Writing an effective NSF graduate research fellowship application

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The NSF Graduate Research Fellowship Program (http://www.nsfgrfp.org)

DISCLAIMER: The opinions expressed in this presentation are solely my own, and they have not been approved by the NSF.
NSF GRFP program overview

Purpose

ensure the vitality and diversity of the scientific and engineering workforce in the United States

Supports

outstanding students pursuing research-based master's and doctoral degrees in fields within NSF's mission (early career)

Provides

3 yrs of support ($34k/yr) for individuals who have demonstrated their potential for significant achievements in research (fund person)

Due Dates for 2018

Late October 22\textsuperscript{nd} to 26\textsuperscript{th} (References due November 1\textsuperscript{st})

Different dates for (i) Engineering, Computer and Information Science and Engineering, Materials Research, (ii) Chemistry, Math, Physics, (iii), Social Sciences, Psychology, STEM Education & Learning Research, and (iv) Life Sciences, Geosciences
Parts of the NSF GRFP application

1. Basic information (name, education, honors, etc.)
2. Personal statement, Relevant Background, Future Goals (3 pg limit)
3. Proposed research statement (2 pg limit)
4. Letters of recommendation (3 limit)
5. Academic transcripts (official)

Note: GRE scores are not included
Basic information that is required

1. Panel that is most appropriate for reviewing application

2. Stage of your academic training (3 levels)
   (a) senior undergraduate
   (b) first year graduate student
   (c) second year graduation student (*expectation highest*)

3. School(s) attended as an undergraduate

4. School attending as a graduate (or plan to attend)

5. Grade point averages at each institution (no GRE)

6. Demonstrated potential for research and excellence
   - honors and awards
   - research participation
   - conference abstracts and/or publications
   - leadership activities (teaching, volunteering)
   - additional activities (balancing work)
The two short essays (3+2 pgs)

The application requires three short essays with limited space to convey information (*decreased this year*).

1. *Personal, Prior Research, Future goals* statement (3 pg limit)
2. *Proposed research* statement (2 pg limit)

GRFP applications must address two criteria in these essays, like all other proposals considered by NSF

- INTELLECTUAL MERIT
- BROADER IMPACTS

*We will generate a rubric.*
Before writing statements, consider the following questions

Why are you fascinated by your research area?

What examples of leadership skills and unique characteristics do you bring to your chosen field?

What personal and individual strengths do you have that make you a qualified applicant?

How will receiving the fellowship contribute to your career goals?

What are all of your applicable experiences? For each experience, what were the key questions, methodology, findings, and conclusions?

Did you work in a team and/or independently? How did you assist in the analysis of results?

*How did your activities address the Intellectual Merit and Broader Impacts criteria?*
What **PERIOD OF TIME** will a reviewer spend on your application?

strategies to deal with this audience
General considerations for essays

1. **Write clearly!** Quality is evidence for your intellectual merit and good writing means multiple drafts and revision until high caliber.

   “Easy reading is damn hard writing” - Nathaniel Hawthorne

   “The main thing I try to do is write as clearly as I can. I rewrite a good deal to make it clear.” - E.B. White

   “Rewriting is the essence of writing well - where the game is won or lost”- William Zinsser

   “You write to communicate to the hearts and minds of others what’s burning inside you, and we edit to let the fire show through the smoke.” - Arthur Plotnik

   “Omit needless words” - William Strunk Jr.

   “The first draft of anything is shit” - Ernest Hemingway

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Start your first drafts!

**revise, revise, revise**
General considerations for essays

2. Be sincere. For IM and BI, your essays provide an opportunity for depth and sincerity in wanting to solve problems.

3. Make your reviewers job easy. They will be read dozens of applications in a short period of time, which are from many outstanding individuals.  

   a. Use space wisely. Only have 2-3 pgs for each essay and need to convey excellent IM and BI. Make it easy for reviewers to find IM and BI if they skim your document.

   b. Be mindful of space. Think about reinforcing ideas for IM and BI that are important, but avoid excessive duplication. Bold headings for different sections can help convey ideas.

   c. Include graphics. Well prepared graphics can aid in conveying an idea. Make sure they appear well in gray scale and look as professional as a faculty member would insert in a grant.
What would go on your rubric for **INTELLECTUAL MERIT** if you were a reviewer?

*let's make a rubric*
INTELLECTUAL MERIT rubric

Past evidence for success (personal statement):
1. academic excellence (GPA)
2. research participation (academic and summer)
3. research contributions (posters, presentations, publications)
4. leadership & innovation (beyond coursework)
5. persistence (balancing many activities, overcoming challenges)

Future evidence for success (proposed research):
1. interesting/important question addressed
2. knowledge within proposed area
3. creativity and originality
4. institutional match for studies is relevant
5. leadership & innovation
6. strong communication skills
What would go on your rubric for BROADER IMPACT if you were a reviewer?

let's make a rubric
BROADER IMPACTS

Highly varied - typically relate to broader mission of NSF:

1. **Benefit of research**. Need to explain how your studies will benefit society in terms of the research knowledge (project data), tools (new software/methods), and research education (people).

