ENGR/ME/MSE 3100
Engineering Research Leadership and Management

Department of Mechanical Engineering and Materials Science
Swanson School of Engineering
University of Pittsburgh

Fall 2024

Request for Proposals

Contents

1.   Funding Opportunity Description

This is a request for proposals (RFP) issued for Engineering Research Leadership and Management. Proposals submitted in response to this RFP should be of high-quality and represent research of interest to the science and engineering community. The topic chosen by the principal investigator (PI) is their choice, but must successfully address the merit criteria. Grades will be based upon the merit review.

1. Statement of Objectives

1.1 Background and Objectives

It is recognized that research vision, planning, proposal writing, and communication are important skills for an independent researcher to master. The course Engineering Research Leadership and Management (ERLM) seeks to have students, in the role of the project's principal investigator, learn and practice these skills by planning and developing a research project by writing a proposal. This RFP sets out the guidance and requirements for the proposal process. In developing this process, the typical grant process and requirements will be used. This includes the requirements, types of submissions, obligatory deadlines, and review of proposals.

1.2 Research Areas

Proposals that respond to this RFP should be written as if being submitted to the National Science Foundation (NSF). As such, proposals should be written as if responding to the programmatic needs of a specific, identified NSF program. Applicants should review the appropriate program areas for programs that are relevant to their area of research. It is recommended that applicants contact the program manager for their program of interest to learn about the program and how their research concept matches the objectives of the NSF program.

With permission, applicants may write the proposal as if being submitted to another federal agency (e.g., NIH, DARPA, DOE). Permission must be given at the start of the term, and an identified program at the agency of interest must be made.

2. Application Schedule

A four-phased proposal selection process will be used for this request for proposals to minimize cost and effort for prospective applicants:

Quad Chart This will consist of the solicitation, receipt, and evaluation of a one-page Quad Chart.

Quad Chart guidelines and requirements are outlined in Chapter 2.

White Paper This will consist of the solicitation, receipt, and evaluation of a White Paper. A Quad Chart submission is required before a White Paper can be submitted.

White Paper guidelines and requirements are outlined in Chapter 3.

Proposal This will consist of the solicitation, receipt, and evaluation of a Proposal.

Based upon the review and evaluation of the White Paper, full proposals will be invited for submission. An invitation must be offered before a Proposal can be submitted.

Proposal guidelines and requirements are outlined in Chapter 4.

Presentation This will consist of the presentation and review of the proposed project.

A Proposal must be submitted before a Presentation can be offered.

Presentation guidelines will be posted on the ERLM Canvas site.

2.1 Application Deadlines

Application deadlines are as listed on the ERLM Canvas site.

3. Submission Requirements

All submissions should meet the guidance and requirements in this RFP. When guidance or requirements are unclear, contact the instructor: dgcole@pitt.edu.

4. Evaluation of Proposals

4.1 Merit Review

Engineering Research Leadership and Management asks PIs to develop projects that create new knowledge and enable breakthroughs in understanding in their area of science or engineering. To evaluate a project, ERLM relies on a merit review process that considers both the technical aspects and broader impact of that project.

4.1.1 *Merit Review Principles*

These principles are to be given due diligence by PIs when preparing proposals. Given that Pitt and ERLM are charged with nurturing and supporting excellence in research and education, the following three principles apply:

1. All projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.

2. Projects should contribute more broadly to achieving societal goals.

3. Meaningful assessment and evaluation of projects should be based on appropriate metrics.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

4.1.2 *Merit Review Criteria*

All ERLM proposals are evaluated through use of two merit review criteria. The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria.

When evaluating proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

1. The **Intellectual Merit** criterion encompasses the potential to advance knowledge; and

2. 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:

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?

4.2 Selection of Reviewers

External reviewers will be used for the review and evaluation of submissions for this RFP. Applicants are required to submit the names of three (3) suggested reviewers at the start of the course. These people do not have to be faculty, but should have an earned Ph.D. and be familiar with the topic of the proposed research.

2.   Quad Chart

Quad charts provide a concise, informative description of proposed research for a project. ERLM requires that all PI prepare and submit a one-page quad chart for their proposed projects. Quad charts present a brief snapshot of your project across four quadrants of a single PowerPoint slide (see PowerPoint templates). Quad charts will be shared with course faculty, reviewers, and classmates.

