Welcome to the ADVANCE Spring Pre-Tenure Faculty Workshop

“NSF CAREER Grant Workshop”

April 25, 2012
NSF Career Grant Workshop
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Department of Mathematics
General strategy:
• write a very good “standard grant” application
• supplement with a strong educational component

Integration: I did not really worry about it very much... which might be a bad example to follow.

Experience:
• prior standard grant applications (either successful or not)
• Have some educational/broad impact program going – will give your educational component an authentic feel
Specifics

• CAREER 5 years more “ambitious” than a standard grant application (usually 3 years, at least in Math)
• Get several recent samples: in your field but diverse subjects.
• Summary page and introductory/connecting paragraphs are important: the panel is not specific to your field
• Get several colleagues to read your application (they’ll appreciate an advance notice and no overnight deadline 😊)
• Consider hiring an editor
• Give yourself plenty of time!
Educational component: examples (just my own experience)

• Proposed to organize a summer school (had some documented experience organizing conferences)

• Proposed to significantly expand a math outreach program I was already running. The current Math Circle part of that was recently featured in the A&S newsletter; the program involves grade school students, undergrads, and graduate students (“vertical integration”😊).

• Promised to keep being involved in other math outreach events around campus with a record of participation: Math Day, SIMUW (Summer Institute for Mathematics at the University of Washington), a summer residential camp for talented high school kids.
Intellectual merit

Of course, I cannot tell you how to do good research and how to write about it. So, just some obvious generalities:

• Be ambitious; set up long term career goals
• Have a proven track record
• Write coherently and convincingly
• Check for readability; appeal to a general audience
About Jim Pfaendtner
or... “why I love the NSF”

Career Trajectory:

- PhD, Northwestern Univ. Chemical Engineering
- NSF IGERT trainee: 4 yrs

2.5 year postdoc
U of Utah / ETH Zurich Chemistry
- NSF IRFP Postdoc award

Assistant Prof.
UW
Chemical Engineering
- 1st grant: NSF BRIGE
- 2nd grant: NSF CAREER

Fun stuff along the way:

- Year 1: initiate new collaboration with team from UMASS
  - NSF EAGER from CBET division

- Year 2: international workshop in area of expertise
  - NSF Pan American Advanced Studies Institute: PASI

- Year 3: start new collaboration with research group in Mainz, Germany
  - NSF Catalyzing New International Collaborations
NSF CAREER: Try 1

• First CAREER proposal was prepared at the end of my 1st year
• Finished it with about 7-10 days of lead time, enough time for feedback from a few people
  • Fatal mistake: Feedback was not great and I knew deep down there were flaws but I decided to submit anyway
  • If I had finished with a few more weeks lead time, I would have had the chance to fix it

Result: VG/G, VG/G, G
Placed in “recommend for funding” category

Feedback from program manager: 1) serve on a panel, 2) start doing some experiments because people in my field don’t value work that is only simulations
NSF CAREER: Try 2

• Complete re-write of the proposal
  • The work had the same methods but different model systems
• I finished the proposal around 5 weeks ahead of time
  • I performed 3 rounds of reviews:
    • Sent to other early career folks, close friends, people outside of my field [~8 people]
    • Sent to some people a bit further along in their career then me after revising from round 1 [~5 people]
    • Sent to departmental mentor, PhD advisor, someone in my field [~3 people]
  • Some people thought this was overkill, but I learned a ton and people were happy to help. There were very few redundant comments and each person helped make my proposal better.
• All aspects of proposal were significantly stronger
  • I actually felt like this was the best proposal I had written
• Participated in a panel for my program
• I discussed Summary statement w/PM on the phone

Result: E, E/V, E/V, E/V, V  [joint panel between CBET and CHEM]
Placed in “highly recommend for funding” category
## Suggestions and tips

<table>
<thead>
<tr>
<th>Item</th>
<th>Importance</th>
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<tbody>
<tr>
<td>Carefully read the NSF CAREER solicitation and understand the difference between CAREER and other types of grants</td>
<td>Critical</td>
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<tr>
<td>Read as much material as you can that other people have written about preparing CAREER grants</td>
<td>High</td>
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<td>Establish a meaningful plan to integrate research and education and provide at least one novel thing</td>
<td>Medium/High (depends totally on PM)</td>
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<td>Finish your proposal with enough time to solicit multiple rounds of revisions from friends/colleagues (use different people each round)</td>
<td>Critical</td>
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<tr>
<td>[Remember: the reviewers for your panel will be outside your area]</td>
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<tr>
<td>Establish your plan to become a leader in field X. Show that you are doing something new and exciting different from your PhD and postdoc work</td>
<td>High</td>
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<tr>
<td>[Don’t overdo it here – will be partially obvious from your text and CV]</td>
<td></td>
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<tr>
<td>If you don’t get it the 1\textsuperscript{st} or 2\textsuperscript{nd} try make sure you understand why by talking to your PM</td>
<td>Critical</td>
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<tr>
<td>Understand the type of work that is funded by your program, the subject of recent CAREER grants funded, and the profiles of CAREER winners from the last 5 years (they may be your panelists)</td>
<td>Critical</td>
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Perspectives from an NSF review panelist

