NC STATE UNIVERSITY

Research Grant Proposals 101

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Research Funding Reality

- The nation needs more top-level scientists, engineers, teachers, nurses….
- At the graduate level, research IS education.
- Research is growing more expensive (people, labs, equipment, other infrastructure).
- Stable higher education funding from state budgets is rapidly dwindling.
- Successful corporate scientists and tenure-track faculty at research institutions must secure funding to support their laboratories and support their graduate students.

Research Funding Reality

Ergo….

- Obtaining funding for research and graduate study is growing more and more competitive.
- Much more is expected by reviewers and agencies.
- You can gain a competitive edge by learning the art of proposal development.

Proposal Guidelines

- Government research funding is awarded to winning proposals received in response to solicitations.
- Winners are (usually) chosen by peer review panels who advise government program officers.
- Solicitations detail specific requirements and guidelines.
- Policy guides detail agency-wide requirements and guidelines.
  - NSF Grant Proposal Guide: nsf.gov/publications/pub_summ.jsp?ods_key=gpg
  - NIH Grant Proposal Basics: grants.nih.gov/grants/grant_basics.htm

Reading the Solicitation

- Who are the sponsors and what are they trying to accomplish?
- When is the application due?
- What are eligibility requirements?
- Apply through university or as individual?
- What does the fellowship/grant pay for?
- Can fellowships be used at the institution of your choice?

Reading the Solicitation

- How many awards will there be?
- What are the evaluation criteria?
- What are the required components of the application?
- What is application process?
- How do you contact the program officer by e-mail or phone if you have questions?

Fellowship Proposal Components

- Biographical information
- GRE scores
- Transcript
- Letters of Reference
- Essays/Proposal
  - Discussion of proposed research
  - Often, discussion of one or more research experiences
  - Sometimes, other questions

Research Proposal Components

- Forms
- Abstract or Summary
- Narrative
- References
- Budget and Justification
- Letters of Commitment
- Facilities & Equipment
- Usually several other appendices/data tables

Fellowship Proposals Answer:

- Will you further the goals of the funder?
- Will you be a successful graduate student and researcher?
  - Do you understand the research process?
  - Do you do your homework? (i.e., read the literature in your area, understand previous work)
  - Can you express your ideas well?
- Is your selected area of research something they want to support? (varies in importance depending on mission of funder)
- Are you one of the best candidates in the applicant pool?

Research Proposals Answer:

- What do you want to do, how much will it cost, and how much time will it take?
- How does the proposed project relate to the sponsor's interests?
- What difference will the project make to: your university, your students, your discipline, the state, the nation, the world, etc.?

Research Proposals Answer:

- What has already been done in the area of your project?
- How do you plan to do it?
- How will the results be evaluated?
- Why should you, rather than someone else, do this project?

NSF Review Criteria

- Intellectual Merit
  - Significance, transformative research
  - Qualifications of the researchers
  - Infrastructure available to ensure success
- Broader Impacts
  - Significance of the research to broader field
  - Impact on society
  - Integration of research and education
  - Enhancement of diversity
- Specific questions for reviewers to consider for this opportunity.

Submission Deadline

- Be realistic about whether you have enough time.
- Most proposals can only be submitted on-line by your institution; paper submissions must be signed, copied, and shipped.
- The Real Deadline: Subtract 5 days for university/college review and approval and 4 days for Grants.gov acceptance (2 days for FastLane). Note deadline HOUR.
- Know policy on late submissions, exceptions, mail delays.
- Find out how funder will notify you about receipt/status.
- **Get familiar with Grants.gov and NSF FastLane forms early.** They're complicated.

Contact the Funder

- Identify the appropriate project officer.
- Contact by phone or e-mail.
- Prepare an executive summary beforehand.
- See guidance on appropriate areas of interest.
- Find out how proposals are reviewed and decisions are made.
- Learn about budgetary requirements and preferences (matching funds, timing of reviews, start dates, etc.).
- You can’t hurt your chances by asking questions.

Writing Strategies

- Outline the RFP in detail.
- Make special note of “do nots.”
- Create a schedule you can stick to:
  - Meetings
  - Section deadlines
  - Draft reviews
  - Support materials
  - Vacations and other competing events
  - University internal processing time required
  - Final deadline
- Good proposals are 90% planning, 10% writing.

Writing Strategies

- Start early. Make a schedule and stick to it.
- Expect Murphy's Law to rule!
- Write in a scholarly style.
  - Make it clear you understand your subject.
  - Cite references.
  - Avoid passive voice.
  - Avoid 1st person.
- Make it clear that you understand the research process.
  - Clarify hypothesis, goals, objectives, strategies, outcomes.
  - Discuss your planned approach with sufficient detail to show your understanding of the topic.

