

NSF GRANTS FOR FACULTY

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Learning Objectives

- To learn about NSF Directorates/Divisions
- To understand best practices for optimizing grant development
- To discuss grant writing tips and strategies

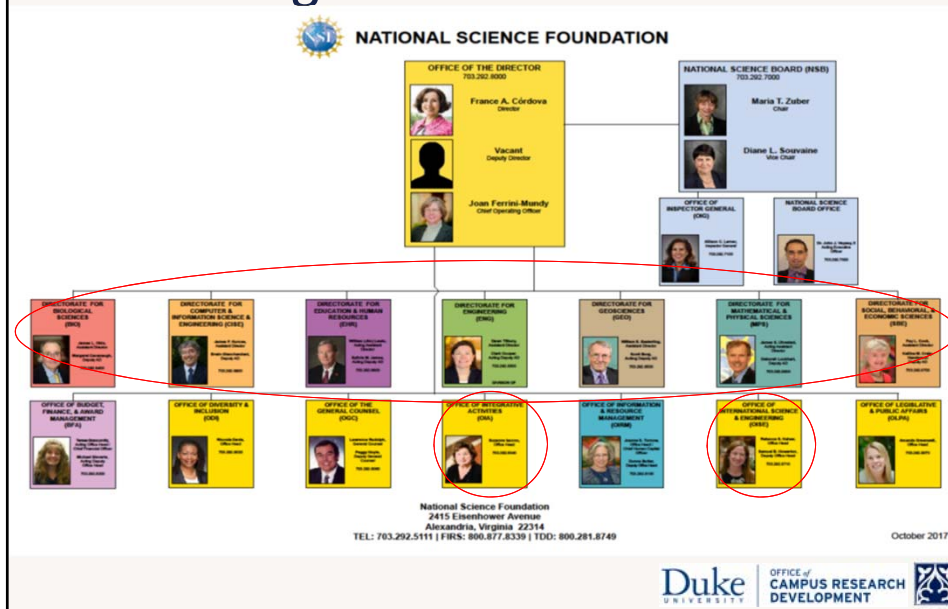


Is NSF a Good Fit for Your Research?

- STEM research
 - Does have a social, behavioral, economic component
- STEM education and workforce development
- Interdisciplinary collaborations in STEM
- International collaborations in STEM
- Activities to increase participation of women and minorities and other underrepresented groups in STEM



NSF Organizational Structure



Searching NSF Funding Opps

- NSF-wide
 - CAREER Awards (early tenure-track faculty)
 - ADVANCE (Institutional-level)
 - Research Experience for Undergrads (REU)
- Cross-cutting
 - Opp between or among 2 or more directorates (several)
- Directorate/program-level
 - Need to go to program of interest
- (Generally speaking) **Program Solicitation** for each funding opportunity



Other NSF Funding Possibilities

- EAGER: Exploratory/untested but potentially transformative research
- RAPID: Research that requires severe urgency to do
- FASED: Facilitate research for persons with disabilities

Do not go through regular peer review process

More information about all:

https://www.nsf.gov/geo/opp/opp_advisory/briefings/may2010/gpg_rapid_eager.pdf

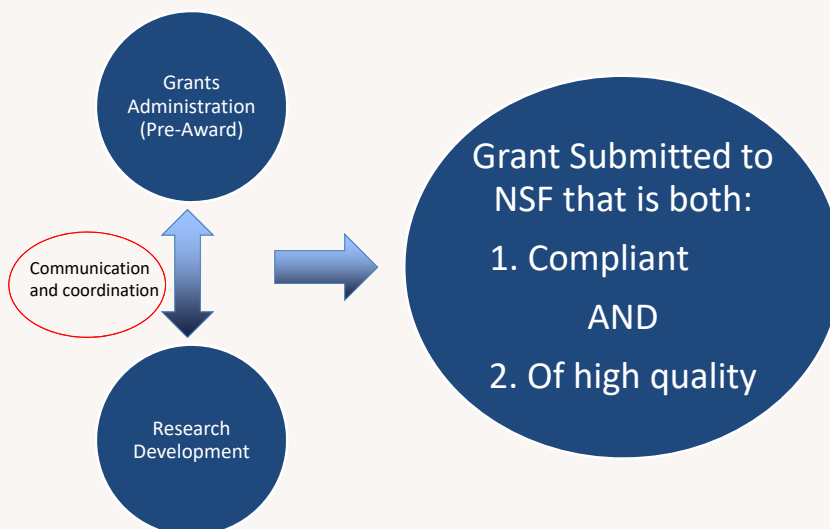


NSF General Eligibility

- No national restrictions for **faculty-level** programs (can be US or non-US citizens)
- NSF allows for PI and Co-PIs to be on research grants

