NATIONAL INSTITUTES OF HEALTH NRSA F30 & F31

Tips for Writing the Research Training Project Strategy

You are ready to begin your NIH F31 fellowship application! Of all the documents you will submit, the Research Training Project Strategy is the centerpiece. Here, Graduate Writing Lab Fellows and recipients of the F31 have collected their key guidance and tips.

NOTE: Application changes starting January, 2025

Starting for applications submitted on or after January 25, 2025, the NIH is adjusting the application components and review criteria. The broad changes are explained here, and the details are explained in the Instructions (Version I). It will likely take a few application cycles to understand exactly how these changes will affect applications and the review process. We don't expect these to have a major effect on the Research Strategy, but this document is now framed as primarily a training document—hence the change from its pre-2025 title as "Research Strategy" to the new title "Research Training Project Strategy."

While we wait for more information about these changes, give yourself extra time to work on your application materials! We still recommend drawing inspiration from example past applications, but double-check the new application guidance to ensure that you are adhering to the current program requirements and tailoring your application to the program's current priorities.

Know Your Audience

Send your application to the institute with a mission that best aligns with your research goals.

- The NIH is composed of 27 distinct institutes with specific biomedical research agendas.
- You can determine the best institute for your project through institute webpages, asking your advisor where they normally send their grants, pitching your project to Program Officers, and using tools like NIH RePORTER (type in keywords or an abstract and see which institutes fund similar projects).
- Some institutes have unique application instructions or requirements, so check the target institute's Funding Opportunity Announcement (FOA).
- Highlight throughout your application how it addresses the institute's mission.

Identify the appropriate study section to review your application using the Assisted Referral Tool (ATR) from the NIH.

Title Your Application

Titles should be as concise as possible, but should also include enough detail to cover the main points and implications of the study. Avoid unnecessary adjectives or redundant words.

Start by choosing keywords from your research project that also align with your target institute's stated priorities and/or hot topics in your field.

Titles are usually phrased as *goals*. For example, a common formula is "*Verbing [e.g., "determining" or "elucidating"] the role of X in Y context*." If you're developing a new method or one key method in your project is very hot in your field right now, you may also briefly mention that method in your title.

Formulate Specific Aims

Most F30/31 applications will be 2-3 aims. The one-page Specific Aims document gives an overview of the goals and significance of the proposal as a whole and briefly outlines the aims.

Target your aims to test a central hypothesis

- Start your Specific Aims page with an introductory paragraph that identifies your research problem and convinces your readers that it is an important problem to solve (i.e., the problem is relevant to the institute's mission and solving it will advance the research area, with immediate or long-term implications for human health). Either within this paragraph or a subsequent one, state the overarching hypothesis and main goals for your proposal.
- NIH reviewers are trained to prefer hypothesis-driven work. A clear hypothesis gives your reviewers something to measure your aims against in a relatively straightforward way.
- Your hypothesis should be specific and directly testable with the experiments you propose.

Make your aims related but independent

- Specific aims should work towards the common goal of the proposal, but should also be *independent* from each other (i.e., if Aim 1 fails, you should still be able to pursue Aim 2).
- Aims can be based on defining a mechanism (hypothesis-driven) or characterizing a phenomenon (usually less hypothesis-driven). A mix is fine, but proposals that are composed entirely of characterization aims are usually not reviewed favorably.

Phrasing your aim titles

- Try to make your aim titles active sentences. Common phrasings include: "Assess whether...", "Determine/elucidate the mechanism of...", "Examine how...", "Design a..."

Consider breaking up aims into subaims

- Many students prefer to break their specific aims down into 2-3 subaims, which allow for further definition of sub-hypotheses and goals.
- Organizing your project into subaims allows reviewers to refocus each time they get to a new sub-aim. Subaims can also give a sense of clear logical progression within the aim.

How much is too much?!

- One of the most common reviewer comments is that a proposal is too ambitious!
- Remember, you are only one grad student asking for 2-3 years of funding, so what you propose should be feasible for that period of time.

Significance and Background

Try to keep this section to approximately one page. If there is background information that is highly technical but would serve as a valuable addition to your strategy, add it as part of the rationale for a specific sub-aim, not the Background section.

Start by broadly explaining why your sub-field is important, then get successively more specific while introducing the key concepts and "characters" of your experiments.