1. **General Instructions**

   - Please make one PowerPoint slide that succinctly describes your project.

   - The Quad chart is expected to briefly inform a non-technical audience about the objectives, approach, and impact of your project.

   - You are limited to one slide; do not add any additional slides.

   - Use 11 point Arial font (template default). If you do not have enough space, reduce the amount of text, not the size of the font.

   - Slide 1 of the PowerPoint attachment is your template. Add your project or award information to Slide 1 according to the instructions below.

   - Slide 2 of the PowerPoint attachment is an example of a completed Quad Chart to help you complete the task. Slide 2 should be deleted before uploading the file to JIT or ART.

2. **Content**

Header: Project Information

   - Enter Project Title in 16 point boldface font.

   - Enter Principal Investigator (PI) name in 14 point font.

Quadrant 1: Project Goal and Objectives (Upper Left)

   - Enter the Research Goal with a very brief description. The sentence should read

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The goal of this research is to . . . .

- Enter the Research Outcomes. Explain what it is you should be able to do if the research is successful.

  If this research is successful, we should be able to do the following:
  1. . . .
  2. . . .
  3. . . .

  Note: This is not a list of tasks or things you want to do.

- Use absolutely no jargon.

Quadrant 2: Research Approach (Lower Left)

- Explain the Research Approach. Answer the question: "What is new about your approach and why you think it will be successful?"

Quadrant 3: Graphic (Upper Right)

- Insert a figure that illustrates the problem, mechanistic pathway or conceptual model, study approach, or graph or table of relevant data.

- Decrease the figure resolution if needed to keep total file size below 500 kb, but please be sure it is readable.

- Add a figure caption in 11 point font, if needed.

- Make sure that no personal identifiable information or image (such as the face of a human subject) is included.

Quadrant 4: Impact (Lower Right)

- Describe the anticipated impact of the research. Answer the questions: "Who cares? If you succeed, what difference will it make?"

- Provide contact information for the PI.

- Provide contact information for the PI's advisor.

3. **Submission**

- Delete slide 2 (Example) and slide 3 (Guidance).

- Save the file with your last name in the format `lastName-quad-chart.pptx`

- Submit the quad chart to the ERLM Canvas site by the due date for the assignment.

3. White Paper

A research white paper is a brief report or abridged proposal that informs the reader about the objectives, approach, outcomes, and impact of a research concept without requiring the in-depth preparation of a full proposal. White papers are often used to inform program managers about an idea to gauge their interest, or as an interim step in a proposal submission so that a funding agency can vet the most promising for additional steps in submission of a full proposal.

1. Parts of the White Paper

The parts described below represent the body of the white paper. Failure to submit all of the required parts will result in the proposal not being accepted, or being returned without review.

  I. Cover Sheet (one page)

 II. Summary (500 words)

III. Research Description (5 pages)

IV. References Cited (no limit)

1.1 Cover Sheet

The Cover Sheet must contain the following information.

- Proposal title

- Program for which the research effort is appropriate (only one program can be listed)

- PI's full name

- PI's email

- PI's Advisor

- Advisor's email

1.2 Project Summary

Each proposal must contain a summary of the proposed project **not more than 500 words in length**. The Research Summary consists of an overview, and should highlight the intellectual merit and broader impacts of the proposed activity.

The overview includes a description of the statement of objectives, approach, and methods to be employed. The statement on intellectual merit should describe the potential of the proposed activity to advance knowledge. The statement on broader impacts should describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.

The Project Summary should be written in the third person, informative to other persons working in the same or related fields, and, insofar as possible, understandable to a scientifically or technically literate lay reader. It should not be an abstract of the proposal.

1.3 Research Description

1.3.1 *Content*

The Project Description should provide a clear statement of the work to be undertaken and must include the objectives for the period of the proposed work and expected significance; the relationship of this work to the present state of knowledge in the field.

Proposers should address what they want to achieve, why they want to achieve it, what their approach is, how they will know if they succeed, and what benefits could accrue if the project is successful. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions.

