

Presenters: Jenny Amos, University of Illinois Urbana-Champaign

Topic: Funding Opportunities in Engineering Education

Resources:

- Private Funding: <https://venturewell.org/> and <https://engineeringunleashed.com/>
- NIH Grant Examples:
 - <https://grants.nih.gov/grants/guide/pa-files/PAR-22-000.html>
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Presentation Overview:

- This conversation is tailored for newer people who are seeking funding.
- The perspective shared during the presentation are from Jenny Amos and do not represent NSF/NIH or any other sponsoring bodies.
- Jenny began by having three grants being approved. Even though it was a great achievement, but it was incredibly stressful.
- This discussion is based on the reflection on how to manage something like that.
- Grant Timeline (Planting Analogy):
 - Pre-Award Phase (Planting a seed)
 - Award (Seedling)
 - Post Award (Tree)
 - Grant Close out (Fruit)
- The timeline can be between two or five years.
- **First question to ask:** Why do you want to get a grant?
 - Some of these grants are meant for training and development of students (Thesis/Dissertation)
 - It can also include undergraduate student hiring.
 - Are you allowed to hire students or can you be a phd advisor?
 - **What type of research are you doing?**
 - **Foundational Grants vs Applied Grants.**
 - **Foundational grants** – theoretical frameworks, literature, research questions, theoretical conceptual work.
 - **Applied grants** – taking theoretical frameworks into applied context. (e.g. framework that works in mechanical engineering, could it work on biomedical engineering?)
- **Second Question:** Who wants to fund your work?
 - **Local/College:** 2k to 4k. Could help with travel, materials, hourly hiring of students.
 - **University/State:** bigger. Can help with preliminary funding and broaden your network.
 - **Federal:** NSF/NIH
 - **Private:** KEEN network/Venturewell
- **Third Question:** Who will you work with and what will they do?
 - Define rolls in the grant.
 - A grad student could be a researcher, developing material, etc.
- **Fourth Question:** Think of the budget – Detail your spending before writing your grant.
 - **Personnel:**
 - **PI/Co-PIs**
 - **Postdocs:** full salary
 - **Research Assistants**
 - **Participation costs.**

- **Supplies:**
 - Equipment
 - Materials
 - Surveys (some have costs)
- Softwares
- **Fifth Questions:** How do you do the writing?
 - **Emphasize NEW ideas founded on literature**
 - **Title is important**
 - Need clearly stated research questions
 - Detailed methodology for approach and analysis
 - Demonstrate success for potential with preliminary data (NSF is risk averse)
 - Discuss the significance to your field and others
 - A clear, concise, comprehensive Proposal Summary
- **Sixth Question:** What things are reviewed on a grant?
 - Remember who your reviewer is:
 - A busy researcher with too many demands on their time.
 - Will compare yours with the 2 or 3 other grants they reviewed
 - Will read it in 60 minutes or less
 - Will compose their summary in 30 mins
 - Criteria
 - Intellectual Merit
 - Probability of success
 - Feasibility
 - Applicant's qualifications
 - Preliminary work
 - Broader Aspects
- Seventh Question:

EXAMPLE GRANT CALLS

- **Example NIH Call.**
 - R Mechanisms – Research Category in NIH
 - PAR-22-000 Team-Based Design in Biomedical Engineering (<https://grants.nih.gov/grants/guide/pa-files/PAR-22-000.html>)
 - Focused on creating UG design experiences (\$20k/yr)
 - It is implementation and adaptation
 - It is very restrictive budget/expense wise.
 - It is a lot of work and specific relative to the money.
 - Letter of intent in April prior to May submission.
 - PAR-19-197 – Summer Research Education Experience Program
 - Focused on research experiences for highschool students, undergraduate students, and/or science teachers during summer.
 - \$125k/yr depending on proposal, but limit \$50K in personnel support.
 - It is not as restrictive, but it must tie to NIH priority funding topics (grants.nih.gov/grants/guide/pa-files/PAR-21-168.html)
 - It is a standard 25-page proposal.
 - Requires letter of intent in February prior to March submission.
- **Example NSF Calls:**
 - PFE Indicator – Focused on Literature and Methods in a mentored partnership.
 - 20-558 – PFE: Research Initiation in Engineering Formation (PFE: RIEF)