- When deciding what details to include, ask yourself whether those details are necessary to understand your research question and proposed experiments.
- Discuss the strengths and weaknesses of prior studies and emphasize the unanswered questions or limitations that your proposed work will address.

Clearly sign-post the gap in the literature that your research will address

- Use clear signal phrases like, "it is unknown whether …" , "X has not been characterized" , "current techniques have precluded …" , "Recent advances in technology X provide an opportunity to …" , etc.
- In addition to stating the gap your research will fill, provide enough context to explain that this gap is *important* to fill – how is this gap holding the field back? What new advances will be possible if this gap is filled? Paint a general picture of what the field will gain when this research gap is filled.

Highlight the specific contributions the proposal would make to your field in the final paragraph.

- Highlight how each aim will contribute to filling the research gap. Avoid vague phrases like "These data will advance our understanding of X." Instead, describe concrete deliverables, like "This aim will identify whether JAK2 overexpression is a predictive biomarker of glioblastoma."
- As tangibly as possible, describe how those answers would move your field forward.

Preliminary Data

Some preliminary data is necessary!

- Showing preliminary data is a powerful way to convince reviewers that the project is viable and that you are capable of succeeding.
- "Preliminary data" can include data you (the applicant) generate, as well as highly relevant data from others in your lab.
- Some amount of preliminary data is necessary to be awarded an F30/31, but not every proposed experiment needs to have associated preliminary data.

Where to incorporate preliminary data

- Some applicants have a separate section for preliminary data. This works especially well when the preliminary data supports the overall premise of the proposal and can be narrated as a somewhat-complete story.
- Others work preliminary data into the relevant Aim in the Approach section. This works especially well when the preliminary data supports smaller hypotheses and/or method feasibility within specific aims or sub-aims, but would feel patchy if grouped all together in one narrative.

Figure design

- Figure design should be publication-quality—not too small, neat and clear, consistent within and between figures (e.g., color schemes, fonts, etc.), containing statistical indicators, etc. Taking shortcuts on these design elements will unnecessarily annoy your reviewers.
- The data itself doesn't necessarily have to be publication quality (e.g., you can report results with a smaller-than-publication-level sample size), but the closer you get to publication-quality data, the better off you'll be.
- The figure legend must contain a short, descriptive title, along with a few short sentences that indicate what is shown and any statistical test(s) used.

Approach/Experimental Design

For each aim, consider including the following sections and label each section with the underlined words. If your aim contains multiple subaims, include the following sections for each subaim.

Brief paragraph on <u>background</u> and <u>rationale</u>

- This background will be specific to the aim and will include details that are more tailored to the aim, rather than the overall proposal
- Explain the gap in knowledge the aim will address, why it is important to the field that this gap in knowledge be addressed, and a hypothesis that is specific to this aim.

<u>Preliminary data</u> specific to this aim, if you don't have a separate preliminary data section.

Approach

- Experimental details to show you have thought about how to carry out the experiments.
- It can be particularly challenging to gauge how much experimental detail to include – too little detail leaves the reviewer questioning whether you really know how to carry these experiments out, but too much detail leaves the reviewer digging through unnecessary information to find your main points. Ask someone adjacent to your sub-field to help you calibrate the necessary level of detail.

Expected results

- Explain what you think will be the experimental outcome and why, including references where possible.
- Clearly stating these outcomes gives your reviewer something concrete to connect to the stated significance of your proposal.

Alternative approaches

- This part is important – it demonstrates critical thinking.
- Come up with feasible alternatives in the event of technical challenges with your proposed experiments and describe why they would be good alternatives. You should also justify why your initial approach is better than the alternative approach you describe here.

Getting Feedback & Revising

It is difficult to be your own critic, especially when you've been working on this document for a long time. In your writing schedule, include days that you take off from working on the application so you can come back to it with fresh eyes!

Tips and tricks to help you edit your own work

- Use reverse outlining (make a bulleted list of just the main point of each paragraph/section) to get a bird's eye view of the logic/flow. Within your bulleted list, make sure each point clearly leads to the next one and background information is introduced before it is needed to explain experimental plans or hypotheses.
- Re-write your research question on a new piece of paper and evaluate every paragraph in terms of how it directly relates to the research question. If it doesn't relate, you need to adjust or remove that paragraph, or possibly edit the research question itself.
- Search for very technical words or jargon. Have you defined them or explained them well enough that a non-expert will understand?

