



The University of Vermont

# The National Science Foundation Graduate Research Fellowship (NSF-GRFP)

## Information you need to know, resources you can't live without, and general suggestions for the application process

University of Vermont, Office of Fellowships Advising

More Information: Contact Aimee Hutton, Office of Fellowships Advising 802-656-4658 [aimee.hutton@uvm.edu](mailto:aimee.hutton@uvm.edu)

### First steps for the NSF Graduate Research Fellowship Application Process:

#### 1. Review the NSF GRFP solicitation for program and eligibility information:

[http://www.nsfgrfp.org/how\\_to\\_apply/eligibility\\_guide](http://www.nsfgrfp.org/how_to_apply/eligibility_guide)

#### 2. If eligible for the NSF-GRFP competition, create an account in the FastLane system:

<https://www.fastlane.nsf.gov/grfp/Login.do>

#### 3. Check your application deadline in your field of study (all deadlines 8 p.m. EDT):

- October 29, 2014: Engineering; Computer and Information Science and Engineering; Materials Research
- October 30, 2014: Mathematical Sciences; Chemistry; Physics and Astronomy
- November 03, 2014: Social Sciences; Psychology; STEM Education and Learning
- November 04, 2014: Life Sciences; Geosciences

#### 4. Note Required Application Materials: The following material is required as part of the 2015 GRFP application, and must be submitted with all your materials through the [FastLane System](#).

- Personal Statement, Relevant Background and Future Goals
- Graduate Research Statement
- Three Reference Letters
- Academic Transcripts

#### 5. Get more information:

NSF Graduate Research Fellowship Information Session  
Featuring Dr. Rory Waterman, GRFP Application Reader  
Wednesday, September 24<sup>th</sup>, 4:00 p.m.  
Williams Family Room, Davis Center

## I. An overview of the NSF Graduate Research Fellowship from UVM's Office of Fellowships Advising

More information available at: [http://www.nsfgrfp.org/about\\_the\\_program](http://www.nsfgrfp.org/about_the_program)

The NSF Graduate Research Fellowship Program (GRFP) helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. As one of the oldest and largest fellowships, the program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited United States institutions.

The award is very prestigious and also quite lucrative: NSF Graduate Research Fellows receive a three-year annual stipend of \$32,000 along with a \$12,000 cost of education allowance for tuition and fees (paid to the institution), opportunities for international research and professional development, and the freedom to conduct their own research at any accredited U.S. institution of graduate education they choose. In 2014, approximately 14,000 students applied for 2,000 fellowships.

The NSF-GRFP seeks to identify and support students who demonstrate they are on track to become leaders in their field. The agency expects that, "NSF Graduate Research Fellows are anticipated to become knowledge experts who contribute significantly to research, teaching, and innovations in science and engineering. These individuals are crucial to maintaining and advancing the nation's technological infrastructure and national security as well as contributing to the economic well-being of society at large."

As a current (or aspiring) graduate student, you've likely applied for scholarships, research placements, or research grants in the past. You're familiar with your work and its significance. But the NSF-GRFP has a rather unique mission, and readers for the NSF-GRFP are very focused on:

- **Supporting the person, not necessarily the project:** Unlike a traditional research grant, the NSF-GRFP funding is for the individual (that means you). Applicants have to write about a specific research area and they have to propose a specific research topic, but if an applicant is awarded a fellowship they are not obligated to do that project. The NSF-GRFP application is best thought of as an exercise for the reader to see how you think like a scientist through your proposed work.
- **Supporting graduate students who want to pursue research that is innovative and transformative:** The NSF wants to support students who are on track to be leaders in their field through their research, as well as through how they engage the greater population in that research. See more on "socially relevant outcomes."
- **Supporting those students who can clearly and convincingly articulate why their work is important to society:** The real question the NSF is asking is, "Why should federal tax dollars be spent to support YOU?" Convince the reader that your work will have the transformative ability to change society for the better.

