

NSF Graduate and Postdoctoral Fellowships: Opportunities and Advice

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Outline

- Advice for both fellowships
- NSF GRFP Advice
 - Project vs. potential
 - Broader impacts
 - Science vs. medicine
 - Audience analysis
 - Reviewer process
 - Essay construction
- NSF MSPRF
 - Overview
 - Advice



Advice for Both Fellowships

- Start early
- Make sure you're actually eligible
- Read all the instructions and the Solicitation
- Look at the many wonderful NSF fellowship resources assembled online (links at end of presentation)
- Contact letter-writers early, and be clear about what you want in your letter



GRFP: Project vs. Potential

“The Graduate Research Fellowship Program (GRFP) is a National Science Foundation-wide program that provides Fellowships to individuals selected early in their graduate careers based on their demonstrated potential for significant research achievements in STEM or in STEM education.”



GRFP: Importance of Broader Impacts

“The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.”

From my (anecdotal) observation, applicants who don't demonstrate broader impacts in all aspects of the application are not successful - needs to be a key focus of personal statement, research statement, and CV/resume.



GRFP: Target Science, Not Medicine

- The NSF is the National SCIENCE Foundation.
- Although it's okay to have medical applications for your research (and broader impacts claims can be easier to make with medical applications), ultimately it's necessary to emphasize scientific merit.
- Ineligible areas of research:
 - Clinical practice, counseling, social work, patient-oriented research, epidemiological and medical behavioral studies, outcomes research, and health services research; interventions for disease or disorder prevention, prophylaxis, diagnosis, therapy, or treatment; community, public, or global health.



GRFP: Audience Analysis

What is the Agency's Mission?

NSF's aim is to promote and advance scientific progress in the United States.

...

NSF welcomes proposals on behalf of all qualified scientists and engineers and strongly encourages women, minorities, and people with disabilities to compete fully in its programs.



GRFP: Audience Analysis

How does this fellowship function within that mission?

Funding future STEM leaders and supporting minorities.

Women, Ethnic Minorities, Disabled, Veterans, and Geographic.



GRFP: Audience Analysis

Who is eligible for this fellowship? (i.e. who is your competition?)

All U.S. senior undergraduates and graduate students with less than 12 months of course work.

A lot of competition!



GRFP: Reviewer Process

Reviewers are looking for **LOSERS** not winners.

Did the applicant follow guidelines when applying?

- Missing any part of the application such as a letter of reference or transcript.
- Formatting of essays (automated now).
- Exceeding length requirement.

Two to three reviewers will review 15 - 25 applications initially independently and assign a numeric score on Intellectual Merit and Broader Impacts (50pts).



GRFP: Reviewer Process

Reviewers are looking for **LOSERS** not winners.

The scores are compiled and cutoffs are drawn based on the number of winners and honorable mentions in each category set by the Program Manager.

Reviewers will discuss students who are close to cutoffs to either push above or below cutoffs.




GRFP: Essay Construction (Legos)

- **Thesis Sentence:** *In the summer of 2014, I conducted research in microbial biophysical systems through the Leadership Alliance Summer REU Program at Princeton University with Prof. Howard Stone (letter writer).*
- **Clearly sets up experience:** *As a part of his research team, I developed a microfluidic approach to measure the rheological properties of bacterial biofilms and probe the influence of structural mechanics on biofilm-microbial behavior.*




GRFP: Essay Construction (Legos)

- **What the applicant accomplished during the experience:** *During the course of the summer, I designed and characterized a micro-membrane rheometer capable of measuring the elastic modulus of various strains of bacterial biofilms. In the design of the device, stress was imposed on the test specimen by pressurizing a microfluidic channel located directly under a flexible polydimethylsiloxane (PDMS) membrane in contact with the biofilm. The elastic deformation resulting from the applied stress was quantified by measuring the deflection with confocal microscopy. In order to obtain the modulus of elasticity of the biofilm from the resulting deformation, I undertook a computational approach and developed a COMSOL software based finite element model, allowing us to characterize the relative contributions of the elastic modulus from the PDMS membrane and the biofilm.*
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GRFP: Essay Construction (Legos)

