

**Division of Graduate
Education
(DGE)**

**Graduate Research
Fellowship Program (GRFP)
NSFGRFP.org**



The overall goal of the Graduate Research Fellowship Program is to recruit individuals into Science, Technology, Engineering, and Mathematics (STEM) fields

- To select, recognize, and financially support early-career individuals with the demonstrated potential to be high achieving scientists and engineers
- To broaden participation of the full spectrum of diverse talents in STEM



Five Year Awards – \$159,000*

\$53,000 each year for three years over five-year period

- \$37,000 stipend + \$16,000 education allowance paid to institution
- Payment covers all tuition and mandatory fees (no cost to student)

Other NSF Opportunities

- INTERN – non-academic internship program
- FASED Individuals with Disabilities support
- Career-Life Balance Initiative (family leave)



- **Fellowship**: Awarded to individual, paid through the attended graduate institution
- **Flexible**: Choice of project, advisor, and graduate program
- **Unrestricted**: No service requirement after completion
- **Portable**: Can be used at any accredited, non-profit, US institution of higher education, with campus in US for research-based master's and doctoral degrees

2010 - 2022: ~2,000-2,100 Fellowships yearly

2022: ~12,600 Applications - ~18% success rate

2021: ~12,600 Applications - ~17% success rate

2020: ~12,800 Applications - ~16% success rate

2019: ~12,200 Applications - ~16% success rate



- U.S. citizens, nationals, and permanent residents
- Early-career: undergrad & graduate students
- Pursuing research-based master's and/or doctoral degrees (no professional degrees)
- Science, Technology, Engineering, Mathematics (STEM) or STEM Education
- Full-time enrollment in graduate degree program at accredited, non-profit US institution of higher education
- NO foreign institutions

Level 1: Seniors/Bachelor's degree: no graduate study

Level 2: 1st-year graduate students

- Joint Bachelor's-Master's (completed 3 years)

Level 3: Second-year graduate students

- No more than 1 academic year completed in 1st graduate degree program
- Joint BS/MS holders ONLY: can apply as 1st year doctoral students progressed to PhD directly after completing joint BS/MS degree

Only
apply
once

Level 4: Returning graduate students

- > 2-year interruption in graduate study
- No doctorates or >1 academic year in graduate program
- NOT ENROLLED in graduate program at application deadline



- Professional degree programs
 - E.g., MBA, MD, JD, DVM, DDS, PharmD
- Joint science-professional degree programs
 - E.g., MD/PhD, JD/PhD
- Community, Global, or Public Health (MPH)
- Counseling, Social Work (MSW)
- Education (except STEM education)
- Humanities (except history of science)

**See Detailed Eligibility
Requirements in the
GRFP Solicitation**





GRFP Application

Complete Application Package:

- 1) Personal Information, Education, Work/Research Experience, Proposed Major Field of Study, Honors, Awards, Publications
- 2) Personal, Relevant Background and Future Goals Statement (3-page PDF)
- 3) Graduate Research Statement (2-page PDF)
- 4) Transcripts (PDFs; mandatory)
- 5) Letters of reference (may provide up to five names of reference letter writers)
 - Mandatory: 3 reference writer names



DEADLINES (5 p.m. local time of applicant mailing address):

- Oct. 15, 2024: Chemistry, Geosciences, Mathematical Sciences, Physics & Astronomy
- Oct. 16, 2024: Life Sciences
- Oct. 17, 2024: Engineering
- Oct. 18, 2024: Computer & Information Science & Engineering, Materials Research, Psychology, Social Sciences, STEM Education & Learning

Read the GRFP Solicitation for detailed application instructions and requirements!

To request accessibility accommodations, please contact info@nsfgrfp.org at least four weeks before the application deadline.



