

Standard NSF Research Proposals:

1. **Formatting Rules** – applies to ALL proposal documents

Typeface/Font Size

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

Standard Single Spacing: No more than six lines of text within a vertical space of one inch.

One inch margins

Project Description must be paginated prior to upload

2. **Checklist of Required Proposal Content/Documents:**

Your proposal package should present the (1) objectives and scientific, engineering, or educational significance of the proposed work; (2) suitability of the methods to be employed; (3) qualifications of the investigator and the grantee organization; (4) effect of the activity on the infrastructure of science, engineering and education; and (5) amount of funding required. It should present the merits of the proposed project clearly and should be prepared with the care and thoroughness of a paper submitted for publication. Sufficient information should be provided to enable reviewers to evaluate the proposal in accordance with the two merit review criteria established by the National Science Board: Intellectual Merit and Broader Impacts.

REQUIRED DOCUMENTS

- a. Cover Sheet – Fastlane Form
- b. Project Summary – Content pasted into 3 text boxes on Fastlane form, one each for Overview, Intellectual Merit, and Broader Impacts. Must fit on one page when printed.
- c. Table of Contents -- (auto generated by Fastlane)
- d. Project Description – Generally 15 pages, must include separate sections for intellectual merit, broader impacts, and results from prior NSF support.
- e. References Cited
- f. Biographical Sketch(es) for all key personnel
- g. Budget (Fastlane Form) and Budget Justification (uploaded in Budget form section of Fastlane)
- h. Current and Pending Support for all key personnel (may use NSF form or upload a document)
- i. Facilities, Equipment and Other Resources
- j. Special Information and Supplementary Documentation
 - Data Management Plan
 - Postdoctoral Mentoring Plan (if applicable), if applicable
 - Letters from unfunded collaborators, if applicable.
- k. Additional Single Copy documents
 - Collaborator spreadsheets for all key personnel. Must use NSF form.

3. **Document Content Descriptions**

3.1 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; 1-page maximum; the text is pasted into three Fastlane text boxes corresponding to required sections; if you use special characters, you may upload a 1-page document
- Summary should be written in the third person, informative to other persons working in the same or related fields, and understandable to a scientifically or technically literate lay reader. It should not be an abstract of the proposal.
- Overview: describe the activity that would result if the proposal were funded and provide a statement of objectives and methods to be employed
- Intellectual merit: describe the potential of the proposed activity to advance knowledge. You should speak to the merit of the proposed project (question) and the merit in your proposed approach.

- Broader impacts: describe the potential of the proposed activity to benefit science and society. Identify potential impact on related or unrelated fields of science, on enhancing participation of those traditionally underrepresented in STEM, and on broader society through informal education, public policy, economic development, etc.

3.2 Project Description

15 page maximum. Do NOT include URLs in the text.

The Project Description should provide a clear statement of the work to be undertaken and must include:

- objectives for the period of the proposed work and expected significance;
- relation to longer-term goals of the PI's project; and
- relation to the present state of knowledge in the field, to work in progress by the PI under other support and to work in progress elsewhere.

The Project Description should outline the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provide a clear description of experimental methods and procedures.

Proposers should address what they 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.

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.

We recommend the following sections, but you are free to choose something entirely different that covers the required content.

a) Introduction (typical 1-2 paragraphs):

State your goal and specific objectives for the proposed project by providing a concise explanation or definition of what you propose to do and the expected impact of your work. Identify the gap in knowledge you seek to address or question(s) you will pursue. Both the goal and the objectives should be outcome oriented. The approach through which you will achieve your objectives and goal will be defined in your research plan.

b) Background and Significance (typically about 3 pages)—this is the literature heavy section, but should not be a full literature review, nor come across as a 'intro 101 lecture':

You are trying to provide a context for your proposed project, so your reviewers clearly understand "why this research? why now? and why you?", and so that your research objectives, methods, and procedures flow very logically from this context.

Remember that your reviewers will be skilled in your discipline, but may not have subject matter expertise in your specific area. So...you need to identify/define the area of research you will address; concisely identify the current state of scientific knowledge in this area and the current limits; present the unanswered question you seek to answer that will address the current limits; and explain why this is important.

c) Research Plan (Typically 8-9 pages)

This is the forward-looking, detailed description of your proposed project. It is most frequently organized around the proposed objectives, but can alternatively be organized around research questions to be addressed.

