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Division of Engineering Education and Centers (EEC)



NSF Engineering Education and Centers Division Engineering Education

Research Initiation in Engineering Formation (RIEF; NSF 20-558)

**Webinar for Prospective PIs
October 2, 2020**

- Please mute your microphone.
- Turn on your camera at your discretion.
- Type questions into chat box as we go or during Q&A session.
- If I don't get to your question during Q&A, please email me afterwards.

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Research Initiation in Engineering Formation

Full Proposal Deadline Date

November 10, 2020

Maximum Award

\$200K for 2 Years



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Research Initiation in Engineering Formation

RIEF falls under the Professional Formation of Engineers (PFE): framework which was established to create and support an innovative and inclusive engineering profession for the 21st Century.

- Introductions to the profession at any age.
- Acquisition of deep technical and professional skills, knowledge, and abilities in both formal and informal settings/domains.
- Development of outlooks, perspectives, ways of thinking, knowing, and doing.
- Development of identity as an engineer and its intersection with other identities.
- Acculturation to the profession, its standards, and norms.



Research Initiation in Engineering Formation

The RIEF program has two goals:

1. Support research in the Professional Formation of Engineers (PFE).
 2. Increase the community of researchers conducting engineering education research.
- RIEF is intended to increase capacity for engineering education research by bringing new researchers into the field.
 - PIs are expected to have little or no experience conducting social science/education research.



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RIEF Merit Review Criteria

RIEF follows the **NSF standard merit review criteria** as stated in the PAPPG (NSF 20-1).

RIEF also has two **solicitation-specific review criteria**, which are described in the solicitation (NSF 20-558).



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NSF Merit Review Criteria, Part 1

Intellectual Merit (IM): The Intellectual Merit criterion encompasses the **potential to advance knowledge**.

Broader Impacts (BI): The Broader Impacts criterion encompasses the **potential to benefit society and contribute to the achievement of specific, desired societal outcomes**.



NSF Merit Review Criteria, Part 2

Both IM and BI are evaluated according to 5 National Science Board approved review considerations:

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?



RIEF Solicitation-Specific Review Criteria

The solicitation (NSF 20-558) states:

1. Extent to which the **project will expand the community of engineering education researchers**: Reviewers will consider the prior experience of the engineering faculty PI. It is expected that the PI will have little or no experience conducting education or social science research. Development of new curricula or education programs does not count as social science research experience, although extensive work evaluating such programs does.
2. Merit of the mentoring plan: Reviewers will consider the extent to which the **mentoring plan is clear, well thought out, and practical for developing the research capabilities of the PI**, the qualifications of the mentor(s) at providing the necessary mentoring, and the extent to which the mentoring plan will provide the PI with the skills and abilities needed to conduct independent research in engineering education.



Merit Review in the Context of RIEF

In subsequent slides, I will refer to these review criteria using this notation:

- IM-1-a refers to Intellectual Merit, consideration 1a
- BI-5 refers to Broader Impacts, consideration 5
- RIEF-1 refers to RIEF solicitation-specific criterion 1
- and so forth



Reminder:

Type your questions into the chat box for the Q&A at the end of this webinar. We will answer as many questions as we can.



Important Guidance for Proposers

- Read the PAPPG (Proposal & Award Policies & Procedures Guide, NSF 20-1) and follow it.
- Read the solicitation in its entirety (NSF 20-558).
- Don't submit the same proposal to multiple programs.
- Consider resubmission with substantive changes based upon feedback from earlier proposals and your own evolution in thinking, but note that all submissions are reviewed as 'new' proposals.
- Make sure that you're proposing research that advances understanding of engineering formation and not about course/lab/curriculum development.



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General Advice: The Submitter's Three Jobs

- Identify the right funding opportunity.
- Conceptualize a fantastic project.
- Write a persuasive proposal in 15 pages.



Conceptualize a Fantastic Project

- You **MUST align** with the solicitation or program description. Misaligned proposals usually do not review well.
- You have thought through more detail than you can express within the 15-page limit for the Project Description. Focus on the most important elements of the project/plan.
- Any part of the project that you can reasonably execute before funding is awarded, you should do before submitting the proposal (locate partners, **design studies**, **do preliminary work**, submit IRB, etc.). Include relevant details of those elements in the proposal.



Writing a Persuasive Proposal: Keep the Merit Review Criteria in Mind

- In addition to the required sections on IM and BI, the proposal should frequently remind reviewers about how the project aligns with the merit review criteria.
- Make important information about both processes and impact easy for reviewers to find (IM-1-5, BI-1-5); use headings and other approaches to guide reviewers.
- Build trust in reviewers; you want them to understand that you can execute the elements of your project that you don't have space to fully detail in the proposal.



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Writing a Persuasive Proposal: Help the Reviewers

- Write for both an expert in your area, as well as an educated reviewer with different research emphasis.
- Don't assume that all reviewers will know the jargon of your community or commonly used acronyms.
- Consider how your proposal will read both when reading start to finish and when a reviewer skims to look for certain elements. **Reviewers will likely use both of these approaches** as they evaluate your proposal against the merit review criteria.



