Funding Opportunities at NSF to Transform Your Department: Strategies for Faculty Development and for Writing Successful Proposals.

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BIO - Division of Biological Infrastructure

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Some BIO Priorities

Brain Research through Advancing Innovative Neurotechnologies (BRAIN)

National Ecological Observatory Network (NEON)

Plant Genome Research Program (PGRP)

Dimensions of Biodiversity (DoB)

Projects at Interface of Biology, Mathematics, and Engineering (BIOMAPS)

New: Enabling Discovery through Genomic Tools (EDGE)

Crosscutting: Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS)
Division of Molecular and Cellular Biosciences (MCB)

• Supports research aimed at understanding life processes at the molecular, subcellular and cellular levels
  - Biomolecular Dynamics, Structure, and Function
  - Cellular Processes
  - Genetic Mechanisms
  - Networks and Regulation
Division of Integrative Organismal Systems (IOS)

- Supports research aimed at understanding the living organism -- plant, animal, microbe -- as a unit of biological organization
  - Behavioral Systems
  - Developmental Systems
  - Neural Systems
  - Physiological and Structural Systems
  - Plant Genome Research Program
Division of Environmental Biology (DEB)

- Supports fundamental research on the origins, functions, relationships, interactions, and evolutionary history of populations, species, communities, and ecosystems

  - Ecological Biology
  - Ecosystems Science
  - Population and Evolutionary Processes
  - Systematic Biology and Biodiversity Inventories
Division of Biological Infrastructure (DBI)

- Research Resources Cluster
  - Advances in Biological Informatics
  - Collections in Support of Biological Research
  - Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Labs
  - Instrument Development for Biological Research
  - Advancing Digitization of Biodiversity Collections
  - Major Research Instrumentation

- Human Resources Cluster
  - Postdoctoral Research Fellowships in Biology
  - Research Coordination Networks: Undergraduate Biology Education
  - Research Experiences for Undergraduates (site or supplement)
Funding Opportunities

• Faculty/Institution Focus
  - Research at Undergraduate Institutions (RUI)
  - Faculty Early Career Development (CAREER)
  - Research Opportunity Award (ROA)

• Undergraduate research and education
  - Research Experiences for Undergraduates (REU)
  - Research Coordination Networks – Undergraduate Biology Education (RCN-UBE)
  - Improving Undergraduate STEM Education (IUSE: EHR)
Research at Undergraduate Institutions (RUI)

- Designed to support Research at Predominantly Undergraduate Institutions (PUI)
- RUI is a mechanism, not a separate funding stream
- ~10% of proposals submitted to BIO research programs are RUIs
- “RUI” should be designated in the title of the proposal
- Five page (max) “RUI impact statement” must accompany proposal
Faculty Early Career Development (CAREER)

- NSF's most prestigious award to junior faculty who exemplify the role of “teacher-scholar”
- NSF-wide: all disciplines, including cross-disciplinary
- In BIO, faculty are funded at a minimum of $500,000 for 5 years
- Proposals are submitted to the research programs (‘core”) with deadlines in July each year
- Faculty early in career (assistant professor), read solicitation for other eligibility requirements
Research Opportunity Awards (ROA)

- Funded as supplements to active NSF grants
  - Salary or stipend for undergraduate faculty
  - Travel to host lab and/or to attend a meeting
  - Research supplies

- Provide support for faculty from PUIs to participate in ongoing, NSF-funded research projects for limited periods, usually a summer

- Goal -- Provide research experience for faculty to enhance research at home institution and host lab, improve research & teaching

- Making connections with an NSF grantee:
  - Network at scientific meetings
  - Consult NSF FastLane list of awards in relevant program
  - Contact NSF Program Director in your area of interest
  - Consult the NSF web site for contact information
REU Site: Research Experiences for Undergraduates

- NSF-funded programs run by institutions
- NSF-wide: all disciplines, including cross-disciplinary
- Typical program: 10-weeks; 10 students; summer
- Main focus: research plus orientation, lab prep, workshops, seminars, presentations, etc
Research Coordination Networks in Undergraduate Biology Education (RCN-UBE)

• **Goal:** “focus on any topic likely to lead to improved participation, learning, or assessment in undergraduate biology curricula”
  - active and inquiry-based learning
  - engage faculty in professional development
  - incorporate new fields into the biology curriculum
  - improve assessment of student learning
  - improve transition from 2-year to 4 year institutions
  - incorporate authentic research experiences into undergraduate laboratory courses

• **Incubator awards** ($50 K) and **Full awards** (up to $500K for five years)

*Current solicitation is NSF 15-527.*
Improving Undergraduate STEM Education (IUSE: EHR)

- Replaces TUES, STEP, and WIDER programs
- Program Solicitation Check Website

Program Goals:

- Improve STEM Learning & Learning Environments - Improve the knowledge base for defining, identifying, and innovating effective undergraduate STEM education teaching and learning