The research description should contain the following sections:

a. *Objectives* This section should state the goal and objectives of the research. It should outline what the purpose of the research is, and if successful what new scientific or engineering capabilities will be possible.

b. *Limits of Current Practice* This section should discuss what is the state of the art, as related to the proposed work, and what are the limits of current practice.

c. *Research Approach* This section should describe how you will overcome the limits of current practice that have been identified, what is new about your approach, and why you think it will be successful.

d. *Metrics of Success* This section should clearly define the metrics for success for the research effort.

e. *Broader Impacts* This section should explain the impact of the research, identifies who cares about the result of the research, and if you succeed, what difference will be made.

1.3.2 *Page Limitations and Inclusion of Uniform Resource Locators (URLs) within the Project Description*

Brevity will assist reviewers in dealing effectively with white papers. Therefore, the Project Description **may not exceed 5 pages**. Visual materials, including charts, graphs, maps, photographs and other pictorial presentations are included in the 5-page limitation. PIs are cautioned that the Research Description must be self-contained and that URLs must not be used because: 1) the information could circumvent page limitations; 2) the reviewers are under no obligation to view the sites; and 3) the sites could be altered or deleted between the time of submission and the time of review.

Conformance to the 5-page limit will be strictly enforced and may not be exceeded unless a deviation has been specifically authorized.

1.4 **References Cited**

Reference information is required. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication.

PIs must be especially careful to follow accepted scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal. While there is no established page limitation for the references, this section must include bibliographic citations only and must not be used to provide parenthetical information outside of the 5-page Project Description.

2. **Formatting**

The guidelines specified below establish the minimum type size requirements; however, PIs are advised that readability is of paramount importance and should take precedence in selection of an appropriate font. **Small type size makes it difficult for reviewers to read the proposal; consequently, the use of small type not in compliance with the above guidelines may be grounds to return the submission without review.** Adherence to type size and line spacing requirements also is necessary to ensure that no applicant will have an unfair advantage, by using smaller type or line spacing to provide more text in a submission.

2.1 **Pagination Instructions**

Each part should be individually paginated.

2.2 **Proposal Margin and Spacing Requirements**

The submission must conform to the following requirements:

1. Use one of the following typefaces identified below:

   - Arial, Courier New, or Palatino Linotype at a font size of 10 points or larger; or
   - Times New Roman at a font size of 11 points or larger; or

- Computer Modern family of fonts at a font size of 11 points or larger.

A font size of less than 10 points may be used for mathematical formulas or equations, figures, table or diagram captions, and when using a Symbol font to insert Greek letters or special characters. PIs are cautioned, however, that the text must still be readable.

2. No more than six lines of text within a vertical space of one inch.

3. Margins, in all directions, must be at least an inch.

These requirements apply to all parts of the submission.

2.3 **Page Formatting**

PIs are strongly encouraged to use only a standard, single-column format for the text.

3. Submission

White Papers must be submitted as **one PDF document** to the ERLM Canvas site by the due date for the assignment.

4. Proposal

The Proposal must meet the guidlines and requirements for a proposal as outlined below.

1. Parts of the Proposal

A full research proposal must contain the following parts:

   a. Cover Sheet

   b. Project Summary

   c. Table of Contents

   d. Project Description

   e. References Cited

   f. Biographical Sketch(es)

   g. Budget and Budget Justification

   h. Facilities, Equipment, and Other Resources

   i. Data Management Plan

   j. Appendix — Deviation authorization required.

a. **Cover Sheet**

The Cover Sheet must contain the following information.

   - Proposal title

   - NSF Program for which the research effort is appropriate (only one program can be listed)

   - PI's full name

   - PI's email

   - PI's Advisor

   - Advisor's email

b. **Project Summary**

Each proposal must contain a summary of the proposed project not more than one page in length. The Project Summary consists of an overview, a statement on the intellectual merit of the proposed activity, and a statement on the broader impacts of the proposed activity.

The overview includes a description of the activity that would result if the proposal were funded and a statement of objectives and methods to be employed. The statement on intellectual merit should describe the potential of the proposed activity to advance knowledge. The statement on broader impacts should describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.

