NSF GRADUATE RESEARCH FELLOWSHIP PROGRAM (GRFP)

WHAT IS IT? HOW DO I APPLY?

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WHAT IS NSF GRFP

• Around 2000 students a year across all STEM disciplines are awarded NSF graduate research fellowships
  – Approximately 15% of applicants
  – 1-3 students a year from CSUDH has been awarded a fellowship in the last 5 years
• It is one of the most prestigious fellowships one can receive in their early graduate career
  – They are given to students they believe will be future leaders in their fields; 40+ Nobel laurates received this money to start their careers
• This is a fellowship: it is funding for a person, not a project
  – You need to show you can develop a strong research plan, but ultimately, they are deciding on the person
• Historically they have gone to students from top schools, but that is finally changing (somewhat):

Graduate Research Fellowship Program
“The NSF GRFP recognizes and supports outstanding graduate students in NSF-supported STEM disciplines who are pursuing research-based master’s and doctoral degrees at accredited US institutions. The five-year fellowship includes three years of financial support including an annual stipend of $34,000 and a cost of education allowance of $12,000 to the institution.”

- That $12,000 is a reward to your institution—you have no access to that money
  - All of the money is given to your school to pass along to you
  - You should have a full tuition remittance with your acceptance to a PhD program, unless it is a state school with out-of-state tuition issues for out-of-state students

- You can pick and choose which three years you take it over a five-year period
  - A previous student, Rubi, got a McNair first year fellowship from the University of Texas, so she delayed the NSF GRFP for years 2-4

- I have never heard of an undergraduate applying only to master’s programs getting one
  - Say you are applying to PhD programs even if you don’t get admitted to any
  - You don’t want your smaller masters sized project being compared to bigger doctoral projects unless you have a very clear justifiable reason
• Most graduate programs in the social sciences and natural sciences will fund their PhD students
  – There are limits on how long and whether you must have a master’s degree first
  – The funding is not always a livable wage
    • Especially at public institutions and in high-cost locations

• NSF GRFP pays you $34,000 a year to get your masters/PhD for 3 years
  – Better than almost any university fellowship and is a livable wage in most places
  – Some universities will pay you a bonus to reward you (e.g., $1000 bonus or extra 10%)
  – Increases the likelihood you will be accepted because you bring your own funding
    • Unfortunately, they usually tell you too late (early to mid-April) to use it as a bargaining chip unless you wait a year
WHEN CAN I APPLY?

• You can only apply once as a graduate student for the NSF GRFP
  – During your first or second year
• BUT undergraduate seniors can apply and then they would have the option to apply a second time during graduate school
  – Undergraduate applicants are reviewed separately to give them a fair chance
  – If you apply now, you will get a second chance
    • You can submit a revised application or a totally new application
ELIGIBILITY

• Must be a US citizen or resident (since it is federal dollars)
• Must intend to enroll (or be enrolled at) a graduate program in one of the fields on the next slide (it is long, basically a Natural or Social Science or STEM education) that is in the US
  – No MDs, MPHs, PhDs in the UK, etc
• Must be early in graduate career (pre- or first two years)
  – You cannot have a completed master’s degree unless you waited at least two years between your master’s degree and applying to NSF GRFP (but not currently in a PhD program yet)
• You need at least 3 letters of recommendation
**CHEMISTRY**
- Artificial Intelligence
- Chemical Catalysis
- Chemical Measurement and Imaging
- Chemical Structure, Dynamics, and Mechanism
- Chemical Synthesis
- Chemical Theory, Models and Computational Methods
- Chemistry of Life Processes

**COMPUTATIONALLY INTENSIVE RESEARCH**
- Environmental Chemical Systems
- Macromolecular, Supramolecular, and Nanochemistry
  - Other (specify)

**Quantum Information Science**
- Sustainable Chemistry

**COMPUTER AND INFORMATION SCIENCES & ENGINEERING**
- Algorithms and Theoretical Foundations
- Artificial Intelligence
  - Bioinformatics and other Informatics
  - Communication and Information Theory
  - Computational Science and Engineering
  - Computationally Intensive Research
  - Computer Architecture
  - Computer Networks
  - Computer Security and Privacy
  - Computer Systems and Embedded Systems
  - Data Mining and Information Retrieval
  - Data Science
  - Databases
  - Formal Methods, Verification, and Programming Languages
  - Graphics and Visualization
  - Human Computer Interaction
  - Machine Learning
  - Natural Language Processing
  - Other (specify)

