Tribal Colleges and Universities Program (TCUP)

PROGRAM SOLICITATION
NSF 16-531

REPLACES DOCUMENT(S):
NSF 14-572

National Science Foundation

Directorate for Education & Human Resources
Division of Human Resource Development

Directorate for Geosciences

Directorate for Social, Behavioral & Economic Sciences
Division of Behavioral and Cognitive Sciences

Directorate for Engineering
Engineering Education and Centers

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

April 14, 2016

April 14, Annually Thereafter

PArtnerships in Geoscience Education

April 18, 2016

Pre-Engineering Education Collaboratives Phase II

September 02, 2016

September 2, Annually Thereafter

Instructional Capacity Excellence in TCUP Institutions

September 16, 2016

Partnerships for Documentary Linguistics Education

September 16, 2016

September 16, Annually Thereafter

Targeted STEM Infusion Projects

October 03, 2016

October 3, Annually Thereafter

SEA-PHAGES in TCUs

December 05, 2016

First Monday in December, Annually Thereafter

Small Grants for Research

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

Proposals Accepted Anytime

Preparing for TCUP Implementation

IMPORTANT INFORMATION AND REVISION NOTES

A new funding track, Partnerships for Documentary Linguistics Education (PADLE), is offered collaboratively by this program and the Documenting Endangered Languages program (DEL) in the Directorate for Social, Behavioral, and Economic Sciences (SBE). The strand provides support for collaborations that will improve TCUP institutions' instructional capacity in documentary linguistics (descriptive linguistics, computational methodology, archiving and preservation); attract, retain and support TCUP students in internships and research endeavors deemed to be necessary for a complete curriculum offering; and engage partner universities to provide an academic grounding and a successful transition for students who wish to study or attain degrees in documentary linguistics.

In partnership with the Science Education Alliance of the Howard Hughes Medical Institute, the program offers a new funding strand, Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science in Tribal Colleges and Universities (SEA-

PHAGES in TCUs). This strand provides additional support to the nation's tribal colleges and universities to enable their participation in the SEA-PHAGES curriculum.

A one-time funding opportunity, Pre-Engineering Education Collaboratives Phase II (PEEC-II) is offered to allow previous awardees to capture and capitalize on the experiences of the Pre-Engineering Education Collaboratives by conducting studies that elucidate the impacts of that unique pedagogy on the academic success of TCUP students.

Broadening Participation Research in STEM Education (BPR) has been combined with Small Grants for Research (SGR). SGR now supports grants in STEM discipline areas or educational research.

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.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Tribal Colleges and Universities Program (TCUP)

Synopsis of Program:

The Tribal Colleges and Universities Program (TCUP) provides awards to Tribal Colleges and Universities, Alaska Native-serving institutions, and Native Hawaiian-serving institutions to promote high quality science (including sociology, psychology, anthropology, economics, statistics, and other social and behavioral sciences as well as natural sciences and education disciplines), technology, engineering and mathematics (STEM) education, research, and outreach. Support is available to TCUP-eligible institutions (see the Additional Eligibility subsection of Section IV of this solicitation) for transformative capacity-building projects through **Instructional Capacity Excellence in TCUP Institutions (ICE-TI)**, **Targeted STEM Infusion Projects (TSIP)**, and **Preparing for TCUP Implementation (Pre-TI)**. Collaborations that involve multiple institutions of higher education led by TCUP institutions are supported through **PArtnerships for Geoscience Education (PAGE), Partnerships for Documentary Linguistics Education (PADLE)**, and **Pre-Engineering Education Collaboratives Phase II (PEEC-II)**. Finally, research studies that further the scholarly activity of individual faculty members are supported through **Small Grants for Research (SGR)** and **Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science in Tribal Colleges and Universities (SEA-PHAGES in TCUs)**. Through the opportunities highlighted above, as well as collaborations with other National Science Foundation (NSF) units and other organizations, TCUP aims to increase Native individuals' participation in STEM careers and the quality of STEM programs at TCUP-eligible institutions. TCUP strongly encourages the inclusion of activities that will benefit veterans.

Transformative Capacity Building

Instructional Capacity Excellence in TCUP Institutions (ICE-TI) projects provide support to design, implement and assess comprehensive institutional improvements in the STEM instructional and research capacity in TCUP-eligible institutions of higher education. Successful projects are transformative in their approaches to increasing the numbers of STEM students and the quality of their preparation by strengthening STEM education and research. ICE-TI Projects create and/or adapt and assess innovative models and materials for teaching and learning in STEM, embody knowledge about how students learn most effectively in STEM teaching and learning activities, and bring STEM disciplinary advances into the undergraduate experience.

Targeted STEM Infusion Projects (TSIP) provide support toward achieving a short-term, well-defined goal that promises to improve the quality of undergraduate STEM education at an eligible institution. Targeted STEM Infusion Projects could, for example, enhance academic infrastructure by systematically adding traditional knowledge to the scope or content of a STEM course, updating curriculum, modernizing laboratory research equipment, or improving the computational network array for research and education.

Preparing for TCUP Implementation (Pre-TI) projects support development-level activities that can ground an institution's readiness for Implementation-level projects, such as an institutional assessment of its current STEM instructional capacity, or the conversations necessary to formulate a shared vision of what that capacity should be and how to achieve it. Provided specifically for those TCUP-eligible institutions of higher education that have never received a TCUP Implementation-level award, Pre-TI grants can support staff and faculty release time, travel, stakeholder gatherings, and associated administrative costs.

