

**Advice for Applicants to the NSF Graduate Research Fellowship**  
**By Keith Jacks Gamble**  
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**\*Note: The bulk of this article was written in 2004, so some details may have changed. If you see an inconsistency with the current competition procedures, please email me so I can update this article to reflect the change.**

I'm writing this article not just because I had the fortunate experience of winning an NSF graduate research fellowship, but also because I had the misfortunate experience of not winning one. Although I did win an honorable mention the first year I applied, let me be the first to tell you that it doesn't mean jack squat financially. Hopefully, you are reading this article because you want to win the NSF graduate research fellowship, and rightfully you should want to win it. Currently, the stipend for fellows is \$30,000 a year along with full payment of tuition and fees<sup>1</sup>, not to mention a travel allowance or additional departmental money that might be awarded as a result of winning "the NSF". I do not know of any better fellowship for a graduate student. In addition to the financial rewards, the honor of winning the NSF stays with you throughout your academic life. If you don't believe me, just take a look at a few Harvard, MIT, or UC Berkeley professors' CVs.

Much of the advice in this article is due to the work of Michael Sacramento, a fellowships coordinator at UC Berkeley, who organized an NSF application workshop featuring a panel of NSF winners and a professor who served on an NSF review committee. They too deserve credit for much of the advice in this article as well as my success in winning an NSF. Although I didn't change much between my senior year when I first applied for the NSF and my first year of grad school when I won an NSF, my application was remarkably improved. I hope that these tips will help you to put your best foot forward the first time you apply.

### **The Basics**

The purpose of my writing isn't to list the rules for eligibility, the deadlines, or the application requirements; however, they are important. Before reading further you should read every word of the guidelines for applicants <http://www.nsf.gov/pubs/2005/nsf05601/nsf05601.htm> . In the rest of this article, I'll assume you've read it.

### **A Word about Motivation**

Your NSF application deserves your time and effort. Add (at least) \$5,000 in paid tuition and fees to \$30,000 in stipend and then multiply by the three years of the award. That is \$105,000!!! (at least) that the NSF could mean for you. Keep in mind that the NSF is not a job; the work you'll do as an NSF fellow is the same as the work that you'll do anyway as a grad

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<sup>1</sup> Technically, NSF currently pays \$10,500 per fellow each year for "cost of education." Especially at private schools, tuition and fees are often much higher; however, I have never heard of case in which a fellowship award winner was required to pay out of pocket for the rest of tuition and fees (though I suppose it's possible). Furthermore, at schools with tuition and fees less than the cost of education allowance (such as UC Berkeley for California residents), the university is still paid the entire allowance, and you don't get the extra.

student. The NSF just pays you to do it. My first year as a grad student I took the same nine classes that the two NSF winners in my incoming class did, yet I was taking out \$24,500 in loans while they were getting paid more than that in stipend alone! In short, winning the NSF is like winning the lottery, just not quite as random. Thus, you can't put enough time into your application. I skipped more than one lecture to attend an application workshop, to meet with professors, and to read over previously successful applications. Those efforts turned out to be well worth my time.

### **This Can't Wait**

Hopefully, you've already taken the GRE and done well. You pretty much can't get into grad school, much less win an NSF, without the GRE. I know the importance of subject tests varies by field. For example, in economics don't bother taking the subject test. Nobody cares.

Perhaps the single most important part of your application to get started on early is getting the reference reports a.k.a. letters of recommendation. Ideally, you want four strong letters from professionals in your field who know you personally. Typically, reference writers will be professors you've had meaningful interactions with. For me, this was the most daunting task of my application. Even just a month before my application was due, I only knew two of my recommenders well.

First, you need to choose your recommenders wisely. My senior thesis advisor was an easy choice since I had worked with him for nine months on a substantial research project. Any professor you have conducted research with would likely make a great choice. After all, your ability to produce successful research as a graduate student is perhaps the most important criteria for winning this fellowship. Since my senior thesis was my only research experience at that time, I had to cultivate relationships with other professors that shared my research interests. I began regularly attending office hours of two professors to discuss research ideas and to find out more about their work. After a few visits, they were happy to recommend me. Of course, don't go into these meetings unprepared. You must know something about their research and how your ideas relate to theirs. My fourth recommender taught one of the courses that I had the most success in. Although he didn't know much about my research interests, he was able to vouch for my ability to succeed in graduate level coursework. You need to know who your four letter writers will be by the time you submit your application (in November) since you must list their names on your application; however, their reference reports are due LATER (in December) than your application. Use all of that time to continue to cultivate your relationships with your recommenders. [Incidentally, this will not only help your application, but it will also help out your research ideas tremendously.]