## II. NSF Merit Review Criteria:

### According to Section VI the NSF-GRFP Award Solicitation:

*When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:*

- *Intellectual Merit: The Intellectual Merit criterion encompasses the potential to advance knowledge.*
- *Broader Impacts: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.*

### **1. Intellectual Merit: The potential to advance knowledge.**

Intellectual merit can be shown through:

- A thoughtful, original research plan & choice of institution
- Significant research experience
- Strong grades and a challenging curricula
- Awards & honors
- Publications & presentations
- Communication skills
- Independence & creativity
- Strong references

### **2. Broader Impacts: The potential to benefit society and contribute to the achievement of specific, desired societal outcomes.**

Broader impact can be demonstrated through many factors including:

- Awareness of the value of research and its potential societal impact
- Awareness of resources and programs
- Leadership roles
- Integration of research and education
- Active community involvement
- Involvement with underrepresented groups
- Diversity of experience – includes international experience
- Genuine and reflective essays
- Passion

Finally, NSF reviewers are carefully looking to see if the broader impacts of the research contribute to societal advancement as well as “socially relevant outcomes.” The NSF defines [these outcomes as:](#)

*Full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the US; and enhanced infrastructure for research and education.*

Strong NSF-GRFP applicants demonstrate both intellectual merit and broader impact in both of their application essays. The next sections will break down the essays and discuss how to incorporate both criteria into your written work.

### **III. Personal Statement, Relevant Background, Future Goals Statement (3 pages):**

*The prompt: 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.*

*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.*

Beyond your scientific accomplishments, here are some things the reviewers will need to learn about you in these 3 pages:

- **What motivates you to pursue advanced studies in a STEM field:** Graduate study is not for the faint of heart: What is driving you to pursue an advanced research degree? The best way to illustrate this idea is to hone in on one experience or anecdote (ideally research-related) that shows the reader what has motivated or inspired you to become a leader or an innovator in your field. Think of this anecdote as a window into who you are, the way you approach opportunities/challenges/and an insight into the contributions you can make to your field (*relates to both intellectual merit and broader impact*)

- **Your intelligence, analytical ability and insight:** This includes academic achievement, research experience, or other extraordinary efforts to enhance your knowledge and skills beyond the classroom & lab. You don't have space to go into detail about all of your accomplishments; instead, pick one or two experiences. Get into detail with these experiences; show the reader how you test new ideas, learn from mistakes, think creatively about solutions and move past barriers or failure. Walk the reader through your process, show the reader how you think as a scientist. Articulate the importance of your past experiences, then connect the dots to how these experiences prepare you for your graduate study goals. (*relates to intellectual merit*).
- **Your potential as a leader and collaborative team member:** As you are highlighting past academic/research/other experiences, be sure to detail how you work with and/or mentor others as a part of your work. (*relates to broader impacts*)
- **Transferable skills & other qualities you possess that will make you an exemplary professional:** If relevant, be sure to detail other experiences related to communication, writing, project management, initiative, etc. This shows the type of person you are and type of contributor to your field that you could be (*relates to broader impacts*).
- **Your long-range academic goals:** This includes clear career aspirations and ways you intend to contribute to your future profession (*relates to broader impacts*).
- **Other contributions you can make to society through your work:** Part of the NSF mission is having contributions to society – e.g., community engagement; volunteer service; helping others; engagement in diversity efforts; public outreach or education; etc. (*relates to broader impacts*).

#### Personal Statement Essay Tips:

- **Stay organized:** Feel free to use sections in this essay (Introduction, Educational and professional plans, Relevant Experience, Goals in Graduate Study, Broader Impacts of Work, etc.)
- **Use examples to illustrate your ideas:** The University of Missouri (<http://grfpessayinsights.missouri.edu/personal-outline.php>) has some helpful information on what kind of examples work well in the personal statement.
- **Use bold print:** Use text formatting to draw the reader's eye to specific statements or ideas that highlight intellectual merit or broader impacts.
- **Be forward-thinking:** It is easy to spend a lot of this essay talking about your "relevant background," in fact you may find it quite easy to fill three pages detailing your academic work, your research experience, and other experiential or professional opportunities you have participated in. *But your past is only half of the prompt; give yourself plenty of space to discuss your "future goals."* This includes
  - The broader impacts your work will have on society (i.e., in an ideal world, how do you want your work to change society for the better?).

