



***New Solicitation: NSF 24-564
Deadline: September 10, 2024***

Revolutionizing Engineering Departments (IUSE/PFE: RED)

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QR Codes

- PFE/RED Solicitation



NSF 24-564

- REDPAR Website



www.nsf-redprojects.org

- PAPPG



NSF 24-1



Webinar Administrative Logistics

- Use Zoom Q&A to submit questions during the webinar.
- Real-time captions are available within Zoom.
- The presentation slides and webinar recording, including Q&A, will be available on the [RED program site](#) as soon as possible following the webinar conclusion.



Webinar Overview

- Welcome from EEC and DUE
- IUUSE/PFE:RED Program overview and goals
- Four (4) tracks in new solicitation
- Elements of RED proposals
- Questions from the audience



IUSE/PFE:RED -- What are those Prefixes?

- IUSE: Improving Undergraduate STEM Education
 - NSF-wide umbrella for all undergraduate STEM education investments
- PFE: Professional Formation of Engineers
 - ENG initiative to understand engineering formation holistically
- RED has many partners
 - Directorate for Education & Human Resources (EHR)
 - All ENG Divisions (CMMI, CBET, ECCS, EEC)



RED addresses the Professional Formation of Engineers (PFE)*

Elements of PFE

- 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.

**PFE: the formal and informal processes and value systems by which people become engineers.*



RED continues its emphasis on revolutionary change!

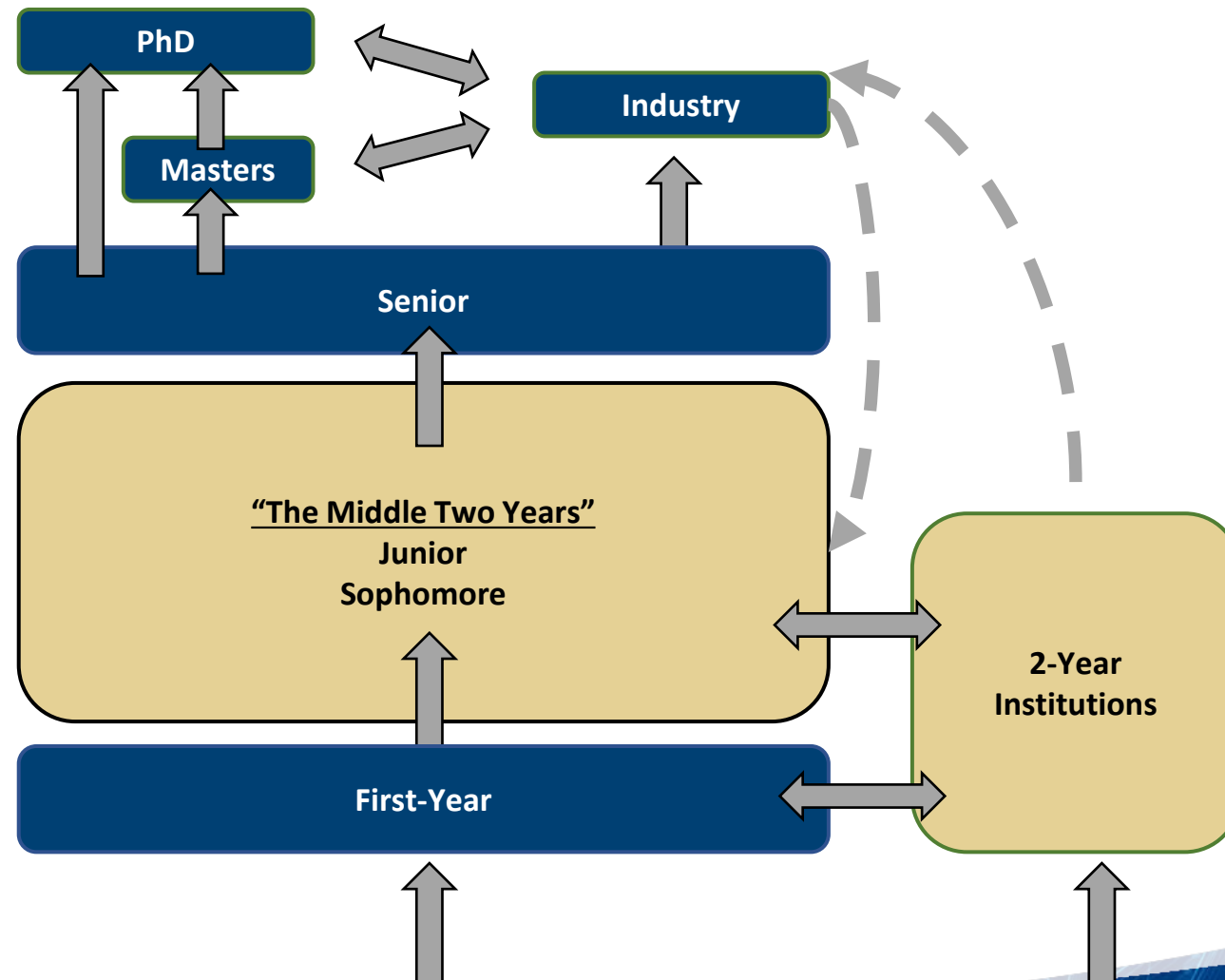
- *Radically, suddenly, or completely new*, producing fundamental, structural change; going outside of or beyond existing norms and principles.
- Focus on significant, sustainable/perpetual, *systemic department change*.
- Curricular reform is **NOT** the driver of RED programs. It may be an outcome of RED activities.
- Create a vision for what it means to have an engineering program in your discipline.



