

## Additional Guidelines and Advice

See the document “Application Instructions” for detailed instructions regarding the application and the content and format of the Research Plan. Application documents are available on the program website (<http://www.medschool.umaryland.edu/osr/PRISM>).

### Evaluation Considerations

As you work with your Research Mentor to develop your research plan and prepare your application documents, keep in mind that reviewers will consider various aspects of the planned research experience including following as they evaluate each application.

1. Is the research project realistic and approachable, and does it have potential to produce a meaningful experience?
2. Is there evidence to support that the student can accomplish the project?
3. Can the project (or most of it) be accomplished within the indicated time period?
4. Is the mentor likely to provide the appropriate environment, supervision, and support (based on current grant or funding support, resources, publication history, mentoring history or statement of commitment to mentoring, *etc.*)?
5. Is there a reasonable expectation that the experience will yield a scholarly product that can be presented at a research forum or a scientific conference, or possibly published in a peer-reviewed journal?

### Elements of the Research Plan

The following will explain some important elements of the Research Plan.

A research proposal follows these basic rules which are typically incorporated into NIH-styled review criteria for proposals.

1. The research proposal must be hypothesis-driven. The research project must be focused on a specific question, set in the form of a testable hypothesis. The research is then designed to answer the question by testing the hypothesis.
  - a. First identify the topic and narrow it down to a focused question. *What is the problem that needs to be solved? What is its foundation?*
  - b. Then develop a hypothesis that captures the question and proposes a possible answer in a way that can be tested with measurable results. *How can this question be tested scientifically?*
  - c. Next, develop a realistic approach in the form of a clear set of methods to test the hypothesis. The hypothesis seeks to relate cause and effect in a scientifically testable manner. Plan out the steps and procedures that will be followed in order to test the hypothesis. The data collected will become the basis for your analysis and conclusion in answering the question.

2. The research proposal must follow a format that reflects the scientific method.
  - I. **Aim**  
What am I testing and why?
  - II. **Background**  
What do I and others know about this problem? This can be founded, for example, on literature searches, surveys, or preliminary data.
  - III. **Materials**  
What will I use to test this problem or question? (Be careful to show relevance.)
  - IV. **Method**  
What exactly will I do to test the question? (Be careful to show relevance.)
  - V. **Results**  
What data did I get and what is my interpretation?
  - VI. **Discussion and Conclusion**  
How do the data relate to the hypothesis? Is it supportive? Are there conflicts or alternative explanations?

A good proposal follows this general sequence.

1. What am I going to do and why?
2. How am I going to do it?
3. What do I expect the results to tell me?

### **Additional Tips**

It is always helpful to very briefly state technical challenges or how conflicting results will be reconciled. That is, how will you work around technical or logistic hurdles or what will you do if you get certain results that are either surprising, contradictory, or even equivocal (show that nothing appeared to happen)? The last statement is important because some results could actually be false negatives. For example, you can actually observe a tumor growing rapidly, and you might have chosen to study the contribution of a molecular pathway or marker which has been shown to drive growth in other systems. In your study, your data might show that there are no differences in the activation- or mutation-states of molecules in this pathway. This would suggest that there are other considerations.