2. Identification of a social problem (education) within the US and a description of **activities that integrate research training with a solution** to that challenge (outreach/service).

3. **Long-term benefits of supporting you** as they relate to societal challenges. How will your outreach and service activities overcome the challenge that you describe?

4. **Potential for leadership and innovation** in the future. Applicants are uniformly strong, so why are you likely to be a leader among your peers? Past evidence for contributions as evidence.

Note: NSF is funding individuals, not the 3 yr plan so make sure to provide evidence for **sincerity/depth** in your plans as they relate to broader impacts (do not just ✔ the box because required).
What information does a reviewer expect in the **PERSONAL STATEMENT**?

*lets make a rubric*
Personal Statement, Relevant Background, Future Goals (3 pgs)

Prompt: “outline your educational & professional development plans and career goals. How do you envision graduate school preparing you for a career that allows you to contribute to expanding scientific understanding as well as broadly benefit society?”

Relevant background. Motivation for your decision for studies. Include relevant examples, e.g., research, professional activities, leadership roles. Describe ability to work independently and as part of team to advance knowledge. Include past activities having societal impacts (very important).

Future goals. Describe plans as they relate to your ability to be a future leader that contributes to research, education, and innovation in science and engineering. What are your future plans that will have broader impacts.
What information does a reviewer expect in the **RESEARCH STATEMENT**?

*lets make a rubric*
Graduate Research Statement

(2pgs)

Prompt: “Present an original research topic that you would like to pursue in graduate school. Describe the research idea, your general approach, as well as any unique resources that may be needed for accomplishing the research goal”

Significance. Describe the significance of the research challenge that your idea will help overcome. Convey impact on society.

Point of departure. Explain what the current state of science is at it relates to the research problem you are describing.

Aims/Experimental design. Describe the specific objectives/goals of your research idea, and explain your plan to achieve these.

BI. Convey concisely how you will integrate your research efforts with activities related to broader impacts.

Figures. Visuals are often included to help convey ideas.
Who should ask for a LETTER OF RECOMMENDATION?

thoughts?
Letters of recommendation

The letter writers should be able to address at least some, if not most, of the following *with concrete examples*. They should know you well and be able to comment convincingly about your capabilities.

- Academic record
- Intellectual capacity
- Research record & ability to carry out independent research
- If publications, applicant’s contribution to that work.
- Originality
- Creativity
- Leadership ability
- Motivation and chances of success for graduate research
- Unusual or extraordinary circumstances

*Who should you ask for letters? Who will appear to have a bias? Who might represent unique letters?*
How should you
REFINE YOUR ESSAYS?

thoughts?
Get feedback on your writing

1. Writing Center: will help you with grammar and usage of English language

2. Current and past fellows: can be an excellent resource for asking questions about the process of developing an application.

3. College of NatSciMath (NSM) Peer Writing Group: will help you as you start working on your drafts.

4. Members of your lab: can be an excellent sounding board for the ways in which you make arguments

5. Faculty mentors: can advise you on strategy, as well as providing critical feedback on your ideas and essays.

*How many resources should you leverage? What order?*
How does the REVIEW PROCESS work?
The review panels

**Size.** A few dozen scientists from academia, national labs and/or industry. Number depends upon applicant pool size. The panels created to represent a diverse population.

**Topic areas.** Sorted by disciplines (physics, chemistry, and biology) and specialties of each field (biophysics, development).

**Diversity.** Come from all types of institutions (private and public, large and small, primarily research and undergraduate) and are at different career stages (assistant, associate or full professors).

**State of mind.** Reviews are done remotely by skype, which leads to scoring primarily based on essay quality (hence the need for polished, clear essays).

**Values.** Highly diverse values, which reflect the spectrum found within scientific community, so weighting given to different NSF criteria (IM and BI) can vary tremendously.
The review panels

**Constraints when reviewing.** Panelists are not allowed to obtain external data from the internet. They may call upon their own knowledge of a research field and the schools and/or research programs mentioned in an application.

**Conflicts of interest.** Panelists may NOT: (i) review application from own institution or from student who is planning future studies there, and (ii) review an application of someone with whom they have an existing relationship or other conflict of interest. Panelists sign a conflict of interest statement agreeing to abide by these rules.

Note that if an application is discussed during the final review process, anyone having a conflict of interest may answer factual questions posed by the other panelists but otherwise must recuse themselves from any discussion of the applicants file.
The review process

Initial readings. Each application is read by three panelists with each panelist reading on the order of 40 applications. In some cases, there are time constraints on this process (although changing).

Scoring of applications. Each panelist gives an application two scores based upon: (i) intellectual merit and (ii) broader impacts. These are distinct from the descriptive score that you receive.