Good Writing: More than Mechanics

- Do your homework and demonstrate your knowledge.
- Be organized and clear.
- State the important points up front, but stick to the required format.
- For research proposals, state your hypothesis and goals clearly.
- Explain what you will do and the logic behind your plan.
- Check spelling, grammar, and follow format requirements.

What's Your Research Project?

- Clarify the purpose of your project.
- Write a concise mission statement.
- Define the scope of work to focus your search.
- Determine broad project goals.
- Identify specific objectives and strategies that define how you will focus work to accomplish your goals.
- Decide who will benefit.
- Draft expected project outcomes (measurable).

Parts of a Proposal

- Cover Page
- Abstract or Project Summary
- Table of Contents
- Project Narrative
  - Introduction (mission statement, purpose, significance)
  - Background (including literature survey)
  - Description of Proposed Research (objectives, methods, approach, outcomes, evaluation, timeline, project mgmt.)
- References
- Biographical Sketches, Current & Pending, Conflicts of Interest
- Facilities & Resources
- Budget

Project Summary

- Most important single element in proposal.
- Speaks for the project—many uses.
- Informative description for general technical audience
- Includes project title, PI's name & institution
- Succinct summary of project mission, key objectives, projected outcomes, preliminary data, partners, etc.
- Broader Impacts and Intellectual Merit (NSF)
- 3rd person (no I, me, my, we, our)
- Appears first, but write it last.

Project Narrative

- Introduction
  - Mission
  - Introduction—context of the problem—how project will advance the field or provide solution.
- Background (may be unnecessary)
  - Clarify the problem and what has been accomplished (lit search, your previous work)
  - Show what's missing—why the previous work needs to continue.
  - Give evidence of your (or your team's) competence in the field.

Example: Mission

To develop an interdisciplinary research program to build a deeper understanding of how the human and marine worlds respond to *Vibrio* bacteria, and to tackle the global problem of *Vibrio* infections in the human and marine environments.

Project Narrative

- Description of Proposed Research
  - Goals
  - Approach
    - Focus of the research (define the limits; pose specific questions, especially in exploratory projects)
    - Assumptions or hypotheses the research method rests upon (be explicit)
    - Objectives and strategies
    - Outcomes (measurable)
    - Timeline

Example: Goals

- Goal 1: Investigate how *Vibrio* genomes have evolved and restructured.
- Goal 2: Determine targets in the *Vibrio* quorum sensing pathway to control virulence.
- Goal 3: Develop therapeutics to inhibit biofilm formation and dispersal.

Example: Objectives

Measurable (yes/no; quantitative/qualitative)

2.1 Identify signal transduction pathways critical for *Vibrio* virulence, persistence, and adaptability.

2.2 Integrate state-of-the-art structural biology and computational studies to examine pathways in detail and provide at least three therapeutic targets for drug design specialists to exploit.

Example: Outcomes

- Milestones or Deliverables (not processes or tasks)
- Gantt chart or other graphic showing quarter/year.
- Examples:
  - Identified critical signal transduction pathways critical for *Vibrio* virulence, persistence, and adaptability
  - Identified therapeutic targets
  - Annual report to funding agency
  - Learning outcomes
  - Events (symposia, training workshops, conference, etc.)
  - Student outcomes (count, demographics, degrees awarded, etc.)

Example: Milestone Chart

Task	Milestone/Target	Year 1		Year 2		Year3		Year 4		Year 5	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
3.3.1	**Estimates of endemic HuNoV disease burden**										
	A. Veterans Affairs										
	Develop protocol, identify collaborators, complete IRB/human subjects review										
	Stool and data collection from patients										
	Complete laboratory analysis of stools										
	Analyze data and preapre manuscript on burden in this adult population										
	B. New Vaccine Surveillance Network										
	Continue collection of stool specimens and clinical data from at least 3 sites										
	Complete laboratory analysis of stools										
	Analyze data and prepare manuscript on burden in children										
	C. FoodNet										
	Develop protocol, identify collaborators, complete IRB/human subjects review										
	Implement protocol to collect/test stools										
	Complete laboratoy analysis of stools										
	Analyze data and prepare manuscript on burden										
	D. Administrative Data										
	Complete analysis and prepare manuscript of mortality data										
	Analyze ambulatory administrative datasets										
	Prepare manuscript of ambulatory administrative data										
3.3.2	**Estimates of epidemic HuNoV disease burden**										
	Implement enhancements to NORS and CaliciNet										
	Compile outbreak data reported through NORS and CaliciNet										
	Prepare surveillance summary on epidemic burden and attribution fractions										
3.3.3	**Preliminary HuNoV epidemiological attribution model**										
	Review of data collected and available literature to define attributable fractions										
	Perform sensitivity and scenario analyses										
	Prepare final attribution model										

Project Narrative

- Personnel Section
  - Position, role, and level of effort for each team member.
  - Student involvement (paid or unpaid)
  - Administrative support (if any)
  - Organization Chart (if team is complex): show lines of responsibility, research thrusts, administrative support, advisory committees, etc.
- Evaluation Plan—3-column table
  - Measurable objectives and outcomes
  - Evaluation questions
  - Evaluation methods

Project Narrative

- Be realistic in designing the program of work.
- Most frequent reviewer comment: “Research plan should be scaled down to a more manageable project that will permit the approach to be evaluated and form the basis for further work.”
- Break into phases if one phase is dependent on completion of another. Anticipate aggressive/dumb questions.
- Be specific about the means of evaluating the data/conclusions.
- Connect objectives and methods. Go ahead and state the obvious. Show interdependencies.

