and/or community college faculty be recruited for the program from the same K-12 school/community college.
- Must involve participants in an ongoing engineering or computer science research project for a duration of at least six weeks during the summer. Shorter durations may be proposed with justification.
- Must include a sustained academic-year follow-up plan between the faculty and the participants to ensure that the research experience is translated to classroom practice and the program provides maximum benefit to all participants. Including graduate student support of academic-year classroom implementation is strongly encouraged. Plans must be included for outreach and dissemination activities to local educators. The quality and appropriateness of the academic-year plans will be explicitly assessed.
- Must include a detailed plan for summative and formative evaluation of the research project and (academic year) classroom impact. Must identify an external evaluator and provide funds (normally \$2,500 to \$3,000 per year) to the evaluator.
- Must provide a compelling description of past results for Sites that are seeking renewal.
- Must include a detailed plan for effective dissemination of the impact on RET participants, on the quality of the classroom experience, and on the engagement and preparation of students. Must provide for the dissemination of the curricular materials that are developed on a national platform.

## B. Review and Selection Process

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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

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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 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](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](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 *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](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg).

### 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 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=papppg](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg).

## VIII. AGENCY CONTACTS

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*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:

- Mary F. Poats, Program Manager, Directorate for Engineering (ENG), Division of Engineering Education and Centers (EEC), 585N, telephone: (703) 292-5357, fax: 703-292-9051, email: [mpoats@nsf.gov](mailto:mpoats@nsf.gov)
- Harriet G. Taylor, Program Director, Directorate for Computer and Information Science and Engineering (CISE), Division of Computer and Network Systems (CNS), 1175N, telephone: (703) 292-8950, email: [htaylor@nsf.gov](mailto:htaylor@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](mailto:fastlane@nsf.gov).  
Research.gov Help Desk e-mail: [rgov@nsf.gov](mailto: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](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, "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

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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](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  
Office of the General Counsel  
National Science Foundation  
Alexandria, VA 22314

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