Webinar on NSF’s Improving Undergraduate STEM Education: Education and Human Resources (IUSE:EHR) Program (Pre-service Teacher Preparation Focus)

For proposals submitted to **NSF 17-590**

**Program Directors**

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This session is being recorded.

In participating in the session, you are giving permission to record your question/comment(s).
Are You Interested In:

- Making changes at your institution to improve students’ STEM learning and engagement?

- Using assessment to enhance what is known about effective STEM teaching and learning practices?

- Considering the implications of the aforementioned factors for pre-service STEM teacher preparation?

Stay tuned to learn more about the IUSE: EHR program ...
Webinar Topics
(Webinar Duration: 1.5 hours)

• Introduction to IUSE:EHR Program

• What do you want to do?

• Description of IUSE: EHR Program (Tracks and Tiers)
  • Tracks: Engaged Student Learning (ESL) and Institution & Community Transformation (ICT)
  • Tiers: Exploration & Design (E&D) and Development & Implementation (D&I)
  • Research Only Projects
  • Workshop and Conference Submissions

• Additional Program Details
  • Important Program Expectations
  • NSF Review Criteria

• Resources

• Just for NEW to NSF

Note: Webinar will include 3 Q & A sessions. Participants will use the Q&A box (CHAT) in the platform to ask questions.
Introduction to IUSE:EHR Program
What have you been longing to do to improve STEM Pre-service Education?

**Action:** Write down 3 things you have been longing to do that require financial resources.

**Response:** Your *INNOVATIVE* pre-service idea is here!

**Question:** Could NSF fund *your* pre-service idea?

**Answer:** *YES!*
Pre-Service STEM Teacher Education in IUSE

From Solicitation NSF 17-590:

• “IUSE: EHR encourages projects that develop faculty expertise, prepare K-12 teachers, and provide all undergraduate students with STEM competencies and a basic understanding of STEM concepts and principles.”

• “... improving K-12 STEM education through undergraduate pre-service STEM teacher preparation courses and curricula; encouraging life-long learning; and building capacity in higher education.”
Sample ESL Project Themes

- Assessment/metrics of learning and practice *(in STEM or pedagogy courses for teachers)*
- Educational Research *(of best practices in STEM teacher preparation)*
- Conducting undergraduate disciplinary research *(for pre-service teachers)*
- Developing the STEM and STEM-related workforce *(including teachers; not scholarships)*
- Educating a STEM-literate population *(including STEM teachers)*
- Broadening participation in STEM *(including STEM teachers)*
- Exploring co-curricular activities to increase student motivation and persistence *(in STEM teaching)*
- STEM faculty professional development *(including PD for STEM faculty teaching pre-service STEM teachers)*
- Building capacity in higher education *(including STEM teacher preparation programs or curricula)*

*Note: While these are some examples of ESL project themes, other themes are appropriate and many other applications to preservice STEM teacher preparation are possible.*
Sample ICT Project Themes

• Technology and distance education methods (in STEM or pedagogy courses for teachers)

• Institutional STEM planning efforts and investigation of evidence-based practices in institutional strategic planning and faculty rewards (in collaborations among pre-service education and STEM disciplinary departments/colleges and faculty)

• STEM faculty professional development (including PD for STEM faculty teaching pre-service STEM teachers)

• Development of instruments and metrics to assess institutional shifts towards evidence-based teaching practices (in STEM or pedagogy courses for teachers)

• Research studies on approaches for advancing change in the STEM undergraduate community (including STEM teacher preparation programs)

Note: While these are some examples of ICT project themes, other themes are appropriate and many other applications to pre-service STEM teacher preparation are possible.
Q & A — Session #1

• QUESTIONS?

• QUESTIONS?

• QUESTIONS
IUSE: EHR Program

Two Program Tracks

Engaged Student Learning
Focus on designing, developing, and implementing research on STEM learning models, approaches, and tools

- Exploration & Design (smaller scale)
  - Up to $300K
  - Up to 3 yrs
- Development & Implementation (larger scale)
  - Level I:
    - Up to $600K
    - Up to 3 yrs
  - Level II:
    - $600K to $2M
    - Up to 5 yrs

Institutional & Community Transformation
Focus on increasing the propagation of highly effective methods of STEM teaching and learning

- Exploration & Design (smaller scale)
  - Up to $300K
  - Up to 3 yrs
- Development & Implementation (larger scale)
  - Up to $3M
  - Up to 5 yrs
How Much Time Do I Have to Put Together a Winning Proposal?
(or when are IUSE proposals due?)

• E&D—No submission deadline
(can submit proposals anytime between Oct. 1, 2018 and Sept. 30, 2019)

• D&I — Submission Deadline is December 11, 2018
Two Program Tiers (E&D and D&I)

**Exploration and Design** projects are small-scale projects that may:

- Establish the basis for future D&I projects;
- Pose new interventions or strategies, and explore challenges to their adoption; and
- Have a goal of informing policy, practice, future design, or development of components in the STEM higher ed.

