

Dear UCITE,

In this proposal I'd like to describe my current efforts at assisting undergraduate students to competitive fellowship funding for graduate school (e.g. NSF Graduate Fellowships), and also potential success in research careers. Further I'd like to outline a plan in which I think a Nord Grant will a) help CWRU BME students better prepare for their future, b) impact my career by helping me mentor tomorrow's superstars, and even c) indirectly boost the reputation of this school.

Students Need Competitive Fellowships for Graduate Study.

Let me start from the beginning. For the past several years I have been collecting data and observing a trend in undergraduate students intending to pursue a career in research. For admission to graduate school, CWRU students have historically done very well. However as research dollars have gone down, and student interest in advanced education has gone up, competition has been getting harder and harder. As one example from my lab, 2 years ago I had a student in my lab with a 4.0 GPA, Captain of the swim team, and many other commendations to her name. She got rejected by almost every graduate school she applied to. Nowadays it almost seems like the only way you can have any certainty for graduate school is to come with your own money, in the form of a graduate fellowship. There are several out there, but the biggest and in some ways most attainable is the NSF Graduate Fellowship. For the past 5 years I have served on my field's study section for the NSF fellowships, and have observed firsthand that the criteria necessary for success are very clear. Nevertheless, a few schools seem to manage to rake in most of the awards.

CWRU Does Not Have Dedicated Staff to Assist in Fellowship Applications.

Why are these schools more successful, you might ask? Some schools, such as Georgia Tech, employ full-time staff to assist graduate students in their proposal writing. The immediate result is a competitive advantage. Students getting even a little help will have statistically better proposals than ones getting no help. Smaller schools like CWRU find it difficult to justify staff for the few proposals we submit. Last year I convinced my department chair to allow me to spend part of my service time in providing this assistance role to CWRU BME students. We historically submit 5-10 proposals per year, and typically get 1 or 2 awarded. This past year we got 4. This increase was just from a little help to Seniors during their Fall term. In my opinion the effort needed to take us to the next step in competitiveness is quite clear (and easy!). We also will need to help students boost their metrics of research productivity (i.e. not just write better, but have better stuff to write about). With the help of a Nord Grant, I'd like to engage Juniors earlier in their career plans and help arm them with tools that will make them more competitive for these proposals, as well as more prepared for their future careers.

Writing Papers Makes All the Difference for These Fellowship Applications.

In serving on the NSF Fellowship panels, what surprised me was that the very first thing that came up in any review was how many papers each applicant had written. I learned over the years that absolute number of papers was deemed by many to be a good gauge of who were the superstars and who were the "ordinary stars". I guess the theory that reviewers had was that everyone can tinker around in the lab, but it takes a real talent, as well as motivation, confidence, and intellectual skills to put your discoveries into a manuscript for others to read and critique. While this makes some sense, it is also apparent that a little bit of effort on this front can suddenly shift a group of students from moderately competitive to highly competitive. So how do I propose to do that.

Papers Are Not As Hard As Students Think.

Students write papers all the time, for classes, even for fun. The barrier keeping them from submitting to a journal I believe are threefold: a) ensuring that the student knows that a paper is going to be a required metric, b) starting early enough to be able to do it; and b) having the confidence to submit it. In BME we have many students performing undergraduate research. Few, if any, know that the #1 metric that they will be graded on is their paper productivity. This is not just for graduate fellowships, it is for job competitiveness, for grant proposals, for career promotion, etc. Yet many don't think of the paper as their objective. They think some shorter term goal (like the result of a particular experiment) is the objective. We need to fix that.

Another aspect is that some students (either in a research lab or not), don't have the opportunity to write a basic research paper by the time they are applying to graduate schools. Even these students can make themselves more competitive by writing a literature review paper on a topic they already had to investigate for some other aspect of their CWRU training. (And before you ask, yes, even these papers count!). Often times the barrier to such a paper is not that students don't have material they think they can turn into a paper. The barrier is that they can't justify to themselves the time to put into a paper which they see as only a remote, intangible accomplishment, and not the crucial, career-defining achievement it can be. For example I teach a class where by the end everyone has written a review on some topic of their choosing. In past years I have cherry-picked the best ones and put my best effort into trying to convince them to work with me to polish it enough to submit it to a journal. All have failed to do so. **All**. When questioned later, they usually had a (believable) excuse that they had to fill their time with something like a job to make ends meet, and couldn't justify the time spent on polishing a "mostly done" paper (even if it was with my help).

It is depressing to me to think that students are forced to choose to flip burgers for a summer to make ends meet, satisfying their very short-term economic needs; rather than commit to something (writing a paper) that will play a huge role in almost every aspect of their long-term needs. So here is my proposal:

1. In the spirit of helping CWRU BME undergrads be more competitive in their Graduate Fellowship Applications, I would like to engage students earlier in their time here. This will start with a presentation (a.k.a. the Pizza Event) geared toward research-career bound Juniors early in their Spring semester. (Others are welcome, but this will primarily be geared toward Juniors). The purpose of the meeting will be to:
 - a. Instill upon them the importance of papers as their most important research output.
 - b. Have the vast majority of them identify research labs as soon as possible to get research experience, data, and the chance at a basic science research paper.
 - c. Make plans to follow up with them regularly for the next ~ one year as they make research progress, write their papers, and put together their NSF Graduate Fellowship applications.
2. I'm expecting that by priming the pump in this way, many of them will already do a better job at paper productivity in the labs that many of them would have ended up in anyway. (Easy win).
3. Some few won't have space in a research lab. I will work with those students, specifically, to craft a literature review paper on something they have already begun investigating while at CWRU. For this part I need the funds from the Nord Grant for both a) providing salary support so that rather than the short term fix of flipping burgers, they are committing to a long-term fix of investing in their career; and b) providing publication costs often necessary to get said papers published. The details of this will be broken down in my Budget Justification below.

Budget Justification

I'm planning to start with an initial cohort of 5 students. Over the course of the summer I will work with them on their papers. With help from the Nord Grant I will provide minor financial assistance to help them prioritize this use of their time. I don't expect this to be a full time job. They will probably still need to flip burgers on the side. But if we expect quality work we have to be willing to pay for it.

Next I wish to provide for potential publication costs. These range highly, with some journals requiring no publication costs, others requiring over \$1000. I will have to work with the students on how to make this grant stretch as far as it can for everybody. I have also considered spending some of it, depending on our publication goals, to hire CWRU or CIA art students to help us with some well-crafted images of research topic (one such example is depicted below). Again this will be in consultation with the individuals and the group. Probably can't spend the entire publication cost amount on one student.

Graduate Students ("the kittens"). Summer Salary \$500 x 5 students =	\$2500
Publication Handling Costs ("the mittens"). \$500 each x 5 students =	\$2500
Introductory Pizza Event costs ("the pie").	\$200
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Total:	\$5200

Metrics of success will be collected over the next two years on:
 Year 1: Paper productivity
 Year 2: Fellowship proposal success.

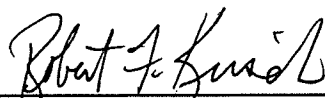
This will be collected on the larger group of Juniors (who attended the first meeting and follow-up activities); as well as on the focused group of Nord Grant-paid students.

My hope is that if we can report impressive enough statistics on these success metrics, this program will:

- A. Be further endowed (e.g. Chair, Dean)
- B. Expand beyond BME



Horst von Recum, PI



Robert F. Kirsch, Department Chair, BME

