

# Applying for Grants

GmMaW

University of Wisconsin-Madison

October 16th, 2023

# Why apply for a fellowship?

- More money, less work!
- With a fellowship, your PhD is supported by an external source so you don't have to TA.
- Looks great on your CV.
- Practice writing grant applications and learning how to communicate about your mathematical interests.

# What can you apply for?

- **NSF-GRFP**

Government fellowships:

- **DOE Computational Sciences Graduate Fellowship**
- **NDSEG** (through US Department of Defense)

Diversity related fellowships:

- **Ford Foundation Predoctoral Fellowships**
- **Graduate Fellowships for STEM Diversity** (formerly NPSC)
- **GEM Fellowship**

Other:

- **Hertz foundation**
- **Jane Street Graduate Research Fellowship**

# NSF-GRFP (Graduate Research Fellowship Program)

- **\$37,000** stipend for **3 years** (over a 5 year period) and tuition paid
- Can only apply in undergrad or **one of your first two years** of grad school
- Must be a US citizen, or permanent resident
- Need a **research statement**
  - Ask a professor to help you
  - NSF wants to fund people who have a clear goal and a plan for reaching that goal
  - Don't have to end up actually working on that problem or even working with that professor
- 3 references, transcript, **personal statement**
- 2022: 12,600 applicants → 18 % acceptance rate
- Due **Oct 20th** (this Friday!)

- Research statement excerpt:

### Wall Crossings of Stability Functions of Root Systems

S. Moore

#### Background

Let  $L$  be a finite dimensional semisimple Lie algebra. A subset  $H \subset L$  is said to be a *Cartan subalgebra* if  $H$  is a maximal toral subalgebra (a subalgebra in which all elements are ad-diagonalizable). In particular,  $H$  will be abelian, implying that every  $h \in H$  is simultaneously ad-diagonalizable. We call  $\alpha \in H^*$  a *root* of  $L$  if  $\alpha \neq 0$  and there exists nonzero  $v \in L$  such that  $[h, v] = \alpha(h)v \forall h \in H$ . The set of roots,  $R_\phi$ , is finite. Let  $S_\phi = \{\alpha_1, \alpha_2, \dots, \alpha_n\} \subset R_\phi$  be a basis of  $H^*$  such that any  $\alpha \in R_\phi$  can be written as  $\alpha = \sum_{i=1}^n c_i \alpha_i$  with all  $c_i$  either nonpositive or nonnegative integers. We call elements of  $S_\phi$  *simple roots*. If  $\alpha \in R_\phi$  has all  $c_i$  nonnegative, then  $\alpha$  is said to be a *positive root*. We denote the set of positive roots by  $P_\phi$ . These sets  $S_\phi \subset P_\phi \subset R_\phi$  (together with some more data) are called the *root system*  $\phi$  of  $L$ . For example, the root system of  $sl_3(\mathbb{C})$  (denoted  $A_2$ ) has simple roots  $\{\alpha_1, \alpha_2\}$  and positive roots  $\{\alpha_1, \alpha_2, \alpha_1 + \alpha_2\}$ .

A (*Bridgeland*) *stability function* on a root system is a map

$$Z : P_\phi \rightarrow \mathbb{H} = \{z = x + iy \in \mathbb{C} \mid y > 0\}$$

satisfying  $Z(\alpha + \beta) = Z(\alpha) + Z(\beta)$  for all  $\alpha, \beta \in P_\phi$ . As such,  $Z$  is uniquely determined by  $Z|_{S_\phi}$ . We also typically require that  $Z$  be *generic*, meaning that  $Z(\alpha) \neq cZ(\beta)$  for any  $c \in \mathbb{R}$  whenever  $\alpha \neq \beta \in P_\phi$ . See Fig. 1 for examples of stability functions on  $A_2$ .