**Quantum Computing and Communication**
- Quantum Information Science

**GEOSCIENCES**
- Aeronomy
- Artificial Intelligence
  - Atmospheric Chemistry
  - Biogeochemistry
  - Biological Oceanography
  - Chemical Oceanography
  - Climate and Large-Scale Atmospheric Dynamics

**Computationally Intensive Research**
- Geobiology
- Geochemistry
- Geodynamics
- Geomorphology
- Geodynamics
- Geology
- Hydrology
- Magnetospheric Physics
- Marine Biology
- Marine Geology and Geophysics
  - Other (specify)
- Paleoclimate
- Paleontology
  - Other (specify)

**Quantum Information Science**
- Oceanography
- Physical Oceanography
- Physical Oceanography

**LIFE SCIENCES**
- Artificial Intelligence
  - Biochemistry
  - Bioinformatics and Computational Biology
  - Biophysics
  - Cell Biology

**Computationally Intensive Research**
- Developmental Biology
- Ecology
- Environmental Biology
- Evolutionary Biology
- Genetics
- Genomics
- Microbial Biology
- Neurosciences
- Organismal Biology
  - Other (specify)

**Psychochemistry**
- Proteomics
- Quantum Information Science
  - Structural Biology
  - Systems and Molecular Biology

**MATERIALS RESEARCH**
- Artificial Intelligence
- Biomaterials
- Ceramics
- Chemistry of Materials

**Computationally Intensive Research**
- Electronic Materials
  - Materials Theory
  - Metallic Materials
  - Other (specify)
  - Photonic Materials
  - Physics of Materials
  - Polymers

**MATHEMATICAL SCIENCES**
- Algebra, Number Theory, and Combinatorics
- Analysis
- Applied Mathematics

**Artificial Intelligence**
- Bioinformatics
  - Computational and Data-enabled Science
  - Computational Mathematics
  - Computational Statistics

**Computationally Intensive Research**
- Geometric Analysis
- Logic or Foundations of Mathematics
  - Other (specify)
- Probability
- Quantum Information Science
  - Statistics
  - Topology

**PHYSICS & ASTRONOMY**
- Artificial Intelligence
  - Astronomy and Astrophysics
  - Atomic, Molecular and Optical Physics

**Computationally Intensive Research**
- Condensed Matter Physics
- Nuclear Physics
  - Other (specify)
  - Particle Physics
  - Physics of Living Systems
  - Plasma Physics

**Quantum Information Science**
- Solid State Physics
  - Theoretical Physics

**SOCIAL SCIENCES**
- Anthropology, other (specify)
  - Archaeology

**Artificial Intelligence**
- Biological Anthropology
  - Communications
  - Cultural Anthropology
  - Decision Making and Risk Analysis
  - Economics
  - Geography
  - History and Philosophy of Science
  - International Relations
  - Law and Social Science
  - Linguistic Anthropology
  - Linguistics
  - Medical Anthropology
  - Other (specify)
  - Political Science
  - Public Policy

**Quantum Information Science**
- Science Policy
  - Sociology
- Urban and Regional Planning

**STEM EDUCATION AND LEARNING RESEARCH**
- Artificial Intelligence
- Computer Science
  - Engineering Education
  - Mathematics Education
  - Other (specify)

**Quantum Information Science**
- Science Education
- Technology Education
CHOOSING THE MAJOR SUBJECT

• The reviewer expertise will be based on the major subject you choose
  – And you should be listing applications to PhD programs in that discipline
• You can select that a project is interdisciplinary
  – And select a primary and secondary subject
  – The reviewers will be from the primary subject
• The NSF priorities of quantum, artificial intelligence, and computationally intensive methods means you can either choose that as your primary or an interdisciplinary secondary subject under any of the broad fields
  – If your project has nothing to do with quantum, AI, etc., don’t worry. Most funded projects won’t, but they want to increase research in that vein
• NEWS FLASH: The administration has new priorities for NSF: climate change and clean energy; emerging technologies, including biotechnology; racial equity; and research infrastructure.
  – We don’t know yet whether these priorities will also apply to GRFP, but good to consider them
PREPARING TO APPLY

