Webinar on NSF’s Improving Undergraduate STEM Education: Education and Human Resources (IUSE: EHR) Program

Overview and Focus of the Program

For proposals submitted to NSF 21-579
This session is being recorded

By participating in the session, you are giving permission to record your questions and comments.
Webinar agenda

• Introduction to the IUSE: EHR Program
• IUSE: EHR Program organization
  • Tracks and levels
  • Workshop and conference submissions
• Questions?
• Program Expectations
• NSF Review Criteria – Intellectual Merit and Broader Impacts
• Questions?

Note: The webinar will include several Q&A sessions. Participants will use the Q&A box in the platform to ask questions.
Introduction to the IUSE: EHR Program
IUSE: EHR calls for projects to...

• Improve the quality and effectiveness of the education of undergraduates in all STEM fields

• Improve undergraduate STEM teaching and learning for all students and/or the institutional environment where they occur
Who can apply?

- Proposals are accepted from all types of institutions of higher education and from professional societies and organizations that work with or represent those institutions
What institutional types has IUSE funded?
IUSE: EHR Program Organization

Engaged Student Learning
Institutional and Community Transformation
Levels, Funding, and Deadlines
Two program tracks:

- **Engaged Student Learning**: development, testing, and use of teaching practices and curricular innovations that will engage students and improve learning, persistence, and retention in STEM

- **Institutional and Community Transformation**: transformation of colleges and universities to implement and sustain highly effective STEM teaching and learning
Engaged Student Learning

• Focuses on improving student learning (directly or indirectly)
• Supports development of improved instructional materials and/or methods
• Aims to engage students, improve learning, and increase retention in STEM
Engaged Student Learning

Range of approaches including (but not limited to):

• Development and implementation of novel instructional methods and technologies
• Design and assessment of metrics to measure STEM teaching and learning or student outcomes
• Faculty learning through professional development
• Discipline-based or interdisciplinary educational research
• Re-envisioning or adaptation of learning environments
• Co-curricular activities that increase student motivation and persistence in STEM
• Synthesis or meta-analysis of prior work
• Collaborations between 2-year and 4-year institutions to develop innovative pathways for transfer and student success
Target populations for ESL projects

- Undergraduate 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
Levels for ESL projects

Three levels of funding are available depending upon the scope and scale of your project.

• **Level 1:** $\leq$ $300k$, up to 3 years
  - Support early-stage or exploratory research projects, as well as projects that propose adaptation of existing pedagogies and methodologies in novel environments on a small scale

• **Level 2:** $301k$ - $600k$, up to 3 years
  - Support design and development efforts or impact studies to improve student learning, including department-wide reform efforts, interdisciplinary or multi-disciplinary collaborations, or partnerships across institutions.

• **Level 3:** $601k$ - $2M$, up to 5 years
  - Benefit large numbers of students or broad communities of faculty and instructors through large-scale design and development studies or impact research. Expected to contain highly developed research plans including significant research questions or large-scale evaluation efforts.
Institutional and Community Transformation

• Focuses on improving evidence-based instruction by academic departments, institutions, and other organizations or communities

• Supports efforts to build and understand systemic change in undergraduate STEM education

• Aims to use appropriate theories of change to transform institutions
Institutional and Community Transformation

Range of approaches including (but not limited to):

• Transformation of high-enrollment classes to include evidence-based teaching practices
• Developing teaching evaluation rubrics rooted in a research-based framework
• Development of faculty communities to improve accessibility or sustainability of evidence-based practices
• Identifying best practices to guide institutional transformation
• 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
Institutional and Community Transformation proposals should…. 

• 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
Levels for ICT projects

Three levels of funding are available depending upon the scope and scale of your project.

• **Capacity-Building:** $150k for single institution or $300k for multiple institutions, up to 2 years
  • Enable institutions that have not served as the lead institution on a prior ICT award to identify a project of interest.

• **Level 1:** ≤ $300k, up to 3 years
  • Support smaller, early-stage institutional and community transformation projects

• **Level 2:** $301k - $2M for single institution or $3M for multiple institutions, up to 5 years
  • Support design and development work or impact research that examines and/or incorporates broad communities of institutions, departments, or faculty. Expected to contain robust research plans including either significant research questions or large-scale evaluation efforts, along with appropriate assessment efforts.
<table>
<thead>
<tr>
<th><strong>Engaged Student Learning</strong></th>
<th><strong>Institutional and Community Transformation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increasing engagement and learning through new tools, resources and models</td>
<td>• Spreading and scaling up evidence-based practices using a “theory of change”</td>
</tr>
<tr>
<td>• Generating knowledge about student learning</td>
<td>• Generating knowledge about the organizational change process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Level</strong></th>
<th><strong>Budget</strong></th>
<th><strong>Duration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1:</td>
<td>≤ $300k</td>
<td>up to 3 years</td>
</tr>
<tr>
<td>Level 2:</td>
<td>$301k - $600k</td>
<td>up to 3 years</td>
</tr>
<tr>
<td>Level 3:</td>
<td>$601k - $2M</td>
<td>up to 5 years</td>
</tr>
</tbody>
</table>

