

Cultivating Cultures for Ethical STEM (CCE STEM)

PROGRAM SOLICITATION

NSF 15-528

REPLACES DOCUMENT(S):

NSF 14-546



National Science Foundation

Directorate for Social, Behavioral & Economic Sciences

Office of Integrative Activities

Directorate for Mathematical & Physical Sciences

Directorate for Computer & Information Science & Engineering

Directorate for Geosciences

Directorate for Engineering

Directorate for Biological Sciences

Directorate for Education & Human Resources

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

March 12, 2015

February 16, 2016

February 15, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

The only significant changes included in this new solicitation are:

Under Eligibility Information/Who May Submit Proposals, the following information was added:

Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

A budgetary limitation was added. The maximum amount now for 5-year awards is \$600,000 and the maximum amount for 3-year awards is \$400,000.

Under Additional Proposal Preparation and Submission Guidelines, the following new requirement was added:

Proposal Title: The title for the proposal project should begin with the type of award followed by a colon (e.g. Institutional Transformation: or Standard:).

Under PI Eligibility Limit Description an additional sentence was added:

"For Institutional Transformation Research Grant proposals, it is highly recommended that one or more senior members of the administration (e.g. Provost, VP, and/or President) serve as a PI."

Letters of Collaboration are being requested in this solicitation.

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) ([NSF 16-1](#)), which is effective for proposals submitted, or due, on or after January 25, 2016. Please be advised that proposers who opt to submit prior to January 25, 2016, must also follow the guidelines contained in [NSF 16-1](#).

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Cultivating Cultures for Ethical STEM (CCE STEM)

Synopsis of Program:

Cultivating Cultures for Ethical STEM (CCE STEM) funds research projects that identify factors that are efficacious in the formation of ethical STEM researchers in all the fields of science and engineering that NSF supports. CCE STEM solicits proposals for research that explores the following: 'What constitutes ethical STEM research and practice, and which cultural and institutional contexts promote ethical STEM research and practice and why?' Factors one might consider include: honor codes, professional ethics codes and licensing requirements, an ethic of service and/or service learning, life-long learning requirements, curricula or memberships in organizations (e.g. Engineers without Borders) that stress social responsibility and humanitarian goals, institutions that serve under-represented groups, institutions where academic and research integrity are cultivated at multiple levels, institutions that cultivate ethics across the curriculum, or programs that promote group work, or do not grade. Do certain labs have a 'culture of academic integrity'? What practices contribute to the establishment and maintenance of ethical cultures and how can these practices be transferred, extended to, and integrated into other research and learning settings?

Successful proposals typically have a comparative dimension, either between or within institutional settings that differ along these or other factors.

CCE STEM research projects will use basic research to produce knowledge about what constitutes responsible or irresponsible, just or unjust scientific practices and sociotechnical systems, and how to best instill students with this knowledge.

Proposals for awards from minority-serving institutions (e.g. Tribal Colleges and Universities, Historically Black Colleges and Universities, Hispanic-Serving Institutions, Alaska Native or Native Hawaiian Serving Institutions), women's colleges, and institutions primarily serving persons with disabilities are strongly encouraged. Proposals including international collaborations are encouraged when those efforts enhance the merit of the proposed work by incorporating unique resources, expertise, facilities or sites of international partners. The U.S. team's international counterparts generally should have support or obtain funding through other sources.

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.

- Wenda Bauchspies (SBE), telephone: (703) 292-5026, email: wbauchsp@nsf.gov
- Elliot Douglas (ENG), telephone: (703) 292-7051, email: edouglas@nsf.gov
- Ephraim P. Glinert (CISE), telephone: (703) 292-8930, email: eglinert@nsf.gov
- Elizabeth L. Rom (GEO), telephone: (703) 292-7709, email: elrom@nsf.gov
- Joseph A. Akkara (MPS), telephone: (703) 292-4946, email: jakkara@nsf.gov
- Robert D. Fleischmann (BIO), telephone: (703) 292-7191, email: rfleisch@nsf.gov
- Cassandra M. Dudka (OISE), telephone: (703) 292-7250, email: cdudka@nsf.gov
- Alexandra Cohen (SBE), telephone: (703) 292-4927, email: acohen@nsf.gov

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.083 --- Office of Integrative Activities (OIA)

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 6 to 8

Anticipated Funding Amount: \$3,150,000

Estimated total annual funding amount is \$3,150,000 - subject to the availability of funds. The maximum amount for 5-year awards is \$600,000 and the maximum amount for 3-year awards is \$400,000. The average award is \$275,000.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

NSF expects project teams to include persons with appropriate expertise. This might include expertise in the domain or domains of science or engineering on which the project focuses, in ethics, values, evaluation, and pedagogy. For Institutional Transformation Research Grant proposals, it is highly recommended that one or more senior members of the administration (e.g. Provost, VP, and/or President) serves as a PI.