RED Focus - The Middle Two Years

Focus on Structural & Cultural Change

- Policies & Practices
- Faculty Development
- Department Culture
- Faculty Culture
- Department Head Role



Create a Seamless Educational Experience for Students from Foundational Courses to Capstone Design

- T-shaped Engineers
 - 21st Century Skills
 - Classroom Experiences
 - Curricular Experiences
 - Out-of-Class Experiences
- Internships/Co-ops



RED Tracks: Track 1

- Track 1 – Planning Grant
- Track 2 – Adaptation & Implementation
- Track 3 – Innovation
- Track 4 – Innovation Partnership

- Up to \$75,000 / 2 years
- Supports efforts necessary to build capacity and establish collaborations endeavoring to address the broader goals of the RED program.
- Limited to:
 - (a) two-year institutions that support transfer students
 - (b) institutions in EPSCoR jurisdictions
 - (c) Primarily Undergraduate Institutions (PUIs)
 - (d) Minority Serving Institution (MSIs)
- Must include someone from an awarded RED project.
- Submit a Concept Outline via email by August 11.
- See PAPPG II.F.1



RED Tracks: Track 2

- Track 1 – Planning Grant
- Track 2 – Adaptation & Implementation
- Track 3 – Innovation
- Track 4 – Innovation Partnership

- Up to \$1M / 5 years
- Generate new knowledge related to the adaptation of proven change strategies and actions in a new context.
- Can be adaptation of an existing RED's approach but can also just be based on existing literature that demonstrates positive change.
- Whatever innovation you choose to implement in your context, be sure to describe the *evidence of its effectiveness in its original context*, as well as your argument for *how it will work/be adapted in your context*.



RED Tracks: Track 3

- Track 1 – Planning Grant
- Track 2 – Adaptation & Implementation
- Track 3 – Innovation
- Track 4 – Innovation Partnership

- Generate new knowledge on best practices for meaningfully and thoughtfully incorporating into the middle two years and technical core of the engineering curriculum oft-neglected “professional skills” (i.e. 21st Century skills, design, communication, teamwork, historical and contemporary social context, lifelong learning, and ethics). Changes in the middle two years need to be integrated with freshman and senior experiences in order to form an unbroken sequenced thread through the curriculum so that the process of professional formation deepens and strengthens as students move through engineering programs.
- Generate new knowledge on how to transform the departmental cultures to be environments that are inclusive, innovative, equitable and supportive of faculty, faculty development to support cultural or structural change, and build new department structures and cultures through innovative practices and policies that support significant holistic professional formation.



RED Tracks: Track 3 (cont.)

