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## Advice for NSF Graduate Research Fellowship Program Applicants

Compiled by Five Winners from Michigan State University

There are two key points to remember when applying for the National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP). First, NSF is looking for someone who can demonstrate success in the past and has significant potential for success in graduate school. Second, NSF does not have a lot of time to review your application. NSF is reviewing hundreds of applications. The overall idea is to make your proposal be different while adhering to their guidelines and to general scientific writing rules. Reviewers have very little time to read your proposal so make your application worth their time.

Success in applying to NSF is in large part making yourself appealing by injecting your personal passion & drive into every sentence of your written statements. The rest of the application serves to establish your competence and experience, which is important, but, in one winner's opinion, serves in a supporting role to the main attraction, which is the individual applicant.

The following are a few bits of advice for your application:

- Start now - If nothing else, setup your Fastlane account. Then in a day or two, enter your demographic information. By the end of the month (honestly, by the end of the week) you should have everything except for your essays and recommenders entered into Fastlane. This is extremely important because the system can get bogged down as the deadline approaches. You don't want all of your hard work to go to waste because you can't get it submitted.
- Read the program guides - Take time to read! You should READ (not skim, not glance at, but read) the program announcement, administrative guide, and FAQ. This will benefit you substantially when you begin to make plans. It will affect your graduate school search as well. Take the time to do it!
- Create a list - Starting to write your essays from a blank sheet of paper is almost impossible. Start by making a list of all of the different things you could possibly put into each essay. It's OK if you over lap content in the essays, especially in the beginning. Later on you can decide what fits where and what should be kept or deleted. You do not want to waste space repeating yourself, but do want your essays to form one coherent message.
- NSF is funding you, not your proposal - I've heard it called funny money because it goes to you, not the project. This means you can do (within your major) whatever work you want. You have to convince NSF that you will be successfully and can contribute to the advancement of the body of knowledge in your area. Therefore, it is not as important that you decide right now what you are going to

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- study in graduate school. They are more interested that you can develop an idea into a proposal.
- Tiers - There are different tiers to the NSF GRFP competition. Your grade level and experience determine into what level you are placed (undergraduate, first year graduate, 2nd year/other). The lower levels are easier with fewer expectations. The further along you are in your education, the more NSF expects from you.
  - They are looking for a reason to get rid of you - NSF has a lot to read. If you do not follow formatting guidelines or other simple rules, they will throw your application out. Review all parts of your application and make sure you meet the requirements. Beyond this, edit your application to make sure that it is as perfect as you can make it. Do not give them an easy out.
  - Science not a product - NSF is looking to fund science, not a product. Tailor your application so that it is about the science and research. NSF does not want to fund an engineer to develop a product. Even if there might be an end product, emphasize the science you will be exploring while developing this product.
  - Writing process and resources - MSU has many writing resources. Use them. After you have made a few drafts, get help editing them. Start early so that you can set it down for a few days and not think about it. Get feedback from your professors. Discuss your application with all of your recommenders.
  - Limited space - You have only a limited amount of space. Pick and choose what you want to include carefully. This goes even for the things mentioned here. If you want to mention something you have done in multiple essays, emphasize different aspects of it.
  - Use headings and bold typeface - As above, NSF has hundreds of applications. Ideally, your application would be unique in every aspect so that you could not be confused with any one else. Realistically you should make it easy for the reviewers to reference your application and find important items in it. Use headings to identify important sections. This also helps them see the layout of the document and read important parts. If you do nothing else, label your intellectual merit and broader impacts section(s) (where is the broader impact section of this document?).
  - List publications - If you have anything that could be considered a publication, list it. This could be presentations, posters (including UURAF), papers, editorials, your work mentioned in a magazine, e.g. ReCUR.
  - Use pictures if you have the space - Pictures give the reviewers something else to look at in your application. Make sure you use a unique photo and not a generic diagram/picture. Make sure it also relates to your work and that you reference it. Finally, cite the source.
  - Broader Impacts and Intellectual Merit section – If you use a separate section for this, it can be short or long. It can summarize what you have said elsewhere in your essay or it can have all related items under this section.
  - **Broader impacts** - Some say the most important part of your application is the broader impacts. Spend time on this. If you can, make it consistent across all of your essays and in your letters of recommendation. This doesn't mean the same thing, but let NSF see that you have an established history and experience in

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outreach/volunteer and that you will be able to continue it throughout graduate school. Don't get discouraged if you haven't done a lot of this. Chances are you have helped out with a couple events on which you can expand.

NSF as an organization places a large emphasis on broader impacts. You should demonstrate a real commitment to significant and diverse activities that fall under the umbrella of broader impacts. Many students have a difficult time coming up with activities in which they are involved that could be used here. These activities do not have to be you teaching a 6<sup>th</sup> grader about your engineering discipline. Possible activities could include volunteering, university clubs and organizations, hobbies outside of school, maybe church activities, scouting (there are science merit badges), mentoring students, and helping other university students with their studies.