• What do you want to study?
• Do you have graduate programs and advisors picked out?
  – It’s the spring, so use this summer to start exploring this
• Do you have someone to help you with the process (a current advisor/mentor)?
  – Someone in your department plus Dr. Lacy
• Do you have a proposed project that is discrete, fundable, and compelling?
  – You are not held to it though– it is ok if you change it later in your career
• Remember deadlines range around Oct 20
  – You need to start writing well before the deadline
  – Reference letters are due at the end of Oct, so you have an extra week to bug your letter writers
CHOOSING LETTER WRITERS

• It is mandatory to have 2 letters, but 3 is HIGHLY recommended
  – Basically, you need 3, but they made this the rule in case someone’s 3rd letter writer didn’t turn it in on time
• But 3 professors from your department that knew you in the same context is not ideal
• You want your letters to provide different perspectives on your work
  – Maybe a professor you took many classes with, a professor whose lab you worked in, and a boss who has seen you flourish
  – Tell them why you chose them, so that they can make sure they tailor their letter to that
  – Give them rough drafts of your proposal as quickly as you can, so they accurately describe your intellectual merit and broader impacts
• If you have diverse experiences, you can include up to 5 letter writers
  – Would give you a safety net if one or two letter writers fall through
• Personal, Relevant Background and Future Goals Statement (3 pages)
  – Who are you and why are you in your field? What sets you apart?
  – What opportunities have you had and how did you use them to better yourself and your community?
  – Why should NSF sponsor you? Are you a leader? What have you done that showcases your ability to do self-directed work? What experiences do you have that prepare you to be a successful graduate student and researcher? What is your potential?
  – What your goals after the PhD?
• Graduate Research Plan Statement (2 pages)
  – What is your proposed project: what is its intellectual merit and how will it benefit society in large?
  – Why are you the person to do this project as well
• The ‘Intellectual Merit’ and ‘Broader Impacts’ evaluation is based off both documents
  – Helpful to make sub-headings for each within both documents
DOES YOUR PROJECT HAVE INTELLECTUAL MERIT?

• “[R]eviewers will be asked to consider [in the graduate research plan statement] 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.”

• Look at the” call for proposals” as a grading checklist
  – Someone is scoring each thing that is being asked for
  – If you don’t provide it, you get a zero for that box (this applies to job applications too)

• Does this project have the potential to advance knowledge?
  – You need to have a clear, formal research question with testable hypotheses
  – Answer basic questions in the field in a new/different methodology, i.e., classic question with a novel approach
  – If you question is too convoluted or out of left field, you will be scored poorly

• Do you have the experience and skills to execute this project—or at least do you have to potential to develop them? This is also about your intellectual merit, not just the project’s merit
DOES YOUR PROJECT HAVE INTELLECTUAL MERIT?

- Are you applying to the right graduate program to support this project?
  - Be clear that this is best lab and mentor to work under and that they want you to come (because you already talked to them)
  - If you proposed mentor doesn’t have the equipment you need, how will you get access? Collaborations elsewhere?
  - Trust me, someone on the panel knows this potential PhD advisor and whether your project is a good fit for their lab
 DOES YOUR PROJECT HAVE BROADER IMPACTS?

• Does this project have the potential to benefit society and contribute to the achievement of specific, desired societal outcomes?
  – Training an under-represented minority/marginalized scholar counts under this section—don’t be afraid to highlight your identity if it is marginalized in your field (in addition to the personal background section)

• This is half of your proposal, so if this is weak, you are screwed
  – This is often the weakest part of people’s application

• Describe your project to a non-specialist and ask them if they think this is important work? If they can’t see why it is important, your broader impacts failed
  – Should be understandable to a non-specialist
  – Should be important to other academic disciplines and/or industry
DOES YOUR PROJECT HAVE BROADER IMPACTS?

• Specifically, detail outreach efforts you will have
  – Making a youtube channel or tiktok science videos counts!
  – The more creative you are, the more you will stand out
  – If you work at a field site, why will local people benefit? How will they learn about the results of your work?

• If your topic is very jargon-y or difficult for non-specialists to understand, how will you translate it for the public?

• WHY SHOULD THE US GOVERNMENT BE PAYING FOR YOU TO GET A PHD?!
DOES YOUR PROJECT HAVE BROADER IMPACTS?