Graduate Research Fellowship Program (GRFP)

Two Statements

- 1) Personal, Relevant Background & Goals
- 2) Research Statement



3 Page Personal statement, relevant background and future goals

Plus broader impacts and intellectual merit

Important questions to ask yourself before writing the statement:

1. Why are you fascinated by your research area?
2. What examples of leadership skills and unique characteristics do you bring to your chosen field?
3. What personal and individual strengths do you have that make you a qualified applicant?
4. How will receiving the fellowship contribute to your career goals?
5. What are all of your applicable experiences?
6. For each experience, what were the key questions, methodology, findings, and conclusions?
7. Did you work in a team and/or independently?
8. How did you assist in the analysis of results?
9. How did your activities address the Intellectual Merit and Broader Impacts criteria?

But do not provide a bulleted list that answers the posted questions & you are not limited to these questions.

- 1) Convince them you deserve the award
- 2) Convince them you can do the work proposed in the research statement

Personal Statement

- You are writing an essay to humanize yourself
- Who are you? What made you pursue your career path/grad school?
- If you've overcome obstacles tell your reviewer
 - Watch tone. Focus on what you learned and character you built.
- Address red flags (e.g., poor grades yr 1; light on research experience)
- Pick 1 theme and stick to it

Too many themes

The phrase “your body is attacking itself” is not something most children hear. When I returned to the physician’s office for my diagnostic results, I was informed that my incurable autoimmune disorder had diminished my thyroid function. Coping with and understanding my diagnosis would take years to develop, but managing symptoms and following diet restrictions as a child introduced me to medicine from a unique vantage point. From an early age, I discovered the importance of advocating for myself as a patient.

“Would you like to double your dosage?” inquired the nurse practitioner.

My eyebrows knitted together in confusion at her question. The invitation for my participation in the treatment plan left me feeling uneasy. Until now, my relationship with physicians had been paternalistic and largely consisted of recommendations and uninformed consent provided by my mother on my behalf. But this time, I viewed my relationship with my physician as a conversation instead of an instruction manual. I began researching my disorder and going to appointments with questions regarding new medications or diagnostic tools to try.

With my interest in medicine piqued by my childhood relationship with my doctor, I decided to explore medicine further through a certified nursing assistant program at my high school. While bringing water to the residents of my local nursing home, I met a bed-bound war hero. I could immediately tell that, in that moment, what he needed most was human connection. In those meaningful moments, I convinced him to show me how to do his favorite dance, “the jitterbug” from his bed, which revealed the joy that had been buried from his isolation.

In the memory care unit, most of the residents suffered from regressive memory, which brought out different versions of themselves from day to day. From knocking on their door to feeding them, I often needed to reintroduce myself several times or convince them that they were safe. Through my role as a CNA, I realized that treating my patients had less to do with specific tasks or illnesses, but rather the person as a whole. “Treat the patient, not the disease” is a phrase that my mentor, Dr. Witherington, often repeated to me. As my experiences in medicine grew, I found myself continually coming back to that rule, which never seemed to fail.

“This can’t be happening. We got vaccinated. I can’t have COVID.” denied one of Dr. Witherington’s patients as he confirmed her positive status in our local urgent care.

Personal Statement

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 - Watch tone. Focus on what you learned and character you built.
- Address red flags (e.g., poor grades yr 1; light on research experience)
- Pick 1 theme and stick to it
- Sometimes details of chronology can bog things down
 - Not always relevant

Relevant Background: Capture what you learned not just what you did

- **For each research experience, provide the following**
 - who you worked for, where, and when
 - **The conceptual foundation of the project**
 - **The implications of the results/how the project provided local impact and broader impact**
 - **how the results were disseminated**
 - If relevant describe the team and individual elements of the work
- **Is other work experience relevant? Yes!**
 - you must spin the experience into something that illustrates the skills you developed and could transfer to graduate school (e.g., leadership skills, project management skills, etc.)
 - was it financially necessary?
 - Lovett proposal

Relevant Background: Qualified to complete proposed work

- Talk about research experiences (& sometimes non-research experiences)
- Tell us the goals and implications of the research
 - List of your daily tasks are boring—synthesize!
 - What did you learn?
- Details of chronology can bog things down
 - Not always relevant
- If lots of experience you can group by themes
 - Not always relevant to know every project you worked on
- How did these experiences shape what you're doing today? If not relevant then delete
- Confidence: Nothing happened by luck. You planned everything to work out this way
I will vs. I hope

How to champion yourself?: Take ownership!