**Capacity-Building:**
- $150k for single institution or $300k for multiple institutions, up to 2 years
- Level 1: ≤ $300k, up to 3 years
- Level 2: $301k - $2M for single institution or $3M for multiple institutions, up to 5 years
Program Deadlines

• Level 1, 2, & 3, and Capacity-Building proposals:
  • July 21, 2021 (and the third Wednesday in July thereafter)

• Level 1 and Capacity-Building proposals:
  • January 19, 2022 (and the third Wednesday in January thereafter)
Workshops and Conferences

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

• Depending on size and scale of the workshop or conference, these proposals typically include budgets between $20,000 and $100,000.

• Proposers must consult an NSF Program Officer (in the IUSE: EHR program) before submission to determine appropriateness of the proposed workshop or conference for IUSE: EHR.
Workshops and Conferences

Conference and workshop proposals addressing diversity in STEM teaching and learning and those involving collaborations of educational researchers and disciplinary scientists to ensure that STEM teaching reflects cutting-edge STEM disciplinary research are especially encouraged.
Questions?
Program Expectations
<table>
<thead>
<tr>
<th>IUSE: EHR Program Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To build knowledge about STEM teaching and learning at the undergraduate level</strong></td>
</tr>
<tr>
<td>Develop novel, creative, and transformative approaches to undergraduate STEM teaching and learning</td>
</tr>
<tr>
<td><strong>To incorporate evidence-based practices in STEM teaching and learning for all undergraduates</strong></td>
</tr>
<tr>
<td>Adapt, improve, replicate, and include evidence-based practices in STEM teaching and learning</td>
</tr>
<tr>
<td><strong>To build and understand systemic change in undergraduate STEM education</strong></td>
</tr>
<tr>
<td>Lay the groundwork for sustained departmental, institutional, or community transformation and improvement</td>
</tr>
</tbody>
</table>
Gaining new knowledge

All IUSE: EHR proposals are expected to increase knowledge about effective STEM education through

- Posing one or more research questions OR
- Evaluation of project activities, impacts, or outcomes
Successful IUSE proposals will...

• **Build on what is known**, summarizing published literature and defining a starting point that extends the prior work
• Include a well-designed plan to **gather data**
• Specify **methods of analysis** that will be employed to answer the questions posed
• Include mechanisms to **evaluate** the success of the project (both formative and summative evaluation)
• Explain how findings and materials will be **shared**
• Address the **sustainability** of project efforts
• **Collaborate** as needed with other investigators, institutions, or communities
Methods of Analysis

• Align research or evaluation methods with the questions posed

• Select appropriate methods to perform the study. These may be:
  • Qualitative
  • Quantitative
  • A mixture of both
IUSE Fact Check (True or False?)

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

• Q2: 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 undergraduate STEM education for either or both is appropriate.

• Q4: Proposals may focus solely on students in a single discipline.
  • True, as well as on multidisciplinary or interdisciplinary STEM education.
IUSE Fact Check (True or False?)

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

• Q6: Proposals should demonstrate a solid grounding in relevant literature on STEM teaching and learning.
  • True

• Q7: Only colleges and universities may submit proposals
  • False, all categories of proposers in the PAPPG are eligible (including professional societies, companies, nonprofit organizations, etc.)
Which of the following may receive IUSE funding?

- Use and build evidence about improved STEM instructional practices
- Investigate novel instructional tools or learning systems, including cyberlearning
- Create, implement, and test program, curricular, course, and technology-driven models for STEM teaching and learning
- Develop, implement, and test creative approaches for adoption of education research into disciplinary teaching
- Develop and validate assessments/metrics for undergraduate STEM learning and instructional practice; and
- Propagate and sustain transformative and effective STEM teaching and learning through institutional practices or involvement of professional societies

Answer—ALL of the above
Questions?
NSF Merit Review Criteria

Intellectual Merit
Broader Impacts
Merit Review Criteria

**Intellectual Merit (IM):** What is the potential for the proposed activity to advance knowledge and understanding within its own field or across fields?

- What will we learn from the work?

**Broader Impacts (BI):** What is the potential for benefitting society or advancing desired societal outcomes?

- Why is the work important to society?
Other review considerations

• To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?

• 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 qualified is the individual, team, or institution 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.
Is it IM or BI?

In addition to development and implementation of a novel curriculum, the project will include educational research to uncover new information about undergraduate model-based-reasoning through detailed assessment of classroom learning.

• Intellectual merit
Activities planned will provide in-depth faculty development through a national series of workshops, and an expansion of an ongoing national study of the effectiveness of this approach for learning about the nature of science.

• Broader Impact
Questions?