- Personal statement excerpt:

## **Broader Impacts**

After graduating, I plan to become a professor. As described in my personal statement, a large focus of my career will be in mentoring undergraduates in research projects. I have previously mentored a high school student in a research project where she explored various non-Euclidean geometries. If awarded the NSF GRFP, I will continue building my mentoring capabilities by creating a project for UNC's Directed Reading Program. This program allows graduate students to mentor undergraduates through a semester-long reading project. My project would be based in Lie algebra, culminating in an understanding of the root systems associated to each  $sl_n(\mathbb{C})$ . I will also become involved in the McNair Scholars Program at UNC by helping with their research program over a summer. This will allow me the opportunity to help minority undergraduate researchers in a variety of fields (not just mathematics) by providing them with critical feedback at various stages in the research process.

# DOE Computational Sciences Graduate Fellowship

- **\$45,000** stipend and tuition paid
- Must be in **first year of grad school** to apply
- Research topic must be "**broadly applied**" -make your work sound more **applied** if you can (they specifically mention applied math and machine learning but other areas could work).
  - e.g. Harmonic analysis can be applied to PDEs which can be applied to physics.
- For now it says "**the application will open in late October**"

# National Defense Science and Engineering Graduate Fellowship (NDSEG)

- **\$43,000** stipend
- Also get some **travel money**
- Must be a US citizen
- Must have **at least 3 years in program remaining by Sept 2024** (i.e. must be a second year (now) or before if you're planning on taking 5 years, or a third year or before if you're planning on taking 6 years)
- **Minorities especially encouraged to apply!** (mentions women, people with disabilities, and ethnic minorities)
- Due **Nov 3**



# Graduate Fellowships for STEM Diversity (formerly NPSC)

- Duration: 2-3 years, can be extended up to 6 years
- **\$20,000** annually
- Must be a US citizen
- Can be Masters or PhD student
- Due Dec 29

# GEM Fellowship

- For PhD and Masters
- MS: **\$8,000** living stipend and tuition paid, PhD: **\$16,000** plus tuition paid
- Maybe only senior undergrads and masters students can apply? update when they respond to email
- Due **Nov 10**

# Hertz Foundation

- Must be a **senior undergrad or first year PhD student**
- US citizen
- **\$38,000**/nine-month personal stipend and tuition paid
- Renewable annually for up to five years, **\$5,000**/year stipend for fellows with dependent children
- "intend to direct their studies toward understanding and solving major, near-term problems facing society;"
- Due **Oct 27th**

# Jane Street Graduate Research Fellowship

- **\$45,000** and tuition paid
- International students eligible
- Due **mid December**
- CV and research statement
- Two letter writers

# General Advice on writing statements/proposals

- Start working on statements as early as possible
- Have multiple people look over them and give you feedback
- Write to the panel you'll have (i.e., appropriate breadth)
- Submit early, before the deadline
- Read the instructions early, well before the deadline, and follow them.

# NSF-GRFP specific advice

Have separate sections for:

Intellectual Merit:

- Convince readers you are academically prepared
- classes, seminars, workshops you've done
- Things you plan to do: academic, research , conferences

Broader Impacts:

- ways in which you contribute to the broader math/scientific community, or even to the general public
  - Mentoring: DRP, MxM, math circle
  - organizing a group or event
  - organizing a seminar or reading group
  - outreach
- Remember that the NSF GRFP is looking to fund the PERSON as a whole and not just the research they are proposing. This is to a large extent true of other fellowships as well.

# TAing with a Fellowship

- You can always choose to TA a class while you have a fellowship!
- This would be a 33% appointment, which pays \$19,883
- e.g. Graduate Fellowship for STEM Diversity pays 20,000, plus a 33% appointment that pays \$19,883 = \$39,883

# Links

- NSF-GRFP
- DOE
- NDSEG
- Ford Foundation
- Graduate Fellowships for STEM Diversity
- GEM Fellowship
- Hertz Foundation Jane Street



# Thanks

Thanks to Bella Finkel, Laurel Ohm, Caitlyn Peot, Betsy Stovall  
for their advice!