Begin by making a list of every activity with which you have been involved, even if it was only one time. From here, begin to narrow down the list to relevant items. When you begin writing, you will have to completely demonstrate how the work is related to science, technology, engineering, and math (STEM) in some way. If it is not related, use this to explain that you have done outreach/volunteer work and that you will be able to adapt to STEM-type outreach/volunteer activities in graduate school. Your goal is to demonstrate a history of activities so that you can be successful when you participate in broader impact activities in graduate school.

Some NSF resources include:

- [http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg\\_2.jsp#IIC2d](http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_2.jsp#IIC2d)
  - [http://www.nsfgrfp.org/how\\_to\\_apply/review\\_criteria](http://www.nsfgrfp.org/how_to_apply/review_criteria)
  - <http://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf>
  - [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg)
- Literature search - Show that you have done a basic literature search. This demonstrates that you are able to develop ideas yourself and not just using existing work/ideas. Further, it shows that you are developing as a researcher, and that you have the ability to read, review, and understand others writings and apply them to your own work. This demonstrates the type of advanced graduate student that NSF is looking to fund.
  - Number of recommendation letters - NSF will accept more than three letters of recommendations but will not guarantee that they will read all of them. Consider using one or two extra to round out your application.
  - Number of recommenders - NSF allows you to enter multiple people who will write letters of recommendation for you. You will probably want to enter more than three into Fastlane. This allows you to adjust who actually submits after you have already submitted your application. Letters of recommendation are not submitted at the same time as the rest of the application. (Just because you enter more than three, does not mean that you have to use all of those people)

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- Broader Impacts letter of recommendation - Consider getting a letter of recommendation that mainly addresses your broader impacts. It is ok if one of your letters is not about your technical abilities or intelligence. Use this letter to show you can do things outside of the lab.
- Picking recommenders- Pick three people that show different aspects of your work. You want to pick people who really know you and your work ethic and not just someone who might look prestigious one paper.
- Give your application to your recommenders - Make sure that what you put into your application jives with what your letters of recommendation will say. Besides a copy of your final application, consider giving your recommenders a few points which you would like for them to address in their letters.
- Where and for whom will you work - Show NSF that you have investigated your proposed institution. You need to demonstrate that you have looked into your PI and the university so that you know they have the resources and interests related to your research. Again, you are trying to show them that you will be successful in graduate school. Read their latest papers to make sure you are proposing a project on which they might actually consider working.
- Contact your proposed advisor - Make contact with your proposed advisor. This goes for all graduate school applications as well. If you have spoke with someone at the school, you have already elevated yourself in the admissions process from a random person to a known person. Demonstrate that you have put an effort into your future studies.
- Class projects -You may not have a lot of work or research experience. You can use your class projects to add more to your application.
- Comments back from reviewers - Regardless of whether you get an award or not, look at the comments from the reviewers. Use this as constructive criticism as you move forward.
- Passionate and curious about science - NSF is about science. Show that you are not just an engineering trying to solve one specific problem but that you are interested in science and problem solving. Show that you have a passion for your work.
- What will you do with results - Tell what you will do with the results of your work. This will also help with the broader impacts of your application.
- What happens if plan doesn't work - Failure is guaranteed, success takes work. Discuss how you will troubleshoot your research. Tell how you will adjust your plans if something unexpected comes up in your work. Show that you can face the harsh reality of research (not always succeeding on the first try) and continue to push for a solution.
- Make it cohesive - Ensure everything in your application belongs and works together. You need a cohesive application to demonstrate your ability and potential.

NSF is about the person - Make NSF believe that you have done amazing things in the past and will be able to, with their assistance, continue on that path. Establish a history on which you can stand and aim for the stars.

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**Personal Statement, Relevant Background and Future Goals:**

Please outline your educational and 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? Describe your personal, educational and/or professional experiences that motivate your decision to pursue advanced study in science, technology, engineering or mathematics (STEM). Include specific examples of any research and/or professional activities in which you have participated. Present a concise description of the activities, highlight the results and discuss how these activities have prepared you to seek a graduate degree. Specify your role in the activity including the extent to which you worked independently and/or as part of a team. Describe the contributions of your activity to advancing knowledge in STEM fields as well as the potential for broader societal impacts (See Solicitation, Section VI, for more information about Broader Impacts). NSF Fellows are expected to become globally engaged knowledge experts and leaders who can contribute significantly to research, education, and innovations in science and engineering. The purpose of this statement is to demonstrate your potential to satisfy this requirement. Your ideas and examples do not have to be confined necessarily to the discipline that you have chosen to pursue.

**Graduate Research Statement:**

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 (i.e., access to national facilities or collections, collaborations, overseas work, etc.) You may choose to include important literature citations. Address the potential of the research to advance knowledge and understanding within science as well as the potential for broader impacts on society. The research discussed must be in a field listed in the Solicitation (Section X, Fields of Study).