BIO 529 Research Proposal

Instructions for the Research Proposal-

Each graduate student and postbac in the course is required to write a research mini-proposal that will count for 25% of the final grade in the course. Undergraduates may also choose to write a proposal, in which case their grade will be determined the same as above for graduate students. Undergraduates will indicate their intention to write the optional proposal by submitting an outline by the deadline below. An undergraduate may not submit a proposal if the outline deadline is not met. Undergraduates may submit an outline, but then choose not to submit the drafts (the outline grade will be dropped). However, undergraduates that submit a 1st draft must submit a final draft.

Topics: Students may choose almost any current question in developmental biology in which they are interested, with the exception of areas related to their own research. The goal of the proposal will be to design a few experiments that utilize developmental methods to clearly answer one simple developmental biology question that is currently unresolved. There is no need to think big here. Real science typically progresses as a succession of small steps, so you don’t need to figure out how to cure cancer or save the world from birth defects. You may get ideas about appropriate unresolved questions by reading recent reviews on a topic or reading the Discussion section of a recent research paper. You can identify such publications by reading recent issues of developmental biology journals (see list below) or doing a keyword search using the Entrez/ PubMed online index (http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=PubMed). If you do a search that gets too many hits, one tip to narrow the field is to include “review” in the search terms to limit the articles to just reviews. You must get your topic and question approved before you submit your outline. You may submit and receive approval by email, but I may request to talk to you in person before granting approval, so don’t wait until the last minute.

Format: The proposal should be based on the format and directions for an NIH Individual National Research Service Award Application PHS 416-1, except that it is limited to a total of 5 pages, not 10 (not including references). Do not use the forms, but follow the general instructions for the Contents of Research Training Plan (section 5.5) found on p. I-44 to I-45 in the pdf link to instructions. Essentially, this tells you that your proposal should include the following sections (described in detail below): Specific Aims, Background & Significance, Research Design & Methods, and Literature Cited (but Literature Cited is not included in the page count). I would suggest a distribution of approximately a half page for the Specific Aims and 2-2.5 pages each for the Background & Significance and Research Design & Methods. Your font size must be at least 11 point and your margins must be at least 1” on all sides.

Specific Aims
List the broad, long-term objectives and the goal of the specific research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Background and Significance
Briefly sketch the background leading to the present application, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. State concisely the importance and health relevance of the research described in this application.
Research Design and Methods

Describe the research design conceptual or clinical framework, procedures, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Describe any novel concepts, approaches, tools, or technologies for the proposed studies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative sequence or timetable for the project. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised.

Content: As described above, the proposal must seek to answer a current question in developmental biology. You must articulate why this question is important and how having an answer (or testing the hypothesis) will advance the field. It is expected that you will come up with experiments that will address the question/hypothesis as directly as possible. The approaches used should be standard methods in developmental and/or molecular biology. Many of these methods are described early in the course, but you may use other related techniques with which you are familiar, so long as they appear in your text or are routinely used in publications in major developmental biology journals (such as Development, Developmental Biology, Developmental Cell, Mechanisms of Development, and genesis). You may not use methods that are more appropriate to other disciplines. For example, you may not propose to use X-ray crystallography to determine the structure of a protein that has developmental significance. If you have any questions about the appropriateness of an approach, you should discuss it with me prior to submission of the outline. If you propose inappropriate approaches in the outline, I will indicate during our scheduled office meeting that these need to be modified. Your grade on the proposal will consider several factors, including:

- Ability to identify and state the question/hypothesis
- Appropriateness of the experiments proposed and how well they address the question
- Clarity of the writing and how well it conveys the scientific ideas

The submitted outline should include a clear statement of the research question and hypothesis. It should be organized in the same way as the final proposal and should include all the ideas you expect to use in your proposal. The outline will require as much consideration and work as the written drafts. The idea of the outline is not just to state the problem, then worry about how to fill out the rest of the proposal later. I expect that a well considered outline will likely be 1-2 pages long. Based on comments and our individual discussions, you will modify your outline and use it to create a full draft of the proposal. The first draft will be complete in every way. It is considered a first draft only because you will be given an opportunity to revise the proposal based on comments returned to you. The revised draft will be final and will count for the bulk of the score. The rationale for the emphasis on the final draft is to avoid penalizing you heavily for any false starts and to reward you for continued consideration and refinement of your ideas. This does not mean that it is OK to turn in shoddy or incomplete outlines or first drafts. Minimal efforts on the earlier assignments will receive minimal grades.

Submission of assignments: The proposal will be submitted in three parts and will be due at the beginning of class as per the schedule in the course syllabus:

- Outline* - (5% of final grade)
- First draft - (5% of final grade)
- Final draft - (15% of final grade)
Failure to meet a deadline will result in a grade of zero for that portion of the assignment.

* The topic must be approved in consultation with me prior to submission of the outline.

**Plagiarism & other forms of cheating:** The entire proposal is expected to be the work of only that student. Academic honesty is required, and cheating and plagiarism will not be tolerated. According to the Encarta Dictionary, plagiarism is “copying what somebody else has written or taking somebody else’s idea and trying to pass it off as original”. If I had failed to cite the Encarta Dictionary in the previous sentence, that would have been plagiarism. It is not expected that every idea in your proposal will be completely original; you will be reading papers to come up with ideas about what to propose. It is OK to use those ideas if you express them in your own words and you reference the source of your ideas. You are expected to do both in your proposal. The *minimum* penalty for students caught cheating or plagiarizing is an E in the course, but the actual penalty may be more severe.