

## National Science Foundation Fellowships

[www.nsf.gov/grfp](http://www.nsf.gov/grfp) and [www.nsfgrfp.org/](http://www.nsfgrfp.org/)

**Deadline:** November

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### Fields of Study

Science, mathematics, engineering, and any other field supported by the National Science Foundation.

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### Description

The National Science Foundation (NSF) seeks to ensure the vitality of the human resource base of science, mathematics, and engineering in the United States and to reinforce its diversity. A competition is conducted for Graduate Research Fellowships, with additional awards offered for women in engineering and computer and information science. NSF Graduate Fellowships offer recognition and three years of support for advanced study to approximately 1,000 outstanding graduate students in the mathematical, physical, biological, engineering, and behavioral and social sciences, including the history of science and the philosophy of science, and to research-based PhD degrees in science education. Approximately 90 of these awards will be in Women in Engineering (WENG) and Women in Computer and Information Science (WICS) components.

Fellowships will be awarded for periods of three years, the second and third years to be approved by the Foundation on certification by the fellowship institution of the student's satisfactory progress toward an advanced degree in the approved field of study. Recipients of three-year awards must use the fellowship within a period of five years. This flexibility will enable them to engage in other institutionally-approved activities that contribute to their training.

NSF Graduate Fellowships are tenable at any appropriate, accredited nonprofit U.S. institution or nonprofit foreign institution of higher education. Those offered an award will be required to submit to the National Science Foundation appropriate evidence of acceptance for study in graduate degree programs.

**Eligibility:** Applicants must be U.S. citizens or nationals, or permanent resident aliens of the United States. Fellowships are intended for individuals in the early stages of their graduate study. In most cases, an individual has three opportunities to apply: during the senior year of college, the first year of graduate school, and the beginning of the second year of graduate school.

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### Criteria for Selection

Selection is based on all available evidence of ability, including academic records, four letters of recommendation, and Graduate Record Examination (GRE) scores. Both the general aptitude test and one subject test should be taken no later than December.

In evaluating applications, reviewers are asked to address two questions that are the basis of NSF's merit review criteria: 1) What is the intellectual merit of the applicant? and 2) What are the broader impacts of supporting the applicant's graduate study? Both intellectual merit and the broader impacts of support are important to the evaluation of applications. Competitive applicants must address both merit review criteria in their application materials.

For purposes of this fellowship competition, the **intellectual merit criterion** includes demonstrated highly meritorious scholarly characteristics and credentials, such as the ability to plan and conduct research; work as a member of a team as well as independently; and interpret and communicate research findings. The **broader impacts criterion** includes contributions that 1) effectively integrate research and education at all levels, 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; 2) encourage diversity, broaden opportunities, and enable the participation of all citizens—women and men, underrepresented minorities, and persons with disabilities in science and research; 3) enhance scientific and technical understanding; and 4) benefit society.

In responding to the broader impacts criteria, the applicant should consider past experiences in volunteer activities, mentoring or teaching other students or young people, leadership activities, and other examples the applicant deems appropriate. Each individual will have different experiences that relate to these criteria, and the above are provided as examples only. NSF is giving increasing emphasis to the broader impacts criterion. Applicants should point to their own experiences that suggest they can help NSF reach its goals in these areas in the future. The NSF provides examples of the broader impacts criteria: <http://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf>

**Proposed Plans of Research:** The best research plans accomplish two things: 1) demonstrate that the applicant understands how to conduct research in his/her discipline using the scientific method and 2) demonstrate creativity in thinking about research questions as well as communication and organizational skills. To do this well, applicants need to start the writing process early and review drafts and solicit suggestions for development and improvement from faculty advisors. It should include the basic elements of a research proposal in the discipline, including a clearly defined research question or hypothesis. A good Proposed Plan of Research is strengthened further if it ends with a brief statement about choice of graduate program, which shows that the applicant has chosen a program that is a good match with his/her proposed research.

Students who are already enrolled in a graduate program have a special burden in demonstrating creativity and originality, especially if they are already working in their advisor's lab. A less polished essay that shows evidence of the student's own creativity is usually more impressive than a sophisticated plan that is not original. Applicants who do take a portion of their research interest from a project initiated by a faculty researcher are

advised to declare this and outline what part they will work on as their own and what questions they intend to pursue.