Multiple Institution Collaborations

The **PArtnerships for Geoscience Education (PAGE)** strand provides support for collaborations that will improve TCUP institutions' instructional capacity in geosciences; attract, retain, and support TCUP students in internships and research endeavors deemed to be necessary for a complete curriculum offering; and engage partner universities to provide an academic grounding and a successful transition for students who wish to study or attain degrees in geosciences.

The **Partnerships for Documentary Linguistics Education (PADLE)** strand provides support for collaborations that will improve TCUP institutions' instructional capacity in documentary linguistics (descriptive linguistics, computational methodology, archiving and preservation); attract, retain and support TCUP students in internships and research endeavors deemed to be necessary for a complete curriculum offering; and engage partner universities to provide an academic grounding and a successful transition for students who wish to study or attain degrees in documentary linguistics.

Pre-Engineering Education Collaboratives, Phase II (PEEC-II) will support studies or educational research conducted by institutions that have had active PEEC awards. The intent of PEEC-II is to capture, analyze, and disseminate the impact of these awards on the participating institutions, faculty, or students, and their communities.

Individual Investigator Studies

Small Grants for Research (SGR) projects support faculty members in STEM disciplines or STEM education at TCUP-eligible institutions to initiate or pursue research projects or programs that may include undergraduate or graduate student engagement. Awards are intended to help further the faculty member's research capability and effectiveness; to improve research and teaching at his or her home institution; create and study new models and innovations in STEM teaching and learning; and enhance the understanding of diverse groups' participation in STEM education practices and interventions. These awards are particularly appropriate as a means of recruiting and retaining highly qualified scientists, engineers, and educators at TCUP-eligible institutions.

Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science in Tribal Colleges and Universities (SEA-PHAGES in TCUs) projects provide support to tribal colleges and universities to enable their participation in the SEA PHAGE curriculum, managed by the Howard Hughes Medical Institute (HHMI). NSF, through TCUP, will support those aspects crucial to participation that are not provided by HHMI. HHMI will provide the support to TCUs that it provides to all SEA institutions. Awards will engage TCU faculty and students in the on-going national study to isolate, identify, sequence, and analyze newly discovered mycobacteriophages. These awards can help a TCU develop a novel biology curriculum, establish an undergraduate research program, or provide professional development for 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.

- Jody Chase, Program Director, TCUP, telephone: (703) 292-8682, email: lchase@nsf.gov
- Rebecca A. Bates, Program Director, TCUP, telephone: (703)292-8682, email: rbates@nsf.gov
- Jill L. Karsten, Program Director, GEO, telephone: (703) 292-7718, email: jkarsten@nsf.gov
- Colleen Fitzgerald, Program Director, DEL, telephone: (703)292-4381, email: cfitzger@nsf.gov
- James L. Moore, telephone: (703) 292-7082, email: jamoore@nsf.gov
- Denise Spain, Program Specialist, TCUP, 815, telephone: 703-292-5189, email: dspain@nsf.gov

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

- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 17 to 45 - Up to 8 ICE-TI awards will be made pending the availability of funds. Up to 10 TSIP awards, up to 3 SEA-PHAGES in TCUs awards, up to 10 Small Grants for Research, and up to 2 Pre-TI awards will be made pending the availability of funds. Up to 3 PAGE collaborative awards will be made pending the availability of funds. Up to 5 PADLE collaborative awards will be made pending the availability of funds. Up to 4 PEEC-II collaborative awards will be made pending the availability of funds.

Anticipated Funding Amount: $11,800,000 Approximately $9,000,000 for TCUP ICE-TI, TSIP, PEEC-II, and SGR projects, pending availability of funds. Approximately $2,000,000 for PAGE projects, pending availability of funds. Approximately $500,000 for PADLE projects, pending availability of funds. Approximately $300,000 for SEA-PHAGES in TCUs, pending availability of funds.

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.

Who May Serve as PI:

For the Instructional Capacity Excellence in TCUP Institutions, PArtnerships for Geosciences Education, Partnerships for Documentary Linguistics Education, and Pre-Engineering Education Collaboratives Phase II award tracks, the principal investigator (PI) is expected to be the chief academic officer of the institution, or another senior academic officer responsible for oversight and management of curriculum and instructional policies for the institution, although senior STEM faculty may be considered. Typically, the PI for Targeted STEM Infusion Projects and Small Grants for Research proposals would be a member of the STEM faculty. Prospective PIs are encouraged to consult TCUP program staff.

Limit on Number of Proposals per Organization:

Eligible institutions may receive consecutive, but not concurrent, Instructional Capacity Excellence in TCUP Institutions awards. Eligible institutions may participate in only one SEA-PHAGES in TCUs awards concurrently. Eligible institutions may participate in only one PArtnerships for Geoscience Education award concurrently, but participation is not prevented by the institution's having other TCUP awards. Eligible institutions may participate in only one Partnerships for Documentary Linguistics Education award concurrently, but participation is not prevented by the institution's having other TCUP awards. There is no limit on the number of Targeted STEM Infusion

Projects or Small Grants for Research projects per TCUP-eligible institution. Institutions may receive only one Preparing for TCUP Implementation award.