**Development and Implementation** projects are larger-scale projects that may:

- Focus on new or promising interventions or strategies;
- Seek to achieve well-specified STEM learning objectives, including making refinements on the basis of small-scale testing.
Engaged Student Learning (ESL) Projects

• Focus on designing, developing, and implementing research on STEM learning models, approaches, and tools.

• Involve the creation, exploration, or implementation of tools, resources, and models that show promise to:
  • increase engagement in STEM learning; and
  • lead to measurable and lasting learning gains.

• Reflect disciplinary differences in needs and priorities.
ESL Track Specifics cont.

• Collaborations are encouraged among:
  • STEM disciplinary researchers
  • Education researchers
  • Cognitive scientists

• Such collaborations should:
  • Leverage what is known about how people learn
  • Contribute to the growth of that body of knowledge
Target Populations for Projects in ESL Track

• Students at two- and four-year institutions
• STEM majors (declared and undeclared)
• Students whose course of study require solid skills and knowledge of STEM principles
• Non-STEM majors seeking to fulfill a general education requirement in STEM
• STEM faculty members
• Pre-service STEM teachers in *undergraduate* teacher preparation programs
Institutional & Community Transformation (ICT)

- Focus on increasing the propagation of highly effective methods of STEM teaching and learning.

- Use **innovative approaches** promoting the spread of highly effective teaching and learning methods and curricular and co-curricular practices across/within disciplinary communities.

- Be **proposed by an institution or set of institutions**.

- Be **proposed by professional communities**.

- Seek to **transform high enrollment, lower division courses**.

- **Implement efforts in multiple courses** within a dept/college or in a particular disciplinary area.

- Focus on **leadership development** for pedagogical & curricular innovation.
ICT Proposals

• Describe **theory of change**.

• Include **research literature and theoretical perspectives** concerning change.

• Recognize STEM higher education as a **complex system**.

• Promote institutional change and include:
  • **Teams** of faculty members
  • **Support** from the department chairs, college deans, or others within the institution's academic leadership
  • **Support** from Provosts or Presidents
IUSE Fact Check (*True or False*)

- Q1: All proposals must have a research component.
  - False, but all proposals must generate new knowledge.

- Q2: Funds for STEM curriculum development, programmatic pathways, learning resources, assessment instruments, and faculty development may receive funding.
  - True

- Q3: Proposals may focus on both STEM and non-STEM majors.
  - True, efforts to improve STEM undergraduate education for either or for both are welcome.

- Q4: Proposals may focus solely on STEM teacher preparation.
  - True, as well as any area of STEM undergraduate education.

- Q4: Proposals should demonstrate a solid grounding in relevant literature on STEM teaching and learning.
  - True, all proposals should be evidence-based.

- Q5: An evaluation plan that provides formative and summative assessment of the effectiveness of the project in achieving its goals is required.
  - True

- Q6: Only Universities and Colleges may submit a proposal.
  - False, all categories of proposers in the PAPPG are eligible
Which of the following may receive IUSE funding?

- use and build evidence about improved STEM instructional practices;
- design and study innovative learning opportunities, including cyberlearning;
- create, implement, and test program, curricular, course, and technology-driven models;
- develop, implement, and test creative approaches for adoption of education research into disciplinary teachings;
- develop and validate assessments/metrics for undergraduate STEM learning and instructional practice; and
- conduct fundamental research on issues of undergraduate STEM teaching and learning.

Answer—ALL of the above
Q & A — Session #2
IUSE:EHR Research Projects

• Projects that are predominantly research studies may be submitted to either track (ESL or ICT).

• Research studies may explore (among other possibilities):
  • Enhancement of student learning and attitudes through teaching strategies and effective curricula
  • Diffusion of widespread practices through the community
  • Effective professional development
  • Effective institutional change models
Workshops and Conferences

• Proposals for workshops and conferences addressing critical challenges in undergraduate STEM education may be submitted at any time.

• Typically these proposals include budgets between $50,000 and $100,000.

• Proposers must consult an NSF Program Officer (in the IUSE: EHR program) before submission to determine appropriateness of proposed workshop or conference for IUSE: EHR.
Additional Program Details
ESL and ICT Proposals Must...

• Be transportable and propagatable --- and include
  • plans for making project transportable.
  • plans for encouraging, enabling, and facilitating use of findings or developments by others.

• Be evidence-based --- and include
  • evidence-based justification of the proposed topic and approach.
  • substantial discussion from research literature.

• Be knowledge-generating --- and include
  • plans for collecting, analyzing, and sharing data.
  • goals and objectives (intended outcomes).
  • evaluation plan to determine the effect of the intervention.
  • description of how the evaluation results will be a basis for publication.

• Include objective feedback (formative and summative)
Pay Attention To:

- Solicitation 17-590 (the IUSE: EHR)  


- Part I of the Proposal and Awards Policies and Procedures Guide (PAPPG)  
Q & A – Session #3

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Program Resources
IUSE: EHR Website

• For more information on IUSE: EHR Program visit: https://www.nsf.gov/pubs/2017/nsf17590/nsf17590.htm

• Conduct an Awards Search of previously funded IUSE projects at www.nsf.gov.