Writing a Persuasive Proposal: RIEF-Specific Advice

- Be sure to address the solicitation specific criteria of **expanding the community of engineering education researchers (RIEF-1)** and the **mentoring plan (RIEF-2)**:
 - Use space in the 15 pages to explicitly address this; you can discuss your motivation, interest, plans for future work.
 - Provide a road map for what your future contributions might be to the field of engineering education research and how the proposed work helps you start on that path.
 - Describe the mentoring relationship and activities—be specific! Show the reviewers that the mentoring plan sets you up for success in the project and as future researcher.



Writing a Persuasive Proposal: RIEF-Specific Advice

- Have one or more clear research questions that are aligned with the resources provided (2 years and \$200,000)
- Include details about your intellectual and/or practical motivation (and your interest in engineering education research; RIEF-1), theoretical framework, methodology, and research plan (IM-3).
- Identify an appropriate audience for the research results and dissemination plans, and be creative about how to reach these people—be specific (BI-2-5).
- Be creative about assembling the right team to achieve meaningful dissemination and other BIs (IM-4, BI-4).



Timeline for Merit Review Process

- ~4 weeks after deadline: Administrative review, compliance checking
- ~2-3 weeks after deadline: Potential panelists contacted, panel finalized
- ~2-3 months after deadline: Panel meets and provides guidance to PO, NOT a decision
- ~4-5 months after deadline: PO considers panel input and other factors, may contact PI for additional information, decides on recommendations
- ~5-6 months after deadline: PO makes recommendation, recommendation is reviewed at higher levels
- ~6 months after deadline: Notification received by PI and/or SPO about either award or decline



Contacting Program Officers- General Advice

- Recognize that program officers are *busy*, and their workload ebbs and flows.
- Start with email rather than a phone call. Explain your question and the information you seek from the PO.
- Don't mass email—multiple POs may work on a program, talking to many of them creates redundant work.
- Be prepared to say what you're asking for: advice on where to submit an idea, feedback on a one-pager to a program, procedural advice or answers to specific questions.
- Consider volunteering to review (send a CV right near a program deadline).



Successful RIEF Proposals

- **Alignment with program:** your project must align with the program goals and address the solicitation-specific review criteria. (RIEF-1 and RIEF-2)
- **Clarity and specificity:** you should build a specific and detailed research plan with research questions, sampling processes, data collection protocols, etc. (IM-3, IM-5).
- **Expertise and collaboration:** your team should incorporate expertise appropriate to the contributions you want to make, both in the project overall and in proposal (IM-4, BI-4).
- **Innovation and impact:** you should address an important problem, avoid incremental projects, and anticipate important outcomes and impacts (IM-2-5, BI-2-5).
- **Mentoring:** you should clearly describe the **mentoring relationship and activities**—be specific! Show the reviewers that the mentoring plan enables your success in the project and as future engineering education researcher (RIEF-2, IM-4).



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Frequently Asked Questions

- **How many proposals can be submitted by an institution?**
 - There are no restrictions or limits; see also the solicitation (NSF 20-558).
- **My institution already has an active RIEF project; can I submit a RIEF proposal?**
 - Yes.
- **Is the mentoring plan supposed to talk about general career mentoring?**
 - The mentoring plan should address (from the solicitation, NSF 20-558) “...the extent to which the mentoring plan will provide the PI with the skills and abilities needed to conduct independent research in engineering education.” (RIEF-2) The mentoring plan *can* talk about general career mentoring, but it should *focus* on research skills specific to the execution of this research project and capacity building for future research in engineering education.
- **My mentor is already a mentor on another RIEF project. Can they participate in this project as my mentor?**
 - Yes.
- **I am a current RIEF awardee. Can I apply for another RIEF award?**
 - No. See the “Who may serve as PI” section of the solicitation (NSF 20-558).



Frequently Asked Questions

- **What role can my mentor play in writing the proposal?**
 - The PI (the mentee) should drive the research directions, aspirations for impact, overall plan, and **the writing of the proposal**. The mentor should *advise* the PI on project scoping (to fit within RIEF parameters of 2 years/\$200k; IM-5, BI-5), project planning (IM-3, BI-3), and research skills acquisition (IM-4, BI-4, RIEF-2). The research project should clearly be the mentee's, not the mentor's (see the solicitation under "Who may serve as PI").
- **Should the mentor be compensated for their role in the project?**
 - All project team members should be compensated in a manner that is commensurate with their role in the project. This includes the mentor, advisory board members, evaluators, graduate students, undergraduate researchers, etc. See also the PAPPG (NSF 20-1).
- **Does my mentor need to be located at my institution?**
 - No. For projects involving more than one organization, you should follow the guidance in the PAPPG (NSF 20-1) about your options for how to submit such proposals.
- **Can my mentor be a co-PI?**
 - Yes, although there is no requirement that they are a co-PI.



Frequently Asked Questions

- **Do I need an external evaluator and/or advisory board?**
 - From the solicitation (NSF 20-558): “**Evaluation:** Evaluation refers to monitoring of the research process to ensure that the project stays on track. The evaluation plan should include both formative and summative evaluation. An evaluator external to the PI's organization is not required, but the evaluator should not be an individual who is involved in the research activities. **Potential evaluators include faculty with evaluation expertise at the PI's institution, an institutional evaluation office, or an advisory board of experts.**” You should organize your project/partnerships to align with this expectation, and to support the overall goals of the project. (IM-3, BI-3)