- Broaden Participation & Institutional Capacity for STEM Learning - Increase the number and diversity of undergraduate students

- Build the Professional STEM Workforce for Tomorrow - Improve the preparation of undergraduate students
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<td>Exploration</td>
<td>Design and Development</td>
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What NSF Does NOT Normally Support

• Research with disease-related goals, including work on the etiology, diagnosis or treatment of physical or mental disease, abnormality, or malfunction in human beings or animals (except for research in bioengineering)

• Animal models of such conditions or the development or testing of drugs or other procedures for their treatment
How to Get Started

• NSF Home Page
• Previous funding decisions
  • Volunteer to review - and do it!
• Interact and collaborate with successful PIs
  • Have others read and give you feedback…
• Finish writing a draft (early!), *then let it sit for a day or two before revising*…
• Critical: Proposal needs to get off to a good start and also close well (make an impression!).

Panelists in particular are reading many proposals…

• Submit - then resubmit if necessary!
Program Announcements/Program Solicitations: What to Look For!!

- Program Goal(s)
- Eligibility Requirements
- Special Requirements
- Deadline/Target Date
- Cognizant Program Director
Proposal Development

What do you intend to do?

Why is the work important?
These need to be effectively frontloaded!

What has already been done?
Relevant background… what important gaps in knowledge need to be filled?

How are you going to do the work?
You are the only one who can!
(planning, feasibility…)

In a Nutshell:

NSF Proposal & Award Process & Timeline

- NSF Announces Opportunity
- GPG Announcement Solicitation
- Org. submits via FastLane or Grants.gov
- NSF
- Research & Education Communities

Proposal Receipt at NSF: 90 Days
Proposal Receipt to Division Director Concurrency of Program Officer Recommendation: 6 Months
DGA Review & Processing of Award: 30 Days
Award
DD Concur
Organization
Decline

Minimum of 3 Reviews Required
Mail
Panel
Both

Award Via DGA
A Good Proposal

A good proposal is a good idea, well expressed, with a clear indication of methods for pursuing the idea, evaluating the findings, and making them known to all who need to know.

A Competitive Proposal is...

- All of the above
- Appropriate for the Program
- Responsive to the Program Announcement
What Makes a Proposal Competitive?

- New and original ideas
- Sound scientific rationale
- Critical approach
- Likely high impact
- Succinct, focused project plan
- Relevant preliminary data!
- Experience in essential methodology
- Clarity concerning future direction
- Knowledge of subject area / relevant work
- Includes a timeline
- Organization and clarity of expression, “flow”
Competitive Proposal Writing: Getting Started

• Take your best research ideas for which you have some preliminary data
• Develop hypotheses and experiments to take the next step(s).
• Consider feasibility in a 36 to 60 month window
• Consider what assistance you will need given teaching and other time commitments
• Prepare a plan of attack
Getting Started, Cont’d

• **Communicate** with a program officer
  - Assist in program selection
  - Provide advice about how to proceed
• Examine prior NSF awards in similar areas
  - Contact PI with record of success
  - Link to award information through
    - **BIO Award Search**
    - Search by subject, institution, PI name
Proposal Preparation

Grant Proposal Guide (GPG)
- Found in the new Proposal and Award Policies and Procedures Guide (PAPPG)
  http://www.nsf.gov/funding/
- Guidance for proposal preparation & submission
- Review process and criteria
- Withdrawals, returns, and declinations
- Award process and procedures
- Grant administrative highlights

FastLane
- NSF electronic business system
- Proposal Submission
  - Grants.gov
- Information source - "Proposal Status"
- Access to Reviews
- Post-Award:
  - Requests and Notifications
  - Reporting
What to Look for in a Program Announcement

Read the Program Announcement Carefully

Pay special attention to:

- Goal(s) of program
- Eligibility
- Special requirements

For any questions...
email or call your Program Officer
NSF invests in the best ideas from the most capable people, determined by competitive merit review.

Two Merit Review Criteria:
- Intellectual Merit
- Broader Impact
Two NSF Merit Review Criteria

- **Intellectual Merit**
  - How important is the proposed activity in advancing scientific knowledge and understanding?
  - How well qualified is the proposer (PI) and team?
  - How well conceived and organized is the proposed activity?
  - What is the quality of the prior work?
  - Are the resources available to successfully complete the project?
  - To what extent does the proposed activity suggest and explore creative, original, or potentially TRANSFORMATIVE concepts?

- **Broader Impacts**
  - Graduate student and postdoctoral training alone is typically just average!!
  - Discovery while promoting teaching, training and learning
  - Broadening participation
  - Enhancement of infrastructure for research and education
  - Dissemination of results to enhance scientific and technological understanding
  - Outreach to enhance public awareness
  - Societal benefits, etc.

The most competitive proposals will be OUTSTANDING in BOTH Intellectual Merit and Broader impacts.

