NSF Graduate Research Fellowship (GRFP)

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What is the GRFP?

Goals:

1. Recognize & support early-career scientists with high potential for significant achievement.

2. Broaden participation in STEM fields.
Videos


https://www.youtube.com/watch?v=unXO_fhLeys

https://www.nsfgrfp.org/applicants/grfp_application_tutorial
What is the GRFP?

In a 5-yr period
- 3 years of full graduate support
- $138,000 ($34,000/yr stipend plus tuition+fees)
- GROW (International study for NSF GRFP Fellows)
- GRIP (Federal internships for NSF GRFP Fellows)
- INTERN (Non-academic research internships for NSF GRFP Fellows)
- Career-life balance support possible

2000 awards; ~12,000 applicants in 2018, 15-16% funding rate

Eligibility
- US Citizen, national, or permanent resident
- Have not completed any grad degree by Aug 1 of the submission year unless (1) joint BS/MS program and no additional grad work; (2) At least 2 years off.
- NO MD/PhD, JD/PhD, Management, Social work;
- NO support for clinical research, health services
When should I apply?

Senior undergraduates
Post-baccalaureates who have not started grad school
Must be prepared to enroll the fall after you receive the award

First year graduate students
Apply only if highly competitive against other first AND second years

Last shot - APPLY!

Fall of your second year grad school

Highly competitive = demonstrates high potential to make significant achievements in STEM

- Past achievements predict future success
- GPA, awards, research experience, letters, great essays, clear past broader impacts and plans for future broader impacts of your work.
- Publications, presentations definitely help
How to apply

Fastlane: https://www.fastlane.nsf.gov/grfp/Login.do

How to register
Accessing sections of the application
Personal information, education, work experience

“The easy stuff”
Add details to make your achievements clear

Proposed field of study
Choose carefully, and consult your advisors!

Transcripts
Grades count; GREs do not

3 letters of recommendation

Personal, relevant background & future goals (3 pp.)
Tell your story; concrete details discuss individual research experienced; craft a coherent and integrated whole, not a list

Graduate research plan statement (2 pp.)
Demonstrate ability to plan and conduct research; why is it original, important, innovative? Future steps? Alternate interpretations?
2020 GRFP deadlines

All applications are due at 5:00 p.m. local time, based on applicant’s mailing address.

**October 19, 2020**
- Life Sciences

**October 20, 2020**
- Computer and Information Science and Engineering
- Materials Research
- Psychology
- Social Sciences
- STEM Education and Learning

**October 21, 2020**
- Engineering

**October 22, 2020**
- Chemistry
- Geosciences
- Mathematical Sciences
- Physics and Astronomy

**October 30, 2020**
- Reference letter deadline
Selection Criteria

What is the potential of the proposed activity to:

Advance knowledge and understanding within its own field or across different fields (Intellectual Merit)?

Benefit society or advance desired societal outcomes (Broader Impacts)?

Rating: Excellent; Very Good; Good; Fair; Poor

MUST be strong under BOTH criteria
Labelled Intellectual Merit and Broader Impact statements must be in each essay
Intellectual Merit

Definition: The potential to advance knowledge
Considers: Creativity, originality

Personal Statement: Evidence of prior achievement, personality, recognition

Convince reviewers that you have intellectual merit

Research Statement: Importance and relevance of the proposed work

Convince reviewers that your proposed research outcomes have intellectual merit
Broader Impacts

Definition: Potential to benefit society or advance desired societal outcomes

Personal Statement: Evidence of prior engagement or interest relevant to your proposed plan

show reviewers that you have experiences and qualifications that contribute to your ability to carry out your plan, and sincere commitment to its outcome

Research Statement: Detail your BI plan in a way that naturally flows from some aspect of the research plan

convince reviewers that you can and will carry out your BI plan, and that it will effectively accomplish something that meets the description of at least one of the major 5 types of broader impacts.
Fatal Flaws (Advice from a Panelist)

Panelists advised to weight Intellectual Merit and Broader Impacts equally

• Weak *history* of Broader Impacts (in Personal Statement)
• Weak *future* plan for Broader Impacts related to proposed research (in Research Statement)
• Too vague of Broader Impacts—need both specific history (not laundry list, but a story) and specific future plan
• Too mundane of Broader Impacts
• Too much overly personal information or too negative in Personal Statement
• Weak Intellectual Merit in Research Statement
Finding Fluorescence

Illuminate the unseen world around you

Help scientists make new discoveries in your own backyard! All you need is a black light and enthusiasm. Perfect for a class activity or to add a little extra exploration to your camping trip.

Many organisms are biofluorescent; they are able to absorb light and re-emit it at a longer wavelength, and new discoveries of biofluorescent organisms are made everyday. We need your help to expand our knowledge of which organisms fluoresce.

