



**U.S. NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314**

NSF 24-028

Dear Colleague Letter: NSF-Lemelson Initiative on Environmental and Social Sustainability in Engineering Education

December 6, 2023

Dear Colleagues:

With this Dear Colleague Letter (DCL), the Directorate for Engineering of the National Science Foundation (NSF) notifies the research community of a collaboration with The Lemelson Foundation of a special topic focus to foster efforts that transform engineering education and address environmental and social sustainability. The opportunity described in this DCL remains in effect until archived.

Based in Portland, Oregon, The Lemelson Foundation believes in the power of invention to improve lives. Inspired by the belief that invention can solve many of the biggest economic and social challenges of our time, The Lemelson Foundation helps to increase equitable access to invention education, strengthen entrepreneurship programs that support impact inventors and ensure engineering education prepares all future engineers with the skills to protect and improve our planet and our lives.

Future engineers will need to be prepared to address and impact environmental and social sustainability for increasingly complex engineering systems that support human well-being. Diminishing natural resources, coupled with increased emissions and waste generation, threaten future habitation on Earth. Efforts in engineering education to promote a sustainable future to counter these trends include integration of socio-technical complexity in engineering problems through focus on societal challenges, development of case studies and sustainability engineering content, explorations of engineering identities and beliefs about sustainability, and integrating sustainability with engineering design, among other approaches. To integrate sustainability into current systems and ensure future engineers are prepared for professional demands, curricular transformation is needed that reevaluates content, fosters fundamental sustainability skills and mindsets and integrates diverse stakeholder perspectives.

The Research in the Formation of Engineers program (RFE) supports research to advance

understanding of professional formation in engineering. It seeks both to deepen our fundamental understanding of the underlying processes and mechanisms that support professional formation and to demonstrate how professional formation is or can be accomplished. Ultimately, RFE aims to transform the engineer-formation system with the goal of fostering an innovative and inclusive engineering profession for the 21st century. NSF invites proposals to the RFE program to address sustainability in engineering education. This special topic focus call seeks to support projects to transform engineering education so that all students encounter environmental and social sustainability principles as an integrated part of their education and are equipped with the tools needed to incorporate these principles into their future research, careers, and innovations. Evidence-based curricular transformation will be critical to training future engineers with the skills, knowledge, and mindsets that will enable sustainable engineering systems and practices.

Priority projects for this special funding focus may include the following elements:

- Advancement of evidence-based understanding of curricular change at all levels.
- Well-developed research plans rooted in relevant literature and theory that specifies how the project will strengthen the research base that informs investments in environmental and social sustainability in engineering education.
- Institutional curricular change efforts that include team members from two or more engineering disciplines, engage multiple stakeholders, demonstrate support from institutional leadership, and highlight alignment with departmental and institutional missions as well as strategic plans.

Proposals may address topics including, but not limited to:

- effective design, development and propagation of curricular and co-curricular transformation efforts to integrate sustainability in engineering;
- design and impact of educational interventions that meet workplace expectations for knowledge and competencies;
- fostering capacity-building, networks, or structural changes to promote and integrate sustainability across diverse disciplines, including multiple engineering disciplines;
- assessment factors that increase persistence, motivation, self-efficacy, and retention of learners including historically marginalized and underrepresented groups;
- the influence of public/private partnerships on sustainability education in engineering; and/or
- measurement of the effectiveness of interventions for different audiences.

Principal investigators are encouraged to consult and reference the Engineering for One Planet (EOP) Framework (<https://engineeringforoneplanet.org/>), prioritize, and integrate principles of diversity, equity, inclusion, and justice, demonstrate how project outcomes will sustain or grow beyond the grant period, and deliver value as well as impact across multiple

institutions through direct engagement and/or dissemination of products and/or publications.

Additionally, proposals are encouraged from community colleges, Minority Serving Institutions (MSIs), and/or institutions that serve veterans, first-generation students, students with different abilities, and/or other students from groups underrepresented in engineering.

PREPARATION AND SUBMISSION INSTRUCTIONS

Proposals must be prepared using proposal preparation guidelines contained in the [NSF Proposal & Award Policies & Procedures Guide](#) (PAPPG) and submitted to NSF through the [RFE program](#).

The proposal title should start with "NLI:" followed by either "Research:" or "Design and Development:" as appropriate as described in the [RFE program](#). If the proposal is submitted as part of a set of collaborative proposals, the title of the proposal should begin with "Collaborative Research:" followed by NLI: and the other required title tags from RFE.

Proposal submissions to NSF in response to this opportunity are accepted anytime. Projects submitted by April 30 will be considered for the current Fiscal Year.

Proposals will be evaluated using the standard National Science Board approved merit review criteria of intellectual merit and broader impacts in the context of the [RFE program](#).

Representatives from The Lemelson Foundation may attend NSF review panels and observe discussions of proposals submitted in response to this Dear Colleague Letter (designated by the title tag NLI). Reviewers will be informed that unattributed reviews and panel summaries (when appropriate) may be shared with The Lemelson Foundation. NSF may also share all or parts of proposals submitted in response to this Dear Colleague Letter with The Lemelson Foundation. NSF will provide The Lemelson Foundation with project summaries of meritorious proposals through this initiative.

Before submitting a proposal to this special topic focus, principal investigators are strongly encouraged to consult the RFE Program Director Matthew Verleger at MVerlege@nsf.gov.

Dr. Susan S. Margulies
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Directorate for Engineering (ENG)