Overview of the NSF REU Program and Proposal Review

2015 GRC Funding Competitiveness Conference

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The NSF Mission

To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other Purposes.

The NSF Act of 1950 (Public Law 81-507)

- basic scientific research and research fundamental to the engineering process
- programs to strengthen scientific and engineering research potential
- science and engineering education programs at all levels and in all the various fields of science and engineering

Empowering the Nation Through Discovery and Innovation
Strategic Goals

• Transform the frontiers **emphasizes the seamless integration of research and education** as well as the close coupling of research infrastructure and discovery.

• Innovate for society points to the tight linkage between **NSF programs and societal needs**, and it highlights the role that new knowledge and creativity play in economic prosperity and society’s general welfare.

• Perform as a model organization emphasizes the importance to NSF of attaining excellence and inclusion in all operational aspects.
Active research experience is one of the most effective ways to attract talented students to, and retain them in, careers in science and engineering.
History of REU at NSF

• Undergraduate Research Participation (URP) program launched in 1958; was zeroed out in 1981 budget
• Reinstituted in 1987 as Research Experiences for Undergraduates (REU)
• Single program announcement; funding and management distributed across NSF directorates
• Encompasses all areas of research normally supported by NSF
• Additional investments in undergraduate research through other NSF programs
REU Characteristics

- A “cross-cutting” program, managed and budgeted within the various NSF research units instead of centrally
- Program officer for REU in each NSF research unit (generally)
- The REU Team (= REU program officers from the research units) discusses NSF-wide policies for the program and revises the program announcement periodically
More Characteristics

• ~500 REU Sites running each year, involving ~5,000 undergraduates

• ~1,800 REU Supplements running each year, involving ~3,500 undergraduates

• Disciplines with the most REU Sites: biological sciences, materials science, chemistry, physics, engineering
In REU grants, the $$ should be focused on support for the student participants.
Funding Mechanisms

• REU Sites
  Grant to support a group of students in a research area, in response to a specific proposal to establish an REU Site

• REU Supplements
  Support for one or two students within an NSF-funded research project, in response to a PI’s Request for Supplemental Funding or a special request within a regular research proposal
REU Sites

- Award to an organization specifically to support a group of students (8-10) in a research area
- Implemented as a formal annual proposal competition within research units NSF-wide
- Research area may be a single discipline or an interdisciplinary/multidisciplinary area with a *coherent intellectual theme*
- Sites design and run student selection process
- Site experiences are usually 8-10 weeks in summer, but academic-year sites are also OK
- Sites use awards to provide stipends for students, plus help with expenses for housing, food, travel, etc.
- Significant fraction of students come from outside the host institution
- Typical grant: $70k-$120k per year for 3 years
Interdisciplinary/Multidisciplinary REU Sites

- Coherent intellectual theme is important.
- Questions about appropriateness or submission? Contact NSF REU program officer in the relevant research unit(s).
- Submit (usually) to the NSF research unit corresponding to the discipline/department…
  1) of the majority of the student research projects, or
  2) of the main PI.
- REU program officer in receiving unit decides best way to handle proposal. Proposal might be reviewed/funded by more than one NSF research unit.
REU Supplements

- Support for (usually) one or two students within an NSF-funded research project
- Students usually from host institution
- Request either as a supplement to an active NSF grant, or within a regular (new or renewal) research proposal
- For advice, contact program officer assigned to the active NSF grant or program officer who manages the relevant research program
- Not appropriate for education grants, except education research
REU Sites vs. Supplements

**REU Sites**
- Group of students with group activities
- Variety of research projects, maybe NSF-funded or maybe not
- Choice of mentor or project
- Most students not from host institution

**REU Supplements**
- Usually one or two students
- Research within an NSF-funded research project
- Position tied to particular mentor or project
- Students usually from host institution
Typical Features of REU Sites

• Students experience cutting-edge research with modern equipment/tools in first-rate facilities/settings.

• Activities foster student–faculty interaction, student–student communication, and collegial relationships.

• Group activities (mini-courses, seminars, field trips, etc.) contribute to a “cohort experience” for students.

• Research mentors (faculty, postdocs, graduate students) are experienced or well-trained in mentoring undergraduates.