**Grades and GRE:** Quantitative measures are not the only criterion for success in this program. Most successful applicants have a high undergraduate GPA of 3.7 or better and high GRE scores. However, there is no minimum GPA or GRE score, and sometimes applicants win with less competitive quantitative measures. When they do, they usually show substantial improvement in their grades, and a very strong application in other respects, especially the Proposed Plan of Research and the supportiveness of references. Reviewers don't ignore poor grades or low GRE scores, but they can be convinced that they are not indicative of the work the student will do as a graduate student. Near perfect grades and GRE's are never, by themselves, enough to win. Applicants who present outstanding GRE and GPA numbers do not win awards if they fail to demonstrate strength on essay questions, and excellent recommendations. Many applicants to the program have outstanding GRE scores and GPAs.

The skills and credentials required to be successful in the NSF Graduate Research Fellowship competition are like those required to succeed as a scientist. The process of applying for a fellowship prepares applicants for the proposal process later in their careers. It also helps applicants to formulate their thesis/dissertation research topic.

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## **Application Procedure**

Applications will be available on the web from the NSF through the Fastlane electronic application system:

- NSF Graduate Fellowship Program web alias: [www.nsf.gov/grfp](http://www.nsf.gov/grfp)
- NSF GRF Fastlane application: <https://www.fastlane.nsf.gov/grfp/>
- Applicant Resources: [http://nsfgrfp.org/applicant\\_resources/](http://nsfgrfp.org/applicant_resources/)
- GRE Registration Information: [www.gre.org](http://www.gre.org)

These websites include application information, FAQs, and sample rating sheet. Students submit application materials electronically using the secure NSF FastLane Graduate Research Fellowship Program process. The deadline for submission of application materials extends over a period of days, depending on discipline, in November and December. Winners are announced between mid-March and mid-April.

The number of applicants for the NSF Graduate Research Fellowships has risen rapidly in the last few years, and the award is fiercely competitive. In 2011, 2,000 awards were selected from 12,000 applicants. The NSF also awards a Graduate Research Fellowship Honorable Mention to meritorious candidates who did not receive an award. The NSF

Honorable Mention is considered to be a significant academic achievement nationwide, and the honorable mention recipients are listed on the NSF GRF website.

Applicants need to understand the review structure when they complete the application. When they indicate a particular field of study, their application will be reviewed by faculty in that discipline, so multidisciplinary proposals should make a considered choice. Applications are also read in bulk, perhaps 400 at a time, by panels of reviewers stuck in a hotel for a period of three days. So craft the application so that it will awaken interest and make an impression on reviewers.

The Personal Statement makes the first impression by demonstrating commitment to a career path. This essay might provide a personal intellectual history, or describe the physical and cultural environment of youth, work experience, or exposure to research. The Broader Impacts Statement could discuss work as a science volunteer in the community, leadership in scientific or other student groups, or tutoring or mentoring of students. It is not enough for the applicant to say that he or she did these things; the essay should also say what it meant to them, and how they made a difference in the lives of others. Reviewers are looking for impact. The Proposed Plan of Study is the most important factor: the proposal should be a clear statement of graduate research interests, demonstrate research principles of the discipline, and show that the applicant owns the research idea by describing what they will do, and why the proposed institution is right for them. The Previous Research Experience essay might describe academic and job-related scientific research activities, explaining the applicant's purpose and role, and indicate what they learned from the research. Previous research experience need not be in the same subject as the proposed plan of study. Applicants should mention *all* publications and presentations, including forthcoming works.

Letters of recommendation are crucial, and should specifically address the NSF review criteria and provide specific examples that give a personal sense of the applicant. They should not be recycled letters written for another purpose such as a graduate school application. Applicants can help faculty to write helpful letters by meeting with them to discuss the application, and providing copies of all of the essays and other supporting materials. Late letters of recommendation will result in the application being disqualified, so applicants should follow-up with faculty to confirm receipt of the Reference Report Form.

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### **Additional Information**

The NSF GRF recipients broadly reflect the characteristics of the applicant pool. If the applicant pool is 39% graduating seniors, the NSF tries to award about 39% of the Fellowships to seniors. The distribution of awards among scientific disciplines also reflects the broader range of applications, except engineering fields which receive a somewhat higher proportion of the awards in relation to the number of applications.