- My research has centered on links between physiology and behavior in a variety of test organisms exposed to environmental contaminants and ecological stressors (e.g., elevated predation risk, food limitation). Currently, I am conducting research on the effects of crude oil ingestion on avian physiology and behavior with Dr. Sarah DuRant at Oklahoma State University. In particular, I have been examining indirect, energy-mediated effects of crude oil on behavior. To measure suborganismal and organismal energetic responses to crude oil ingestion, I have employed various molecular assays (e.g., qPCR, Western Blot, fluorescent probes, ELISA) to measure oxidative stress, cellular integrity, stress response, and immune function. Additionally, I have used respirometry techniques to measure whole-animal metabolic rate

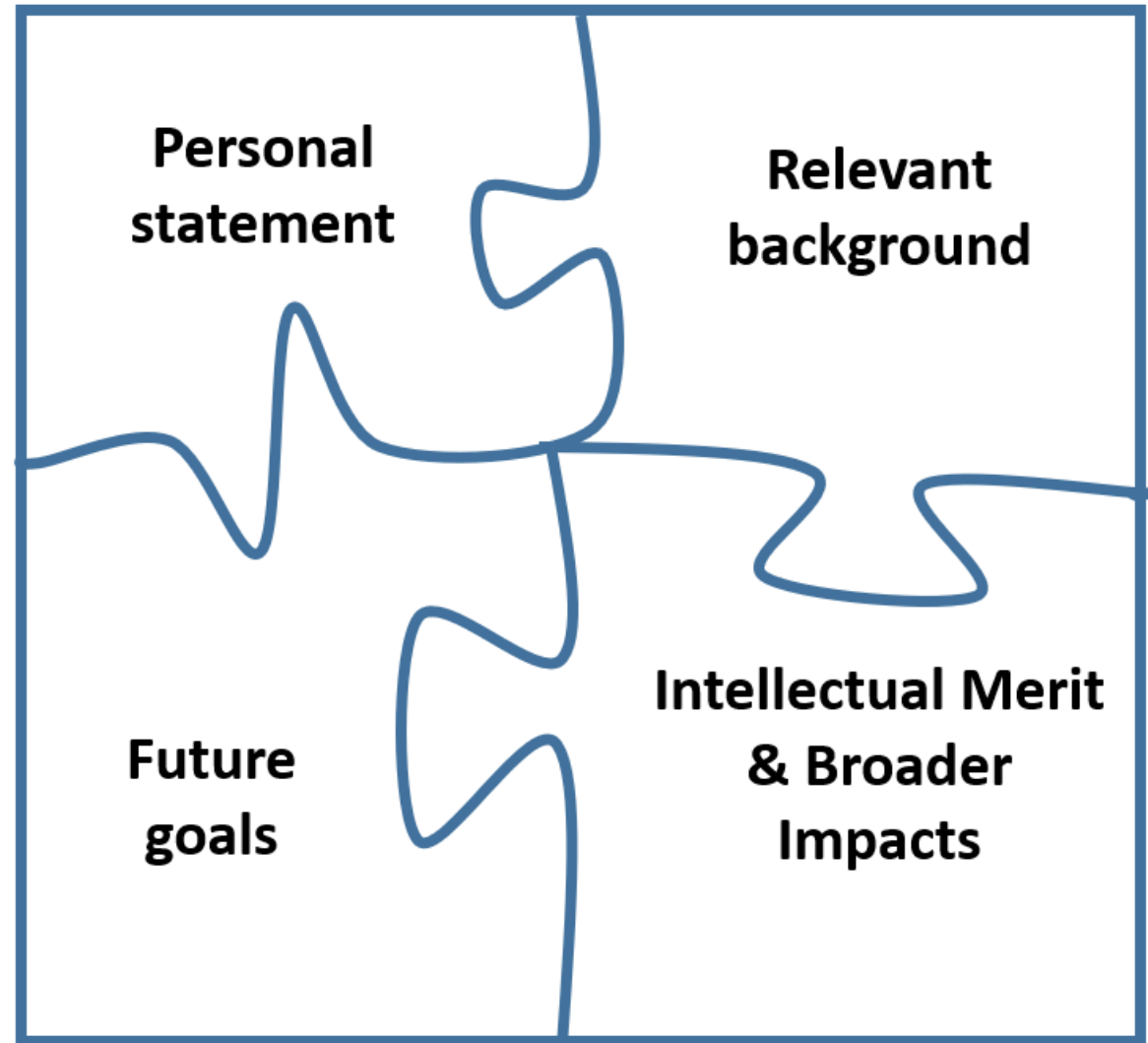
How does this draft differ from the previous slide?

