Strengthening NSF GRFP Applications

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on behalf of
the Assistant Vice Provost for Graduate Education
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Odds are reasonable.

Historically:

~10-15% fellowship rate
+
~15% honorable mention rate
NSF priorities determine funding categories – can change annually.
Top 25 undergrad institutions are well represented, but this too is changing.

Percentage of Awards to Students Graduating from Top 25 Institutions (2012)

- Top 25: 29%
- Other Awards: 71%
Success rates by institution over time.

Awards by Undergraduate Institution (Selective, 2010-2012)
Preparation is key.

- Study criteria
- Review models
- Apply criteria to models
- Prioritize material
- Write
- Evaluate + revise
Requires 3 separate tasks.

1. Understand reviewers evaluate using criteria.
   a. Have deep understanding of criteria.
   b. Assess how you meet/exceed criteria.
   c. Integrate support throughout application.

2. Understand reader’s expectations.
   a. Demonstrate you are an insider: structure, logic, formatting, language choices, citations.
   b. Anticipate and address reviewer concerns.

3. Reduce reader’s cognitive load.

Requires depth and breadth.
PRINCIPLE 1

Understand how reviewers evaluate:

intellectual merit

and

broader impact.
Review criteria are tightly focused.

<table>
<thead>
<tr>
<th>Intellectual Merit</th>
<th>Broader Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Potential to advance knowledge</td>
<td>* Potential to benefit society and contribute to achievement of specific, desired societal outcomes</td>
</tr>
<tr>
<td>Qualifications</td>
<td>Broaden participation</td>
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<td>Creativity, originality, potential for transformation</td>
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<td>Dissemination</td>
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</table>
Use criteria as road map.

<table>
<thead>
<tr>
<th>Intellectual Merit</th>
<th>Your Content</th>
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<tbody>
<tr>
<td>Knowledge advancement</td>
<td>Contextualize research in terms of past, present, future</td>
</tr>
<tr>
<td>Qualifications</td>
<td>Why best prepared? Independent activities?</td>
</tr>
<tr>
<td>Creativity, originality, potential for transformation</td>
<td>How field will change – specific methods? Skills?</td>
</tr>
<tr>
<td>Research design and quality; resource availability</td>
<td>Specify research, hypotheses, reasoning</td>
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</table>
Prioritize these ideas.

<table>
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<tr>
<td>Discovery, understanding, teaching, training, learning</td>
<td>Past work; plans; impact of learning</td>
</tr>
<tr>
<td>Broaden participation</td>
<td>Across ages, groups; in various contexts</td>
</tr>
<tr>
<td>Infrastructure growth; capacity building</td>
<td>Build relationships; collaborate</td>
</tr>
<tr>
<td>Dissemination</td>
<td>Activities; publications</td>
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<tr>
<td>* Society benefits</td>
<td>Who will be impacted? How many? What areas?</td>
</tr>
</tbody>
</table>
Society benefits are wide-ranging.

- Participation (women, persons with disabilities, underrepresented groups in STEM)
- STEM education/educator development
- Public scientific literacy, public engagement with science & technology
- Quality of life
- Diverse, globally competitive STEM workforce
- Partnerships between academia, industry
- National security
- Economic competitiveness of US
- Infrastructure for research & education
Reviewer comments identify concerns.

1. Use their language when you address criteria (key words).
2. Provide evidence/support/specificity/detail.
3. Show trajectory.
4. Highlight consistency of interests.
5. Detail contingency plans.
6. Describe outcome measures.
Convince reviewers you are capable.

Had research success? Detail:

✓ Whose idea?
✓ Specific responsibilities (“I” vs. “we”, your role)
✓ Problem/knowledge gap and significance
✓ Lessons learned
✓ Outcomes (results, publications, presentations)
✓ Future research / open questions

Better to go deeper with fewer examples.
Strong applications show trajectory.

Undergrad

Graduate student

Researcher or professor
Strong applications show consistency.

• Central questions or themes
• Overarching plan to accomplish goals
• Approaching one problem using different methodologies or tools

______________________________

Ability to plan + focused activity + follow through
Strong applicants have alternatives.

If → Then
Else → ??
Recognize readers come to review process with expectations.
Reader expectations and habits shape understanding.