- The PFE goal is to support research in professional formation of engineers and increase community of researchers conducting PFE research.
 - Up to \$200K over 2 years
 - Typically a 15-page proposal research plan
 - November submission
- 23-510 – Improving Undergraduate STEM Education: Directorate for STEM Education (IUSE)
 - Support projects to improve STEM teaching and learning for undergraduate students.
 - Has two tracks:
 - Engaged student learning – in the classroom or with direct contact with students.
 - Institutional and community transformation – organizational change, policy and structural changes that can support student learning.
 - Typically a 15 page proposal
 - No letter of intent, due dates depend on pathway either January or July.
- 23-527 NSF Scholarship in Science, Technology, Engineering and Mathematics Programs (S-STEM)
 - Supports institutions of higher education to fund scholarships for academically talented low-income students.
 - Three tracks
 - Institutional Capacity Building
 - Implementation: Single Institution
 - Inter-institutional Consortia
 - \$15K/y for UG and up to \$20k/y for graduate students. Renewable for 5 years.
 - \$1 – 5M over 6 years depending on track.
 - Typical 15-page proposal research plan and supporting documents. Many require admin letters.
- 22-586 CAREER Proposals Submitted to the Directorate for Education and Human Resources (EHR)
 - Encourages eligible members of the STEM education research community to submit proposals to NSF's CAREER program. EHR invests strategically in research to understand factors and issues that influence STEM learning and education.
 - Novel research with strong emphasis on filling gap in literature and practice.
 - Average award size for RFE is \$400K over 5 years. Award can fund research, trainees, professional development.
 - Typical 15-page proposal research plan.
 - July submission deadline.
- 22-514 Broadening Participation in Engineering (BPE)
 - BPE program aims to support innovative and convergent research, curriculum, collaborations, and strategies in broadening participation and equity as they relate to engineering and the engineering profession.
 - Strong emphasis on theoretical and scientific literature and broadening participation assessment and dissemination efforts.
 - Award is \$100K to \$1.2M depending on pathway
 - Track 1: Planning and Conference Grants
 - Track 2: Research in Broadening Participation in Engineering
 - Track 3: Inclusive Mentoring Hubs (IM Hubs)
 - Track 4: Center for Equity in Engineering (CEE)
 - Typical 15 page proposal.
 - Track 1&2 – rolling submission | Track 3&4 letter of intent September, November submission.
- Research in the Formation of Engineers (RFE) – no call refer to Dear Colleague Letter
 - Supports research on the professional formation of engineers and the design and development of new approaches to engineering education and training.
 - Novel research with strong emphasis on filling gap in literature and practice.

- Average award for RFE is \$350 K for 36 months. Can be bigger by contacting cognizant program officer prior to submission
 - Typical 15 page proposal
 - No letter of intent, no due date, rolling deadlines.
- 22-587 IUSE/Professional Formation of Engineers: Revolutionizing Engineering Departments (IUSE/PFE: RED)
 - Projects include consideration of the cultural, organizational, structural, and pedagogical changes needed to transform the department to one in which students are engaged, develop their technical and professional skills, and establish identity as professional engineers or technologists.
 - \$1-3M depending on the pathway.
 - RED Innovation \$1-3M over 5 years
 - RED Adaptation and Implementation:
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Discussion:

- Conrad: How important is the applicant's education experience? In particular, I have significant BME education experience, but not a lot of "formal" engineering education experience.
 - Jenny: Experience is considered and formal education (PhD in Engineering Education) is not needed. Some grants are more forgiving on background
- Lori: Would it be helpful to add a full professor or starting on getting funding through state/local programs.
 - Jenny: My own experiences is that preliminary data is valued higher than the rank of the professors in the grant. Going after the local/state is a preferred pathway.
- Richard: Frustrating on submitting an IUSE with getting useful, but consistently different feedback.
 - Jenny: It is a common feeling when submitting grants. Keep going and submit by perhaps adjust
- Nicole: Would you recommend applying to serve on review panels even if we have not applied for a grant before?
 - Jenny: Try to get on panels by asking older contacts.
- Ashy: Tangent question, what is your teaching/research/service balance?
 - Jenny: My first grant started as off goodwill. Now, she has capability of getting summer salary and advise on students. She would hire a post-doc in the past.
- Celinda: How do you start mentoring PhD and graduate students through grants?
 - Jenny: I started with a post-doc with engineering education. We both shared a lot of experience and mentoring since they had knowledge on the field. On advising students on a project, I ensure that the projects have both quantitative and qualitative experiences for students. I ensure that the students get the necessary skills.