Limit on Number of Proposals per Organization: 1

Only one proposal may be submitted by an eligible organization, as defined above, in which a member of their organization serves as the PI. Potential PIs are advised to contact their institutional office of research regarding processes used to select proposals for submission. Organizations submitting more than one proposal will be notified and given one week from notification to select one proposal for consideration. If one is not selected in that time period, all of those proposals will be returned without review. There is no limit on the number of proposals under which an organization may be included as a non-lead collaborator or sub-awardee.

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=papp.
 - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

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):
 - March 12, 2015
 - February 16, 2016
 - February 15, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

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

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

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

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I. INTRODUCTION

Building on the Foundation's prior support for ethics-related research and program development, in 2004 the NSF Directorates for: Biological Sciences; Computer and Information Science and Engineering; Education and Human Resources; Engineering; Geosciences; Mathematical and Physical Sciences; Social, Behavioral and Economic Sciences, and the Office of International and Integrative Activities joined together to create the Ethics Education in Science and Engineering Program (EESE). Via a series of solicitations (NSF 05-532; NSF 06-524; NSF 07-541; NSF 08-530; NSF 11-514), EESE funded projects that developed ethics education materials and approaches for STEM researchers being trained as graduate students at US institutions and their affiliates. Results included courses, case studies, and modules--materials which are now available at one or more of the online ethics resource centers that NSF has funded:

Ethics Education Library. Illinois Institute of Technology (<http://ethics.iit.edu/eelibrary/>);

IDEESE: International Dimensions of Ethics Education in Science & Engineering. University of Massachusetts Amherst (<http://www.umass.edu/sts/ethics/>);

National Center for Professional & Research Ethics. University of Illinois (<https://nationalethicscenter.org/>);

Online Ethics Center. National Academy of Engineering (<http://www.onlineethics.org/>).

Some of the materials focused on discipline-specific issues, others aimed at issues more broadly shared, but regardless of content, they were directed at changing individuals' behavior through instruction. Research has shown that certain pedagogical approaches are more effective than others for STEM ethics education, e.g., active learning typically works better than lecturing (Prince, 2004; Loui 2010; Pavlidis 2013). Overall, however, research suggests that commonly used instructional approaches are of limited efficacy and are sometimes even counterproductive (Waples et al 2008; Sekerka 2009; Ellison 2013; Mumford 2009; Anderson 2009; Cech 2014). A recent study found that engineering students leave college less concerned about public welfare than when they entered (Hodges 2013).

Given how important social norms and culture are for influencing individuals' behavior, EESE has been changing its emphasis beginning with last year's first Cultivating Cultures for Ethical STEM (CCE STEM) solicitation (NSF 14-546) and it is continuing to do so in this solicitation. CCE STEM hereby invites research proposals that seek to provide answers to the following: 'What constitutes effective ethical STEM research and practice? Which cultural and institutional contexts promote ethical STEM research and practice and why?' Factors one might consider include: honor codes, professional ethics codes and licensing requirements, an ethic of service and/or service learning, life-long learning requirements, curricula or membership in organizations (e.g. Engineers without Borders) that stress social responsibility, humanitarian goals or critical praxis, institutions that serve under-represented groups, institutions where academic and research integrity are cultivated at multiple levels, institutions that instill ethics across the curriculum, or programs that promote group work, or do not grade. Do certain labs have a 'culture of integrity'? What practices contribute to the establishment and maintenance of ethical cultures and how can these practices be transferred, extended to, integrated into other research and learning settings?

What are the existing 'descriptive' and 'injunctive' social norms (Goldstein, Cialdini, Griskevicius 2008) regarding STEM teaching, learning, research, and practice? How are ethical norms communicated to STEM students, faculty, and researchers? Are there more effective ways of doing so? Are there ways that the lessons from social psychology and marketing environments (e.g., about how to influence people's behavior) can be used to cultivate ethical STEM teaching, learning, and research?

Results of the Cultivating Cultures for Ethical STEM (CCE STEM) program will contribute to resources that institutions may utilize in complying with Sec 7009 of the America COMPETES Act (H.R. 2272), which requires institutions to "provide appropriate training and oversight in the responsible and ethical conduct of research." Awardee institutions are now being asked to determine whether the training and oversight they are providing is effective and to begin the process of determining what additional or alternative approaches they might provide.

With this solicitation, the CCE STEM program encourages novel research approaches to the formation of STEM researchers who are

committed to ethical academic and research practices and to the cultivation of institutional cultures that value, expect, and reward academic and research integrity. The program ultimately aims to increase the number of students, postdoctoral fellows, and faculty members exposed to 'macro' and 'micro' ethical research training (Herkert, J.R. 2004). Also sought are improved approaches to motivating student and faculty interest in exploring and being cognizant of the ethical dimensions of STEM.

