

Experience with the NSF CAREER Proposal Preparation

Yue Yu

Assistant Professor in Applied Mathematics
Department of Mathematics, Lehigh University
yuy214@lehigh.edu

CAREER Award or Regular Grant

- Differences

1. CAREER award: \geq \$400k-\$500k for 5 years, 3 submissions at most; Regular grant: 3 years, no limit for unsolicited (**usually keep you budget as close to the floor as possible**).
2. Panels and review process may be different (**consult your program manager**). Typically the CAREER panels are composed of senior prominent faculty.
3. CAREER is supposed to a long-term project and establish a leadership in the field (**no incremental project**).

- My experience

- 1) 2014 (Year 1 after Ph.D., Year 1 in TT position):** First Regular Proposal submission
Competitive – **declined** by PM #1
- 2) 2015 (Year 2 after Ph.D., Year 2 in TT position):** Second Regular Proposal submission
Competitive – **funded** by PM #2, co-funded by Computational Math (PM #2) and Engineering of Biomed Systems (PM #3), \$235k, **2016-2019**
- 3) 2017 (Year 3 after Ph.D., Year 3 in TT position):** First CAREER Proposal submission
Highly Competitive – **funded** by PM #4, co-funded by Computational Math (PM #4) and Mathematical Biology (PM #5), \$235k, **2018-2023**

CAREER Award or Regular Grant

- My experience

2015 (Year 2 after Ph.D., Year 2 in TT position): Second Regular Proposal submission

Competitive – **funded** by PM #2, co-funded by Computational Math (PM #2) and Engineering of Biomed Systems (PM #3), \$235k, **2016-2019**

- Advantages

- 1) Know the PM#2 (**the system has memory**)
- 2) Serve as reviewer (invited by PM#5) and learn the review process and criteria.
- 3) Published 2 papers in the first year (**have good record**).

- Disadvantages

- 1) Possible overlaps in the project scopes (**Need to specify it in the CAREER proposal**)
- 2) Overlap in the award active periods (**some programs are less likely to give the same PI >2 grants at the same time**)

My Proposal

- Title: A Local--Nonlocal Coupling Framework for Tissue Damage in Fluid--Structure Interaction

Main theme: To understanding the tissue fatigue mechanism of Bioprosthetic Heart Valves (BHVs)

Still **within the area of my established expertise** (coupling methods, simulation of bio-systems), **but with new and challenging ideas**.

- Proposal structure:

1) Overview (3 pages, summarized objectives, time lines, previous experience, **a flowchart of the 10-year plan**)

2) Broader Impact (1 page, impacts on the other fields, outline of education/outreach activities)

3) Technical Details (8 pages, **30% preliminary work**, 70% proposed work)

4) Education and Outreach Plans (3 pages, **PM suggested: 4 pages**)

5) Results from prior support (**emphasize the progress, clarify the difference**)

6) Provide references (**know the literature of the field**)

How long it took to pull the proposal together

- Around 1 month on writing.
- Preparations:
 - 1) 6 months prior to submission: start generating the major preliminary results
 - 2) 6 months prior to submission: start building connections (on per-tenure leave)
 - 3) 2 months prior to submission (**too short**): start working on and integrating the preliminary results on outreach activities
 - 4) 1 month prior to submission (**too short**): ask for collaboration letters
 - 5) (**IMPORTANT**) 1.5 month prior to submission: visited NSF in person and met with PMs #2, #3 and #5.
- Would strongly recommend to start early, especially for the letters and for the education and outreach plans.
- Things I missed but should be very helpful: Lehigh Writing Workshop (Dr. Kate Bullard) and NSF CAREER Workshops.

Interactions with the program officer

- Interactions before submission (**very critical**)
- What the PM can help you:
 1. Choose the right NSF program: a project may fit several programs but different program/panel has different focus.
 2. Give advise on the parts you should stress according to the program/panel.
 3. (Sometimes) Read your whitepaper and give detailed or even very technical suggestions
 4. Keep in touch
- Note: There are two types of PMs (permanent and temporary). Make sure your PM is still in the program during your review since the feedback can be very PM-specific.

Interactions with the program officer

- Interactions before submission (**very critical**):
 1. Schedule a day for visiting NSF in person.
 2. Email the PMs of several programs I might submit to (just a short paragraph to introduce myself, my current NSF project and what I plan to propose).
 3. Met with the program officers in person on June
 - a CV
 - a whitepaper which is almost the overview part of my final proposal
 - a 10-min slides of project flowchart and preliminary results
 - probably should also include the broader impact plans (which I don't have)
- Start from the PM you know/supported you, not to meet more than 1 PMs in a program
- Other possible interactions (which I didn't try)
 1. Serve in the panel (volunteer service)
 2. Participate in the CAREER workshops organized by NSF (e.g., 2018 NSF CMMI CAREER Proposal Writing Workshop <http://129.130.42.171/NSF2018/main.html>)

Outreach project

- A perfect outreach plan won't 100% win the award for you, but a bad plan can make your proposal declined.
- Get help from colleagues:
 - Your department chair (who should also provide a support letter)
 - Kate Bullard, Ph.D., Research Program Development Officer
 - Marci Levine, Ph.D., Lehigh ADVANCE Project Manager
 - Sarah Stanlick, Ph.D., Director of Center for Community Engagement
 - Rita Jones, Ph. D., Director of Center for Gender Equity
 - Previous NSF CAREER award-winners and previous NSF panelists
- Main theme: To promote the engagement and retention of women and under-represented groups from middle school to young researchers post graduate school (have **preliminary work** in all aims).
 1. Lehigh CHOICES summer program which hosts middle school girls to experience several scientific and engineering modules (Prof. Best).
 2. Research experiences for undergraduates (REU) from primarily undergraduate institutions (DeSales University)
 3. High-performance computing (HPC) workshop to promote female researchers from Lehigh, local high school and neighboring colleges.
(<https://researchcomputing.lehigh.edu/2017-hpc-workshop>)

Ask for help

- Talk to the program managers before you start.
- Collect successful proposals (from workshop/colleague and workshops)
- Talk to your colleagues/mentors, ask them to read your proposal if possible.

GOOD LUCK!