- Track 1 – Planning Grant
 - Track 2 – Adaptation & Implementation
 - Track 3 – Innovation
 - Track 4 – Innovation Partnership
- \$1M – \$2M / 5 years
 - Typically going to be single-department/institution projects, but may be multi-institution, however only one institution is leading the change. Partnerships play a support role to the main institution.



RED Tracks: Track 4

- Track 1 – Planning Grant
- Track 2 – Adaptation & Implementation
- Track 3 – Innovation
- Track 4 – Innovation Partnership

- Track 3 PLUS:
- Generate new knowledge on best practices and the support structures necessary for meaningfully and thoughtfully leveraging or managing cross-institutional partnerships in ways that enable transferability and interoperability of research findings.
- All institutions must implement some change and contribute for mutual benefit. Partnerships are not just supporting a main institution.
- \$1.5M – \$2.5M / 5 years



Project Team

- Track 1
 - Must include an awarded RED team member to help guide/support.
- Track 2-4
 - No longer *required* to include engineering education or organizational change experts. Still strongly encouraged.
 - The activities/value that these folks provided in previous iterations of RED should still be present, how they are included can look different.
- All tracks
 - PI must be department head/chair –OR- be empowered in a similar capacity and be justified in the support letter from institutional leadership.



Role of the RED Team members

- Department Chair Head or Dean
 - Serve as Principal Investigator
 - Provide leadership for the change process
- Education Researcher
 - Provide guidance on evidence-based practices
 - Possible departments: engineering educ., educational psychology, CETL, STEM ed.
- Organizational Change Expert
 - Advise on strategies for developing a culture of change and for creating meaningful collective ownership of the effort among faculty, students, and staff
 - Possible departments: organizational psychology, sociology, anthropology, leadership
- Other RED Team Members: Advisory Board, Evaluator, Department Faculty & Staff, Other stakeholders...



RED history

- Throughout RED's history so far, ENG, EHR, CISE funded 30 projects.
- Common threads across these projects: focus on *organizational and cultural change* within the departments, involving students, faculty, staff, and industry in rethinking what it means to provide an engineering program.
- The RED programs are changing department culture and contributing to literature on organizational change--not simply changing curriculum or pedagogy.

Change doesn't start
with the syllabus,
change shows up in
the syllabus.



RED Outcomes for All Tracks

- Fund programs that can serve as exemplars of change.
- Achieve revolutionary change to middle two years of the undergraduate experience.
- Connect engineering education research and practice.
- Contribute to the literature on change.
- Create a cohort of project teams with activities and collaboration within and across cohorts.



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.



Proposal Elements

Proposal title must indicate track, as noted in the solicitation.



Track 1 – Planning Grant

- 8 pages
- Title must start with Planning: IUUSE/PFE:RED Planning
- See PAPPG for general requirements & required sections.
- Additionally:
 - Vision for RED
 - Need for Planning Support
 - Project Plan
 - Goals & Objectives
 - Specific Actions
 - Barriers
 - Current or Former RED Recipient Advisor



Tracks 2, 3, & 4 (as described in RED Solicitation)

- See PAPPG for general requirements & required sections.
- Additionally:
 - Vision & Rationale for RED
 - Project Plan
 - Goals & Objectives
 - Specific Actions
 - Barriers
 - Advisory Board
 - Research Plan
 - Evaluation Plan
 - Mentoring Plan
 - Dissemination Plan
 - Sustainability, Scaling, & Adaptation Plan
 - Project Leadership
 - Faculty Support
 - Succession Plan
 - (Track 4 only) Partnership Dynamics



Supplementary Documents

- List of project participants
 - PIs, CoPIs, Senior Personnel, Project Staff, Advisory Board Members, Project Evaluators, Consultants, Collaborators... anyone except named (under-)graduate students or individuals to be named later.
- Letters from Institutional Leadership (2 pages max)
 - Dean, Provost or President (as appropriate for project).
 - Must include the individual's name and title below the signature.
- Letter(s) from Other Partners (1 page, max)
 - Clear description of how the partner will participate in the project.
- Letters of Collaboration
- Mentoring Plan (if applicable) – for Graduate students and/or Post-docs
- Data Management Plan (including considerations for doing human subjects research (IRB) with FERPA-protected data)



Second Reminder

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NSF Merit Review Criteria

Intellectual Merit: The Intellectual Merit criterion encompasses the potential to advance knowledge; and

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

The following elements should be considered in the review for both criteria:

- 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 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 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 organization or through collaborations) to carry out the proposed activities?