- A central theme in my graduate research has been developing assessment tools and conceptual frameworks for establishing links between physiology, behavior, and fitness in order to better understand the ecological hazard posed by environmental perturbations. Currently, I am using zebra finches to investigate the effects of crude oil ingestion on avian physiology and behavior with Dr. Sarah DuRant at Oklahoma State University. In an effort to quantify the effects of crude oil ingestion, I developed a novel assay for determining oxidative damage to avian red blood cells by measuring the formation of heme degradation products. To probe the whole-animal implications of damaged red blood cells, I designed a vertical flight-tunnel and hop-flutter chamber to measure take-off performance and measure peak exercise metabolic rate, respectively.

Future Goals

- What are your plans?
 - No waffling
 - Do I have to be an academic?
- How will the GRF/work you proposed help you achieve your goals?
- Remember: The \$\$\$ is for stipend not research support
- If planning to take advantage of the INTERN program → talk about it!

Each element tells a specific part of a single story



The entire application tells ONE story

Exactly what are broader impacts and how do I work this into my first statement?

- Potential for the proposed work to benefit society or advance desired societal outcomes
- Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by and complementary to the project.
- ***Outcomes include:*** 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. (**Buzzwords!**)

Partner with existing infrastructure!!!

Bio vs Engineering proposals

Intellectual Merit and Broader Impacts

1. What is the potential for the proposed activity to

a. Advance knowledge and understanding within its own field or across different fields (**Intellectual Merit**); and

- Personal statement:

- How well do you do research, work as team, exhibit leadership skills?
- How well do you communicate your research (e.g., pubs, presentations)
- What are the implications of your work so far on your discipline?

- Research statement

- How will your research influence your discipline?
 - Does it match the broadness of your first paragraph?
 - Will your research really contribute to the problems/ideas/disciplines you say it will?

Broader Impacts in a typical biology proposal

- **Broader Impacts:** Outcomes of my research will be disseminated to the scientific community through publication in open access journals and presentations at the biennial Fungal Genetics Conference, among others. I will also engage in two-way dialogue with our local community at the Fayetteville Farmers Market about this research to increase the public's scientific literacy and build trust in science and scientists. Lastly, this research will expose ~10 disadvantaged student mentees enrolled in the University of Arkansas Upward Bound program to impactful hands-on molecular cell biology research.

Broader impacts in an engineering proposal where the research is a broader impact

- The novel AirLoC device will create a platform for respiratory research during a time of urgent global need. It can be used as a tool in discovering disease pathology, therapeutic targets, and immunization techniques, as well as other applications such as nanotoxicity and exposure to environmental pollutants. This research will contribute to the understanding of microfluidic device design and demonstrate the value of integrating engineering and medicine to improve lives. To facilitate interdisciplinary collaborations for this project, I will work with the virology lab at the University of Arkansas for Medical Sciences (UAMS) in Little Rock, Arkansas, to implement the AirLoC device for testing other infectious diseases. I will also collaborate with physicians at UAMS to research preclinical applications of the AirLoC device. Additionally, this research will be used to promote STEM to younger students. Through the Arkansas Engineering Summer Academy, I will teach high school students about the importance of biomedical research as they construct and test AirLoC devices.

