

Notes after serving on the review panel for the NSF Graduate Research Fellowship Program

Executive Summary:

- Fellowship applications in field of Mechanical Engineering are evaluated by panel of ME faculty. Remember your audience when you write.
- Two criteria—intellectual merit and broader impacts—have equal weight this year
- Roughly 15 minutes to read an entire application—make your point clearly and quickly.

Roughly 10% of those *who apply* for these fellowships will receive them. The applicants are all amazing individuals.

Process

All of the applications are evaluated by a panel of engineering faculty from a variety of schools, including research and teaching schools. Applicants for the same field (e.g. Mechanical Engineering) are evaluated by the same panel. This year the mechanical engineering panel we participated in had more than 20 members, and evaluated roughly 400 applications. The applications are sorted by level: level 1 is for those who are in their final undergraduate year, level 2 is for those who have just started their graduate programs, and there are also levels 3 and 4. While all those who are in level 1, level 2, etc are evaluated simultaneously (with criteria appropriate to the level), the final decisions on who to fund are not done by level.

NSF has two basic criteria for evaluating the applications: intellectual merit and broader impacts. *They are weighted equally.* After a “calibration exercise” which is designed to arrive at a kind of panel-wide understanding of what would constitute intellectual merit and broader impacts, each application is read by two panelists and scored (out of 50) in each category. One panelist reading a single application takes 15-20 minutes. Panelists can not read any applications for which they have a conflict of interest.

At the end of these first and second reads, applications get two Z-scores, where

$$Z = \frac{\text{Application's Score} - \text{Mean Application Score for that Panelist}}{\text{Application Standard Deviation for that Panelist}}$$

The Z-score is created to adjust for the fact that some panelists score applications much higher (on average) than others. The average of the Z-scores is used to rank the applications. Applications in the top 35% of the ranking get a third reading, as do any applications that have a wide discrepancy on their Z-scores. (The discrepancies are identified by computer and by the panelists.) The remaining 65% of the applications are retired, meaning they get no further consideration. After the third reading, applications that have widely varying Z-scores are returned to the 3 panelists for additional discussion and a resolution.

Finally a new ranking is created. The top 20 or so in this ranking are in Quality Group 1—definite funding. (Notice that this is only 5% of the applications.) The next 40 or so are in Quality Group 2—honorable mention and possible funding. (The top of this group may get funded, depending on resources. Also, this group is mined for recipients of special focus awards, programs for under-represented groups, etc.) The next 40 or so are in Quality Group 3—honorable mention. The rest are in Quality Group 4 and don't get an award.

Criteria for Evaluation

Here are criteria we used in evaluating the applications for level 1. Keep in mind that each panelist develops their own criteria based on the panel discussion, so that not every panelist is going to use the same standards. However, they will give you the general ideas behind the ratings. Also, they may seem very harsh, but this turns out to be essential since all of the applications are very strong.

Intellectual Merit:

Excellent

- (1) The research proposal clearly describes truly innovative or transformative research. (Transformative research transforms the way the field or society will think about the problem.)
- (2) The student is academically well-prepared to conduct the research. Outstanding letters of recommendation, good GPA, solid GREs. The GPA does not need to be 4.0, but should be good. The GRE's I saw were not as high as I anticipated.
- (3) The student has a clear passion for their work which comes across in their writing and their actions to date.
- (4) The student has prior research or industry experience that demonstrated the ability to define, initiate, and complete projects with substantial independence. Avoid describing senior design projects or class projects, as they were not generally persuasive.

Very Good

- (2), (3), and (4) still there. Research is solid (more than incremental) but not transformative or truly innovative.
Or, (1), (2), and (3) but not (4).

Good

- (2) and (3), research is solid, but no (4).

Fair

- (2) and (3). Research proposal is weak and student has little experience.

Poor

- Student is not well-prepared, research plan is ordinary and sketchy, and the student has failed to convey any passion for their work.

Broader Impacts:

Be sure to address this topic, as Broader Impacts is half of the score and many applicants who were Excellent in Intellectual Merit did not address this area sufficiently.

Also, be sure to realize that almost everyone who applies for these grants wants to teach at the college level. Wanting to be a teacher at the college level is not evidence of broad impact.

The identity of an individual does not constitute a broad impact. This was explicitly discussed at the panel and explicitly ruled out (by NSF) as a broad impact. The fact that you are a female, Hispanic, Native American, African-American, etc does not, in itself, qualify as a broad impact. Also, personal struggle (health/economic/family) does not constitute a broad impact. Whoever you are, you need the types of broad impacts discussed under “Excellent” below. *However*, if you are part of an under-represented group or have overcome substantial difficulties in getting to your current position, *do* put this information in your personal statement if you want it to be considered. After the proposals are ranked, those who fall into these categories in Quality Group 2 will be picked up for additional funding opportunities.

Excellent

(1) Demonstrated record of substantial service to the community, K-12 outreach, commitment to encouraging diversity, etc. Straight leadership a plus, but most highly ranked applicants have ongoing outreach/service activities.

(2) Clear explanation of the broader impacts of the research. How will it affect society, and why should the government fund your project over someone else’s? If the project’s success would have huge impacts on its engineering field, it would fall a bit here and a bit in Intellectual Merit. (Different panelists had different views on this.)

Very Good

(1) *or* (2) is somewhat weaker. (1) still has demonstrated record (not just “I will do...”) but the record is weaker, *or* (2) is still there but the impact is less dramatic.

Good

Both (1) and (2) are present, but weak.

Fair

(1) or (2) is completely missing, but the one that is present is at an Excellent level.

Poor

(1) or (2) is completely missing, the one component that is present is only at a Very Good level.