C [5]1

The Process for Grant Development



Slide 8

- C [5]1** Would it makes sense to include the PI in this diagram? Perhaps not, but I thought I should ask.
Chris Freel, 10/23/2017

NSF Grant Toolkit



General Tips

- NSF application guide entitled: **Proposal & Award Policies & Procedures Guide (PAPPG)**
https://www.nsf.gov/pubs/policydocs/pappg17_1/index.jsp
- PAPPG provides general guidance **BUT also read Program Solicitation for any deviations from PAPPG**
- Make sure you, RD staff, and grants admin read/follow entire PAPPG and solicitation guidance
- All proposals submitted through NSF FastLane:
<https://www.fastlane.nsf.gov/fastlane.jsp>



General Tips

- Contact NSF Program Officer (PO) to discuss your research project and if it fits within scope of program of interest
- Look at successful applications
- **Do not submit anything not requested from PAPPG and Solicitation unless OK'd by PO**



Basic Components

Document	Page Limit
Cover Page	--
Project Summary	1
Project Description	Usually 15
References Cited	--
NSF Biosketch for senior personnel	2 per person
Budget (per yr and total)	--
Budget Justification	3
Current and Pending Support	--
Facilities, Equipment, and Other Resources	--
Supplemental Docs (Main ones)	
Data Management Plan (required)	2
Postdoctoral Mentoring Plan	1
Letters of Collaboration (adhere to template)	--
Collaborations and Affiliations Tables for senior personnel	--

Project Summary—1 Page

- 3 sections:
 - **Overview:** Opening 1-2 sentences introducing topic/problem, purpose of project, and specific objectives of proposal and highlight methods employed to achieve objectives
 - **Intellectual merit:** What is currently known and what is not known about topic/problem AND how proposed activities will advance knowledge in field or across fields
 - **Broader impacts:** How proposal will promoting teaching, training, and learning in STEM education and workforce development; benefit society; and contribute to achievement of specific, desired societal outcomes
- Written in 3rd person (e.g., using “we” instead of “I”)
- Check solicitation for any other requirements in each of the three sections



Project Summary: Observations in Recent Successful Proposals

- **Adheres to what is required from solicitation**
- **Overview**
 - Has opening statement of problem (often linking with some Big Idea of NSF or within field)
 - Introduces purpose of proposal
 - Identifies objectives
 - Other requirements from solicitation
- **Intellectual Merit describes:**
 - What is currently known about problem based on past studies, preliminary data
 - Gaps in current knowledge
 - How proposed objectives will advance knowledge and be transformative
- **Broader Impacts**
 - Increasing representation of women and underrepresented minorities
 - Expanding or improving STEM education in certain populations
 - Accessibility of STEM field to broader applications in society



Project Description

- 15 pages (or other page limit specified in solicitation)
- PAPPG guidance says “Proposers should address:
 - (1) what they want to do
 - (2) why they want to do it
 - (3) how they plan to do it
 - (4) how they will know if they succeed
 - (5) what benefits could accrue if the project is successful.”
- In addition, include sub-sections on:
 - Results From Prior NSF Support (cannot be more than 5 pages within 15-page limit)
 - Broader Impacts
- Do not include any URLs in body of proposal
- Check solicitation for additional requirements/sub-sections



Project Description: Observations in Recent Successful Proposals

- **Adheres to what is required from solicitation**
- In beginning (1-2 pages) includes:
 - Purpose
 - What we currently know
 - Gaps in knowledge
 - Objectives or aims of proposal
- Intellectual Merit sub-section
- Research or Program Plan includes methods/program description for each objective (or aim)
- Includes figures and tables that enhance/clarify text
- Includes timeline/milestones section
- Has thoughtful plan for Broader Impacts



Project Description Organization

Main Sections:

- Introduction
- Objectives
- Background (more in-depth than Introduction)
- Summary of Intellectual Merit
- Research or Program or Education Plan
- Evaluation Plan (may be required to assess Program or Education Plan)
- Broader Impacts
- Results From Prior NSF Support

Other sections may be required per solicitation

OR

Stick to what is required in solicitation that may or may not include any of the above sections



Introduction

- Suggested length: 1-2 pages
- Introduce the problem
- Provide summary of background, including highlighting gaps
- State purpose of project to address problem
- Break into sub-sections for flow, organization, and readability



Objectives

- Identify 2-4 main objectives addressing gaps
 - Develop objectives feasible to complete within grant duration
 - Make sure they can be achievable by activities proposed in plan
- For any objective identified, have accompanying methods in Research/Program/Education Plan to accomplish objective