The Project Summary should be written in the third person, informative to other persons working in the same or related fields, and, insofar as possible, understandable to a scientifically or technically literate lay reader. It should not be an abstract of the proposal.

c. **Table of Contents**

The table of contents should list parts, sections, and appropriate subsections and page numbers for each.

d. **Project Description**

The Project Description should provide a clear statement of the work to be undertaken and must include the following: the objectives for the period of the proposed work and expected significance; the relationship of this work to the present state of knowledge in the field.

PIs should address what they want to achieve, why they want to achieve it, what their approach is, how they will know if they succeed, and what benefits could accrue if the project is successful. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions.

The Project Description is limited to 15 pages. It must contain the following sections:

i) *Goals and Outcomes* This section should state the goals and outcomes of the research. It should outline what the purpose of the research is, and if successful what new scientific or engineering capabilities will be possible.

ii) *State of the Art and Limits of Current Practice* This section should discuss what is the state of the art, as related to the proposed work, and what are the limits of current practice.

iii) *Research Approach* This section should describe how you will overcome the limits of current practice that have been identified, what is new about your approach, and why you think it will be successful.

iv) *Metrics of Success* This section should clearly define the metrics for success for the research effort.

v) *Broader Impacts* This section should explain the impact of the research, identify who cares about the result of the research, and if you succeed, what difference will be made.

vi) *Risk and Contingencies* This section outlines the risks of the proposed research and what provisions for unforeseen circumstances resulting from those risks will be taken.

vii) *Project Plan and Schedule* This section should outline the project tasks, explain what work will be done, and identify key milestones and deliverables for the project.

e. **References Cited**

Reference information is required. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. If the PI has a website address readily available, that information should be included in the citation. It is not the intent, however, to place an undue burden on the PI to search for the URL of every referenced publication. Therefore, inclusion of a website address is optional. A proposal that includes reference citation(s) that do not specify a URL is not considered to be in violation of proposal preparation guidelines and the proposal will still be reviewed.

PIs must be especially careful to follow accepted scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal. While there is no established page limitation for the references, this section must include bibliographic citations only and must not be used to provide parenthetical information outside of the Project Description.

f. **Biographical Sketch(es)**

A biographical sketch (limited to two pages) is required for the PI.

The following information must be provided in the order and format specified below. Inclusion of additional information beyond that specified below may result in the proposal being returned without review.

Do not submit any personal information in the biographical sketch. This includes items such as: home address; home telephone, fax, or cell phone numbers; home e-mail address; driver's license number; marital status; personal hobbies; and the like. Such personal information is not appropriate for the biographical sketch and is not relevant to the merits of the proposal. ERLM is not responsible or in any way liable for the release of such material.

Name
Job Title
Professional address
Phone number
Email address

i) **Professional Preparation** A list of the individual's undergraduate and graduate education and postdoctoral training as indicated below.

Undergrad Institution	Major	Degree, Year
Grad Institution	Major	Degree, Year
Postdoctoral Institutions	Area	Inclusive Dates (Years)

ii) **Appointments** A list, in reverse chronological order, of all the individual's academic and professional appointments beginning with the current appointment.

iii) **Products** Acceptable products must be citable and accessible including but not limited to publications, data sets, software, patents, and copyrights. Unacceptable products are unpublished documents not yet submitted for publication, invited lectures, and additional lists of products. Each product must include full citation information including (where applicable and practicable) names of all authors, date of publication or release, title, title of enclosing work such as journal or book, volume, issue, pages, website and Uniform Resource Locator (URL) or other Persistent Identifier.

  i) up to five products most closely related to the proposed project; and

  ii) up to five other significant products, whether or not related to the proposed project.

iv) **Synergistic Activities** A list of up to five examples that demonstrate the broader impact of the individual's professional and scholarly activities that focuses on the integration and transfer of knowledge as well as its creation. Examples could include, among others: innovations in teaching and training (e.g., development of curricular materials and pedagogical methods); contributions to the science of learning; development and/or refinement of research tools; computation methodologies, and algorithms for problem-solving; development of databases to support research and education; broadening the participation of groups underrepresented in science, mathematics, engineering and technology; and service to the scientific and engineering community outside of the individual's immediate organization.

v) **Collaborators & Other Affiliations** Used to identify potential conflicts or bias in the selection of reviewers.

