

Webinar
**NSF's Improving Undergraduate STEM
Education (IUSE) Program**

**Conducted by the Virtual Faculty Collaborative
(a partnership among AAAS, Louisiana State
University, and Higher Education Services) in
collaboration with NSF**

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Presenters and NSF Participants

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- **NSF Participants**

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- **Webinar slides and a recording of one of the sessions are available through the AAAS IUSE website**

- <http://ehrweb01.aaas.org/stem-iwbw/iuse-webinars/>

Disclaimer

- **This slide set represents the opinions of the presenters and it is not an official NSF document.**
- **Presenters have all served several years as NSF Program Directors in DUE, but they are not currently affiliated with NSF.**
- **Individuals responding to questions during the webinar are currently NSF Program Directors in DUE and are responsible for the IUSE Program.**
- **In preparing the webinar materials, the presenters have had several discussions with these IUSE Program Lead Officers and have gotten comments on the slides from these individuals.**

Webinar Topics

- **Overview of the IUSE Program**
- **IUSE Program expectations**
- **First Q&A Session**

- **Discussion of IUSE design, development, and implementation projects**
- **Proposal review process**
- **Second Q&A Session**

Attendees can type their questions in the QUESTION BOX at any time. One of the Presenters will monitor questions and formulate a set of representative questions to ask the participating NSF Program Officer during the two Q&A Sessions.

Overview of the IUSE Program

Improving Undergraduate STEM Education (IUSE)

- **Described by Program Description (PD 14-7513)**
- **There will NOT be an official solicitation**
 - **No more detailed/specific descriptions of IUSE will be available**
- **Guidance for proposal preparation is in the Grant Proposal Guide (GPG) -- NSF 13-1**
 - **Proposal Checklist on page II-31-33**

IUSE Program

- **TUES, STEP, and WIDER programs are not accepting proposals**
- **IUSE program is accepting proposals for projects that would fit with these earlier programs**
- **Broad types of IUSE projects:**
 - **Research on student learning**
 - **Design, development, and widespread implementation of effective STEM learning/teaching knowledge and practice**
- **IUSE is less restrictive than these earlier programs**
- **Allows applicants to be more flexible and more creative**
- **IUSE projects need to:**
 - **Build on available evidence and theory**
 - **Generate evidence and build knowledge**

Program Target Date and Funding

- **Target Date**
 - **Feb 4, 2013**
 - **Proposals will be accepted at other times but they may miss a particular panel or committee meeting**
- **Anticipated program funding**
 - **Substantial but uncertain until Federal Budget is approved**
- **Estimated number of awards**
 - **Uncertain until Federal Budget is approved**
 - **Flexibility in proposed budgets makes estimating difficult**

Proposal Restrictions

- **Budget -- NO LIMIT**
 - Proposed budgets should be appropriate for proposed effort
 - May include laboratory equipment
- **Project Duration – NO LIMIT -- Except for NSF's five-year limit (see GPG)**
 - Funded projects typically have durations of one to three years
 - Proposed duration should be appropriate for proposed effort
- **Number of proposals per PI – NO LIMIT**
- **Number of proposals per Institution – NO LIMIT**
- **Collaborative proposals – ALLOWED**

NOTE: Lots of flexibility

Proposal Format Requirements

- Proposal format **must comply with GPG requirements**
- Sample requirements
 - Project Description – **LIMITED TO 15 pages**
 - Support letters – **NOT ALLOWED**
 - Letters of commitment and collaboration - **ALLOWED**
 - Appendices are **not allowed without prior approval**
 - Approval unlikely on IUSE proposals
 - Data Management Plan - **REQUIRED**
 - Postdoctoral Mentoring Plan – **REQUIRED ONLY if postdocs are supported in budget**
 - Advisory Board – **NOT REQUIRED**
 - IRB exemption or approval documentation is **REQUIRED at the time of the award**
 - Plan for the timing necessary to obtain institutional IRB approval

NOTE: Required material must be submitted as “Supplementary Information” and “Supplementary Documents” – not as APPENDICES

IUSE Program Expectations

Populations Targeted by Program

- **Two populations**
 - **STEM majors**
 - Educating students to be leaders and innovators in STEM fields
 - **Non-STEM majors**
 - Educating a scientifically literate populace
- **Both include future teachers and current faculty**

NOTE: Proposed projects should target one or both of these populations

Program Objectives

IUSE objectives include, but are not limited to:

- **Generating knowledge on how students learn and on effective teaching and learning practices**
- **Improving students' STEM learning outcomes**
- **Preparing students to participate in science for tomorrow**
- **Increasing student retention in STEM**
- **Broadening participation**

NOTE: Proposed projects may target one or more of these or other similar objectives

Example Expected Outcomes

Expected program outcomes include, but are not limited to:

- Developing the STEM and STEM-related workforce
- Advancing science
- Curricular change
- Wide dissemination and implementation of best practices
- Broadening participation in STEM
- Educating a STEM-literate populace
- Improving K-12 STEM education through teacher preparation
- Encouraging life-long learning
- Building capacity in higher education

NOTE: Proposed projects may be designed to achieve one or more of these expected outcomes or other similar outcomes