Background

- Suggested length: 2-4 pages
- Purpose to demonstrate in more depth relationship of proposed work to present state of knowledge in relevant field(s)
- Suggested content/organization:
 - Introduce relevant scholarly literature and your/team members' preliminary data leading up to proposal
 - Have final paragraph describing gaps
- Break into sub-sections for flow, organization, and readability

Summary of Intellectual Merit




- Suggested length: 2-4 paragraphs
- Describe how achieving objectives will advance knowledge within field or across different fields
- Describe how project is innovative/transformational
- Describe roles and qualifications/expertise and access to relevant resources of PI and other senior members to conduct project
- Use sub-headings or font change to emphasize research advancements and transformational aspects

Research Plan Organization

Modular	Unitary
For each Objective, describe: <ul style="list-style-type: none"> • Preliminary studies (if applicable) • Research design • Study sample or population or data sources • Data collection procedures/experiments • Data analysis • Expected outcomes • Potential Problems and Alternative Approaches 	<ul style="list-style-type: none"> • Preliminary studies (if applicable) • Research design • Study sample or population or data sources • Data collection procedures/experiments • Data analysis • Expected outcomes • Potential Problems and Alternative Approaches
Timeline/milestones	Timeline/milestones

Suggested length: 5-7 pages

Program Plan Organization

Modular	Unitary
For each Objective, describe: <ul style="list-style-type: none"> • Preliminary work/models (if applicable) • Program sample or population • Description of program(s) • Evaluation Plan (if required) • Expected outcomes • Potential Problems & Alternative Approaches 	<ul style="list-style-type: none"> • Preliminary work/models (if applicable) • Program sample or population • Description of program(s) • Evaluation Plan (if required) • Expected outcomes • Potential Problems & Alternative Approaches
Timeline/milestones	Timeline/milestones
Suggested length: 4-6 pages	
  	

Evaluation or Educational Research Plan (for Programs/Education)

- Solicitation will indicate whether Evaluation Plan required
- Purpose could be to test/assess **feasibility** of conducting program and/or **effectiveness/impact** of program
 - Formative and summative evaluation components
- Suggested length 2-3 pages or integrate within Program/Educational Plan
 - But could be its own separate document
- Solicitation may require an outside evaluator
- Use these resources to help develop evaluation plan:
 - Evaluation methods: <http://www.informalscience.org/sites/default/files/TheUserFriendlyGuide.pdf>
 - Educational research: <https://www.nsf.gov/pubs/2013/nsf13126/nsf13126.pdf>

Broader Impacts

- Suggested length: Anywhere from .5 page to 2 pages
- Broader Impacts section should address:
 - How well does project advance discovery and understanding while promoting teaching, training, and learning?
 - How well does project broaden underrepresented group participation?
 - To what extent will it enhance the infrastructure for research and education?
 - Will results be disseminated broadly to enhance scientific and technological understanding?
 - What may be the benefits of the proposed activity to society?
- Contact Jory with Broader Impacts Resource Center (BRIC) to help you develop this section: <https://scienceandsociety.duke.edu/research/birc/>



Results From Prior NSF Support

- Can be up to 5 pages within Project Description page limit
- Indicate “not applicable” if no prior NSF support
- Follow PAPPG guidance on what to include for prior NSF awards listed



References Cited

- No page limit; only cite sources referred to in proposal
- Do not use term, “et al,” when listing co-authors; all names must be spelled out
- Use standard and consistent citation system

Biographical Sketches

- Submit for PI, Co-PIs, other senior personnel
- Each biosketch now loaded separately in Fastlane
- 2-page limit and specific template
- Sub-sections
 - Contact information
 - Professional preparation
 - Academic/professional appointments (starting with most recent)
 - 5 Products or Publications most closely related to proposal (If only publications included, heading, "Publications," may be used for this section)
 - 5 Other significant products/publications
 - Synergist activities (up to 5 examples)
- Indicate “Not applicable” for any sub-section if that is the case

Budget/Budget Justification

- Award amount = total budget (directs + indirects [aka F&A])
- Provide itemized budget for total budget and yearly
 - Check PAPPG and solicitation for any budget restrictions
- Budget usually in 1-yr increments
- Justify what is budgeted (up to 3 pages)
- Seek help from and start to work EARLY with departmental grants administrator

Current and Pending Support

- Must be submitted for Senior Personnel (even if no salary support received from project)
- Must include current proposal as “pending”

Facilities, Equipment, Other Resources

- Describe resources directly applicable to proposal in these categories:
 - Laboratory
 - Clinical
 - Animal
 - Computer
 - Office
 - Major Equipment
 - Other resources (e.g., outside Duke)
- Collect boilerplate language for each to customize the resources for your proposal



Data Management Plan (DMP)