References

- Number in order of first reference in the text.
- Use superscript in text, outside of punctuation.
- List authors' first names first.
- List all authors.
- Be consistent, regardless of which style you choose.

Facilities and Resources

- Depends on project.
- Details resources available to this project.
- May include investigator or shared institutional resources:
  - Laboratory, office, or meeting space,
  - Field stations
  - Equipment
  - Cyberinfrastructure
  - Institutional demonstrated competence in the pertinent area
  - Support services that will benefit the project
- Answers the “why here” question.

Biographical Sketches

- Follow agency rules. See solicitation or proposal guide.
- Follow page limits.
- Use same font, margin, and spacing restrictions as narrative.
- No personal data (marital status, hobbies, civic activities)
- Make sure publications are in consistent, correct bibliographic format.
- List most relevant publications first.
- Consistently format and proof all biosketches.This takes time!

Budget

- Cost projection. Likely to be renegotiated.
- Window into how project will be implemented and managed.
- Reflects careful planning.
- Include only things the funder will support.
- Use forms provided.
- Can the job be accomplished with this budget?
- Are costs reasonable for the market?
- Is budget consistent with proposed activities?
- Level of detail and explanation specified in OMB Circular.
- Get help from your college research office EARLY.

Other Supporting Materials

- Read RFP carefully to determine what is required and what is not allowed.
- Make a checklist.
  - Current and Pending Support
  - List of conflicts of interest
  - Letters of commitment or support
  - Data tables
  - Human or animal subjects
  - Other relevant and unbiased information
- Plan ahead to get these done.

Rule #1

Your application must be complete in itself.

- If it's not complete, it may not be reviewed at all.
- Include all required special sections and forms.
- Use appendices well and only when allowed.

Rule #2

Make it easy for reviewers.

- Mirror the solicitation requirement structure. Use consistent outline format.
- Write to the review criteria.
- Use bold subheadings that point to specific review criteria.
- Cross-reference, label, and number everything.
- Don’t expect reviewers to follow links to websites.

Rule #3

Play it straight.

- Confront potential problems and offer alternative strategies.
- Don’t pad biosketches/CVs.
- Don’t intentionally over- or under-estimate the budget.
- Don’t indulge in blatant self-promotion.

Rule #4

Read & carefully follow instructions

- Basic format of RFP/PA (section headings, etc.)
- Follow special requirements of the solicitation.
- Adhere to special deadlines: LOI, Pre- or Full proposals.
- Comply with special submission instructions.

Rule #5

Don’t work in a vacuum.

- Read a successful similar application.
- Ask successful investigators to critique your draft.
- Expert consultants should read only relevant portions.
- Allow ample time for feedback and revision.

Rule #6

Be aware of policies, procedures and current research.

- Not all policies and procedures are in the solicitation.
- Subscribe to modifications to solicitations via email alerts.
- Stay abreast of newly released research results that could impact your project.

Rule #7

Work with your college research office EARLY.

- Remember that your college research office is **the** signature authority on all NC State proposals and MUST actually submit the proposal
- Know and follow your college's lead time requirements for internal review/approvals in PINS.
- They work 8-5. Your inability to plan does not constitute an emergency for them.

Rule #8

Minimize distractions.

- Stay within the page limits, font restrictions, and line spacing minimum.
- Make it visually appealing: white space, font size, charts, tables, illustrations. Include graphics to clarify how it all fits together.
- Pay attention to citation numbers and form.
- Get somebody good to editt for grammar, speling, redudancy, and organazation.

Rule #9

Submit on time!

- Note the date and the hour of the deadline.
- Be aware of time zone differences.
- Remember that it's not submitted till it's accepted by Grants.gov/FastLane and the funding agency.
- Grants.gov will not accept proposals with "errors." Leave time to receive notices of errors and to correct them.

Rule #10

Learn from failure. You'll succeed!

- No one likes to be rejected. But everyone wins some and loses some.
- Take a few days to process your emotions and clear your head.
- Study reviewers' criticisms & summary statement.
- Decide if problems are reparable. Contact P/O?
- Revise, attending to each criticism.
- Keep a positive tone and attitude.
- Resubmit!