For an excellent essay on the application process from the perspective of reviewers, see: "The NSF Graduate Research Fellowship: A Missed Opportunity for Many"

[http://www.phy.davidson.edu/NSF\\_GRF/NSFGRFfinal.html](http://www.phy.davidson.edu/NSF_GRF/NSFGRFfinal.html)

Congratulations to recent NSF Graduate Research Fellowship winners and honorable mention recipients from WPI:

2012

Adebayo, Olfunmilayo O., Biomedical Engineering at Cornell

Bliss, Julie A., Environmental Engineering at WPI

Collins, Jessica M., (hon. mention) Biochemistry at WPI

2011

Carey, Shawn P., Biomedical Engineering at Cornell University

Marchese, Andrew D, Artificial Intelligence at MIT

Tischer, Douglas K., (hon. mention) for Cell Biology at UC-San Francisco

Charest, Jonathan M., (hon. mention) for Biomedical Engineering at Cornell University

Carney, Daniel W., (hon. mention) for Chemistry at Brown University

Carlson, Erik D., (hon. mention) for Chemical Engineering at Northwestern University

2010

Worobey, Lynn Anne for Biomedical Engineering at University of Pittsburgh

Gagnon, Kevin James for Chemistry - Inorganic at Texas A&M University

Duran, Sara Ingrid for Engineering - Electrical and Electronic at Duke University

Belisle, Melinda Susanna for Life Sciences - Ecology at Stanford University

Smaltz, Daniel Jonathan (hon. mention) for Chemistry - Organic at Harvard University

Roberts, Justine, (hon. mention) for Biomedical Engineering at University of Colorado

Pampuro, Richard Paul (hon. mention) for Chemical Engineering at Cornell University

Charest, Jonathan Marc (hon. mention) for Biomedical Engineering at Cornell University

Carey, Shawn P (hon. mention) for Biomedical Engineering at Cornell University

2009

Stewart, Elizabeth J. for Chemical Engineering at University of Michigan Ann Arbor

Worobey, Lynn A., (hon. mention) Bioengineering at University of Pittsburgh

Roberts, Justine (hon. mention) Biomedical at University of Colorado at Boulder

Ernst, Christina, (hon. mention) Lynn Developmental Biology at Worcester Polytechnic Institute

2007

Schudy, Warren J, (hon. mention) for Computer Science at Brown University

2006

Waldron, Isaac J., (hon. mention) for Electrical Engineering at WPI

Srinivasan, Ravi, (hon. mention) for Physics at Brown University

Schudy, Warren J., (hon. mention) for Artificial Intelligence at Brown University

Oku, Yuko, (hon. mention) for Biochemistry at Johns Hopkins School of Medicine

Norgard, Elizabeth A., (hon. mention) for Molecular Biology at Washington University

Ames, Tyler D, (hon. mention) for Molecular Biology at Yale University

2005

Bush, Katie A., GS, (honorable mention) for biomedical engineering at WPI

2004

Maisey, Heather C. '02, for biology at UC San Diego

Gagnon, Katie L. '01, (hon. mention) for marine geology at Scripps Research Institute

2003

House, Sarah K. '01, (honorable mention) for geophysics at Arizona

MacDonald, Rebecca A. '03, (honorable mention) for biomedical engineering at Cornell

Savard, Jeffrey M. '03, (honorable mention) for chemical engineering at Carnegie Mellon

Streeter, Matthew J. '00, (honorable mention) for computer science at Stanford

2002

Cheung, Win D. '01, for biochemistry at Johns Hopkins

Kotredes, Lewis T. '02, (honorable mention) for astrophysics at Cal Tech

Tan, Frederick J. '01, (honorable mention) for comp. biology at Johns Hopkins

Zimet, Rachel '02, chemical engineering for materials at MIT

2001

Songer, Jocelyn E. '00, for biomedical engineering at WPI

Arcolano, Nicholas F. '01, (honorable mention) for electrical engineering at MIT

Bond, Derek P. '99, (honorable mention) for mechanical engineering at WPI

Tan, Frederick J. '01, (honorable mention) for biology at Washington University

2000

Briggs, Alicia C. (SUNY-Buffalo), for biomedical engineering at WPI

Cheung, Man C. '98, (honorable mention) for neuroscience at Tufts

1999

Shorrock, Susan M. '99, for biomedical engineering at WPI

1997

Khare, Neeraj P. '96, (honorable mention) for chemical engineering at UC, Berkeley

St Martin, Heather M '97, (honorable mention) for organic chemistry at Boston College

1996

Kupcinkas, Rebecca A., '95, for biomedical engineering at WPI