You must do everything possible to make your recommenders letter writing experience easy for them and effective for you. Be sure to ask what efforts from you would help them. Ways you can be helpful might include providing them with your transcripts, previous coursework, papers, application essays, and reminders. I provided each of my recommenders with a packet of materials they requested accompanied by very detailed instructions of how to submit their reference reports online. Make sure to provide them with multiple reminders about the deadline; don't wait until the day before to ask them if they sent in their recommendation. Also, make sure your recommenders know what aspects of you that you want them to address.

For example, I asked my senior thesis advisor to focus on my research experience; I asked the two professors that I just had begun to meet with to focus on my research proposal; and I asked the professor I was taking the course with to focus on my academic ability.

I strongly suggest having at least a couple of your recommenders review relevant parts of your application essays at least a week before you need to submit them. For example, the professors you have done research with will be able to provide helpful editing advice for your essay about your research experience and likely your research proposal as well. Not only will this advice help your essays, reading your essays and interacting with you about them will help your recommenders write better letters for you. Finally, but importantly, be sure that your recommenders confirm the information you provide in your application essays. Panelists likely take boasts made by any applicant with a grain of salt; however, if your Nobel-prize winning recommender makes boasts about you, panelist will take notice. Even non-research related aspects of your application (such as the broader impacts criteria) should be confirmed by your recommenders.

### **Take a Look at This**

Be sure to look at the sample review sheet that is posted on the application information website. (It used to be posted; I wish they would do this again. You used to be able to find a copy here: <http://uts.cc.utexas.edu/~asee/NSFGRFPTalk-OGSWrkshpOct02.pdf><sup>2</sup> as well as some great advice; however, now this too is gone! If you have a copy of a review sheet, please let me know.) The judges use the review sheet to evaluate your application. The most remarkable aspect of the review sheet is how much each of the broader impacts criteria sticks out. Do not underweight addressing these criteria in each aspect of your application. The NSF panelists want to see that you are a positive influence on those around you, not just a great researcher.

### **Filling in the Blanks Smartly**

Don't just breeze by the address portion of your application. If you reside in an area that is under-represented in academia, it's to your advantage to apply from there. The money that supports this fellowship is funded by Congress who wants to insure that people from all areas of the country are supported. In other words, they want winners from Alaska and Arkansas as well as California and New York. Don't think that just because you are from Alabama that you will certainly win or that because you are from Michigan you will certainly lose. In order for your hometown to matter, the panelist must first judge that you are among a group of applicants who stand out. Then from this group of "substantially equal merit" NSF gives preference to those from under-represented areas. I have heard that you should choose to use your home address instead of your school address if you are originally from an underrepresented state<sup>3</sup>; however, I have also heard from an official who was involved on the inside of the application review process that this is a misconception. He states that where you went to high school is the only part of your application that will determine your geography.

Be sure to list any remotely relevant award or honor you have received. Although you might not have impressed yourself when you won the XYZ prize (along with 50% of your classmates), it's likely that panelist will not know that fact. I'm not sure panelists pay to much

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<sup>2</sup> Thanks to Jay Taneja for this link and Tess Moon for writing and posting it.

<sup>3</sup> See, for example, <http://www-econ.stanford.edu/academics/h-prospectiveinfo.html>.

attention to the academic honors list, but it can't hurt to have more honors listed than rather than less. I'm not sure they have the time to speculate how prestigious winning XYZ prize actually is, but I imagine that panelist can quickly see if nothing is listed.

### **Essay I: Desire and Broader Impacts Criteria**

*Describe any personal, professional, or educational experiences or situations that have contributed to your desire to pursue advanced study in science, mathematics, or engineering. Discuss your career aspirations and how the NSF fellowship will enable you to achieve your goals. Provide specific details in the narrative that address the NSF Merit Review Criteria of Intellectual Merit and Broader Impacts as described in the program announcement.*

This essay should make it clear to panelists that you have passion for research. After all, it is the main reason for pursuing advanced study. Beyond exhibiting your passion for research, feel free to add your own personal touch. Given that panelists read hundreds of applications, it's to your advantage to make this essay entertaining.