• Follow up with an NSF IUSE Teacher Prep contact:
  • Kathleen Bergin, kbergin@nsf.gov
  • Sandra Richardson, srichard@nsf.gov
Complementary EHR Programs
(with a teacher preparation focus)

• Robert Noyce Teacher Scholarship Program (Noyce) Track 4: Noyce Research

• EHR Core Research (ECR)

• Advanced Technological Education (ATE)
We Want You!

• Consider serving as a reviewer!

• Contact an IUSE Program Officer via email with a copy of your 2-page vita attached.
  ❖ NSF IUSE Teacher Prep contacts:
    Kathleen Bergin, kbergin@nsf.gov
    Sandra Richardson, srichard@nsf.gov
Thank you for your participation and for your interest in improving Undergraduate STEM Education, particularly related to Pre-Service STEM Teacher Preparation!
New to NSF Proposals?
New to NSF Proposals?

• Proposal Parts

• What makes for a compelling proposal?

• Submitting a Proposal

• What happens after proposal submission?
Proposal Sections

- Cover Page
- Table of Contents
- Project Summary (1-Page)
- Project Description (15-Pages)
- References Cited
- Biographical Sketch(es)
- Budget and Budget Justification
- Current and Pending Support
- Facilities, Equipment and Other Resources
- Special Information and Supplementary Documentation
- Data Management Plan
- Postdoctoral Mentoring Plan (if applicable)
- Single Copy Documents
  - Collaborators & Other Affiliations Information
Project Summary (1-page)

Each proposal must contain a one-page summary of the proposed project that includes:

• Overview
• Intellectual merit statement
• Broader impacts statement

NOTE: Label the paragraph on Intellectual Merit and the paragraph on Broader Impacts
Project Description (15-pages)

• Must contain, as a separate section within the narrative, a section labeled “Intellectual Merit”.

• Provides a clear statement of the work to be undertaken.

• Includes the objectives for the period of the proposed work and expected significance.

• Indicates the relationship of this work to the present state of knowledge in the field, as well as to work in progress by the PI under other support.

• Outlines the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provides a clear description of experimental methods and procedures.

• Addresses what they 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.
Project Description (cont.)

• The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions.
Project Description (cont.)

• must contain, as a separate section within the narrative, a section labeled “Broader Impacts”

• provides a discussion of the broader impacts of the proposed activities of the proposal and how they will be obtained

Note: 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.

Note: NSF values the advancement of scientific knowledge and activities that contribute to the 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 US; and enhanced infrastructure for research and education.
Project Description (cont.)

Brevity will assist reviewers and Foundation staff in dealing effectively with proposals.

• Project Description (including Results from Prior NSF Support, which is limited to five pages) **may not exceed 15 pages**

• Visual materials, including charts, graphs, maps, photographs and other pictorial presentations are included in the 15-page limitation

• Project Description must be self-contained and that URLs **must not** be used
Elements of an Assessment and Evaluation Plan
(included within the 15-page Project Description)
FORMATIVE SUMMATIVE

When the Chef tastes the soup

When the guests taste the soup

From Steve Wheeler's blog "The AFL Truth About Assessment"

What Makes a Proposal Competitive?

- Original ideas
- Succinct, focused project plan
- Realistic amount of work
- Sufficient detail provided
- Cost effective
- High impact
- Knowledge and experience of PIs
- Contribution to the field
- Rationale and evidence of potential effectiveness
- Likelihood the project will be sustained
- Objective feedback, solid evaluation plan (or advisory board in some circumstances)
Tips for Success

• Consult the program solicitation and NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 09-1)
• Test drive FastLane
• Alert the Sponsored Research Office
• Follow page and font size limits
• Be aware of other projects and advances in the field
• Cite the literature
• Provide details
• Discuss prior results
• Include evaluation plan with timelines and benchmarks
Tips for Success

• Put yourself in the reviewers’ place
• Consider reviewers’ comments if resubmitting proposal
• Have someone else read the proposal
• Spell check; grammar check
• Meet deadlines
• Follow NSF requirements for proposals involving Human Subjects
• Call or email NSF Program Officers
Proposal Submission and Review

• Proposal Submission is through Fastlane.nsf.gov or Research.gov

• Reviewers apply the two NSF Merit Review Criteria
Merit Review Considerations

For both ESL and ICT projects, proposals must fully address both IM and BI.

• What is the potential for the proposed activity to:
  ▪ Advance knowledge and understanding within its own field or across different fields (Intellectual Merit)?
  ▪ Benefit society or advance desired societal outcomes (Broader Impacts)?

• To what extent does the proposed activity suggest and explore creative, original or potentially transformative concepts?
Merit Review Considerations (Cont.)

• 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**?

• How well **qualified** is the individual, team, or organization to conduct the proposed activities?

• Are there **adequate resources** available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?

*Please Note: Reviewers are also asked to review Facilities, Equipment and Other Resources, Data Management Plan, Postdoctoral Researcher Mentoring Plan, and required Supplementary Documents.*
Q & A – Session #4