- Your post-graduate goals and where you see your research taking you professionally (i.e., in an ideal world, based on the work you're doing in graduate school, what job do you see yourself having after you graduate? Be sure that this professional position is one that enables you to do the work that enables you to have the broader impact on society that you want to have).

Remember: All statements must be written using standard 8.5" x 11" page size, 12-point, Times New Roman font or Computer Modern (LaTeX) font, 1" margins on all sides, and must be single spaced or greater. Only references, footnotes, and figure captions may be a smaller font, no less than 10-point Times New Roman.

#### IV. Graduate Research Statement (2 pages)

*The 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 (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).*

This statement is your chance to show the reader how you will think like a scientist in your graduate study. Notice that the graduate research statement is not about previous research experience, but is about how you identify a subject of interest and a research question, then how you come up with a research plan to answer that question. The statement also looks for you to identify any challenges in your research, and then articulate the potential broader societal impacts of your work. Beyond that, the readers will be looking for you to:

- **Propose something that is innovative and potentially transformative:** The NSF seeks to support the next generation of leaders and innovators, and the reader will be looking for applicants who have thought through how they can have a big impact. Think big.
- **But don't think too big...be realistic about your research:** The reader wants to see you propose something that is within your capabilities as a graduate student as well as something that is doable with the resources you will have. Readers will also be looking to see that your letters of recommendation reinforce that the work you're proposing is significant, doable, and important, so don't try to do too much with your first proposed graduate research project.
- **Tie your work to the greater body of literature that is already out there on your subject of interest:** You don't have a lot of space, but be sure to cite the literature.
- **Pick a research topic that fits in with your broader career goals.** The work you want to do in graduate school should fit with the work you want to do after graduate

school. Make sure your proposed research reinforces the broader impacts you discuss in your personal statement.

- **Include an image.** An image can help you better communicate your research goals. The scientists and/or engineers serving as application reviewers are used to seeing images included in published papers and other proposals, so including your own image helps to show that you talk about and present your work like a scientist.

Finally, remember that you are not actually mandated to research what you propose here. If awarded an NSF Fellowship, you may take your award to any university to do research on any topic.

Some tips to keep in mind as you discuss your proposed research:

- **Keep your work clear and organized.** The University of Missouri has a helpful Graduate Research Statement Worksheet that can help you organize your thoughts (<http://grfpessayinsights.missouri.edu/Grad-Research-Worksheet.pdf>) as well as some excellent advice on how to move your essay from an outline to a first draft. <http://grfpessayinsights.missouri.edu/outline-to-essay.php>
- **Use appropriate scientific form** (hypothesis, figures, references) in the Graduate Research Statement. Feel free to break the work into sections, and be sure to use headings.
- **Write to your audience:** The application reviewers will generally be knowledge experts in your field, but they will not necessarily be experts in your sub-discipline or specific proposed research topic.
- **Don't get bogged down in the specifics, or be overly technical.** Focus on the rationale for your studies and the existing literature as it supports your proposed work. Remember, the reviewers are in your field but are not necessarily an expert on your topic. Write clearly and concisely.
- **Seek feedback from your mentors**
  - *If you are already in graduate school, work closely with your advisor;* most likely your work fits into the research they have been conducting for years. They likely have written many grants related to this work and can be quite helpful when it comes to identifying the specific elements of the work that fit into intellectual merit or broader impacts.
  - *If you are not yet in graduate school, that's ok!* In this section you can talk about potential research you may like to do at your preferred graduate institution. If you are particularly interested in a certain graduate program or working with a certain PI, you may want to reach out to them to let them know you are applying for this award (that said, there are some etiquette guidelines surrounding seeking help on a proposal from a prospective PI if you are a prospective graduate student. Please contact UVM's Fellowships Office to discuss some of the etiquette issues before you reach out to prospective graduate programs). Do also seek advice from your mentors at UVM.

