# Biology 352 Grant Proposal Instructions

Bioinformatics, Fall 2016

## List of assignments

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| **Assignment** | **Due Date** | **Points** |
| Selection of primary literature article & topic | Thursday, September 8 | 5 |
| Specific Aims | Thursday, September 15 | 10 |
| First Draft | Tuesday, October 11 | 15 |
| Peer Review | Thursday, October 20 | 20 |
| Final Draft | Tuesday, November 29 | 50 |

## Selection of primary literature article

Find a journal article from the primary literature that interests you. You will use this article as a starting point for your grant proposal. The idea is to first identify an area that you find interesting, but rather than simply require you to choose an entire field of study, which can be quite daunting, I want you to focus on a narrow sliver within that field. The paper you select should be applicable to bioinformatic or computational approaches, but **need not be primarily a bioinformatics paper**. What the heck does that mean? I would suggest you avoid journals with bioinformatics in the title because those journals are focused on developing new tools and approaches in bioinformatics, whereas we are more interested in using tools already available to answer biological questions. This means you can examine papers from many disciplines - developmental genetics, cancer, conservation biology, phylogenetics etc. Note that this course might be the only molecular course with the possibility to investigate **human** health and genetics as a subject for your grant proposal. By now you probably know which area in biology you are most interested in, so take this opportunity to find a topic you will enjoy learning more about. The hardest part of this assignment might be selecting just one paper.

Restrict your searches to Pubmed or Google Scholar while on campus. Note that you should do this search on campus - the college IP address will give you access to more full text journals. After finding an interesting paper, obtain the full text PDF. If the full text is not available on-line, you can use the library’s interlibrary loan program to obtain a hard copy. For a list of journals that the library has access (subscriptions) to, go to <http://elmhurst.edu/library/> click on e-Journals and do a search for the Journal title.

After you select a paper that is applicable, you must upload a copy of the paper to blackboard and meet with me to discuss (very generally) what you want to explore.

## Specific Aims

Arguably the most important component of a successful grant application is the Specific Aims section. This is where you lay out your hypotheses and plan of action. This is a one-page document and should compel your audience to continue to read and fund your work.

You should have two independent but related specific aims. Each aim will have its own hypothesis or question that it addresses within your overall research proposal. **At least one aim must involve a substantial amount of bioinformatical analysis.** Examples: RNASeq, genome sequencing, microarrays, phylogenetics, or morphometric analysis.

### Use Your Specific Aims Document as Your Roadmap

The following text is taken from an article on postdoctoral fellowship grant writing published on PLoS Bioinformatics (Yuan, Cai, Ngok, Ma, & Botham, 2016).

A perfectly crafted Specific Aims document, usually a one-page description of your plan during the project period, is crucial for a compelling fellowship because your reviewers will read it! In fact, it is very likely your Specific Aims will be the first document your reviewers will read, so it is vital to fully engage the reviewers’ interest and desire to keep reading. The Specific Aims document must concisely answer the following questions:

* *Is the research question important?* Compelling proposals often tackle a particular gap in the knowledge base that, when addressed, significantly advance the field.
* *What is the overall goal?* The overall goal defines the purpose of the proposal and must be attainable regardless of how the hypothesis tests.
* *What specifically will be done?* Attract the reviewers’ interest using attention-getting headlines. Describe your working hypothesis and your approach to objectively test the hypothesis.
* *What are the expected outcomes and impact?* Describe what the reviewers can expect after the proposal is completed in terms of advancement to the field.

A draft of your Specific Aims document is ideal for eliciting feedback from your mentor(s) and colleagues because evaluating a one-page document is not an enormous time investment on part of the person giving you feedback. Plus, you don’t want to invest time writing a full proposal without knowing the proposal’s conceptual framework is compelling. When you are ready to write the research plan, your Specific Aims document then provides a useful roadmap.

## First Draft

This is not a rough draft, but a true First Draft. My own personal distinction between rough and first drafts is whether I feel embarrassed when someone else reads my draft. If I feel compelled to offer excuses about the draft, it’s a rough draft!

Your proposal must include the following components with these explicit **Headings**:

* **Title Page**
  + Title of research project
  + Name of Student (do not have your name on any other page!)
* **Specific Aims**
  + This is the updated and edited version of the specific aims document that you handed in earlier. See above for format and content.
  + 1 page maximum
* **Background and Significance**
  + Here you write a review of the literature for your topic, but only the details that are relevant to your specific aims (hypotheses and experiments you propose). This is very similar to the Introduction/Background section of a research paper. The last paragraph should briefly summarize what is known (the details of which are earlier) and then lead into what is unknown, setting the stage for your hypotheses and your proposed experiments to test them.
  + 4 pages maximum
* **Research Plan** 
  + This section is usually organized by the specific aims. It should include an explicit hypothesis for each specific aim, and descriptions of the proposed experiments, including the controls that will be used and how they will be carried out. You must also show that you have thought about what could go wrong and how you will adapt your plan if necessary. I.e. if your hypothesis is correct, what should happen? If there is a problem, if you don’t get what you expect, what does that mean? Is there another way to answer the question?
  + 5 pages maximum
* **References**
  + Bibliographic references should be in APA (Bibme, n.d.) format.
  + 5 references (to primary literature) minimum
  + Unlimited references and pages maximum

## Peer Review

Grants will be anonymized for peer review. Each student will review two of their peer’s grants and offer comments and evaluation following a grading rubric. Students will rank the grants for funding potential.

In addition to peer review, the instructor will also read and evaluate each student’s first draft.

## Final Draft

After reviewing the comments of their peers and the instructor, students will incorporate changes and improvements to their first draft. These improvements should, at a minimum, address the comments from their peers. However, it is also expected that the overall draft will be improved in writing and scholarship.

* Same headings and page length requirements
* 10 references (to primary literature) minimum

## References

Bibme. (n.d.). *APA Citation Guide*. Retrieved 2016, from Bibme.org: http://www.bibme.org/citation-guide/apa/

Yuan, K., Cai, L., Ngok, S. P., Ma, L., & Botham, C. M. (2016). Ten Simple Rules for Writing a Postdoctoral Fellowship. *PLoS Comput Biol , 12*(7), e1004934.