IUSE Proposal Types

- **IUSE Program accepting two types of proposals**
 - **R&D Projects:**
 - Research on student learning
 - Design, development, and wide-spread implementation of effective STEM learning/teaching knowledge and practice
 - **IDEAS Labs in Biology, Engineering, and Geosciences:**
 - Details in a soon-to-be-released Dear Colleague Letter(s)
 - Descriptions of NSF's prior experiences with IDEAS Labs available by searching NSF website

Expected Project Approaches

Proposed projects should describe research-based and research-generating approaches to:

- **Understanding STEM learning**
 - STEM education research projects
- **Designing, testing, and studying curricular change**
 - Curriculum and instructional development, program development including co-curricular activities, evaluation, and assessment projects
- **Widely disseminating and implementing best practices**
 - Faculty development and scaling projects
- **Broadening participation of individuals and institutions in STEM fields**
 - Retention, recruitment and capacity building projects

Referenced Background Material - 1

- ***Engage to Excel*** (from the President's Council of Advisors on Science and Technology - PCAST)
 - **Widespread adoption of empirically validated teaching practices that engage students in "active learning"**
 - **Increased use of discovery-based laboratories and course-based research**
- ***Discipline-based Education Research: Understanding and Improving Learning in Undergraduate Science and Engineering*** (from the National Research Council - NRC)
 - **An analysis of effective practices**
 - **A research agenda for continuing to build the knowledge base on how to improve undergraduate STEM education**

Referenced Background Material - 2

- ***The Common Guidelines for Education Research and Development (NSF 13-126 and NSF 13-127)***
 - **Guidance on building the evidence base in STEM learning**
 - **Provides guidelines for six types of “education research and development” projects**
 - **Overview of the nature, justification, evidence generation and so on for each project type**

NOTE: These guidelines provide a framework for developing IUSE projects

Q&A - 1

IUSE Design, Development, and Implementation Projects

Relationship Between IUSE and Earlier Programs

- **Most TUES, STEP, and WIDER type projects can fit within the IUSE Program either as:**
 - **Research projects**
 - **Design, development, and wide-spread implementation projects**
- **Fewer restrictions allow for greater flexibility and creative freedom in developing proposed projects**

IUSE and Design, Development and Implementation Projects - 1

- **Many TUES, STEP, and WIDER type projects focused on**
 - **Curriculum, program, and institutional development**
 - **Dissemination and faculty development**
 - **Retention and broadening participation**
- **These fit within the IUSE “research on design, development, and wide-spread implementation” projects**

IUSE and Design, Development and Implementation Projects - 2

- **Competitive projects will be described in a R&D framework**
 - **Research-based**
 - **Justification of the need and the selected approaches must be based on theory and prior research and development results, including evaluation data**
 - **Background section similar to that in a research proposal**
 - **Research-generating**
 - **Plans for data collection and analysis must be comprehensive**
 - **Plans must demonstrate how the results will contribute to the knowledge base**

Guidance for IUSE Design, Development, and Implementation Project Proposals

- Discussion of the Design and Development Project in the *Common Guidelines* provides some guidance for preparing IUSE proposals focused on design, development, and implementation
- Design and Development Project in the *Common Guidelines*
 - Develop solutions to achieve a goal related to education or learning, such as improving student engagement or mastery of a set of skills
 - Draw on existing theory and evidence to design and iteratively develop interventions or strategies, including testing individual components to provide feedback in the development process

Examples of Guidance from *Common Guidelines* for Design and Develop Projects

- **Justification: Theoretical and empirical discussion**
 - Importance of the problem
 - How the proposed approach differs from prior efforts
 - Why the proposed approach has the potential to address the problem
- **Research Plan:**
 - Method for developing the intervention
 - Methods for collecting data

Evaluation, Publication, and Dissemination in IUSE Projects - 1

- **Plans for evaluation, publication, and dissemination were expected in TUES, STEP and WIDER programs**
- **These are fundamental components in any good design, development, or implementation project**
- **These project components are expected in IUSE design, development, and wide-spread implementation projects**
 - **There is a strong expectation that IUSE projects will “generate evidence and build knowledge”**

Evaluation, Publication, and Dissemination in IUSE Projects - 2

- **NSF's Merit Review Criteria addresses these important project components**
 - **Intellectual Merit** - certainly depends on the project design for getting good research and evaluation data that would inform the STEM education community
 - **Broader Impacts** - depends on effective and widespread dissemination

Does a Project Fit in IUSE?

Project fits with IUSE if the answer to each question is “yes”

- **Does the project focus on improving STEM learning outcomes or student retention either directly or indirectly, for example faculty development or institutional change?**
- **Can you provide a theoretical or empirical justification?**
- **Is the approach based on prior research and development results?**
- **Can you develop a plan for generating evidence and building knowledge?**

NOTE: These questions can also be used to identify weaknesses. If your response is a “weak yes” consider strengthening that aspect of the project

Review Criteria

NSF Merit Review Principles

- 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**
- 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**

NSF Merit Review Criteria

- **Intellectual Merit – the potential to advance knowledge.**
- **Broader Impacts – the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.**

Both criteria, Intellectual Merit and Broader Impact, will be given full consideration during the review and decision-making processes. Proposers must fully address both criteria.

Merit Review Considerations - 1

- **What is the potential for the proposed activity to:**
 - **Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and**
 - **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 - 2

- **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, and Postdoctoral Researcher Mentoring Plan

Q&A - 2

IUSE

- **Website:**

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504976

- **Proposal Target Date:**

– February 4, 2014