- Remember, *two pages should be very short to introduce, justify, and describe a project*. If you find you are having trouble filling two pages, ask if you have enough information in your essay.
- **Seek feedback from other faculty members who have served as NSF reviewers.** The NSF lists UVM faculty members who have served as readers in the GRFP application process and who are here as a resource for you as you complete your application materials:  
[http://www.nsfgrfp.org/applicant\\_resources/find\\_experienced\\_grfp\\_resource\\_persons\\_for\\_institutions\\_u\\_z](http://www.nsfgrfp.org/applicant_resources/find_experienced_grfp_resource_persons_for_institutions_u_z)

Remember: All statements must be written using standard 8.5" x 11" page size, 12-point, Times New Roman font or Computer Modern (LaTeX) font, 1" margins on all sides, and must be single spaced or greater. Only references, footnotes, and figure captions may be a smaller font, no less than 10-point Times New Roman.

### **Tips for Asking for Strong Letters of Recommendation for your NSF-GRFP Application**

Also available at: [http://www.nsfgrfp.org/how\\_to\\_apply/reference\\_letter\\_tips](http://www.nsfgrfp.org/how_to_apply/reference_letter_tips)

*With additional advice provided by UVM's Fellowships Office*

- Applications are required to have three reference letters received by the Reference Letter deadline.
- You should give your reference writers sufficient information to write a letter of reference, including your applicant statements and transcripts, and enough time to write the letter before the deadline. *[UVM FELLOWSHIPS OFFICE TIP: Give your writers at least three weeks to write the letter].*

GRFP Fellows, past panelists, and others involved with the program have offered the following tips regarding references:

- Ask for references early and send gentle reminders as the deadline approaches. Remember that references cannot be accepted after the deadline under any circumstance. More importantly, you want to give your reference writers time to write compelling letters. *[UVM FELLOWSHIPS OFFICE TIP: You can track the submission status of reference letters using FastLane. Once you log into your FastLane account, click "Check Application Package Status" under the Application Package Optional Task List].*
- Provide your reference writers with complete information about your application. Let them read drafts of your statements, discuss your previous and proposed research with them, and offer any other information to help them write strong letters. *[UVM FELLOWSHIPS OFFICE TIP: If possible, arrange a meeting with your letter of recommendation writer. At that meeting, provide them with a copy of your CV, your transcript, any essay drafts you think may be helpful, and a bulleted one-page sheet of your work with them in their lab/classroom/office; be sure to highlight specific work or other accomplishments you had under their supervision that fit into the NSF's intellectual merit/broader impact criteria].*



- Choose reference writers who know your work and know you well as a person. It is far more important to have a reference letter that can offer reviewers detailed information about your qualifications, abilities, and accomplishments than it is to have a reference letter from someone famous who does not know you very well. *[UVM FELLOWSHIPS OFFICE TIP: Remember, the letter must support you as a future researcher; to do that the person writing the letter needs to be very familiar with your past experiences that set you up to be a future researcher and leader in your field].*
- Request reference letters only from individuals who will be able to submit them by the deadline.
- Ask for letters that are personal and specific. Generic statements carry little weight with reviewers. The strongest letters will focus specifically on your qualifications for the GRFP. Generic reference letters, such as the kind kept on file by some university career centers and similar groups, tend not to provide enough detail to be effective.
- Reference writers should comment on your Intellectual Merit and Broader Impacts. Remember that reviewers will be using these letters to evaluate how well you demonstrate the merit review criteria.
- Be comprehensive in your selection of reference writers. You should not simply select three people who will say the same thing. Instead, you are encouraged to select references who can comment on different aspects of your qualifications for the fellowship. For example, you might seek reference letters from your undergraduate advisor, a summer lab coordinator, your graduate advisor or mentor, a supervisor from a K-12 outreach program, or an employer who can address your professional skills. *[UVM FELLOWSHIPS OFFICE TIP: Letters from faculty who have been a research instructor, who have taught you in an upper-level course where you did well, and who have taught you in multiple courses work well for this application].*
- Have at least one backup reference writer (two is better). The GRFP application allows you to list up to five reference writers; the three highest-priority reference letters that are submitted will be included in the application package for review. Seeking four or five references gives you a fallback if one of your top three references is unable to submit a letter for some reason. If your top three reference writers have already submitted their letters, you should inform the remaining reference writers that you no longer need them to submit letters.