Additional Solicitation Specific Review Criteria (see solicitation for details)

- Track 1 - None
- Tracks 2, 3, & 4:
 - Faculty Development: Is faculty development, such as through the Mentoring Plan or Faculty Support sections of the project description, well planned and properly incentivized to build department cultures that support the holistic professional formation of engineers?
 - Potential for Success, Sustainability, and Scaling: How likely is the project to be operationalized in a way that it will continue after the RED project is complete? How prepared is the project for changes in leadership throughout the life of the project?



Unsuccessful RED Proposals

- Fail to address culture.
- Miss important elements.
 - Structural change using an appropriate theory of change, faculty development, specific institutional commitments, plans for sustainability and scaling
- Explain *what* will be done, but not *how* it will be done.
- Lack appropriate grounding in the literature.
- Present a poor evaluation component.
- Weakly engage education research and/or organizational change expertise.



Frequently Asked Questions

- How many proposals can be submitted by an institution?
 - There are no limits
- My institution has a RED project, can I submit a proposal?
 - Yes
- Can computer science departments submit proposals?
 - In general, no, but contact a Program Director for clarification on your specific circumstance.
- Can proposals be submitted from engineering technology departments?
 - Yes! We encourage engineering technology departments to submit to the RED program.
- Can a new department submit a RED proposal?
 - Yes. The proposal will need to make a case for radical change versus adaptation and implementation.



Frequently Asked Questions, part 2

- **Can non-credit programs submit a proposal?**
 - No. US IHEs with associates or baccalaureate engineering or engineering technology degree programs located and accredited in the U.S. are eligible to apply. Two-year engineering technology programs that have articulation agreements with four-year engineering programs are also eligible.
 - Non-credit programs could be a partner for a credit-granting program.
 - May also consider the ATE program.



To learn more, refer to...

- The solicitation (NSF 24-564)
- Proposal & Award Policies & Procedures Guide (PAPPG) ([NSF 24-1](#))
- *Common Guidelines for Education Research and Development* ([NSF 13-126](#)) - see Foundational Research and/or Early-stage or Exploratory Research
- www.nsf-redprojects.org or NSF [award search](#) to see what has been funded
- Email Matthew Verleger (mverlege@nsf.gov) or Christine Delahanty (cdehahan@nsf.gov) with questions about your ideas, approaches, team formation, etc. *We urge you to talk to us before writing your proposal.*



Reading List

- RED PI Community resources : 1) Webinar – Assembling a winning RED team? 2) Webinar – Change Model Required, <https://academicchange.org/>
- Lord, S.M. and Chen, J.C. "Curriculum Design in the Middle Years," *Cambridge Handbook of Engineering Education Research*, Johri and Olds, eds. New York: Cambridge University Press, 2014.
- Doten-Snitker, K., Margherio, C., Litzler, E. et al. Developing a Shared Vision for Change: Moving toward Inclusive Empowerment. *Res High Educ* 62, 206–229 (2021). <https://doi.org/10.1007/s11162-020-09594-9>
- Margherio, C., Doten-Snitker*, K., Williams, J., Litzler, E., Andrijcic, E., & Mohan, S. (2020). Cultivating strategic partnerships to transform STEM education. K. White, A. Beach, N. Finkelstein, C. Henderson, S. Simkins, L. Slakey, M. Stains, G. Weaver, & L. Whitehead (Eds.), *Transforming Institutions: Accelerating systemic change in higher education* (pp.177-188). Pressbooks.
- National Academy of Engineering 2013. *Educating Engineers: Preparing 21st Century Leaders in the Context of New Modes of Learning: Summary of a Forum*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18254>.
- Cutler, S., & Strong, A. C. (2023). The Overlooked Impact of Faculty on Engineering Education. *International Handbook of Engineering Education Research*, 286.



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Questions?