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, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - 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. proposer's local time):

  April 14, 2016

  April 14, Annually Thereafter

  PArtnerships in Geoscience Education

  April 18, 2016

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  SEA-PHAGES in TCUs

  December 05, 2016

  First Monday in December, Annually Thereafter

  Small Grants for Research

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

  Proposals Accepted Anytime

  Preparing for TCUP Implementation

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

The National Science Foundation (NSF) supports research at the frontiers of knowledge, across all fields of science, technology, engineering, and mathematics (STEM) and all levels of STEM education. NSF enables innovation and discovery in science, technology, engineering, and mathematics by educating and preparing a diverse and able STEM workforce motivated to participate at the frontiers of science. NSF is committed to reaching across society to ensure that the rich diversity of the nation's cultures is well represented in the STEM workforce and that individuals engaged in STEM fields are trained to participate fully in the global research enterprise.

The Tribal Colleges and Universities Program (TCUP) is managed by the Division of Human Resource Development (HRD), which is part of the Directorate for Education and Human Resources (EHR) of the National Science Foundation.

To meet the challenges presented by the nation's increasing needs in STEM, the Tribal Colleges and Universities Program is committed to enhancing the quality of undergraduate science, technology, engineering, and mathematics education and research at Tribal Colleges and Universities, Alaska Native-serving institutions, and Native Hawaiian-serving institutions. TCUP seeks development of STEM education initiatives to support the preparation of a science and engineering workforce that is broadly inclusive and capable of performing in an international research and development environment in order for the U.S. to remain at the forefront of world science and technology.

In alignment with the goals of the Directorate for Education and Human Resources and the Division of Human Resource Development, TCUP has identified the following priorities: innovation in instruction and curriculum development; providing access to exciting STEM research experiences for undergraduate students; recruitment and retention; and the successful advancement of students through the critical transition points: between high school and college, two-year and four-year colleges, undergraduate and graduate studies, and into the workforce. Proposals submitted to TCUP are encouraged to address one or more of these priorities. Moreover, TCUP is particularly interested in building knowledge in areas related to the following questions:

- How does cultural integration with the STEM curriculum affect student success?
- How does the engagement of discipline-specific undergraduate research affect student success?

How does the increasing level of rigor affect student success?
- What are the critical support services and how do they affect student success?
- How does faculty development affect sustainability of institutional transformation?

Improving student performance in science and mathematics requires an adequate supply of well-qualified STEM teachers [1], [2], and community colleges play a vital role in the preparation of those teachers, particularly among underserved populations. TCUP strongly encourages PIs to address STEM teacher preparation at either the associate or baccalaureate level to help increase the number and quality of future science and mathematics teachers. A focus of TCUP is the recruitment and retention of veterans in STEM fields as a means to diversify and increase the STEM workforce. Proposals that recruit a cohort of veterans and suggest strategies to retain them are strongly encouraged.

[1] The President's Council of Advisors on Science and Technology (2010). Executive Report to the President. *Prepare and Inspire: K-12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future.* http://www.whitehouse.gov/ostp/pcast.

[2] Kuenzi, J. (2008). CRS Report for Congress. *Science, Technology, Engineering and Mathematics (STEM) Education: Background, Federal Policy and Legislative Action.* Congressional Research Service, Domestic Social Policy Division. Order Code RL33434.

II. PROGRAM DESCRIPTION

The Tribal Colleges and Universities Program (TCUP) promotes improvement and continued quality in undergraduate science (including sociology, psychology, anthropology, economics, statistics, and other social and behavioral sciences as well as natural science and education disciplines), technology, engineering and mathematics instructional and outreach programs at Tribal Colleges and Universities, Alaska Native-serving institutions and Native Hawaiian-serving institutions.

TCUP and the National Science Foundation allow proposers flexibility and creativity in the design of efforts to improve undergraduate STEM education. Proposed activities should be the result of a careful analysis of institutional needs, address institutional and NSF goals, and have the potential to result in significant and sustainable improvement of STEM programs. TCUP emphasizes the expansion of course and degree offerings; development of undergraduate research opportunities, faculty skills, and STEM-education technologies; and the integration of community goals and traditional knowledge with mainstream STEM education and research. Partnerships among institutions of higher education and collaborations with K-12 schools, tribal government units or other relevant groups are encouraged.

TCUP support is available through three main foci: the **Transformative Capacity Building** focus includes **Instructional Capacity Excellence in TCUP Institutions** awards, **Targeted STEM Infusion Projects**, and **Preparing for TCUP Implementation** awards; the **Multiple Institution Collaborations** focus includes **PArtnerships for Geoscience Education**, **Partnerships for Documentary Linguistics Education**, and **Pre-Engineering Education Collaboratives Phase II**; and the **Individual Investigator Studies** focus offers **Small Grants for Research** and **SEA-PHAGES in TCUs** awards. Typical project goals and approaches (described in greater detail below) include course, degree, and curriculum development, reform and enhancement; faculty professional development; the integration of active learning strategies into the STEM curriculum; disciplinary and education research; community outreach and engagement; student support; internships and other educational enrichment activities; student recruitment, retention and placement; infusion of technology to enhance STEM instruction; collaborations with other educational institutions, business, or other community partners; and activities that enhance the knowledge and skills of technical support personnel.