- 2-page limit
- Describes how proposal will conform to NSF policy on dissemination and sharing of research results
- If your project will not generate data that can be archived and shared, you must submit a statement stating that in this section.
- Check on what to include in DMP: <http://www.nsf.gov/bfa/dias/policy/dmpfaqs.jsp>
- Several DMP templates tailored to Directorate
- Resources to help you develop DMP:
 - Duke Libraries can help: <https://library.duke.edu/data/data-management/planning>
 - DMP online tool: <https://dmptool.org/>



Data Management Plan (DMP)

Basic components of DMP:

- Types of data you will be creating
- Contextual details (Metadata) to make data meaningful to others
- Storage, backup, and security
- Provisions for protection/privacy
- Policies for re-use
- Policies for access and sharing
- Plan for archiving and preservation of access



Postdoctoral Mentoring Plan

- 1 page
- Include if requesting funding to support postdoc(s) on grant
- Describes mentoring provided to all postdocs supported by project, at Duke or at another institution
- Suggest mentioning supporting postdocs in Broader Impacts of Project Description, then expand in this plan
- Mentoring activity examples:
 - Guidance on career choices
 - Grant writing workshops
 - Assistance with publications/presentations
 - Guidance on ways to improve teaching and mentoring skills
 - Guidance on how to effectively collaborate with researchers from diverse backgrounds and disciplinary areas
 - Responsible Conduct of Research (RCR) training (<http://www.nsf.gov/bfa/dias/policy/rcr.jsp>); at Duke: <https://ors.duke.edu/orsmanual/rcr-postdoctoral-researchers>



Letters From Collaborating Institutions

- Letter(s) from institutions describing their involvement in your project and/or facilities or resources that will be used by you
- “Letters of collaboration should be limited to stating intent to collaborate/provide resources and should not contain endorsements or evaluation of proposed project” **Not letters of support**
- May have template for these letters—check solicitation

Other Considerations for Suppl. Docs

- Check solicitation for any other required supplementary docs
- Do **NOT** use supplementary docs to provide any additional information for your project

Collaborators and Other Affiliations Information Tables

- Effective April 24, 2017, NSF requires spreadsheet template for identifying collaborators and other affiliations (this information used to be in NSF Biosketches)
- Purpose is to help manage reviewer selection
- PI, co-PI(s), and other senior personnel provide this information



C [8]1

Collaborative Grants

- When proposal involves > 1 university or other organization
- 2 scenarios:
 - Duke team as lead organization with other organization(s) team(s) as sub-awards
 - Duke as lead and other non-lead organization(s) separately submit proposals—proposal title includes: “Collaborative Research”
- Have other document requirements (e.g., Management Plan)—check solicitation



Slide 38

C [8]1 Slides 38 & 39 are nearly identical--is that purposeful?
Chris Freel, 10/23/2017

Sub-Awards

- Have Duke grants administrator work with sub-grants admin(s) to submit the following:
 - Statement of work (see guidelines: <https://ors.duke.edu/sites/default/files/Subaward%20SOW%20DUKE%20guidelines.pdf>)
 - Budget and budget justification
 - Biosketches of senior personnel
 - Other institutional documents that grants admin should take care of (e.g., indirect rate agreement)



Collaborative Research

Lead Organization	Each Non-Lead Organization
Cover Sheet	Cover Sheet
Project Summary	Table of Contents
Table of Contents	Biographical Sketch(es)
Project Description	Budget and Budget Justification
References Cited	Current and Pending Support
Biographical Sketch(es)	Facilities, Equipment and Other Resources
Budget and Budget Justification	Collaborators & Other Affiliations Information
Current and Pending Support	
Facilities, Equipment and Other Resources	
Data Management Plan	
Postdoctoral Mentoring Plan (if applicable)	
Collaborators & Other Affiliations Information	
Other documents requested from solicitation, e.g., Management Plan	

NSF Review Criteria

- Reviewers use these questions to holistically evaluate full proposal:
 - What is the potential for the proposed activity to:
 - Advance knowledge (**Intellectual Merit**)
 - Benefit society or advance desired societal outcomes (**Broader Impacts**)?
 - Are proposed activities potentially transformative (both IM and BI)?
 - Is plan reasonable and feasible? Plan to assess success?
 - How well qualified is individual, team, or organization to conduct the proposed activities?
 - Are there adequate resources available to PI to carry out proposed activities?
- May have additional review criteria—Check solicitation



NSF Review Process

Merit Review Process

Click the square buttons to find out more information about the review process.
Download a printable version of the Merit Review Process Illustration. [PDF \(21K\)](#)



Phase description: https://www.nsf.gov/bfa/dias/policy/merit_review/illustration.pdf



THANK YOU!

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Next on Agenda

- Discussion of Broader Impacts by Jory Weintraub
- Insights from faculty—Faculty who have received NSF funding and have been on NSF study sections