- Be upfront about your identity in the *Personal, Relevant Background and Future Goals Statement*
  - And be specific: women may not be underrepresented in education, but they are in particle physics. Or Indian Americans may not be underrepresented in physics, but they are in anthropology. Say so.
  - Black and Latinx scholars are underrepresented EVERYWHERE
  - LGBTQ scholars are less likely to persist into STEM PhD programs

- Give a unique story about what brought you to your research field
  - Every anthropologist says Indiana Jones ::yawn:: tell me something new
  - Provide a clear narrative of what brought you to your topic and why you are the person to study it

- There are so many applicants that being underrepresented is not enough, but it can help decide between two borderline applicants
Sexual-minority students more likely to abandon science majors

Undergraduates who identify as gay, lesbian, bisexual or queer switch to non-science degrees at higher rates than their heterosexual peers.

Giorgia Guglielmi
Gender disparities persist in many aspects of working life for women in academic rheumatology. To move forward, we must find ways to address the gender gap in rheumatology with the goal of creating a workforce as diverse as the patient population it serves.
DOUBLE CHECKING BEFORE YOU SUBMIT

• Use headings that match the call for proposals
• Bold each important item in the text
  – Don’t make the reviewer hunt for information
• Get your advisor to read it many times, but also ask friends and non-specialist academics for feedback
  – I ask my students to revise their proposals numerous times, but many are funded in the end
  – It will go through many drafts—it is not something you pull together last minute
• Try to submit it before the last day—the portal can get glitchy and it closes at 5pm local time
HOW IS MY PROPOSAL EVALUATED?

• Undergraduates are scored first, so that the reviewers are not biased by “better” written graduate student proposals

• There are 80 panels total (organized by topic) and about 25-30 panels meet at a time
  – Panels are composed of a diverse group of top scholars, around 25 of them
    • Is that really diverse though? They privilege people at doctoral granting institutions
    • They are instructed to consider non-Ivy League students heavily
  – 3 specialists read each proposal then one presents it to the rest for 5 minutes
    • They cannot review students who they have a conflict of interest with and will be sent out of the zoom room
  – After an open discussion, the 3 who initially scored the proposal have the option to adjust their score (in case of bias, error, or an unconsidered issue)
    • If the proposal is stellar, it may not even be discussed. It is the middle ranking ones that are discussed
HOW IS MY PROPOSAL EVALUATED?

• The final decision is made by the NSF program officer though
  – They consider the rankings and they sat in on parts of the panel discussion
  – They may give extra weight to student identity, university type (HSI, HBCU, MSI), uniqueness of question, whatever they want
  – They may even have withheld the best proposals, which were never seen by the panel because they knew 100% they were going to fund those ones
  – It is not exclusively rankings—it is a holistic process
IT IS AN APRIL MORNING AND YOUR INBOX IS FLOODED WITH CONGRATULATION EMAILS

• If you are awarded an NSF GRFP, congratulations!
• If you have already accepted at a PhD program, let them know immediately
  – If you are negotiating at a program or between multiple programs, DEFINITELY let them know ;)
• If you did not get into a PhD program, consider if there are masters programs you are still interested in
  – Or you can let the NSF program officer know that you want to defer your GRFP a year and apply to PhD programs again next year with the NSF GRFP in hand
  – If there was a PhD program that told you that you were not admitted for purely financial/funding reasons, you could reach out and ask them if having the NSF changes their mind
IF YOU GET BAD NEWS...

• Chin up! This was a learning experience, and you will have a leg up when you apply again in grad school
  – You have a better chance next year than those who never tried in undergrad

• There is an “honorable mention” list—definitely tell your advisor/new PhD program about that if you are granted that honor
  – It means you were heavily considered, and it is special

• It is important to collect “No”s; it is the only way to eventually get “Yes”s
NEXT STEPS

- Talk to your advisor/mentor at CSUDH if you think you might want to apply for NSF GRFP next year
  - Discuss your potential project for a PhD program and what universities and doctoral advisors would be a good fit
    - You don’t have to know yet—come with things you are excited about and ask your mentor for help shaping an idea
  - Start reaching out to those doctoral advisors about PhD admissions
    - Tell them about yourself and your research interests
    - Ask them if they are taking PhD students for fall 2023
    - Mention you will be applying for an NSF GRFP!
- We will have another workshop in September to work on preparing your applications
- Multiple CSUDH students are awarded one every year—why not you?