For each objective or question, identify the methods, approach, and/or procedures to be followed to achieve the desired objective or elucidate specific unknowns, and identify who will be responsible to each planned activity (e.g. PI or Co-PI/collaborator, etc.). Highlight prior work (yours or from the literature) and/or established procedures that support your proposed approach; if alternate approaches exist, address why you have selected the proposed approach. Be sure to identify activities that will take

place sequentially versus in parallel as well as where pivotal decision points are in your project/where barriers to success may arise, and how you will handle these.

It is very useful to include a summary timeline to help your reviewer understand how you will sequence your activities through the project period, if you have space to do so, but this is not required.

- d) **Broader Impacts of the Proposed Work** (This is a REQUIRED section for all proposals)
Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to the project. Examples of broader impacts include such things as: increased participation in research among those traditionally underrepresented in the sciences and engineering (women, persons with disabilities, and underrepresented minorities in science); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; informed public policy; and enhanced infrastructure for research and education.
- e) **Intellectual Merit of the Proposed Work** (This is a REQUIRED section for all proposals)
Here you should describe the potential of the proposed activity to advance knowledge. You should speak to the merit or significance of the research question(s), gap in understanding, or technological barrier you will be addressing as well as to the merit of your proposed approach to achieve your goal.
- f) **Results from Prior NSF Support** (This is a REQUIRED section for all proposals – if you have none, you need to include the heading and state no prior NSF support.)
If any PI or co-PI identified on the project has received NSF funding (including any current funding) in the past five years, information on the award(s) is required, irrespective of whether the support was directly related to the proposal or not. In cases where the PI or co-PI has received *more than one award* (excluding amendments), they need only report on the one award most closely related to the proposal. The following information must be provided:
- (a) the NSF award number, amount and period of support;
 - (b) the title of the project;
 - (c) a summary of the results of the completed work, including accomplishments, supported by the award. The results must be separately described under two distinct headings, Intellectual Merit and Broader Impacts;
 - (d) a listing of the publications resulting from the NSF award (a complete bibliographic citation for each publication must be provided *either in this section or in the References Cited section of the proposal*); if none, state “No publications were produced under this award.”
 - (e) evidence of research products and their availability, including, but not limited to: data, publications, samples, physical collections, software, and models, as described in any Data Management Plan; and
 - (f) if the proposal is for renewed support, a description of the relation of the completed work to the proposed work.

3.3 NSF Biosketch

A biographical sketch (limited to two pages) is required for each individual identified as senior personnel. (See GPG Exhibit II-7 for the definitions of Senior Personnel.) 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** (e.g. home address; home telephone, fax, or cell phone numbers; home e-mail address; drivers' license numbers; marital status; personal hobbies; and the like.) (See also GPG Chapter III.H).

(a) Professional Preparation

A list of the individual's undergraduate and graduate education and postdoctoral training (including location) as indicated below:

| | | | |
|------------------------------|----------|-------|-------------------------|
| Undergraduate Institution(s) | Location | Major | Degree & Year |
| Graduate Institution(s) | Location | Major | Degree & Year |
| Postdoctoral Institution(s) | Location | Area | Inclusive Dates (years) |

(b) Appointments

A list, in reverse chronological order, of all the individual's academic/professional appointments beginning with the current appointment.

(c) Products

A list of: (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. 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. Only the list of ten will be used in the review of the proposal. 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 URL or other Persistent Identifier. If only publications are included, the heading "Publications" may be used for this section of the Biographical Sketch.

(d) 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 STEM; and service to the scientific and engineering community outside of the individual's immediate organization.

3.4 NSF Budget Justification

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. For proposals that contain a subaward(s), **each subaward** must include a separate budget justification of no more than three pages. This should be written to correspond to the NSF budget categories, and not to our internal budget form.

Effective January 2018, NSF requires the following language be inserted into the budget justification.

The following paragraph should be inserted in the Key Personnel section of the description to denote how we handle the allocation of AY effort and the maximum 2 total months allowable salary from NSF across all NSF projects, for all participating U of M faculty:

Dr. XXXXXXXX (or U of M faculty investigators) holds a 9-month academic year appointment with research activity as an expected, normal portion of his duties. We request NSF support to allow continuation of the proposed research during the summer months, when s/he/they is not under contract. Requested effort is calculated by applying the percentage of requested summer effort to 3/9ths of the academic year contracted salary. Maximum permitted NSF compensation across all projects is determined using the University's fiscal year of July 1 – June 30.

The following information must be inserted into the Facilities and Administrative cost explanation.