Transformative Capacity Building

The mission of TCUP from its inception has been to build capacity for improved STEM instruction or increased STEM instructional capacity, including curricular offerings, in TCUP Institutions. NSF recognizes that the TCUP investment has created a potential pool of knowledge that includes such areas as the effect of influences upon learning among indigenous populations or the effect of increasing STEM educational opportunities upon a community.

Instructional Capacity Excellence in TCUP Institutions (ICE-TI), TCUP's signature strand, provides support to design, implement and assess comprehensive, transformative institutional efforts at eligible colleges to strengthen STEM education and research. ICE-TIs create and/or adapt and assess innovative models and materials for teaching and learning in STEM, embody knowledge about how students learn most effectively in STEM teaching and learning activities, and bring STEM disciplinary advances into the undergraduate experience. Projects that may result in new STEM degrees at the associate, baccalaureate, or master's levels are encouraged. Proposers are encouraged to analyze the strengths and potential of the institution in STEM. Based on this analysis, they should design innovative educational strategies appropriate in content and context to increase the capacity and effectiveness of the institution to attract, retain, and educate students in STEM. The students should graduate prepared to pursue further study at the baccalaureate or graduate level, or to join the STEM workforce. Dissemination of successful models, effective methods, and innovative materials for educating STEM students are critical aspects of ICE-TIs. Activities that include pre-college students and educators, particularly those designed to improve interest in and readiness for post-secondary STEM studies, are particularly encouraged. These may include activities that help to bridge the transition from pre-college to undergraduate studies, such as summer intensive workshops, out-of-school enhancement activities, or dual-credit projects between TCUP institutions and their area high schools; and in-service training for education professionals.

In recognition of the significant development of STEM instructional capacity in the institutions that have received TCUP support, and of the multiplier effect that has occurred in institutions that have received multiple TCUP implementation awards, the program encourages new proposals that capitalize upon the investments of the past years to establish inquiries that can lead to discovery critical to and unique to TCUP communities. Such areas of investigation can include disciplinary research on factors that affect the reservation or similar community, such as water and air quality, climate variabilities, anthropological and paleontological artifacts, reintroduction and reestablishment of indigenous plants and animals, economics, and societal influences and impacts. It can also include long-term investigations into the role STEM education plays in unique populations. Work conducted as a TCUP investigation must constitute original hypothesis-driven research. Successful proposals must articulate research questions that are relevant to the investigation, and must include methods and metrics by which the questions will be studied. Proposals must include a dissemination plan that includes publication in peer-reviewed journals.

The **Targeted STEM Infusion Projects (TSIP)** strand provides support toward achieving a short-term, well-defined goal that promises to improve the quality of undergraduate STEM education at eligible institutions. Targeted STEM Infusion Projects could develop innovative learning experiences in emerging fields of science and engineering such as energy science or climate science, and add traditional knowledge to the scope or content of STEM courses. Projects could develop creative uses of cyberinfrastructure for instruction in STEM and next generation STEM undergraduate or graduate programs. Typically, projects are focused on one

activity within a single STEM department; however interdisciplinary and cross-disciplinary projects are encouraged. Beginning in fiscal year 2016, projects that have an emphasis on the **maker movement**, including components necessary to create maker spaces (e.g., equipment, materials, supplies), are eligible activities for TSIP support. TSIPs are encouraged to include pre-college students when appropriate.

Competitive proposals will describe clearly the innovation in STEM education the project will realize. Appropriate short-term goals should be easily measurable and attainable within the project time frame, and appropriate metrics should be identified. The proposal also should include activities for dissemination of project results.

Preparing for TCUP Implementation (Pre-TI) projects support development-level activities that can ground an institution's readiness for implementation-level projects, such as an institutional assessment of its current STEM instructional capacity, or the conversations necessary to formulate a shared vision of what that capacity should be and how to achieve it. Provided specifically for those TCUP-eligible institutions of higher education that have never received a TCUP implementation-level award, Pre-TI grants can support staff and faculty release time, travel, stakeholder gatherings, and associated administrative costs.

Multiple Institution Collaborations

NSF continues to be committed to the work and success of TCUP institutions in providing high-quality STEM instruction to their students. That work and success can be enriched by collaborations with other institutions of higher education in ways that appropriately enhance and extend the students' exposure to STEM. Compelling partnerships can ensure the successful transition of students from one educational level to the next. In recognition of the value that evolves from stakeholders working together to improve the academic experience, TCUP and other NSF programs have developed opportunities to support faculty and institutions working collegially to ensure TCUP students have the best educational experiences possible, including before they enter or after they leave the TCUP environment. As with all other TCUP funding opportunities, partnership proposals are encouraged to include tribal or Native pre-college students to the greatest practicable extent.

Through **PArtnerships for Geoscience Education (PAGE)** projects, the Tribal Colleges and Universities Program and the Directorate for Geosciences seek proposals from the TCUP community that focus on the development and implementation of geoscience studies and degrees in TCUP-eligible institutions, and may include partnerships with universities to which TCUP students may transfer. An effective strategy for development of these models could involve collaboration among TCUP-eligible institutions in a region, and a university with strong regional ties to the TCUP institutions and that offers upper division or graduate coursework in geosciences, particularly earth, atmosphere, ocean, and earth systems science.

This strand has the following goals:

- The development of TCUP institutions' capacity to provide geoscience programs of study.
- The development of partnerships with universities to facilitate and improve the transfer and success of TCUP students seeking degrees in geosciences.
- The development of outreach and support strategies at partner universities to improve access and success of TCUP students seeking degrees in geosciences.