Finding Fluorescence is a resource to teach about biofluorescence, get people involved in and excited about making discoveries, and to document the presence or absence of biofluorescence in the vast number of species across the world, in a format accessible to scientists of all fields.
Broader Impacts: Science Education

Underwater Fluorescence Photographs – Solomon Baksh, Trinidad

Natural Fluorescence under the Microscope

Underwater Fluorescence Photographs – Digital Shootout Bonaire 2011

Fluorescent Drosophila – NIGHTSEA Stereo Microscope Fluorescence Adapter

Finding Fluorescence
Illuminate the unseen

What is biofluorescence?

Biofluorescence is a trait of an organism (any living thing) where light that hits the organism is re-emitted at a longer wavelength. When you stand under a blacklight at a bowling alley or in a haunted house and your white shirt and shoe laces glow bright, that is fluorescence. When you see this in an animal, it is call biofluorescence. To understand biofluorescence, we must understand the difference between biofluorescence and bioluminescence.

The Science of Biofluorescence

Biofluorescence is a great example of how all three main sciences interact. This makes biofluorescence an ideal tool for teaching and learning about science. Let’s examine the biological, chemical, and physical properties of biofluorescence.

Biology

Biofluorescence has been examined in a range of species including insects, plants, fish, reptiles, and amphibians. Biofluorescence has been found to act in sexual attraction (bees and flowers, birds, spiders). Intraspecies recognition (copepods), camouflage (reef fishes), and signals of condition (leaves, fruits, mammals).

Here are a few organisms that fluoresce; watch the image below to see the reveal of their biofluorescence.

Chemistry

Biofluorescence is the result of natural fluorophores (chemicals that fluoresce). There are many natural fluorophores and organic chemicals with their own fluorescent emission wavelength. Here are a few examples of some of the chemicals underlying the fluorescence we see in living organisms.

Physics

Biofluorescence is the result of absorbed light being re-emitted at a longer wavelength due to fluorophores. The wavelengths of light determine if we can see it and what color it appears as. Fluorescence shifts this wavelength to a new color.

What similarities and differences exist between the structures of the fluorophores?

What do you notice about the differences in how each organism ‘glows’? Why might these differences exist?

Here the wavelengths of light visible to humans are labeled. Some organisms can also see wavelengths in the ultraviolet range.

Which aspect of biofluorescence is your favorite? The interaction of biology, chemistry, and physics is necessary for biofluorescence to occur. This characteristic and its widespread nature make it relevant to a large number of researchers and allows for collaboration across scientific fields. Because biofluorescence is often invisible to human eyes without special equipment, many organisms have yet to be tested for fluorescence. Visit the Get Started tab for ways YOU can help scientists make discoveries of biofluorescence and ways to utilize biofluorescence as a tool for teaching science in your classroom.
Broader Impacts: K-12 Activities

Lab Activities for Classrooms

Biofluorescence provides a unique opportunity to teach and learn about the three main topics of science (biology, chemistry, and physics) in one lesson. Find downloadable worksheets linked below. These can be used in the classroom or at home. Check back often as new modules are continually added and being expanded upon to provide resources for students of all ages.

Use the language menu at the top of the page to visit the Spanish version of the site and download the worksheets below in Spanish.

Classroom Resources

MODULES:
- Biology of Biofluorescence Worksheet
- Chemistry of Biofluorescence Worksheet
- Physics of Biofluorescence Worksheet
- Finding Fluorescence Lab
Broader Impacts: Citizen Science

Finding Fluorescence Observation of Fluorescence

Explore the data that people around the world have uploaded. There are list and map forms of entry display. Below is the list form of the data. You can use the filter function to view entries by title and location. Click the three lines at the top right corner and select "MAP" to switch to a map view of the entries. Take note of areas near you not yet surveyed and help us grow our reach!

If you wish to use any of the data, please cite the Finding Fluorescence database as below.
Bonus Material
To assess Intellectual Merit and Broader Impacts, Panelists are instructed to consider:

To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?

Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?

How well qualified is the individual, team, or organization to conduct the proposed activities?

Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
Broader Impacts

Advance discovery and understanding while promoting teaching, training, and learning, for example, by training graduate students, mentoring postdoctoral researchers and junior faculty, involving undergraduates in research experiences, and participating in the recruitment, training, and professional development of K-12 mathematics and science teachers.

Broaden participation of under-represented groups, for example, by establishing collaborations with students and faculty from institutions and organizations serving women, minorities, and other groups under-represented in the mathematical sciences.

Enhance infrastructure for research and education, for example, by establishing collaborations with researchers in industry and government laboratories, developing partnerships with international academic institutions and organizations, and building networks of U.S. colleges and universities.

Broaden dissemination to enhance scientific and technological understanding, for example, by presenting results of research and education projects in formats useful to students, scientists and engineers, members of Congress, teachers, and the general public.

Benefits to society may occur, for example, when results of research and education projects are applied to other fields of science and technology to create startup companies, to improve commercial technology, to inform public policy, and to enhance national security.
Encouragement

Awardees are not composed of only Ivy League superstars!

Diversity is an asset: students from rural areas, underrepresented groups, disabled, economically-disadvantaged, first generation college or graduate student, financial challenges

Talk about these things in your personal statement!

Applicants who have overcome major challenges and persevered are likely to succeed—write about your experience