II. PROGRAM DESCRIPTION

The Cultivating Cultures for Ethical STEM (CCE STEM) program accepts proposals for innovative research projects to foster ethical STEM research in all of the fields of science and engineering that NSF supports, including within interdisciplinary, inter-institutional and international contexts. CCE STEM research projects will use basic research to produce knowledge about what constitutes responsible or irresponsible, just or unjust scientific practices and sociotechnical systems, and how to best instill students with this knowledge.

Projects can include qualitative and/or quantitative approaches. Proposals should specify plans to deliver findings to appropriate research and educational communities and assist them to implement projects or programs based on the findings. CCE STEM awardees must share their findings with others via the Online Ethics Center for Engineering and Science (Award #1355547) and at the biennial PI meetings held at NSF. PIs are responsible for covering the expenses of participating in these PI meetings throughout the tenure of their award and should indicate this in their budget.

MODES OF SUPPORT - STANDARD RESEARCH GRANTS AND INSTITUTIONAL TRANSFORMATION RESEARCH GRANTS

Proposed research should seek to provide answers to the following: 'What constitutes ethical STEM research and practice? Which cultural and institutional contexts promote ethical STEM research and practice and why?' Factors one might consider include: honor codes, professional ethics codes and licensing requirements, an ethic of service and/or service learning, life-long learning requirements, curricula or membership in organizations (e.g. Engineers without Borders) that stress social responsibility or humanitarian goals, institutions that serve under-represented groups, institutions where academic and research integrity are cultivated at multiple levels, institutions that cultivate ethics across the curriculum, or programs that promote group work, or do not grade. Do certain labs have a 'culture of academic integrity'? What practices contribute to the establishment and maintenance of ethical cultures and how can these practices be transferred, extended to, or integrated into other research and learning settings?

Successful proposals typically have a comparative dimension, either 1) between or within institutional settings that differ along the factors suggested or other factors (Standard Research Grants), or 2) over time-- before and after an intervention (Institutional Transformation Research Grants (ITRG)). For ITRGs, investigators are expected to gather and report baseline data in the first annual report. Both Standard and ITRG proposals can be collaborative.

See the Additional Reporting Requirements section of this solicitation for additional reporting requirements for both types of awards.

Proposals for awards from minority-serving institutions (e.g. Tribal Colleges and Universities, Historically Black Colleges and Universities, Hispanic-Serving Institutions, Alaska Native or Native Hawaiian Serving Institutions), women's colleges, and institutions primarily serving persons with disabilities are strongly encouraged.

Note: NSF does not consider proposals for medical research and hence, the program will not consider proposals focused on ethics for medical students or in medical education. It will consider proposals that address medical informatics, biomedical engineering, systems engineering and social scientific studies of health and medicine.

III. AWARD INFORMATION

The anticipated funding amount each year is \$3,150,000 for an estimated 6-8 Standard Grants. The maximum award duration is 5 years. Size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

NSF expects project teams to include persons with appropriate expertise. This might include expertise in the domain or domains of science or engineering on which the project focuses, in ethics, values, evaluation, and pedagogy. For Institutional Transformation Research Grant proposals, it is highly recommended that one or more senior members of the administration (e.g. Provost, VP, and/or President) serves as a PI.

Limit on Number of Proposals per Organization: 1

Only one proposal may be submitted by an eligible organization, as defined above, in which a member of their

organization serves as the PI. Potential PIs are advised to contact their institutional office of research regarding processes used to select proposals for submission. Organizations submitting more than one proposal will be notified and given one week from notification to select one proposal for consideration. If one is not selected in that time period, all of those proposals will be returned without review. There is no limit on the number of proposals under which an organization may be included as a non-lead collaborator or sub-awardee.

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

There are no restrictions or limits.

Additional Eligibility Info:

Other types of organizations can be included only as non-lead collaborators or sub-awardees. In addition, accredited U.S. colleges and universities and U.S. professional associations can be non-lead collaborators or sub-awardees.

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 Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF 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=papp. 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 Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). 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.

Additional Proposal Preparation and Submission Guidelines

Applicants should read carefully the Introduction, Program Description, and Additional Review Criteria sections of this solicitation, to ensure that their proposals are responsive to program requirements.

Proposal Title: The title for the proposal project should begin with the type of award followed by a colon (e.g. Institutional Transformation: or Standard:).

Dissemination Plan: A two-page dissemination plan should be uploaded as a supplementary document.

Letters of Collaboration: The following statement of collaboration from individuals and/or organizations that will work with the PIs and/or provide resources for the proposed project should be included as supplementary documents. (This statement may be in the form of a signed statement or a statement sent by e-mail to the PI.) Such a statement is not needed from individuals included as senior personnel on a project or from awardee or subawardee organizations.