Proposals may be submitted: (a) by a single TCUP-eligible institution or (b) collaboratively by a consortium of institutions, including other TCUP institutions and a university. In the latter case, it is anticipated that one TCUP institution may be identified to take the lead on organizational activities, although each institution will independently manage its award.

Partnerships for Documentary Linguistics Education (PADLE) acknowledges the critical importance of language--its use, its study, its preservation and revitalization--to the Nation's American Indian tribes, Alaska Natives, and Native Hawaiians. Studies show that instruction in immersion classrooms at early ages helps students succeed later in school, including in such English-dominant subjects as science, mathematics, technology, and engineering. The Nation's tribal colleges and universities (TCUs) are among the key repositories for language-related activities undertaken by a tribe, reservation, or community. Executive Order 13592 noted that "TCUs maintain, preserve, and restore Native languages and cultural traditions,..." and underscored the Administration's commitment to improving educational opportunities for students attending TCUs.

The Documenting Endangered Languages program (DEL) and TCUP have partnered to support activities of mutual interest and benefit to the Nation's TCUP institutions. This opportunity is offered through the DEL solicitation 15-567.

Pre-Engineering Education Collaboratives Phase II (PEEC-II) will support studies at PEEC institutions that investigate and elucidate the impact of the PEEC model, with the goal of understanding, documenting, and sharing the results of PEEC discovery. Due to the unique nature of this strand, opportunities are necessarily limited to those projects, partnerships, and institutions that have been actively supported by TCUP and ENG. Successful proposals do not have to include all PEEC partners, but must provide evidence of a partner's self-withdrawal, and may not add new partners not involved in the original collaboration.

Individual Investigator Studies

As the STEM instructional capacity of TCUP institutions increases, so does their stature in the research community. While faculty-led research is encouraged in all TCUP proposals as appropriate, NSF encourages TCUP faculty to look toward increasing their readiness for individual investigator support from the agency. Therefore, TCUP offers research-oriented funding support designed directly for STEM or STEM education faculty.

Small Grants for Research (SGR) awards provide support for faculty members in STEM disciplines or STEM education at TCUP-eligible institutions to initiate or pursue research endeavors in an NSF-supported STEM discipline or STEM educational research. These activities can be centered at the PI's home institution, but may also involve activities at another institution or research agency, such as an NSF-funded Center, a research-intensive institution, or a national laboratory. Awards are intended to help further the faculty member's research capability and effectiveness, to improve research and teaching at his or her home institution, and may involve undergraduate students in research experiences.

Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science in Tribal Colleges and Universities (SEA-PHAGES in TCUs) is made possible through a novel partnership between NSF and the Howard Hughes Medical Institute (HHMI). TCUP will accept proposals for support of faculty, students, materials, supplies, and travel that participating SEA institutions are expected to provide. Simultaneously, TCUs must apply for SEA (http://www.hhmi.org/programs/science-education-alliance/) and, if accepted, receive comprehensive training for faculty and teaching assistants; instructional materials necessary for the course and laboratory work; DNA sequencing and finishing of isolated phages; and participation in the annual SEA-PHAGES symposium. Awards are limited to three years of support, but may be renewed for an additional three years. SEA acceptance is a required award condition. NSF and HHMI will work closely to consider proposals and applications from TCUs that wish to take advantage of this opportunity.

III. AWARD INFORMATION

Instructional Capacity Excellence in TCUP Institutions

- Number of awards: Up to 8
- Project Length: Up to five years
- Award Size: Up to $2.5 million
- Note: Funds should be budgeted for the PI and PD to attend a TCUP Leaders' Forum each award year.

Targeted STEM Infusion Projects

- Number of awards: Up to 10
- Project Length: Up to three years
- Award Size: Up to $500,000
- Note: Funds should be budgeted for the PI to attend a TCUP Leaders' Forum meeting each award year.

Preparing for TCUP Implementation

- Number of awards: Up to 2
- Project Length: Up to two years
- Award Size: Up to $150,000

PArtnerships for Geosciences Education

- Number of awards: Up to 3
- Project Length: Up to five years
- Award Size: Up to $5,000,000; up to $825,000 per institution (up to $165,000 per institution per year; up to $1,000,000 per project per year)
- Note: Funds should be budgeted for the PI to attend a TCUP Leaders' Forum each award year.

Partnerships for Documentary Linguistics Education

- Number of awards: Up to 5
- Project Length: Up to three years
- Award Size: Up to $500,000; up to $250,000 per institution

Pre-Engineering Education Collaboratives Phase II

- Number of awards: Up to 4 collaborative awards
- Project Length: Up to three years
- Award Size: Up to $3,000,000 per collaborative award; up to $495,000 per institution (up to $165,000 per institution per year, not to exceed $1,000,000 per project per year
- Note: Funds should be budgeted for the PI to attend a TCUP Leaders' Forum meeting each award year.

Small Grants for Research

- Number of awards: Up to 10
- Project Length: Up to two years
- Award Size: Up to $200,000

SEA-PHAGES in TCUs

- Number of awards: Up to 3
- Project Length: Up to three years, with the possibility of renewal
- Award Size: Up to $300,000, in addition to the support provided by HHMI

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.