- Carefully consider your acronyms. Will your audience *definitely* know what each one means? If not, does it *need* to be an acronym? (Do you use it >6 times? Is the original phrase extremely long?) Minimize the number of acronyms you use—it takes a lot of energy from the reader to remember them, and you don't want to tire out or annoy your reviewer! When you do use acronyms, make sure they are spelled out the first time they are used (unless they're extremely well-known, like "DNA")
- When proofreading, read only a page or two at a time. Proofreading in small amounts will help prevent you from becoming bored and losing focus.
- Viewing your document in a new way—e.g., changing the font style, color, size, or spacing or printing the document out—can help you catch mistakes you would miss otherwise.

Asking others for feedback on your work

- Ask for feedback early and often throughout the fellowship writing process.
- Early on, identify a team of readers who can give you feedback on different elements of your application: people who can critically analyze the scientific content, people who can assess clarity of the writing itself, people with expertise on the goals of this fellowship and/or institute, and people with an eye for detail who can help you identify formatting and grammatical errors or inconsistencies. These readers should include your advisor and sponsor(s) but can also include others in your lab or on your committee, or even those a little outside your field. Multiple perspectives will be extremely valuable!
- When asking for feedback, be specific about what stage of the process you're in, what type of feedback would be most valuable to you at this stage, and your preferred timeline for receiving the feedback.
- Ask follow-up questions about the feedback if it isn't clear!

Incorporating Revisions and Re-Submitting

Most students do not receive a fellowship on the first submission!

- Depending on the institute, success rates range from ~8-26%. Don't give up!

How to address reviewers' comments

- Thoroughly discuss reviewer comments with your PI and determine which to address through additional experiments or better explanations, and which to address through further justification in your Introduction letter.
- Try to address as many of the reviewer critiques as you can, and generally err on the side of answering as if the reviewer is right. In some cases, you can respectfully disagree with their comment and explain why.

The Introduction document

- All major changes and updates to the application (whether they respond to reviewer comments or are simply progress you've made since the last submission) should be explained in the one-page "Introduction" document.
- First, briefly thank your reviewers for their attention and comments, and reiterate the main goals and significance of your proposal. In one sentence, point out anything the reviewers particularly liked about your proposal (e.g., "I thank the reviewers for appreciating the innovation of using model X to study disease Y and the thoroughness of the training plan").

- The majority of this Introduction document should be a point-by-point response to each reviewer's comments. Specifically, for each theme of reviewer comments, restate the comments in bolded font, explain your response after the comment, and indicate where in the grant you've made the corresponding change (e.g., within which aim, sub-aim, and/or figure). Some applicants opt to add a table containing the reviewer comments and the applicant's response.
- If you resubmit, your reviewers will have access to the summary statement (reviewer comments) from your first submission, so you should plan to address all major criticisms. On your second submission, each reviewer is asked to evaluate how well you responded to the initial review. Don't expect that you can ignore these reviews, even if you disagree with them. If you feel like you cannot address reviewer criticisms from the first submission, consider submitting your application again as a new submission rather than a resubmission.

Additional Resources

The Yale Graduate Writing Lab (GWL)

- One-on-one consultations: graduate writing advisors will work one-on-one with you to edit and polish your fellowship application, so they are ready for submission!
- Peer-review groups: small groups of students all applying to the F30/31 fellowship, as well as a Graduate Writing Fellow, can be incredibly valuable for receiving support and feedback on your application materials. Peer-review groups also provide applicants with structure and help them remain accountable as you progress through the application preparation process.

Relevant websites

- NIH page explaining the NRSA changes going into effect on January 25, 2025: https://grants.nih.gov/policy-and-compliance/policy-topics/peer-review/revisions-nih-fellowship-application-review-process
- Full instructions: https://grants.nih.gov/grants/how-to-apply-application-guide/forms-i/fellowship-forms-i.pdf
- Current NIH fellowship opportunities: https://researchtraining.nih.gov/programs/fellowships
- Samples: https://www.niaid.nih.gov/grants-contracts/sample-applications (note that these are from before the fellowship revisions implemented in January 2025)