Collaborators and Co-Editors A list of all persons in alphabetical order (including their current organizational affiliations) who are currently, or who have been collaborators or co-authors with the individual on a project, book, article, report, abstract or paper during the 48 months preceding the submission of the proposal. Also include those individuals who are currently or have been co-editors of a journal, compendium, or conference proceedings during the 24 months preceding the submission of the proposal. If there are no collaborators or co-editors to report, this should be so indicated.

Collaborator 1   (organizational affiliation)
Collaborator 2   (organizational affiliation)

Graduate Advisors and Postdoctoral Sponsors A list of the names of the individual's own graduate advisor(s) and principal postdoctoral sponsor(s), and their current organizational affiliations.

Your graduate advisor   (current organization)
Your postdoctoral sponsor   (current organization)

Thesis Advisor and Postgraduate-Scholar Sponsor A list of all persons (including their organizational affiliations), with whom the individual has had an association as thesis advisor, or with whom the individual has had an association within the last five years as a postgraduate-scholar sponsor. The total number of graduate students advised and postdoctoral scholars sponsored also must be identified.

Graduate students: Student 1 name (current organization), Student 2 name (current organization)
Total graduate students advised:

Postdoctoral scholars: Postdoc 1 name (current organization), Postdoc 2 name (current organization)
Total postdocs sponsored:

g. **Budget and Budget Justification**

Each proposal must contain a budget for each year of support requested. The budget justification must be no more than three pages per proposal. The amounts for each budget line item requested must be documented and justified in the budget justification as specified below.

h. **Facilities, Equipment and Other Resources**

This section of the proposal is used to assess the adequacy of the resources available to perform the effort proposed to satisfy both the Intellectual Merit and Broader Impacts review criteria. PIs should describe only those resources that are directly applicable. PIs should

include an aggregated description of the internal and external resources (both physical and personnel) that the organization and its collaborators will provide to the project, should it be funded. Such information must be provided in this section, in lieu of other parts of the proposal (e.g., Budget Justification, Project Description). The description should be narrative in nature and must not include any quantifiable financial information. Reviewers will evaluate the information during the merit review process and it will be reviewed for programmatic and technical sufficiency.

i. **Data Management Plan**

Plans for data management and sharing of the products of research. Proposals must include a Data Management Plan of no more than two (2) pages. This supplementary document should describe how the proposal will conform to federal policy on the dissemination and sharing of research results, and may include:

- the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;

- the standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);

- policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;

- policies and provisions for re-use, re-distribution, and the production of derivatives; and

- plans for archiving data, samples, and other research products, and for preservation of access to them.

A valid Data Management Plan may include only the statement that no detailed plan is needed, as long as the statement is accompanied by a clear justification. PIs who feel that the plan cannot fit within the limit of two pages may ask for a waiver. PIs are advised that the Data Management Plan must not be used to circumvent the Project Description limitation. The Data Management Plan will be reviewed as an integral part of the proposal, considered under Intellectual Merit or Broader Impacts or both, as appropriate for the scientific community of relevance.

j. **Appendix**

All information necessary for the review of a proposal must be contained in Sections a) through j) of the proposal.

Appendices may not be included unless a deviation has been authorized.

2. Formatting

The guidelines specified below establish the minimum type size requirements; however, PIs are advised that readability is of paramount importance and should take precedence in selection of an appropriate font. **Small type size makes it difficult for reviewers to read the proposal; consequently, the use of small type not in compliance with the above guidelines may be grounds to return the submission without review.** Adherence to type size and line spacing requirements also is necessary to ensure that no applicant will have an unfair advantage, by using smaller type or line spacing to provide more text in a submission.

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   - Computer Modern family of fonts at a font size of 11 points or larger.

   A font size of less than 10 points may be used for mathematical formulas or equations, figures, table or diagram captions, and when using a Symbol font to insert Greek letters or special characters. PIs are cautioned, however, that the text must still be readable.

2. No more than six lines of text within a vertical space of one inch.

3. Margins, in all directions, must be at least an inch.

These requirements apply to all parts of the submission.

c. **Page Formatting**

PIs are strongly encouraged to use only a standard, single-column format for the text.

3. Submission

Proposals must be submitted as **one PDF document** to the ERLM Canvas site by the due date for the assignment.

5.   Version

(08.26.00.00) Initial version. Includes all of the major pieces of the RFP.