

Research Proposal Assignment

I. Assignment Overview. This assignment is rooted in the belief that you are able to accomplish original intellectual work at this point of your undergraduate career. You will be asked to do exactly that through the writing of a scientific research proposal. The assignment will require you to identify a biomolecular topic of interest to you, to research the primary literature on this topic, and to write an original proposal describing the historic and recent background on the topic, to identify important unanswered questions, and to propose a plan of experiments to address these questions. Thus, the assignment presents the opportunity for you to gain depth of knowledge in an area of biomolecular science that is personally interesting to you. The assignment goal is for you to integrate your education, abilities and interests through a creative problem-solving project and thereby to help achieve (nearly all) the course objectives. To this end, a staged and structured approach will be taken to the writing of the complete proposal in combination with planned support for the different stages of the process along the way.

II. Learning Objectives.

This assignment is aimed at helping satisfy most of the course objectives for the course, so those can be reiterated here as learning objectives for this assignment.

- Add depth to your knowledge and understanding of biochemistry
- Learn to read and critically evaluate the primary literature
- Increase proficiency in communicating you scientific ideas
- Mature you ability to work independently in experimental science
- Develop proficiency at applying your knowledge, the primary literature, biomolecular principles, and experimental approaches to testing hypotheses

III. Directions

Creating a full scientific research proposal is likely to be a new experience for you. The assignment offers an exciting opportunity to challenge yourself in a new way, to bring your intellect and education to bear on mastering a new topic, identifying interesting questions, and proposing viable solutions. The assignment holds the promise of immense satisfaction accompanying the achievement of your goal. The nature of this assignment requires your sustained attention and effort over essentially the entire semester, and thus probably differs from most other course assignments you have had. The entire task has been broken down and given structure to provide guidance to make it easier for a first time proposal writer. The first step is for you to identify a suitable topic for your proposal. The second step is to identify, collect and read the background literature on the topic. The third step will be to write the historical and recent background section of the research proposal, without your experimental plan. The fourth and final step will be to write your experimental plan and make any necessary revisions to your background section in order to pull both parts together as a coherent and complete research proposal. Each of these steps will require you to produce a 'product' by a due date, with the purpose of moving you closer to the final goal while allowing you to finish part of the project.

Topic, Review and Anchor Paper Selection

The first step of this assignment is for you to identify a topic for your research proposal that is supported by a body of literature. Your selection should satisfy several criteria. Most importantly, the topic should be one that interests you and that you would like to learn more

about. Secondly, it should be in a field that is mature enough to offer a rich body of primary background literature. While this is not a formal requirement of professionals in the biomolecular field, for students of proposal writing, it is prerequisite to avoiding frustration in developing the context for presenting one's experimental plan. Finally, it should be a topic from which several unanswered and intriguing questions arise, a criterion that is fairly easily satisfied.

I have developed a vehicle for this assignment that should help you find a topic that satisfies these criteria. First, you should read through the table of contents (TOC) for the last four to five volumes of the Annual Reviews (AR) series for the biomolecular fields (i.e. biochemistry, genetics, etc.). Similarly, you can read the TOC for Microbiology and Molecular Biology Reviews (MMBR). When you find something in the TOC that seems interesting, evaluate the introduction and contents list of the corresponding review for whether it holds your interest. It may be helpful to read a particular section of the review corresponding to an contents heading of interest. One review may lead you to another that is more appropriate to your interest(s). The result of this effort should be the identification of a limited number of reviews that you can evaluate more thoroughly. In the end, you should make a topic selection that is supported by a major comprehensive review such as those in AR or MMBR. This route to topic selection should result in your finding an area of interest with enough literature to support your research proposal and in which there remain intriguing questions (given that a major review was recently written on the topic). While this vehicle should get you started, you may find that you have questions or need help. Please see me as needed.

I require that you select a topic different from others in the class as well as from those selected in past classes (see course web page for list). Let me know once you have identified a topic. Priority will go to those who are first to declare a particular topic preference. If your first-choice topic selection has not yet been declared, I will reserve it for you. First-choice selections that are subsequently released will be made available first to the next in line.

The next part of the vehicle for this assignment is the identification of what we will call your *focus paper*. After you have identified a topic, including the associated comprehensive review, you should become familiar with the topic by reading the review and primary papers in the area (those referenced by the review and those found by searching the literature databases). Your reading should lead you to papers at the leading edge of the field. Your goal will be to identify a paper that will serve as a stepping-off point for the experiments you will propose in your plan. It should reflect the particular focus within the topic that you want to pursue. It should also be the last paper (or one of the last group of papers) to address questions at the leading edge of the field. You can investigate this by finding the paper citation within PubMed and selecting the "Related links" icon to the right of the citation, followed by sorting by date. If a newer paper with this focus exists, you should then use the newer paper as your focus paper. The purpose of the focus paper will be to give direction and purpose to the reading you will need to do in order to write the background parts of your proposal. Thus, it should help you avoid fruitless wandering in the vast literature related to your topic.

Final topic selections are due **February 20th**. On this day, you are to turn in a page with a one-line descriptor of your topic, with the citations for your comprehensive review and your anticipated anchor paper, and a brief description of interest in or reasons for choosing your topic. This due date does not provide sufficient time to do all the reading you need to in order to write you background section. Should it come to pass that your focus-paper selection seems amiss or that there are more helpful reviews, do not worry. You can change your focus paper should your

literature research indicate it is merited, and you can use additional or different reviews. The point of the overall vehicle is to create a means to approach the assignment and avoid time loss.

IV. Assessment

Component and Point Breakdown

<u>Component</u>	<u>Points</u>	<u>Due date</u>
Topic selection	none	February 20
Annotated Bibliography	40 pts	March 6
Research Proposal I	100 pts	April 7 - TBD
Research Proposal II	100 pts	May 3 - TBD

Scheduled Activities to Support the Assignment*

<u>Activity</u>	<u>Date</u>
Topic Selection class	February 10
Grant writing with Dr. Joyner	Week of March 13
Background Refinement class	Week of March 20
Experimental Section class	Week of April 10
Experimental Refinement class	Week of April 24

*Scheduled activities are not a substitute for seeking individualized assistance when needed.

Assessment criteria to follow....