Who May Serve as PI:

For the Instructional Capacity Excellence in TCUP Institutions, PArtnerships for Geosciences Education, Partnerships for Documentary Linguistics Education, and Pre-Engineering Education Collaboratives Phase II award tracks, the principal investigator (PI) is expected to be the chief academic officer of the institution, or another senior academic officer responsible for oversight and management of curriculum and instructional policies for the institution, although senior STEM faculty may be considered. Typically, the PI for Targeted STEM Infusion Projects and Small Grants for Research proposals would be a member of the STEM faculty. Prospective PIs are encouraged to consult TCUP program staff.

Limit on Number of Proposals per Organization:

Eligible institutions may receive consecutive, but not concurrent, Instructional Capacity Excellence in TCUP Institutions awards. Eligible institutions may participate in only one SEA-PHAGES in TCUs awards concurrently. Eligible institutions may participate in only one PArtnerships for Geoscience Education award concurrently, but

participation is not prevented by the institution's having other TCUP awards. Eligible institutions may participate in only one Partnerships for Documentary Linguistics Education award concurrently, but participation is not prevented by the institution's having other TCUP awards. There is no limit on the number of Targeted STEM Infusion Projects or Small Grants for Research projects per TCUP-eligible institution. Institutions may receive only one Preparing for TCUP Implementation award.

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

There are no restrictions or limits.

Additional Eligibility Info:

Organizations eligible to submit TCUP proposals are Tribal Colleges and Universities, Alaska Native-serving institutions and Native Hawaiian-serving institutions. Multiple campuses of one university system are normally encouraged to consider collaborative submissions. Executive Order 13021 defines Tribal Colleges and Universities ("tribal colleges") as those institutions cited in section 532 of the Equity in Educational Land-Grant Status Act of 1994 (7 U.S.C. 301 note), and other institutions that qualify for funding under the Tribally Controlled Community College Assistance Act of 1978, (25 U.S.C. 1801 et seq.), as well as Navajo Community College as authorized in the Navajo Community College Assistance Act of 1978, Public Law 95-471, Title II (25 U.S.C. 640a note). The term "Alaska Native-serving institution" means an institution of higher education that is an eligible institution under section 1058(b) of the Higher Education Act; and that, at the time of submission, has an undergraduate enrollment that is at least 20 percent Alaska Native students. The term "Native Hawaiian-serving institution" means an institution of higher education that is an eligible institution under section 1058(b) of the Higher Education Act; and that, at the time of submission, has an undergraduate enrollment that is at least 10 percent Native Hawaiian students. Institutions of higher education in collaboration with TCUP-eligible institutions are eligible to propose under PAGE, PADLE, or PEEC-II.

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 Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 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. Chapter II, Section D.5 of the Grant Proposal Guide provides additional information on collaborative proposals.

See Chapter II.C.2 of the GPG 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 GPG instructions.

The project description section of all proposals submitted to any TCUP strand is limited to fifteen pages.

Transformative Capacity Building and **Multiple Institution Collaborations Require the Following Information that Supplements the GPG**

Proposals for Transformative Capacity Building and Multiple Institution Collaborations projects should provide a clear picture of the current status of the institution's STEM infrastructure and an institutional plan to enhance the STEM program by indicating the anticipated value added by the NSF-supported efforts.

Transformative Capacity Building and Multiple Institution Collaborations projects are intended to implement significant and sustainable enhancements to the institution's STEM instructional capacity. Proposals to these TCUP strands should include a description of the project management structure. In addition to the Principal Investigator, (normally, the chief academic officer of the institution, or another senior academic officer responsible for oversight and management of curriculum and instructional policies for the institution), typical project organization consists of a Project Director, and a Steering Committee with lead faculty from the relevant disciplines or programs and administrators from partner institutions, if any.

Transformative Capacity Building and Multiple Institution Collaborations proposals should also include a plan for establishing an external advisory committee, normally convened by the college or university president or another ranking institutional representative not designated as key personnel on the project. The PI cannot chair the advisory committee, nor can other members of the project leadership serve on the advisory committee. This committee will help guide the implementation and assessment of project activities.

There should be adequate representation from partner institutions, industry and the local community, as appropriate, and adequate expertise and experience with the topical and programmatic emphases of the project. Prospective candidates for the committee should be identified in the Project Description.

Transformative Capacity Building and Multiple Institution Collaborations projects are intended to continue beyond the period of NSF funding. Successful proposals should provide evidence of the commitment of the proposing institution to the improvement of undergraduate STEM education including plans and resource alignment strategies to continue elements of the project after NSF funding ends.

A crucial element is an evaluation and assessment plan, embedded within the Project Description, so that project development and implementation can be monitored at all stages. One of the key objectives of TCUP is to improve the quality of undergraduate STEM education through the development, adaptation and implementation of effective educational techniques and practices to enhance STEM instruction. (Note: Proposals from TCUP-eligible institutions that have not previously received TCUP support are allowed to develop and submit an evaluation plan within six months of award notification. The submitted budget should typically include no more than $50,000 for this component.)

Project Evaluation

A crucial element is an evaluation and assessment plan within the Project Description, so that project development and implementation can be monitored at all stages. All proposals to any strand of the TCUP program, except SGR and SEA-PHAGES in TCUs, should provide objectives, benchmarks, and indicators of progress that will be used to judge the effectiveness of the project. An individual must be explicitly designated in the proposal to lead the evaluation. The evaluation plan must correspond to the overall stated goals and objectives of the project. The specific elements of the evaluation plan will vary depending on the type and details of project but, in general, evidence of STEM knowledge, skill and aptitude development; and both quantitative and qualitative (e.g., the process of change in organizational culture; student-participants' and other constituents' perceptions of the program) indicators of progress in STEM education should be included.