Example Intellectual Merit in the research statement

- **Intellectual Merit:** Mitophagy is essential for appressorium-mediated plant infection by one of the world's most destructive crop pathogenic fungi, and thus improved mechanistic understanding of mitophagy may inform the development of novel strategies to combat blast disease. In humans, defects in mitophagy are linked to diverse pathologies, including neurodegenerative diseases and cancer, thus outcomes of this research may more broadly contribute to our understanding of mitochondrial homeostasis and its role in human health and disease

Example Intellectual Merit in the personal statement

Taken together, my prior research activities have provided fundamental new insight into the importance of SUMOylation, an evolutionarily conserved protein modification pathway, in the regulation of the *M. oryzae* septin cytoskeleton, revealing that SUMO, and therefore SUMOylation, is dispensable for septin ring formation during appressorium development - a finding that challenges the currently accepted model. Furthermore, my contributions have allowed for a more complete understanding of the role of the cell-end marker protein, Tea4, in F-actin-mediated septin remodeling during appressorium morphogenesis, and the spatial control of hyphal branching. Importantly, improved knowledge of cytoskeleton-mediated fungal morphogenesis may help to inform the development of novel strategies to control blast, and other fungal diseases, which continue to threaten food security and human health, around the globe

Another example Intellectual Merit in the personal statement

- My academic accomplishments and experience in biomedical research are evidence of my capacity and determination to thrive as a doctoral student. During my junior and senior years as an undergraduate, I was awarded the Timothy E. Yates scholarship, a prestigious award at Harding that goes to only two recipients in the STEM field each year. The engineering department also awarded me two scholarships for my senior year. Entering the University of Arkansas, I was granted the Distinguished Doctoral Fellowship, the highest achievement for incoming doctoral students.

Reference Letters

MANDATORY for Application Review

- 3 reference writer names in the application
- 2 reference letters **must be received** by NSF

STRONGLY RECOMMENDED

- List up to 5 names of reference writers
- 3 reference letters received by NSF

List and rank up to 5 reference letter writers
- Top 3 will be seen by reviewers

Transcripts – Required

- All applicants **must** submit Bachelor's degree transcript
- Transcripts **required** for all degree programs
- Transcripts **required** for all graduate degree enrollment
- Official or unofficial transcripts accepted
- Official transcripts **recommended** for 2nd year graduate students

Graduate Research Fellowship Program (GRFP)

Review Criteria



Intellectual Merit

- How important is the proposed activity to advancing knowledge within its own field or across different fields?

Broader Impacts

- How well does the proposed activity benefit society or advance desired societal outcomes?



Review considerations:

- Demonstrated potential for significant achievement in STEM
- Comprehensive approach to review
- Balanced consideration to all components of the application
 - educational and research record, leadership, outreach, service activities, plans for the future, individual competencies, experiences, and other attributes



Evidence of potential and ability:

- Demonstrated intellectual ability (grades, curricula, awards, publications, presentations, etc.)
- Plan and conduct research
- Work as a member of a team as well as independently
- Interpret and communicate research
- Take initiative, solve problems, persist
- Display the potential of your approach to your major field of study and your Research Plan to advance knowledge

Evidence of Intellectual Merit can be found in all parts of the application: Personal Statement, Research Plan, letters, experiences, awards, achievements, and transcripts



Societal benefits may include, but are not limited to:

- Increasing participation of the full spectrum of diverse talents in STEM
- Engaging in mentoring; improving STEM education in schools
- Increasing public scientific literacy; increased public engagement with STEM
- Conducting community outreach: science clubs, radio, TV, newspapers, blogs
- Increasing collaboration between academia, industry, others

Evidence of Broader Impacts can be in all parts of the application: Personal Statement, Research Plan, letters, experiences, awards, achievements



University of Arkansas Office of Nationally Competitive Awards

For application assistance, contact:

**Robert Ellis, Assistant Director of Nationally
Competitive Awards at rce002@uark.edu**

**You can also scan the QR code to make an
appointment:**



awards.uark.edu

We can help you with any aspect of the process, but especially:

- Eligibility determination
- Application process reviews and timeline development
- Guidance on choosing reference writers
- Personal and research statement reviews
- Searching for additional fellowship opportunities