

Applying for National Fellowships

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REU Convocation 2018

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Supporting Yourself in Grad School

- Essentially all science and engineering Ph.D programs will pay you
 - ◆ Teaching Assistantships
 - ◆ Research Assistantships
 - ◆ Departmental Fellowships
 - ◆ University Fellowships
- \$25-30K\$ plus tuition
- Support for terminal M.S. is limited.

Various Competitive National Graduate Fellowships

- Hertz (~10 to 15 awards nationally)
- NDSEG (DOD)(~200)
- DOE
- NIH
- NSF (usually 2,000, depending on budget)
 - ◆ 3 year
 - ◆ \$34,000/yr stipend
 - ◆ Payment in lieu of tuition to the graduate school
 - ◆ \$1000 international travel award
 - ◆ Portable
 - ◆ Prestige
 - ◆ >15,000 applicants

The stipend is not that much better than most Research Assistantships but a national competitive fellowship is WAY better for your career

We will concentrate on NSF Graduate Fellowships

ASEE.ORG is gateway to a lot of these

NSF Graduate Fellowship Eligibility

● Most people are eligible ~~THREE~~ times

- ◆ Senior
- ◆ ~~1st year graduate student~~
- ◆ ~~2nd year graduate student~~

no more than 12 months of full-time graduate study, or its equivalent, by August 1

■ If at first you don't succeed, heed the reviewer's comments and TRY AGAIN

NEW RULE:--TWICE—once when Senior and once EITHER in 1st or 2nd year of Grad

Seniors judged against other Seniors
Graduate Students against other grad students

Bar gets higher

● Deadline for NSF: Late October, **Date varies by NSF division/field...5PM LOCAL**

- ◆ Similar for other fellowships
- ◆ Busy time

2018 GRFP Deadlines

- **October 22, 2018**

- ◆ Geology
- ◆ Life Sciences

Don't Wait until the last DAY or Minute !!

- **Oct 23, 2018**

- ◆ Computer Science
- ◆ Engineering
- ◆ Materials Research

- **Oct 25, 2018**

- ◆ Psychology
- ◆ Social Sciences
- ◆ STEM Education and Learning

- **October 26, 2018**

- ◆ Chemistry
- ◆ Mathematical Sciences
- ◆ Physics and Astronomy

NSF 18-573 <https://www.nsf.gov/pubs/2018/nsf18573/nsf18573.pdf>

The NSF Application Package

- You application is essentially treated as a small research proposal---a proposal to fund your education
- Submit via Fastlane (the NSF online portal)
 - ◆ Submitted by you—talk to your institution coordinator
 - ◆ You need to get a Fastlane ID, however
- **Two Essays** (used to be 3, so be careful looking at web advice)
 - ◆ Graduate Research Plan (2 pages)
 - ◆ Personal Statement, Relevant Background and Future Goals essay (3 pages)
 - ◆ Upload as PDF !!!! Not Word

General rules for all proposals

- Follow Instructions Exactly—Read the call for proposals and make a checklist
 - ◆ # of Pages
 - ◆ Fonts, size and line pitch
 - ◆ # of reference letters (3 minimum, 5 maximum)
 - ◆ Other required components and content
 - ◆ Etc.
- Non-conforming proposals are summarily rejected, or may not even be accepted for upload in Fastlane.

The NSF Review Criteria

- Two Independent Review Criteria (every NSF proposal, regardless of size or program)
 - ◆ Intellectual Merit
 - ◆ Broader Impacts
- You must address them **explicitly**, and the reviewer must comment on each **explicitly**.
- Separate section headings for **Intellectual Merit:** and **Broader Impacts:**
 - ◆ In **BOTH** essays !!

Research Plan

- The “scientific part” of your proposal
- You propose to study a particular scientific problem at a specific university using specific available equipment
- For NSFGFP, It is not so important WHAT you write about
 - ◆ You don't even actually have to do what you write about (as long as you stay in same field)
 - ◆ You don't actually have to attend the school that you write about in your research plan
- They are looking for
 - ◆ How you think
 - ◆ How you organize
 - ◆ How you plan
 - ◆ How you write

- Can't be Trivial
- Can't have been done before
- Can't be junk science

- Should be something you are knowledgeable about and passionate about and can be specific about

Research Plan

- **Use appropriate scientific form** (hypothesis, figures, references) in the Graduate Research Statement
 - ◆ 2 pages !
 - ◆ Write “tight”

Research----What to write about

- Write about an extension of your REU project
- Write about an extension of some other project you worked on as an undergraduate
- Write about something at a school that you would like to go to/group you would like to join
- Something in the literature that EXCITES you

- Talk to a professor

- Easier once you are a first year Grad Student, but the bar is higher also.

