[Improving Undergraduate STEM Education: Education and Human Resource NSF 19-601](#)

This program seeks to promote novel, creative, and transformative approaches to generating and using new knowledge about STEM teaching and learning to improve STEM education for undergraduate students; and supports projects that adapt, improve, and incorporate evidence-based practices into STEM teaching and learning, and that lay the groundwork for institutional improvement in STEM education.

In addition to innovative work at the frontier of STEM education, this program also encourages replication of research studies at different types of institutions and with different student bodies to produce deeper knowledge about the effectiveness and transferability of findings.

This program features **two tracks**, **both with August 4, 2020 submission deadlines**:

I. Engaged Student Learning: Level 1: up to $300,000 for up to three years

Level 1 support early-stage or exploratory research projects, and projects that propose adaptation of existing pedagogies and methodologies in novel environments on a small scale. Proposals from a single institution involving one or more faculty members in a single discipline or across several disciplines are appropriate for this level, as are partnerships across disciplines, institutions, or communities focused on a unifying thematic approach or problem. Pilot data illustrating initial efforts may be helpful in assessing the viability of the project, but projects with a strong grounding in the relevant literature are also appropriate for this level.

The Engaged Student Learning track focuses on design, development, and research projects that involve the creation, exploration, or implementation of tools, resources, and models. Projects must show high potential to increase student engagement and learning in STEM. Projects may focus directly on students or indirectly serve students through faculty professional development or research on teaching and learning. All projects should be both evidence-based and knowledge-generating, with well-developed plans to study student experiences and evaluate student outcomes. NSF's investment in research and development for this track encompasses a range of approaches including:

- Development and implementation of novel instructional methods or adaptation of existing evidence-based pedagogies in STEM disciplines or in multi-disciplinary or interdisciplinary courses or programs
- Design and assessment of metrics aiming to measure STEM teaching and learning or student outcomes
- Local, regional, or national efforts to develop and disseminate tools, resources, or models designed to improve STEM teaching and learning
- Discipline-based educational research or research that spans multiple disciplinary domains
- Faculty learning through professional development
- Re-envisioning or adaptation of learning environments
- Co-curricular activities that increase student motivation and persistence in STEM
- Investigation of novel instructional tools or learning systems, including cyber-learning or learning technologies
- Synthesis or meta-analysis of prior work to examine differences in findings across studies and variations in the types of interventions, for whom, and under what conditions
- Collaborations between two-year and four-year institutions to develop innovative pathways for student transfers and success

II. Institutional and Community Transformation: Capacity-Building: $150K (single institution) or $300K (multiple institutions) for up to two years

Capacity-Building proposals are expected to enable institutions that have not served as the lead institution on a prior ICT award to identify a project of interest. Funding for these projects is intended to support efforts to assess institutional needs, formulate departmental and/or institutional commitments, develop necessary campus partnerships, audit prior institutional efforts, gather data, learn about relevant theories of change, identify relevant institutional practices and policies, and/or formulate plans for advancing institutional or community transformation. Proposers are encouraged to include a variety of participants, such as disciplinary or educational researchers, assessment and evaluation experts and advisors, and institutional leaders. Funds awarded for ICT Capacity-Building proposals are intended to defray costs such as coordinating among project participants, sharing data, and attending relevant meetings including IUSE: EHR PI meetings. The project timeframe is intended to allow institutions to host one or more working meetings at which stakeholders and potential research partners might ultimately develop an ICT Level 1 or Level 2 proposal.

The ICT track funds innovative work applying evidence-based practices that improve undergraduate STEM education and research on the organizational change processes involved in implementing evidence-based practices. The emphasis of this track is on systemic change that may be measured at the departmental, institutional, or multi-institutional level, or across communities of STEM educators and/or educational researchers and are expected to include one or more **theories of change** to guide the proposed work. A theory of change functions to identify and organize the dimensions of the proposed work. Competitive proposals will examine the impact of deliberate interventions in undergraduate STEM education. While proposed projects will vary in approach and the underlying theory/theories of change identified, promising proposals will recognize that STEM higher education is a complex system and that achieving goals involves analyzing and addressing organizational factors, such as institutional policies and practices or opportunities for professional growth. ICT projects may focus on departments or colleges within institutions, entire institutions, or on STEM communities of educators, practitioners, and/or educational researchers. NSF's investment in research and development in institutional and community transformation encompasses a range of approaches, such as:

- Transformation of high-enrollment, lower-division courses within a discipline or across disciplines to include evidence-based teaching practices
- Developing disciplinary or interdisciplinary teaching evaluation rubrics that are rooted in a common research-based framework
- Development and propagation of faculty communities of practice to support efforts to improve accessibility or sustainability of evidence-based educational approaches
- Examination of change processes in colleges, universities, or academic communities and developing metrics and identifying best practices to guide the process of institutional transformation
- Re-envisioning of learning environments or support networks for faculty and students
- Inclusion of non-tenure-track faculty or instructors through policy or professional development
- Identification of common elements across disciplines, programs, institutions, or systems that support students from underrepresented groups to be successful in STEM