Mark Oskin
Dept. of Computer Science and Engineering
University of Washington
How proposals get reviewed (all proposals, not just CAREER)

- A panel is about 10-12 people, and they consider roughly 30-35 proposals.
- Each panelist reviews ~ 10 proposals
- Panelists are a diverse group.
- Panelists get to suggest what they want to review from title and PI only
- If your proposal has 4 reviews, you can count on half of them coming from people who are not experts in the sub-area of your field.... so:
  - Don’t use jargon without defining it, better yet, don’t use it, or do so sparingly
  - Don’t assume your reviewer has read a citation
    - If it’s an important concept defined in a citation, define it in your proposal.
    - Proposals are explicitly reviewed as if the panelists have not read the citations and your existing work.
  - People in your area enjoy the technical meat.
  - People outside your area don’t understand it but are sold on the vision.
...continued

- The “joke” is that traditionally a panelist reads their proposals before the meeting on the train ride down from Boston to DC.

- But this really isn’t a joke: your proposal is going to be read at a rate of about 2 mins/page or less (potentially as fast as 30 seconds a page for an “on the spot” read).

- So make your proposal easy to read
  - Use proper spelling and grammar
    - Hire an editor if this is difficult for you. Don’t be ashamed about it. The chair of our department hires editors all the time before submitting papers to a top conference!
  - Use formatting to your advantage
    - Call out key concepts
    - Make your proposal skimmable with good headings
    - Think a little about what happens if someone skips a paragraph or a page or two... can they jump back in and follow along?
How you are judged

• In practice, proposals are judged on the following criteria (*this is an ordered list*)
  • Vision and potential for transformative impact
    • is the problem important to solve
    • is it a new idea
    • ... but curb your enthusiasm. Don’t breath your own tailpipe and over sell
  • Technical meat -- will it work?
  • Broader impact -- is it not just boilerplate? Do you really care?
  • Technical approach -- is it a viable methodology
  • ...and if these things fall outside the scope of the norm, they are grounds for grumbling or rejection
    • inappropriate budget
    • numerous spelling and grammatical mistakes
    • are all the necessary I’s dotted and T’s crossed according to the GPG
Some tips for success (all proposals, not just CAREER)

• NSF says they want to fund proposals that are “transformative”.
  • *Rarely* can a reviewer really say “the work proposed by the PI would have a transformative effect on the field if it was successful”
  • Only about 2 of 30 proposals meet this bar.
  • So use this to your advantage. Propose something that actually *is* transformative.

• NSF says they want to fund high-risk / high-reward research
  • But panelists are conservative curmudgeons....
  • If you propose something high risk, be extra careful (see next point)

• Justify your ability to be successful with a little preliminary study
• Don’t pay lip service, but actually care about outreach and broader impact
Special to CAREER

- There is an additional perhaps subtly (un)stated evaluation criteria for CAREER
  - “is this a CAREER size project?”, which you can read as, if you are successful at this idea, will you get tenure. Is it that visionary and big?
  - This runs directly counter to the minuscule amount of funds you will get from the award.
  - Tough to balance too big vs. “CAREER size”, good luck!
    - My advice: propose big vision, acknowledge this can only fund the start
- The educational component is taken very seriously. Do not ignore it. Embrace it and be passionate about it.
- I’ve personally seen a proposal that everyone thought was excellent in every respect except the omission of an educational component be rejected.
- I’ve also seen proposals with research ideas that everyone agreed weren't the best and most amazing / transformative / whatever, but had stellar educational sections be strongly recommended for funding.
Ratings and Rejection

• NSF now uses 4 ratings, this is what the panel is saying with them:
  • HC: the panel wants to tie NSF hands and say fund this work
  • C: the panel is saying fund these if there is money, but within C is a hidden grouping of High/Mid/Low. You won’t know where you really ended up.
  • LC: The idea is possibly fundable but the proposal is too flawed to consider. Fix it and resubmit.
  • NC: Do not submit this idea again to NSF.

• For CAREER, the ratings are slightly inflated as a way to be encouraging to you.
• Also for CAREER, extra care is taken in the panel summaries to be helpful and provide positive sounding constructive advice.
• If you did not get funded the panel genuinely believes they have your best interests at heart. The advice they put in the summary is not flippant!
• ...but there is little to no history in the process and a fair degree of randomness. You could follow all their advice for improvement and get a worse score next time! (been there, we all have!)