National Science Foundation
Division of Engineering Education and Centers (EEC)

NSF Engineering Education and Centers Division
Engineering Education

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

ENG CAREER Workshop Lunch and Learn
May 12, 2023

- 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.

Kemi Ladeji-Osias
Program Director, Engineering Education
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Goals for this session

- Provide a brief overview of the RIEF program
- Highlight project examples and PI trajectories
- Answer questions

Professional Formation of Engineers

PFE framework - 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.

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EEC Engineering Education Core Programs

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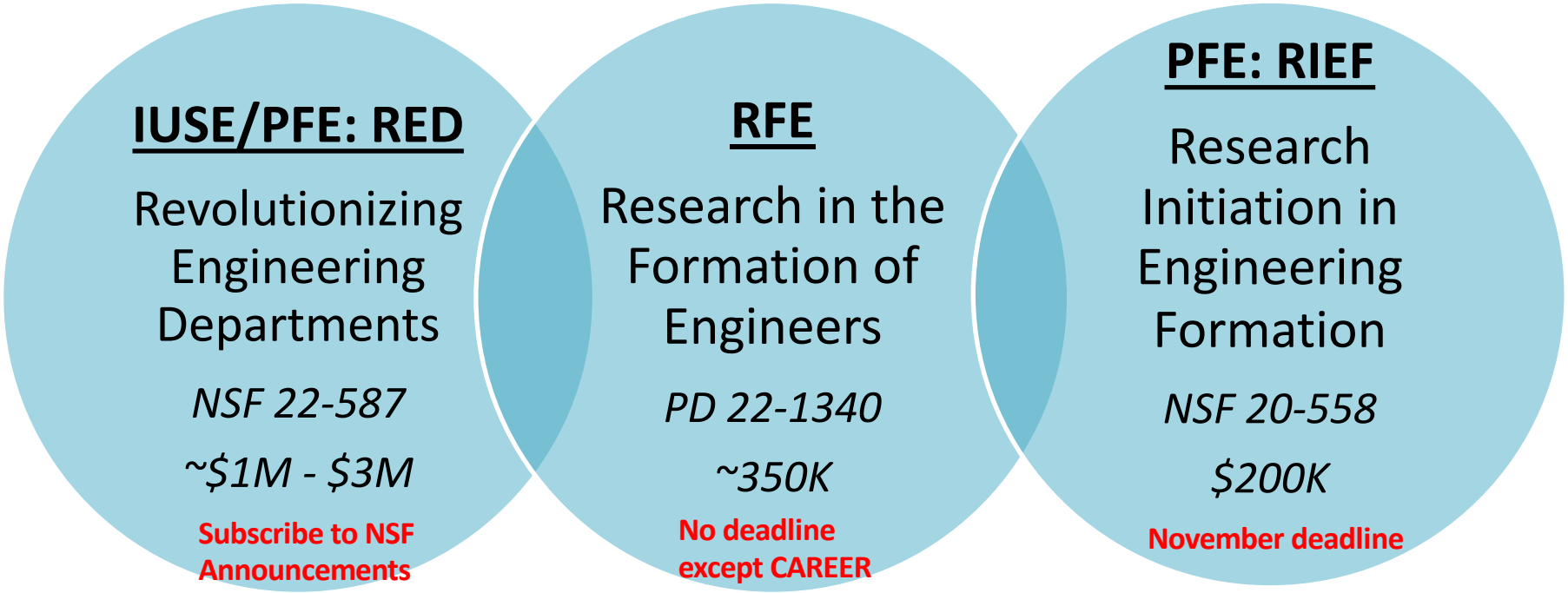
- Translation of fundamental research into practice (RED)
- Fundamental research in the formation of engineers (RFE, RIEF)

See solicitations for details on deadlines and requirements



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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.

https://new.nsf.gov/funding/opportunities/pfe-research-initiation-engineering-formation-pfe

RIEF Merit Review Criteria

RIEF follows the NSF standard merit review criteria as stated in the PAPPG (NSF 23-1).

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

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 pla ed, well-organized rporate a mechanis
4. How well nduct the proposed
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Item 1 separates the IM and BI criteria in general. Items 2-5 are applied to both IM and BI.

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.

What do PIs learn?

- How to design an education or social science research project
- Qualitative, quantitative or mixed-methods data collection and analysis
- Survey design
- How to prepare publications
- How to engage with EER community

RIEF AND CAREER Connections

- RIEF provides an opportunity to
  - Increase capacity for education research
  - Engage in a mentored research project
  - Join a community of practice
  - Experience NSF proposal preparation and award management
- CAREER provides an opportunity to
  - define long term career plans

EXAMPLE RIEF PROJECTS AND PIS

Example RIEF Projects

- **Infusing Culturally Relevant Pedagogy (CRP) at the Start of the Engineering Mechanics Curriculum** - 2024466- Daniel Castaneda - James Madison University
- **Investigating the Connection Among Undergraduate Engineering Students Data Proficiency, Motivation, and Engineering Identity** - 2245022 - Kim-Doang Nguyen - Florida Institute of Technology
- **Long-Term Effect of Involvement in Humanitarian Engineering Projects on Student Professional Formation and Views of Diversity and Inclusion** - 2024525 -Kirsten Dodson - David Lipscomb University
- **Mapping Identity Development in Doctoral Engineering Students** – 2205033 -Jennifer Cross - Texas Tech University
- **Measuring mental demand of interactive textbooks using wearables and web analytics** - 2025088 - Matthew Liberatore - University of Toledo

PI - Karin Jensen
University of Illinois at Urbana-Champaign*

- **EEC - Research Initiation: Understanding Student Perceptions of Engineering Stress Culture (ESC)** - Award Number: 1738186 - Start Date: 09/01/2017
- EEC - CAREER: Supporting Undergraduate Mental Health by Building a Culture of Wellness in Engineering - Award Number: 2315912 - Start Date: 10/01/2022
- EEC - Collaborative Research: Workshop proposal: Building Foundations for Engineering Faculty in Engineering Education Research - Award Number: 2029410 - Start Date: 09/01/2020

Arash Esmaili Zaghi
University of Connecticut

- **EEC - Research Initiation Grants: Nurturing the Creativity of Students with ADHD in Engineering Disciplines** - Award Number: 1441826 - Start Date: 09/01/2014
- EEC - CAREER: Promoting Engineering Innovation Through Increased Neurodiversity by Encouraging the Participation of Students with ADHD - Award Number: 1653854 - Start Date: 01/01/2017
- DGE - MCA: Leveraging Artificial Intelligence to Enhance the Creativity of the STEM Professional Workforce by Transforming Education for Neurodiverse Learners - Award Number: 2120888 - Start Date: 09/15/2021

PI - Steven Hoffenson
Stevens Institute of Technology

- **EEC - Research Initiation: Market-driven design concept formation in undergraduate engineers** - Award Number: 1927037 - Start Date: 08/15/2019
- ECCS - Supporting Sustainable Evolution of Electrical Energy Systems via Closed-Loop Consumer Behavior and Market System Modeling - Award Number: 1953774; Start Date: 06/15/2020
- CMMI - CAREER: Multidisciplinary and Life Cycle Holistic Sustainable Design - Award Number: 2044853 - Start Date: 09/01/2021

QUESTIONS?