Template for a Letter of Collaboration

To: Program Management – Cultivating Cultures for Ethical STEM (CCE STEM)

From: _____
(Printed name of the individual collaborator or name of the organization and name and position of the official submitting this memo)

I agree to undertake the tasks associated with me, or to provide or make available the resources designated, in the proposal titled "_____(proposal title)_____" with _____(PI name)_____ as the Principal Investigator.

Signed: _____

Organization: _____

Date: _____

Lengthier letters from others that articulate what activities a collaborator may undertake and/or that provide arguments for support of

a project may be included in the project description, although inclusion of such letters must be accommodated within the page limit of the project description.

Research with Human Subjects: Research involving human subjects must either have approval from the organization's Institutional Review Board (IRB) before issuance of an NSF award, or identify the applicable subsection exempting the proposal from IRB review. This requirement is in the Common Rule (Federal Policy for the Protection of Human Subjects, 45 CFR Section 690). See the NSF Grant Proposal Guide for more details. The NSF proposal cover sheet requires provision of the relevant information, as appropriate.

Other General Information: Investigators wishing to apply for support are encouraged to discuss their ideas with one of the contacts listed in the solicitation.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

PIs are responsible for covering the expenses of participating in biennial PI meetings held at the NSF throughout the tenure of their award and should indicate this in their budget.

C. Due Dates

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

March 12, 2015

February 16, 2016

February 15, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

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 are strongly encouraged to use FastLane 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: http://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 *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. 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.

Additional Solicitation Specific Review Criteria

Reviewers will be asked to apply the following special criteria to all proposals in this program:

- Is this an innovative effort? Is it likely to enhance the formation of ethical STEM researchers?
- Does the project include adequate grounding in the relevant research literature?
- Do potential results have promise for broad utility?
- Are there adequate supporting materials to document commitment from those individuals and institutions playing a substantive role in the project?

Additional review criteria for Institutional Transformation (IT) proposals:

- How significant will the contribution of the study of the proposed innovative components and other IT activities be to the institutional transformation knowledge base? How strong are the indicators of institutional readiness for institutional transformation and commitment to the project activities and goals?
- Does the proposal include well-formulated, feasible plans for evaluation of the effectiveness of the intervention?
- How well are the proposed activities linked to the institutional context and data?
- How well is the relevant social science literature incorporated into the design of the proposed innovative components and other IT activities?
- Are mechanisms planned that ensure long-term sustainability beyond the duration of the funded project?

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 http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

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=papp.

Special Award Conditions:

CCE STEM awardees must share their findings with others via the Online Ethics Center for Engineering and Science (Award #1355547) and at the biennial PI meetings held at NSF. PIs are responsible for covering the expenses of participating in these PI meetings throughout the tenure of their award.

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=papp.

Additional Reporting Requirements

In annual and final reports, PIs are required to report on the following: 'What actions have been taken as a result of CCE STEM that directly or indirectly lead to the formation of ethical STEM researchers and greater attention to the goal of and means for creating ethical sociotechnical systems?' How is the effectiveness of these interventions being measured?

For Institutional Transformation Awards, the PIs will also report on: 'What actions have been taken by institutions as a result of the CCE STEM program that have directly or indirectly contributed to a culture that prizes academic and research integrity?' How is the effectiveness of these actions being measured?

At the biennial PI meeting, PIs will be asked to assess the success of the program in generating answers to the following:

1. What constitutes ethical STEM research and practice?
2. Which cultural and institutional contexts promote ethical STEM research and practice and why?
3. What practices contribute to the establishment and maintenance of ethical cultures and how can these practices be transferred, extended to, and integrated into other research and learning settings?

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:

- Wenda Bauchspies (SBE), telephone: (703) 292-5026, email: wbauchsp@nsf.gov
- Elliot Douglas (ENG), telephone: (703) 292-7051, email: edouglas@nsf.gov
- Ephraim P. Glinert (CISE), telephone: (703) 292-8930, email: eglinert@nsf.gov
- Elizabeth L. Rom (GEO), telephone: (703) 292-7709, email: elrom@nsf.gov
- Joseph A. Akkara (MPS), telephone: (703) 292-4946, email: jakkara@nsf.gov
- Robert D. Fleischmann (BIO), telephone: (703) 292-7191, email: rfleisch@nsf.gov

- Cassandra M. Dudka (OISE), telephone: (703) 292-7250, email: cdudka@nsf.gov
- Alexandra Cohen (SBE), telephone: (703) 292-4927, email: acohen@nsf.gov

For questions related to the use of FastLane, contact:

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

For questions relating to Grants.gov contact:

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

General inquiries regarding this program should be made to cce-stem-contacts@nsf.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "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>.

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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 (FASSED) 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.

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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
Arlington, VA 22230

X. APPENDIX

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