**General tips for writing strong letters of recommendation for an NSF-GRFP applicant**

Feel free to share the following information with your references (Also available at:

<http://www.uvm.edu/~hncoll/?Page=FellowNSFLetters.html>)

The National Science Foundation's Graduate Research Fellowship Program (GRFP) helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutions. The GRFP Solicitation contains several keywords that correspond with the mission, goals and future direction of the agency:

*"The program goals are 1) to select, recognize, and financially support individuals early in their careers with the demonstrated potential to be high achieving scientists and engineers, and 2) to broaden participation in science and engineering of underrepresented groups, including women, minorities, persons with disabilities, and veterans. GRFP is a critical program in NSF's overall strategy in developing the globally-engaged workforce necessary to ensure the Nation's leadership in advancing science and engineering research and innovation. The ranks of NSF Fellows include numerous individuals who have made transformative breakthroughs in science and engineering research, become leaders in their chosen careers, and been honored as Nobel laureates."* Source: NSF13-584 GRFP Solicitation.

Some letter writing tips:

**Support the student, not just the project:** The NSF is looking to fund the person, not the research project. Your letter should focus on the student's merits: past experiences, present plans and potential for contributions in science and society. Specifics help more than generalities. Students are encouraged to speak with you about their letter, and they should be providing you with a CV or other materials that highlight their experience and why they are applying for the award. These materials should help with adding specifics.

**Address intellectual merit:** The NSF defines intellectual merit as, "The potential to advance knowledge" in the discipline. Intellectual merit can be shown in your letter by discussing a student's past experiences:

- Strong grades, curricula, GRE scores
- Awards & honors
- Publications & presentations
- Communication skills
- Independence & creativity
- Significant research experience

As well as through your understanding of what the student proposes to do in graduate school:

- Thoughtful, student-originated research plan
- Choice of institution

**Address broader impacts:** The NSF defines broader impacts as, "The potential to benefit society and contribute to the achievement of specific, desired societal outcomes relevant to the NSF's mission." Broader impacts can be shown in your letter by discussing a student's past experiences:

- Fostering diversity on all levels (across disciplines, gender, race, economical, etc)
- Active community involvement
- Involvement with underrepresented groups

- Integration of research and education
- Diversity of experience - includes international experience

As well as through your understanding of what the student proposes to do in graduate school:

- Awareness of the research and its potential societal impact
- Awareness of resources and programs
- Leadership roles
- Genuine and reflective essays
- Passion

**Speak to your audience:** You can assume that the people who will read your letter for the NSF competition come from the student's discipline (though they may not be experts in the exact area of the student's expertise. Readers will be looking to you to add depth and perspective to the student regarding their research skills, intellectual ability and potential for a career in science, engineering or mathematics, so be sure to address those topics. Finally, keep in mind that letters that are too short or too long may hurt the applicant. Generally speaking, a one to two page single-spaced letter suffices for this competition.

Reference writers should use letterhead, if possible, and include the following information: Name and Title of reference writer, Department, and Institution or Organization. References must be submitted online via the FastLane site. If reference writers have difficulty with the submission process, they are welcome to contact the National Science Foundation at [info@nsfgrfp.org](mailto:info@nsfgrfp.org) or (866) 673-4737.

**For more information on the NSF-GRFP Fellowship, the application process, or other nationally competitive awards, contact UVM's Office of Fellowships Advising:**

Aimee Hutton, Interim Director  
Office of Fellowships Advising  
802-656-4658

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Appointments available Monday-Friday 8-4:30; e-mail to set up an appointment.