1. When to pay attention
   - Framing in first paragraph, first sentences, close

2. Where to find key ideas
   - Known information, followed by new

3. How ideas will be linked
   - Through known patterns, such as chronology, problem/solution, comparison

4. How graphics will be laid out
   - Time on x axis, label on each axis, etc.
If you violate reader expectations...

• Reader must spend more time making sense of structure.

As a consequence,

• Reader may spend less time understanding your ideas.
Use knowledge of reader expectations to simplify understanding.

1. Place key ideas in locations most likely to receive focus – get to point quickly.
2. Use repetition to drive home central message.
3. Be consistent across documents to maintain focus on central messages.
4. Eliminate or reduce text not related to audience decision making.
5. Use familiar patterns.
Understand reviewers have limited time.

- Use headings.
- Use topic sentences.
- Use insider language and their key words.
- Open strong.
- Close strong.
- Use white space (short paragraphs).

15 minutes / 5 pages = 3 minutes per page
PRINCIPLE 3

Reduce reader’s cognitive load to allow more processing time.
The reader slows down when...

1. Subject and verb are far apart.
2. Verbs are overly generic.
3. Passive voice is the default.
4. New terms are introduced to refer to previously-described ideas.
5. Chronology “jumps” occur.
6. *Paragraphs* don’t have one central point.
7. *Sentences* don’t have one central point.
8. What’s being emphasized is not clear.

You should, then, ...
RESEARCH PROPOSAL
Path 1: Plan before you write.

1. Sketch out basic idea on paper with a visual – or outline your ideas.
2. Explain to others.
3. Identify places where listeners are skeptical, confused, concerned.
4. Modify your plan before you begin writing.
Path 2: Write your draft before you share.

1. Outline your ideas.
2. Elaborate on your ideas in writing.
3. Share your written draft with others.
4. Ask for feedback.
5. Revise based on questions, confusions, concerns.
Incorporate “moves” into your proposal.

A. Open by connecting with the reader & framing your research (significance, opportunity, who affected)
B. Explain process, technique & outcome measures
C. Motivate throughout by showing
   – Expertise & preparation
   – Benefits to the field & to society
   – Capacity for independent work
D. Clarify limitations of your research
E. Suggest future research
F. Close with significance of your project
Use strategies to get good feedback.

1. Keep a tape recorder running as you listen to feedback.
2. Explain your proposal (in the simplest language possible) to someone who cares about you (outside of your domain).
3. After writing, leave your proposal for a week. Then re-read.
4. Ask a friend to play devil’s advocate as you explain your idea.
Proposal FAQ

• How do I know what reviewers will find interesting?
  – hot topics (who says so?)
  – bottlenecks
  – longstanding problems
  – novel techniques or strategies
  – interdisciplinary approaches

• Should I include references?

• Should I include a visual?
PERSONAL, RELEVANT BACKGROUND, & FUTURE GOALS STATEMENT
Before writing, do some pre-work.

1. Why pursuing graduate degree?
2. What characteristics or qualities do leaders in your field have?
3. What characteristics do you have?
4. What evidence can you offer to prove your characteristics or qualities?
5. What experiences have influenced your commitment & drive to conduct research?
Use your experiences to describe your qualities.

1. Tell your story chronologically.
2. Tell reviewers who you are & what qualities you possess.
3. For every research experience, clarify lessons learned and results.
4. Demonstrate commitment to research (constant learning & growth).
5. Close with who you are, what matters to you, and career goals.
Strong applicants ask for input.
Prove you are a wise investment.

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Writing support for NSF GRFP is available.

• Meet with me to discuss:
  – Story line / arc for personal / background statement
  – Forest vs. trees (what are key ideas?)
  – Adequacy of evidence (will the reviewer believe?)
  – Clarity of claims
  – Level of detail (how far back? how far forward?)
  – Level of engagement (how interesting?)
  – Uniqueness of your application
Process is simple.

1) Schedule an appointment (45 min. sessions)
2) Send in what you have 24 hours prior to meeting (gives me a chance to review)
3) Come to my office (Tepper 229)
4) Discuss your draft
5) Revise based on feedback

Starting earlier is better, but I try to work with your schedule.