Consistent with the University's current, federally negotiated rate agreement (cognizant agency DHHS), we request indirect costs of 43.5% of modified total direct costs for the proposed on-campus research. The modified total direct cost base is calculated as total direct costs minus tuition and required fees, minus capital equipment, minus participant support costs, and minus the value of subcontracts in excess of the first \$25,000. Total F&A expenses requested for this project are \$_____, calculated as 43.5% of direct costs totaling \$_____, minus \$_____ in capital equipment, \$_____ in tuition and mandatory fees for graduate research assistants, \$_____ in participant support, and \$_____ in subaward expenses in excess of \$25,000.

3.5 NSF Current/Pending Support Form

This section of the proposal calls for required information on all current and pending support for ongoing projects and proposals, **including this project. All current project support from whatever source** (e.g., Federal, State, local or foreign government agencies, public or private foundations, industrial or other commercial organizations, or internal funds allocated toward specific projects) must be listed. The proposed project and all other projects or activities requiring a portion of time of the PI and other senior personnel must be included, **even if they receive no salary support from the project(s)**. The total award amount for the entire award period covered (including indirect costs) must be shown as well as the number of person-months per year to be devoted to the project, regardless of source of support. Similar information must be provided for all proposals already submitted or submitted concurrently to other possible sponsors, including NSF.

3.6 NSF Facilities, Equipment, and Other Resources Document

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. Proposers should describe only those resources that are directly applicable. Proposers 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 the cognizant NSF Program Officer will review it for programmatic and technical sufficiency.

If no specialized facilities or resources are needed, you may simply upload a document that states, "No special facilities or equipment are needed for the proposed research."

Because NSF does not fund academic year support for faculty, we insert a heading for "Other Resources" and make the following statement: The University will allocate sufficient academic year research effort for the PI (and/or other investigators) to ensure the successful, year-around conduct of the proposed project." You are not permitted to insert the dollar amount or percentage AY effort associated with this cost share.

3.7 NSF Data Management Plan – 2 page maximum

Plans for data management and sharing of the products of research, including preservation, documentation, and sharing of data, samples, physical collections, curriculum materials and other related research and education products should be described. Please check the NSF Directorate or program page for any additional instructions specific to that area. Otherwise, address the following 5 points:

1. the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;
2. 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);
3. policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
4. policies and provisions for re-use, re-distribution, and the production of derivatives; and

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

Note that 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.

3.8 NSF List of Collaborators

Please complete the required NSF Excel Spreadsheet for each individual identified as senior project personnel, co-PI, and/or PI for NSF's use to help identify potential conflicts or bias in potential 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.
- 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, if known.
- Thesis Advisor and Postgraduate-Scholar Sponsor. A list of all persons (including their organizational affiliations, if known), with whom the individual has had an association as thesis advisor. In addition, a list of all persons with whom the individual has had an association within the last five years as a postgraduate-scholar sponsor.

Please take care to follow the instructions in the NSF spreadsheet (e.g. last name, first name format, etc.).

3.9 Post Doc Mentoring Plan, if Applicable – 1 page maximum

Each proposal that requests funding to support **postdoctoral researchers** must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. In no more than one page, the mentoring plan must describe the mentoring that will be provided to all postdoctoral researchers supported by the project, regardless of whether they reside at the submitting organization, any subrecipient organization, or at any organization participating in a simultaneously submitted collaborative project. Mentoring activities provided to postdoctoral researchers supported on the project will be evaluated under the Broader Impacts review criterion.

Examples of mentoring activities include, but are not limited to: career counseling; training in preparation of grant proposals, publications and presentations; guidance on ways to improve teaching and mentoring skills; guidance on how to effectively collaborate with researchers from diverse backgrounds and disciplinary areas; and training in responsible professional practices.

3.10 Other Supplementary Documents – Upload letters of collaboration from unfunded collaborators in this section. Letters of collaboration should be limited to stating the intent to collaborate and should not contain endorsements or evaluation of the proposed project. NSF requests the following format for letters of collaboration:

“If the proposal submitted by Dr. [insert the full name of the Principal Investigator] entitled [insert the proposal title] is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment or Other Resources section of the proposal.”

NOTE: While letters of collaboration are permitted, unless required by a specific program solicitation, letters of support should not be submitted as they are not a standard component of an NSF proposal. Different from letters of collaboration, letters of support are typically from a key stakeholder such as an organization, collaborator or Congressional Representative, and are used to convey a sense of enthusiasm for the project and/or to highlight the qualifications of the PI or co-PI.