- PUIs particularly well positioned to excel in this category given the nature of the dual mission and our impact on the scientific workforce!
Advice to Panelists: Merit Review Criteria

**Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge;

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

The following elements should be considered in the review for both criteria:

1. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
2. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
3. How well qualified is the individual, team, or organization to conduct the proposed activities?
4. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

The panel summary must address both criteria!
How Does NSF Identify Reviewers?

- Program Director’s knowledge
- NSF reviewer database
  - Invited panelists
- Professional society meetings
  - Professional journals
- Literature cited in the proposal
  - Suggestions by the PI
  - Not your friends...
- Volunteers
Get Involved: Participate in a Panel

- Contact your program director
- Offer to serve as an ad hoc reviewer and/or panelist
- **E-mail** your CV to your program director
- Include your contact information
- Indicate your areas of expertise
- Follow up with a **phone call**
- **Be persistent, but polite and pleasant**
Some Insights

- What determines funding chances?
  - Reviews
  - Panel discussion
  - NSF and Program Priorities
  - Program Portfolio

- Contact your program director
  - Cultures, practices, and funding priorities vary across NSF

- Solid science alone is not enough.
  - Exciting, cutting edge science
  - Innovative Broader Impacts
  - Program priorities

- Some luck and some planning.
Common Criticisms

• No compelling rationale
• No proof of concept
• Not “hypothesis based”
  • Over ambitious
• Incremental science/lacking novelty
  • Insufficient detail
• Inexperienced PI/grantsmanship issues
  (don’t wait until page 9 to reveal your specific aims!! Don’t submit a 10 page proposal when the page limit is 15…)
Anticipate Criticisms

- Suggest alternative approaches
- Explain limitations
- Describe the role of each collaborator
- Emphasize specific qualifications and unique features of your proposal...is there impact beyond your research niche (research, education...)?
DO!

- Talk with your Program Director
- Anticipate objections or criticisms
- **Justify** your budget request
- Follow the rules
- Give yourself plenty of time
- Resubmit, if necessary

Do NOT!

- Avoid your Program Director
- Be greedy ... or timid
- Propose too much work
- Give up!
1. Get help with proposal writing

• Read:
  - NSF publications
  - Successful proposals

• Look before you leap:
  - Serve as a reviewer (ad hoc or on a panel)
  - Read successful proposals

• Talk with people:
  - Program Directors- general advice
  - Former “rotators”
2. Start early and don’t be shy

- Write
  - Rewrite
    - rewrite again

- Get critiques from:
  - Mentors
  - Previous NSF program officers

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This is absolutely, positively the last rewrite!
3. Be reasonable

• Be aware of the scope:
  - “Too ambitious” vs. “Too narrow”

• Be honest and up-front:
  - Address issues instead of trying to hide them
  - Acknowledge possible experimental problems and suggest alternatives/work-arounds
4. Make it easy for the reviewers

- Make the best first impression.
  - You never get a second chance to make a first impression.
  - Project Summary and the first page of Project Description are critical.

- Simplify and streamline:
  - Make sure you get your overall idea across!
  - Prepare clear photos, graphs, etc.

- Pay attention to details:
  - Spill check and proof-read
  - Make the font size as big as you can (within guidelines)
5. Broader Impacts should be as rigorous as the research plans

• Innovative and creative
• Integration with research
• Thoughtful plans
  - ‘Will teach a course’ is not enough.
  - Be careful about “will make it available on the web”
  - K-12 educational plans- who will use them?

• Evaluation /Assessment
  - Critical component
  - Find a collaborator
6. If a proposal is declined

- Stay calm!
  - Take ten... breaths, hours, days
  - Examine the criticisms carefully
- Keep in touch:
  - E-mail, call, or visit your program director
- Rapid resubmission does not help!
  - Take time to self-evaluate the proposal and the project
Guidelines for Writing Competitive NSF Proposals

• “Propose a brilliant idea.”
• “Read Grant Proposal Guide and Program Solicitation.”
• “Strategize, network, and work from your strengths.”
• “Address both review criteria!”
• “Seek help with proposal writing.”
• “Integrate education and research activities.”
• “Write for the right audience.”
• “Do not irritate the reviewers.”
• “Do not kill/strangle your ideas (with some exceptions).”
• “Do not steal (present your views, don’t be afraid to be different).”
In Summary

“Start early.”

“Read the Grant Proposal Guide and Program Announcement.”

“Discuss the broader impacts.”

“Get feedback from your colleagues.”

“Write for the right audience.”

“Provide justification for activities proposed.”

“Contact your Program Officer.”
REMEMBER!!

• Proposals should be cogent, appropriate, and justified
• Anticipate and invite criticisms from others
• Study reviews carefully (award or declination)
• Anticipate some frustration (remember success rate)
• If declined - contact your program director after reading your reviews (take some time to think about them), the panel summary, the context statement
• If awarded - follow up on reporting and find out about supplemental funding (stay in touch with PD)
Questions?

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