One of the key objectives of TCUP is to improve the quality of undergraduate STEM education through the development, adaptation and implementation of effective educational techniques and practices to enhance STEM instruction. Accordingly, proposed evaluation and assessment plans should include indicators (as relevant given the specific proposed project) of progress that address the extent to which:

- educational techniques and practices shown to be effective elsewhere are adapted or modified for use at the awardee institution;
- a plan has been developed to identify specific intended outcomes, methods of assessing them, and design for measuring the impact of the project on those outcomes;
- faculty at the awardee institution have been prepared to use the modified educational techniques or practices;
- modified techniques or practices have been incorporated into the curriculum;
- innovative courses or program components are developed;
- the effectiveness of specific planned educational techniques, practices, courses or other implementation components is assessed;
- the equipment has been successfully incorporated into the curriculum (for those projects that acquire equipment); and
- project activities are demonstrated to affect student learning and student access to quality STEM education as defined by measurable quantitative student-based outcomes pre- and post-TCUP investment; e.g., number of STEM majors involved in active learning activities, research activities, or community service; number of STEM majors who have enrolled in and successfully completed newly developed or revised courses or programs; rates of successful completion of STEM gate-keeper courses; student retention in STEM disciplines; number of STEM graduates with grade point averages of 3.0 or higher; number of STEM students matriculating into 4-year colleges or graduate programs; and number of graduates that enter the STEM workforce.

Transformative Capacity Building and Multiple Institution Collaborations: Formative and summative evaluations should include comprehensive assessments of student recruitment; curriculum development; and faculty development activities and achievements in addition to evaluation of the direct outcomes (e.g., student participation and achievement; progression of students to advanced degrees or to the workforce) of the educational intervention. Yearly reports should include evaluation indicators to date. Reporting of full evaluation activities must be included in the final project report.

For information about evaluation methodology, see:

The 2010 User-Friendly Handbook;

the Online Evaluation Resource Library;

the models and checklists available online from the University of Western Michigan's Evaluation Center;

and contact the American Indian Higher Education Consortium (AIHEC) about the report *Indigenous Evaluation Framework: Telling Our Story in Our Place and Time* (LaFrance & Nichols, 2010).

All successful Transformative Capacity Building and Multiple Institution Collaborations proposals must articulate within the project description a dissemination plan.

Appendices are not accepted. Letters of support or commitment are not accepted unless specifically requested. Inclusion of letters of support not specifically requested may result in processing delays.

Prospective proposers are encouraged to confer with NSF TCUP staff prior to proposal submission.

Small Grants for Research (SGR) Proposals Require the Following Information that Supplements the GPG

In addition to following the general format for research proposals as described in the GPG, Small Grants for Research (SGR) proposals submitted must also adhere to the following special instructions:

Project Summary (one-page limit):

The SGR project summary should provide an overview, a succinct summary of the intellectual merit of the proposed project, and a description of the broader impacts of the proposed work, including benefits to society, dissemination of work, enhancements to scientific knowledge, as well as how the proposed activity will broaden participation of underrepresented groups for educational research. Project summaries that do not contain an overview and separate paragraphs that are labeled and explicitly address both intellectual merit and broader impacts will not be accepted or will be returned without review.

Project Description (15 page limit, including tables, figures, and other visual supplements):

The SGR project description should provide a detailed statement of the proposed research to be undertaken. It should contain a:

- brief description of the PI's overall research and education goals;
- detailed description of the proposed research activities including any preliminary data already available and a description of data that the PI plans to obtain;
- description of the relationship between the proposed activities and the PI's projected longer term research goals;
- discussion of how those activities will benefit the research capacity at the institution;
- discussion of how undergraduate students will be involved in this research, if applicable; and
- plan for dissemination of this research.

Budget:

- Support can be provided for release time during the academic year, summer salary for the PI, travel and housing at the research site for the PI and undergraduate students, and stipends for undergraduate student research experiences.
- Cost of equipment cannot exceed 20% of the total budget.

Special Information and Supplementary Documentation:

Include the following:

- a letter of commitment from the PI's Department Chair or Dean stating that the PI will have institutional support in terms of allowance for release time, travel for research purposes, and access to existing research facilities;
- a research plan jointly developed by the PI (and the research collaborator at the research center, university,or national laboratory where the PI conducts his or her research, if applicable);
- a letter of support from the PI's research collaborator at the research center, university, or national laboratory where the PI conducts his or her research, if applicable; and
- a mentoring plan from the PI for the undergraduate students that are involved in the project, if applicable.

Additional funding opportunities for broadening STEM education research topics in student learning, recruitment, retention, persistence to degree, and other STEM educational research for underrepresented minority populations are available throughout the NSF. Please refer to the NSF Website for additional information. See especially educational research funding opportunities from other HRD programs (e.g., Louis Stokes Alliances for Minority Participation [LSAMP]), and those in the NSF's Division of Undergraduate Education (DUE), including the Institutional and Community Transformation track of IUSE.