What makes a successful application

- Grades are important, but not sufficient
 - ◆ GREs are not even considered
- Excellent recommendations are important but not sufficient
- Strong **intellectual merit** is important **but not sufficient**
- Lots of people can do those well
- The game is won and lost with the **Broader Impacts**

An Ivy League 4.0 and a great research project will not, by themselves, be a winner

What do they mean by Broader Impacts

How will the project (i.e.you) “Benefit society or advance desired societal outcomes”

- Generally NOT about the impact of your research
 - ◆ Yes, improved solar cells will have a broad impact on society, but that is not what they are talking about.
 - ◆ OK in the research part but not in the Personal Statement
- What will YOU do to improve society
 - ◆ Largely talking about education outreach, community involvement, communication, etc
 - ◆ Also policy related topics, SEI, etc

Extra important because they are funding
YOUR CAREER not just a “research project”

They Fund YOU not your Science

“Keep in mind that NSF does not just seek to fund scientists and engineers; NSF seeks to fund future STEM leaders. Use the statements to show leadership potential, self-starter capabilities, and the ability to work well with others (scientists, students, people in the community, etc.). Show passion, motivation for a STEM career, and initiative in your past research and other experiences.”

Broader impacts: From NSF web site

- The broader impacts criterion includes **contributions that infuse learning with the excitement of discovery, and assure that the findings and methods of research are communicated in a broad context and to a large audience.**
- A strong application will **encourage diversity, broaden opportunities, and enable the participation of all citizens-women and men, underrepresented minorities, and persons with disabilities**-in science and research.
- In addition to reaching a broad audience, **a strong application must demonstrate how it will enhance scientific and technical understanding, while benefiting society.**
- Applicants may provide **characteristics of their background, including personal, professional, and educational experiences, to indicate their potential to fulfill the broader impacts criterion.**

Personal Statement, Relevant Background, and Future Goals Essay

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.

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Examples Broader Impact Activities

- Education Outreach
 - ◆ Research centers all have EO programs
 - Volunteer
 - Develop activities
 - Implement activities
 - ◆ REU
 - ◆ Tutoring/mentoring
 - ◆ School interactions/visits, etc.
 - ◆ Community outreach, science fairs, etc.
- Government, policy, communications, and social issues

Get personal !

Relevant “Experiences”

They ask/expect that not only will you propose some broader impact activity, but **that you have some relevant experience to show that you can/have done** such “broader” activities—Give them examples of your activities—the don’t have to be “scientific” to be relevant.

--give them a **plan** and a **history of action** (even vaguely) related to that plan—what have you done/organized, etc.

Applicants may provide **characteristics of their background, including personal, professional, and educational experiences, to indicate their potential to fulfill the broader impacts criterion.**

- Education

- ◆ Help with outreach
- ◆ Tutor local high school
- ◆ Visit your high school to talk about research

- Dissemination

- ◆ Organize an small conference at your school, e.g. summer REU experiences of your colleagues.
- ◆ Science fair organize or judge
- ◆ Community talks
- ◆ Journalism, etc
- ◆ Community activities (National Chemistry Week, Nanodays, etc)

- Policy

- ◆ Summer internship in government (congress, OSTP, etc)

- Science Communication

- Other

- ◆ Habitat for Humanity
- ◆ Engineers without Borders
- ◆ Church trips
- ◆ Community action

“Have done” is better than “plan to do/like to do”

“Have organized” is even better

Broader Impacts

- The game is won and lost on the Broader Impacts !!!
 - ◆ **You can't overcome a bad Broader Impacts score!!**
 - ◆ This is much harder and takes much more time planning and much more lead time than the “research” part

Simple examples

- REU seminar/poster session
- High school visit
- If you have more time..
 - ◆ Research center outreach activities
 - ◆ Science club outreach activities

Web Advice

- There is lots of info on NSF Graduate Fellowships on the web

- ◆ Past winners
- ◆ Past reviewers
- ◆ Colleges
- ◆ Examples of successful applications
- ◆ Examples of successful “broader impact” plans/activities
- ◆ Useful websites with **some examples**

- <http://www.malloryladd.com/nsf-grfp-advice.html>

- <http://rachelcsmith.com/academics/nsf.htm>

- <http://www.alexhunterlang.com/nsf-fellowship>

- <http://grfpessayinsights.missouri.edu/>



Look at dates to be sure currently relevant

Tips from Awardees

- Start early, taking significant time to compose essays, and rewrite
- Demonstrate your personal motivation and excitement for research
- Spend time to thoroughly research your topic
- Integrate essays to create singular theme, link the content together
- Keep essays clear and simple to read
- Give essays to many people for review
- Get input from professors or university administration

Tips from Awardees

- Thoroughly address both Intellectual Merit and Broader Impacts
- Be sure to include all volunteer, leadership and extracurricular activities
- Pay close attention to the exact requirements in the solicitation
- Focus on getting strong recommendation letters
- Write toward the REVIEWERS

