Guidelines for the Independent Research Proposal
Chem 647

The purposes of this exercise are to have you become familiar with current research in organic chemistry, give you some initial experience writing research proposals, and to allow you to develop research ideas that could be expanded for future fellowship applications.

To give some focus to this exercise, base your proposal on the following scenario. You are a finalist for a prestigious 2-year fellowship. This fellowship will provide sufficient funds that you can do whatever research you want with any lab in the world. The only requirements are:

(1) Your research should have connection to the chemistry carried out in the following groups:
   David MacMillan  Erick Carreira  Laura Kiessling
   Michael Krische  Carlos Barbas  Carolyn Bertozzi

(2) You must be able to carry out the proposed research by yourself in 2 years.

(3) Two other students in the class must approve your research proposal before it is given to me. I will judge the quality of your written proposal and maybe your ability to explain and defend your project in an oral examination.

Based on your readings, come up with a plan for further developing current research in your hypothetical mentor's laboratory OR consider interesting new directions you could take based on his/her earlier work.

Once you have a topic and potential research advisor in mind, consult with me. Provide me with a short outline of your idea (1/2 page max). I will either encourage you to continue developing your idea, or suggest more productive directions that you could take. Once your topic is approved, then you can begin to prepare the written proposal. Use the outline provided below.

Part I: Cover Sheet. (An example is provided below):

A. Name of Student
B. Student's Ph.D. Advisor
C. Proposed Postdoctoral Mentor. Provide his/her name and institutional affiliation.
D. Proposal Title  Make your title as specific as possible. It should not only indicate goals of the research, but it should also convey the types of experiments used.
E. Four Most Relevant References. These are the four papers that provide the jumping off point for your proposed research. These would typically have been written by your proposed mentor in the last 3 years. They should describe the general area of research and demonstrate the use of experimental techniques or methods that will appear in your proposal. In situations where your proposed mentor has only recently entered a new area of research, you should include references from competing laboratories that describe similar or alternative approaches to the research problem. Submit legible copies of these papers with your proposal. You will be expected to demonstrate a thorough and critical understanding of these papers.
F. Additional References. List 4-6 additional references that illustrate alternative approaches to your objective or describe the same experimental approach applied to a different problem. This list is meant to be representative, rather than comprehensive (you will also be asked to supply a
complete bibliography at the end of the proposal). The idea is to show that you are familiar with competing research efforts.

Part II. Introduction (ca. 2 pages).

A. General Introduction. Describe the general area of research that you intend to pursue. Define any unusual or specialized terms. Explain the significance of the problem.

B. Statement of General Objectives. Provide a 1-2 sentence statement explaining the overall goals of your proposed research. What is the best probable outcome of your proposed studies? This statement should be a separate paragraph that is underlined or otherwise distinguished from the other text. Some good ways to formulate the statement would be: “Successful completion of the proposed research will provide a new method for the analysis of complex protein samples.” OR “If successful the proposed experiments will result in a more detailed understanding of the mechanism of pyruvate dehydrogenase.”

C. Background. Give a more focused introduction to the specific experiments in your proposal. Discuss the recent work that leads up to your proposed investigations. Describe any unusual or specialized techniques that you will apply to the problem. It is important to clearly identify the differences between your proposal and what has been done previously or in competing labs. What questions are left unanswered by the earlier studies? What limitations exist in earlier or competing methods that will be addressed by your studies?

D. Specific Aims. Give a list of intermediate objectives for your research. These should be stated as goals rather than methods. For example “To carry out a series of 2-D NOESY experiments…” does not describe an aim. “To obtain the full chemical shift assignment of protein …” does describe an aim.

Part III: Proposed Research. (ca. 3 pages).

In the third part of the proposal you will discuss your planned experiments (or theoretical investigations). Describe your initial experiments in detail. How will you obtain your materials? What measurements will be made? Discuss the possible outcomes of these experiments and what you will conclude given the various possible outcomes. Outline how you will use these results to plan subsequent experiments (e.g. “…if this fails to provide the monoclonal antibody, then the following alternative strategies will be examined.”) It is often a good idea to provide some sort of timetable or other indication of what experiments are going to be done first and which ones will be done later. Make sure there is a clear connection between your results and your specific aims. Where possible you should justify the feasibility of key steps by citing related work in the literature.

Note the page counts are just guidelines. The main body of the proposal (Parts II and III) is limited to 5000 words of text. This corresponds to about 5 pages of single spaced 12-point text. Use the word count utility on your word processor to see how close you are to the limit. There is no limit to the number or size of figures and/or equations in the main body. Also, the cover page, references, and appendices are not counted toward the word limit.

Part IV: References.

Provide a complete reference list using a standard format used in JACS. If you have not yet learned how to use ENDNOTE or PROCITE, now is a good time. You can cite as many references as you want.
Independent Proposal Evaluation Sheet.

Student Name:__________________________________________________________

Proposal Title:__________________________________________________________

Committee Members:_____________________________________________________

Each category will be assigned a consensus score from 0-4.  
0=unacceptable; 1= marginally acceptable; 2= acceptable; 3= above average; 4 = outstanding

Manuscript: Logic and Organization: Score____
Comments:

Manuscript: Mechanics and Clarity: Score____
Comments:

Literature and Background: Score____
Comments:

Originality and Significance: Score____
Comments:

Feasibility of Proposed Research: Score____
Comments:

Overall recommendation and comments:
(for example, Pass/Rewrite proposal/Repeat oral defense/Repeat entire exercise)