Scaling scores. The mean and standard deviation for all scores given by each panelist are used to convert the raw scores into a Z score. The benefit is that the average score for all reviewers is thus fixed at 0. The Z averages are calculated for each application.

First ranking. After three reads, applications are ranked based on average Z score and some percentage are triaged. Amount triaged is set by NSF based upon how many applications they are likely to fund or award an honorable mention.
The review process

**Discussion.** Any applications with large variability in scores are discussed to make sure that the different views are considered by all reviewers. Scores can be revised at this point.

**Second ranking.** Once the discussion ends, applications are resorted based on z scores and placed into four quality groups.

- QG1 = highest priority to fund
- QG2 = some awarded, some honorable mention
- QG3 = honorable mention
- QG4 = receive nothing

**Group discussion.** At this stage the panel has a group discussion where they re-rank candidate if they feel it is appropriate for any reason. The whole panel must vote to make any change, so this can be slow. Note: if someone goes up, others must go down.

**Final ranked list.** NSF determines which QG2 get an award and verify that the awardees are eligible. Selections in QG2 are used to help NSF achieve different aspects of diversity.
Reading your reviews

INTELLECTUAL MERIT
• receive 3 scores (excellent, very good, good, fair, poor)
• receive 3 sets of comments on this aspect of your proposal

BROADER IMPACTS
• receive 3 scores (excellent, very good, good, fair, poor)
• receive 3 sets of comments on this aspect of your proposal.

The comments represent: (i) critical assessment of your application relative to a very strong applicant pool, (ii) feedback that will be useful for your career and future submissions.

Funding. Typically 2,000 funded (15-20% success rate in recent years)

Note that many more individuals are deserving of NSF awards than will actually receive them. There simply isn’t enough money to fund all worthy applications.
As you think about planning WHERE TO START?
Timeline for preparing application

1. Read NSF instructions
   - May - July

2. Work with the NSM Peer Writing Group on drafts of your personal statement and research plan.
   - August

3. Request reference letters
   - August

4. Start assembling electronic application. Easy to do, so get started in spare time.
   - September

5. Take advantage of any resources available at your institution. Your advisor, UH writing center, review faculty, and others.
   - September

6. Submit proposal
   - Late Oct

7. References due
   - Nov. 1

CHECKPOINT

revise, revise, revise
How to approach writing your…
Personal Statement

1. Read the instructions
2. Brainstorm your relevant experiences
   1. Past research experiences, courses
   2. Publications, posters, presentations, conferences, honors, awards
   3. Professional and service/outreach activities
   4. Leadership roles
3. Identify a theme for your narrative
   1. Motivation for graduate school
   2. Career plans
   3. Are their specific societal issues that you care about?
4. Create an outline to organize your thoughts
How to approach writing your…
Personal Statement

5. Draft your personal statement
6. Work with the NSM Peer Writing Group during the summer to revise your draft
7. Check that you have addressed all the NSF requirements
8. When more polished, ask for feedback from your advisor, and a faculty member in your department
9. **Revise, revise, revise**
How to approach writing your... Research Plan

1. Read the instructions
2. Talk with your research advisor
3. Conduct a Literature Review
4. Create an outline to make sure you are addressing the key elements of the research plan
5. Identify how your proposed project will advance knowledge (IM) and impact society (BI)
6. Discuss your outline with your advisor
7. Write a rough draft
8. Work with the NSM Peer Writing Group during the summer to revise your draft
9. Check that you have addressed all the NSF requirements
10. Ask for feedback from your advisor and a department faculty
11. Revise, revise, revise
Should you **APPLY THIS YEAR**
or wait a year?

*advantages/disadvantages?*
First year graduate students:

Steps to help you assess if you should apply this year or next year?

1. Learn as much as possible about the GRFP
   - Attend workshops, meet with the NSM Peer Writing Group, talk to faculty who have conducted reviews, look at examples of applications

2. Write a draft of your GRFP application
   - A full draft is necessary to assess the competitiveness of your application

3. Assess your application – how strong is your application?
   - Use the GRFP Rubric to assess the competitiveness of your application
   - Discuss with your advisor, a faculty member or the NSM Peer Group.

4. Decide if you are going to apply by October 1st - CHECKPOINT
First year graduate students:
Steps to help you assess if you should apply this year or next year?

CHECKPOINT – October 1st

Reflect on the following questions and meet with a faculty advisor to discuss if you should apply in your first or second year

1. Are you on a good pace to complete a strong application by the end of October?
   - Consider how you will balance writing with other obligations (course work, teaching assignments, affiliating with a lab, etc.)

2. Are you making a good research argument?

3. Have you developed a strong broader impact argument?

4. Would you benefit from refining for another year? Why?

5. If you decide to wait to apply, develop a comprehensive plan to improve your application over the next year.
Questions?

Note: the NSF GRFP website (http://www.nsfgrfp.org) has excellent resources that you should check out as you prepare to apply