- **Clearly stating broader impact:** *The research potential of the microfluidic based rheometer lies in its ability to quantify the effectiveness of new drug treatments against biofilm infections by evaluating the detrimental effects of the drug in the mechanical resilience of the biofilm itself.*
- **Explained what was learned from the experience and research products (in a later paragraph after describing other experiences):** *Overall, these research experiences have strengthened my scientific proficiency for my proposed graduate research by providing me with a broad set of skills and knowledge in the areas of cell mechanics, tissue engineering, and microfluidics. Additionally, I presented my research findings in numerous conferences, including the Leadership Alliance National Symposium, Biomedical Engineering Society Annual Conference, and American Chemical Society Technical Meeting, which has taught me how to effectively communicate a broad understanding of my research to a diverse community of people.*

MSPRF Overview


- N = 1 disclaimer
 - Small number of fellowships compared to GRFP (Estimated number of awards 30-33 vs. 1600)
 - No written feedback
 - I've only seen my own funded proposal and two funded proposals from past years
 - Funds a specific research project not just the researcher
 - The application is roughly a shortened version of a typical proposal an independent mathematical scientist would submit to NSF
 - Applications are evaluated on intellectual merit and broader impacts. Need to cover both
 - Goal: Show your research is valuable and that you can do it
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MSPRF Tip 1: Align your proposal with your goals

- MSPRF is very flexible. Start by thinking about what you want to get out of a postdoc
 - Identify what skills and experiences you want to get in the next 2-3 year
 - Think about what your ideal research program will look like long-term
 - Consider what type of position(s) you're interested after your postdoc
- Examples:
 - Are you interested in teaching-oriented faculty positions? Consider the research instructorship option
 - Do you want your research program with applications? Propose research that will let you start to build a network of collaborators in domain sciences
- Find a sponsoring scientist (postdoc adviser) and host institution that will support your goals



MSPRF Tip 2: Craft a detailed research plan

- Clearly identify the statistical (and scientific?) question(s) of the research
 - Delineate smaller goals (“aims”) that build up to answer your questions
 - Provide enough detail to convey you have pretty concrete idea of how you might answer these questions you propose
 - What data will you use (if applicable)?
 - Who will you collaborate with? How the collaboration will work?
 - Why are the sponsoring scientist and host institution well-equipped to support your research?
 - Highlight the technical advancements you will make (intellectual merit) and the value of your research and/or other efforts to the larger world (broader impacts)
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MSPRF Tip 3: Write to explain not to impress*

- Don't be scared to use a lot of space to describe the problem and why solving the problem matters
- Assume broad backgrounds for reviewers (someone in the mathematical sciences, but not necessarily a statistician)
- Show that you know the literature by describing how what you're proposing to do relates to what's been done before
- Some math is a good idea, but excessive equations won't help

*Exception: Past accomplishments and biosketch sections...




MSPRF Tip 4: Make clear why NSF should fund you, not just your research

- Paint a picture of yourself as someone who is on the path to a career as a successful NSF-funded researcher
- Present a career plan that connects what you've done and what you will do
- Emphasize through the details of your proposal how the fellowship will let you fill the last holes in your development as an independent scientist
- Use the past accomplishments and biosketch section to describe your qualifications (papers, preprints, software, awards, talks, etc.). **Don't be modest!**



MSPRF Tip 5: Manage all the moving parts

- Application has many components:
 - Need to submit: NSF cover page, fastlane application forms, project summary, project description (with 6 different subsections), references cited, biographical sketch, sponsoring scientist statement, data management plan, plan for long-term absence (if applicable)
 - Arrange for submission: 3-4 reference letters
 - Be organized. Missing any component will disqualify you
 - Follow the instructions. Failing to do so will also disqualify you
 - Need to register as an independent researcher with NSF prior to preparing your application
 - Application is prepared and submitted via Fastlane
 - Submit in advance in case of technical difficulties
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More Resources

GRFP:

- <http://clairemckaybowen.com/fellowships.html#overview>
- <http://www.malloryladd.com/nsf-grfp-advice.html>
- <https://www.alexhunterlang.com/nsf-fellowship>
- <https://fellowships.missouri.edu/fellowship/nsf-grfp/>