• Students are involved in designing their research projects.
More Typical Features

• Students develop…
  ▪ deeper knowledge the research process and “culture” of their discipline,
  ▪ understanding of career pathways and graduate school in S&E, and
  ▪ writing, communication, and presentation skills.

• Students co-author articles, prepare posters, and give presentations at student research symposia and often at regional or national professional meetings.
REU Students

- Talented undergraduates who are prepared enough to participate actively in research
- Mostly juniors and seniors (historically true, but not required by NSF)
- Students who might not otherwise have the opportunity to do research, particularly students from colleges where research programs are limited
- NSF strongly encourages participation by women, underrepresented minorities, and persons with disabilities
- Citizens or permanent residents of the U.S. or its possessions (required)
Recruitment Strategies

• Recruit from community colleges near the university hosting the REU Site

• Recruit from Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Minority Serving Institutions (MSIs), or Tribal Colleges and Universities (TCUs)

• Recruit through professional societies and conferences
Other NSF Programs That *Explicitly* Support Undergraduate Research

- Research in Undergraduate Institutions (RUI)
- Engineering Research Centers (ERC)
- Materials Research Science and Engineering Centers (MRSEC)
- Louis Stokes Alliances for Minority Participation (LSAMP)
- Undergraduate Research Collaboratives (URC)
- Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)
- Tribal Colleges and Universities Program (TCUP)
PROPOSAL PROCESSING
Who Reviews?

Experts in:

• General disciplinary content

• others as appropriate for the set of proposals submitted

Experts from:

• Research-1 institutions

• Mid-sized, primarily undergraduate and research-intensive institutions

• Small, liberal arts institutions
The PI Receives…

Reviews

Panel Summary (if applicable)

Context statement & Award/Declination letter

Dear Dr. Doe,

The National Science Foundation hereby awards a grant of...

Dear Dr. Doe,

I regret to inform you that the National Science Foundation is unable to support your proposal referenced above...
Guiding Principles

• All NSF projects should be of the **highest quality** and have the potential to advance, if not transform, the frontiers of knowledge.

• NSF projects, in the aggregate, should contribute more broadly to achieving societal goals.

• Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects.
Rankings

• **Excellent:** an outstanding proposal in all respects; deserves highest priority for support

• **Very Good:** high-quality proposal in nearly all respects; should be supported if at all possible

• **Good:** a quality proposal, worthy of support

• **Fair:** proposal lacking in one or more critical aspects; key issues need to be addressed

• **Poor:** proposal has serious deficiencies
Merit Review Criteria

- **Intellectual Merit:** encompasses the potential to advance knowledge

- **Broader Impacts:** encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes

*NSF Grant Proposal Guide:*
Intellectual Merit

• Importance to advancing knowledge and understanding
• Creative, original, and/or potentially transformative
• Proposers’ qualifications
• Sufficient access to resources
• Proposed activity well-conceived and organized
• Data management plan
• Post-doc mentoring plan, if applicable
• Evaluation
Broader Impacts

- Promote teaching, training, and learning?
- Enhance the infrastructure for research and education? Partnership development?
- Disseminate results broadly?
- Benefit society?
PROPOSAL WRITING TIPS
What Makes a Proposal Competitive?

- Original ideas
- Succinct, focused project plan
- Realistic amount of work
- Sufficient detail provided
- Cost effective
- High impact
- Knowledge and experience of PIs
- Contribution to the field
- Rationale and evidence of potential effectiveness
- Likelihood the project will be sustained
- Solid evaluation plan
Tips for Success

• Be aware of other projects and advances in the field
• Cite the literature
• Provide details
• Discuss prior results as applicable
• Include evaluation plan with timelines and benchmarks
• Put yourself in the reviewers’ place
• Consider reviewers’ comments if resubmitting proposal
• Have someone else read the proposal
• Spell check; grammar check
• Call or email NSF Program Officers
Contact Information

For guidance on requesting an REU supplement for an existing NSF grant or cooperative agreement, contact the cognizant program officer for that grant or cooperative agreement. For guidance concerning an REU supplement as part of a new or renewal proposal to NSF, contact the program officer for the research program to which the proposal will be submitted.

http://www.nsf.gov/crssprgm/reu/reu_contacts.jsp