Top Tips from Reviewers

- Gain research experience (e.g. REU !!!!)
- Become involved in leadership roles and community service
- **Write clear** and scientifically-sound essays
- Have a strong academic record
- Select strong recommenders (3x)
 - ◆ “**did well in class**” letters don’t count for much
- Ensure you display a **history** of accomplishments
- Thoroughly address both Intellectual Merit and Broader Impacts

Tips from Reviewers

- Highlight any **international experience** you may have (Globally aware scientists!)
- Display your **passion and motivation** in the essays
- Be knowledgeable of your research topic
- Demonstrate the significance of your proposed work
- Make sure the proposed research is realistic
- Make specific not “fuzzy” statements
- **“We fund the researcher, not the research”**

- Note how “broader impact” keeps repeating itself.

Process

- Reviewed on line by knowledgeable reviewers
 - ◆ Not necessarily experts in your narrow field
- Each reviewer gets 30 (or more)
- Each reviewer must write a review, including how you addressed the Broader Impact!!
 - ◆ Don't make him look for it !!
 - Guide him/her with headings, bold, etc
 - ◆ Write simply and concisely !
- You get back **WRITTEN REVIEW** Comments

Example Rating Sheet/Review

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Very Good

You get back 2 or 3 of these, one from each reviewer

Explanation to Applicant

As a first generation college graduate, has immersed herself in science immediately during her undergraduate career. Applicant has slightly lower GPA, but was taking a challenging course load. Grades have improved in graduate work. Demonstrated during undergraduate work that she was able to construct scientific hypotheses and design feasible research plans to execute these ideas. Moreover, applicant was able to apply for and receive intramural funding to help move along the research agenda. Research proposal is quite specific, and could be executed within the laboratory she in in, as well as facilities and collaborations institution wide.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Excellent

Explanation to Applicant

Applicant mentions of outreach opportunities with the Kentucky Science Center in conjunction with with local schools, had done work in the past to mentor high school students. Applicant has put forth an ambitious effort to work on clear and effective communication of her results in written and oral form. Notably, as a College Ambassador, applicant was invited to present work to members of congress in order to bring attention to funding needs and potential. This proposal could be strengthened with mention of how research results/techniques could be utilized to impact the STEM groups previously mentioned, or could be used in order to gain congressional support, as the candidate has experience in this arena.

Summary Comments

This applicant has a significant presentation and publication record, has made efforts to gain expertise in science communication via several avenues (including STEM outreach and congressional presentations) and is excelling academically in a graduate program. The project aims are clear and feasible within the current laboratory support set up.

Excellent

Outstanding proposal in all respects; deserves highest priority for support.

Very Good

High quality proposal in nearly all respects; should be supported if at all possible.

Good

A quality proposal, worthy of support.

Fair

Proposal lacking in one or more critical aspects; key issues need to be addressed.

Poor

Proposal has serious deficiencies.

To do

● Seniors

- ◆ Start Now
- ◆ Deadline in less than 3 months
- ◆ Overlaps with Grad school application season
- ◆ IMMEDIATE attention to broader impacts

● Juniors

- ◆ Slowly plan and implement
- ◆ Address broader impacts gradually, PLAN
 - Summer or school break non-technical experience??

- NSF awards made first week in April, **AFTER** grad school decision date

Award

- The award is portable—any US institutions
- Subject matter is flexible, as long as you stay in the same field.
- It is an award to YOU (well, technically an award to whatever institution you assign it to)
 - ◆ Not an award to the UG institution you applied from
 - ◆ Not an award to the institution you wrote about in the Research Project part
- Go anywhere (in the US) you want, and join any research group you want (in the same field). You will be a prized commodity

Official Web Sites

- NSF GRFP site
 - ◆ http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6201
- Actual NSF Solicitation NSF18-573 <https://www.nsf.gov/pubs/2018/nsf18573/nsf18573.pdf>
- Official program information site managed by ASEE
 - ◆ <https://www.nsfgrfp.org/>
- Lots of examples. e.g.
 - ◆ <http://www.alexhunterlang.com/nsf-fellowship>

NIH vs NSF

- There is a line, albeit a fuzzy one, between what NSF funds and what NIH funds in the bio/medical arena.
 - ◆ NSF=Basic biological science.
 - ◆ NIH=human health and treatment of human diseases
 - ◆ **Biomedical engineering/biotechnology** falls in the fuzzy area. If you contemplate proposing a biomedical project to NSF GFP consult someone knowledgeable to make sure you stay clearly on the NSF side.

Application

- Deadlines in late October/early November
- Get a good head start and ask others to read it.
- Major universities have people whose entire job is to help with NSF graduate fellowships
- Good luck

GOLDWATER Scholarships

- Undergraduate Research
 - 2 applications per university
 - \$7500
 - ~300
-
- Consider applying if you are going into your Junior year for Senior year funding.