The Broader Impacts Criteria may sound bobo to you, but I think the most important advice I can provide to you is to treat the Broader Impacts Criteria with great respect. Remember from looking on the panelist review sheet how much they are emphasized. You might be the smartest person in the world, but NSF wants to make sure that you are also a positive influence on those around you before giving you money. The biggest challenge for me in writing this essay was figuring out what the four broader impact criteria mean.

For "integrating research and education," I described my participation in a thesis writers' workshop that met weekly to discuss our research progress and to help each other get past research roadblocks. I also discussed conducting in class experiments while teaching in a summer academic program for middle schoolers. Remember the essay also asks how you will to continue to address these areas in your professional career. If you want to be a professor, you can discuss your interest in participating in current research workshops/seminars as well as your desire to bring examples of current research into your classroom.

For "advancing diversity in science," I talked about my efforts in tutoring and mentoring students from underrepresented groups. Being white and male in economics, my presence alone doesn't promote diversity. I've seen successful application essays from minority students (under-represented races as well as gender) who discussed the lack of their particular demographic group in their academic field. They also described how as a professional they would work as a mentor to students from their minority group in particular.

For "enhancing scientific and technical understanding," I discussed an article that I wrote for a student magazine that put current research results from finance into plain language for a general audience. Other successful applicants have discussed presentations of research made for community groups, such as conducting science experiments for a second grade class. This is one topic that I didn't have many experiences to discuss. When this happens, don't leave the area empty. Be sure to discuss how as a professional you want to further the general community's understanding of your field, such as by writing articles for mainstream publications not just publishing in rarely read scientific journals.

For “benefiting society”, I discussed the volunteer work I did as an undergraduate. Note that these efforts do not need to relate to your field of study. This topic is pretty open ended, so throw all you got in.

Again, don’t underemphasize this essay. You should totally fill up your allowed space. Also, if your letter writers can vouch for any of these experiences, you should ask them to do so. For example, if one of your letter writers edited the article you published in a student magazine, then ask them to mention that fact in their recommendation.

## **Essay II: Previous Research Experience**

*Describe any scientific research activities in which you have participated, such as experience in undergraduate research programs, or research experience gained through summer or part-time employment or in work-study programs, or other research activities, either academic or job-related. Explain the purpose of the research and your specific role in the research, including the extent to which you worked independently and/or as part of a team, and what you learned from your research. In your statement, distinguish between undergraduate and graduate research experience. If you have no direct research experience, describe any activities that you believe have prepared you to undertake research. At the end of your statement, list any publications and/or presentations made at national and/or regional professional meetings.*

This essay was hard for me because I had never worked as a research assistant. At first, I didn’t think I had much to write about. If at any point in your application you find yourself thinking this, don’t give up and leave space blank. Think about how to describe what experience you do have (little as it may be) in the most detail possible in order to demonstrate that you are capable of conducting research. My senior thesis project was my only major research experience, so I took the opportunity to go into great detail of my work. Almost certainly, at least one of your letter writers worked with you on the research you describe in this essay. They should provide confirming details of your contributions in their letters.

## **Essay III: Research Plan**

*In a clear, concise, and original statement, present a complete plan for a research project that you may pursue while on fellowship tenure and how you became interested in the topic. Your statement should demonstrate your understanding of research design and methodology and explain the relationship to your previous research, if any. Describe how you propose to address the two NSF Merit Review Criteria of Intellectual Merit and Broader Impacts. Refer to the program announcement for specific guidance.*

*Format: Include the title, key words, hypothesis, research plan (strategy, methodology, and controls), anticipated results or findings, literature citations, and a statement attesting to the originality of the research proposal. If you have not formulated a research plan, your statement should include a description of a topic that interests you and how you would propose to conduct research on that topic.*

This essay should be your most polished. Get started on this one early, and ask professors in your field for advice. Like the previous, this essay should definitely take up the

entire allowed space. You want to show the panelists that you have a clear, interesting, and workable plan. Your professors will be the best judges of these aspects; after all, professors just like yours will be judging your application. Be sure to cite relevant papers in this essay.

Do not forget to include a final paragraph discussing why your chosen university is an ideal place for you to conduct your plan of research. The application reviewers will judge the quality of your choice. If you choose an institution that isn't well suited to your research plan, the reviewers will be skeptical of your capability to execute your research agenda. Be sure to mention faculty members who are perfect to advise you in this plan of study. Also mention laboratory facilities at your chosen university that will make conducting your research possible.

**Good Luck!**

If you have questions, suggestions, or comments, feel free to email me at [gamble@econ.berkeley.edu](mailto:gamble@econ.berkeley.edu).