The National Science Foundation and the Institute of Education Sciences in the U.S. Department of Education developed Common Guidelines for Education Research and Development. These guidelines describe six types of research studies. For each research type, there is a description of the purpose and the expected empirical and/or theoretical justifications, types of project outcomes, and quality of evidence. The Guidelines (NSF 13-126) can be found on the NSF website: (http://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf). For FAQs regarding the Guidelines (NSF 13-127), see http://www.nsf.gov/pubs/2013/nsf13127/nsf13127.pdf. Grant proposal writers and PIs are encouraged to familiarize themselves with both documents and use the information therein in the preparation of educational research proposals to NSF.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Funds should be budgeted for the principal investigator and project director of Instructional Capacity Excellence in TCUP Institutions, Targeted STEM Infusion Projects, Partnerships for Geoscience Education, and Pre-Engineering Education Collaboratives Phase II awards to attend a two-day Leaders' Forum each year.

For SGR projects only: Cost of equipment cannot exceed 20% of the total budget.

C. Due Dates

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

  April 14, 2016

  April 14, Annually Thereafter

  PArtnerships in Geoscience Education

  April 18, 2016

  Pre-Engineering Education Collaboratives Phase II

  September 02, 2016

  September 2, Annually Thereafter

  Instructional Capacity Excellence in TCUP Institutions

  September 16, 2016

  Partnerships for Documentary Linguistics Education

  September 16, 2016

  September 16, Annually Thereafter

Targeted STEM Infusion Projects

October 03, 2016

October 3, Annually Thereafter

SEA-PHAGES in TCUs

December 05, 2016

First Monday in December, Annually Thereafter

Small Grants for Research

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

Proposals Accepted Anytime

Preparing for TCUP Implementation

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 the GPG as 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. (GPG 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 GPG 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

Proposals submitted to the SEA-PHAGES in TCUs strand will be ad hoc reviewed according to NSF's merit review criteria, with the

understanding that proposing institutions will simultaneously apply to HHMI's Science Education Alliance (SEA). All proposals that are recommended for TCUP support will be considered pending until the institution has been accepted to SEA, at which time they will be finalized according to NSF procedures. Proposals from institutions not accepted to SEA will be declined according to NSF procedures.

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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

The Foundation and project leaders to whom it makes awards are obliged to conform to the various acts governing activities affecting the environment and cultural or historic properties. Project leaders should be aware of these acts and adhere to their requirements. Project leaders proposing work that may affect cultural or historic properties, or whose work involves tribal lands must cooperate with the agency in complying with the consultation requirements of section 106 of the National Historic Preservation Act. Project leaders are encouraged to contact TCUP for more information about cultural or historic impact considerations of their proposed field work. For additional information on cultural or historic preservation issues, see the Advisory Council on Historic Preservation's web site here.

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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

TCUP awardees are required to submit a copy of the evaluation report they receive from their evaluators annually. Evaluation reports for all funded projects must include progress articulated by proposed goal, objective, or activity. Evaluation reports for all funded projects should also include highlights that capture interesting accomplishments or features of the projects.

In addition to the required information listed above, evaluation reports for ICE-TI and TSIP projects also must include quantitative and qualitative evidence of impact on:

- course, program, and degree offerings;
- enrollment and success rates for students directly impacted by TCUP (e.g., STEM majors or students enrolled in STEM coursework supported by TCUP) disaggregated by ethnicity;
- professional development, including degree attainment, of STEM or related TCUP faculty;
- engagement of K-12 students or teachers, if applicable; and
- acquisition of scientific equipment, or IT advances.

Upon request, the program will provide formatting guidance for project leaders on evaluation reports.

TCUP awardees are required to submit copies of any journal articles, etc., that result from work supported by TCUP.

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:

- Jody Chase, Program Director, TCUP, telephone: (703) 292-8682, email: lchase@nsf.gov
- Rebecca A. Bates, Program Director, TCUP, telephone: (703)292-8682, email: rbates@nsf.gov
- Jill L. Karsten, Program Director, GEO, telephone: (703) 292-7718, email: jkarsten@nsf.gov
- Colleen Fitzgerald, Program Director, DEL, telephone: (703)292-4381, email: cfitzger@nsf.gov
- James L. Moore, telephone: (703) 292-7082, email: jamoore@nsf.gov
- Denise Spain, Program Specialist, TCUP, 815, telephone: 703-292-5189, email: dspain@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.

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.

The National Science Foundation and the Institute of Education Sciences in the U.S. Department of Education developed Common Guidelines for Education Research and Development. The Guidelines describe six types of research studies that can generate evidence about how to increase student learning. Research types include those that generate the most fundamental understandings related to education and learning; examinations of associations between variables; iterative design and testing of strategies or interventions; and assessments of the impact of a fully-developed intervention on an education outcome. For each research type, there is a description of the purpose and the expected empirical and/or theoretical justifications, types of project outcomes, and quality of evidence.

The Guidelines publication can be found on the NSF website with the number NSF 13-126 (http://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf,). A set of FAQs regarding the Guidelines are available with the number NSF 13-127(http://www.nsf.gov/pubs/2013/nsf13127/nsf13127.pdf). Grant proposal writers and PIs are encouraged to familiarize themselves with both documents and use the information therein in the preparation of proposals to NSF.

ABOUT THE NATIONAL SCIENCE FOUNDATION

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

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

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

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

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

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

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

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

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  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:

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