

Some Hints on Writing a Term Project Proposal

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For those who plan to pursue an academic career, the exercise of writing term project proposals will prepare you for future grant applications. As you are writing up your term project proposal, imagine you are not doing it for marks. Rather, imagine you are trying to convince the instructor to give you the approval so you may go ahead with the project. That is exactly the mind set one shall be in when he or she is applying for grants. The following guidelines describe how you should go about writing up a term project proposal for the above purpose.

1 The Core

Your goal in writing a term project proposal is to convince the reader of three things:

1. **The project is worth carrying out.** Motivate the project and state its goal. That you need those marks to pass the course is not a sufficient reason to undertake the project. In a term project setting, you do not need to do anything ground-breaking, but you should at least attempt something worthy. The bottom line is that the instructor should be convinced that, by completing the project, you have learned something substantial in the subject area of the course.
2. **You are the right person to undertake the project.** Convince the reader that you are knowledgeable enough to undertake the project. A good way to do this is to give an introduction to the key concepts related to your project, or provide a survey of relevant literature. Do not just copy-and-paste from background materials¹. That

¹In academia, intellectual integrity is considered one of the most important ethical principles. You need to give due credit to everything that you borrow from other sources. If you quote someone, you should put a pair of quotation marks around the contents you took from the source, and then acknowledge your intellectual debt by citing the original work. It is, however, more preferable that you paraphrase the materials in your own words than to directly quote a source (you still need to cite it). Paraphrasing demonstrates that you have actively digested the materials, and that you are offering an original synthesis of your own.

will only reinforce that impression that you do not know what you are talking about. Lastly, linking your past academic/research experience to your present project will also strengthen your case. For example, if you have experience in a topic relevant to your project (e.g., publishing a paper, taking a course), disclosing your experience would convince the readers that you are the right person to conduct the work.

3. **The approach is technically sound and feasible.** Tell the reader what you plan to do to achieve the goals stated in point 1. Give enough details so that the reader may judge if you are bluffing. Be as concrete as possible. When appropriate, offer examples. Identify potential technical hurdles, and explain how you are going to overcome them. If you are going to use a tool (or theory, platform, etc), identify it. If you are to adopt an algorithm, outline it (pseudo code, flow chart, etc). If you already have a design, draw a class diagram (or something similar). If you plan to evaluate your work, describe your methodology (e.g., experimental design, benchmark set, etc).

The last point is particularly worth emphasizing. What you want to convey in your proposal is that you have thought through everything. When I was shown the “way” to write my first grant proposal, my mentor told me the following: “What you want [the funding agency] to get from your proposal is that, he has done all the preparation work already. Just give him the fund, and he will be able to run all the proposed experiments and get some interesting results.” Just give her the money, and the researcher will be able to complete the research project. Just give her the green light, and the student will hand you a good project report by the end of the semester. This is the primary goal for your proposal — to convey the sense that the project is well thought out, and that there is a high probability of success. Well, the first usually leads to the second anyway. Therefore, heed the following heuristics.

Write a proposal as if you are writing an interim report.

I know you have not yet completed the project. You do not have all the details. But try your very best to identify as much details as possible. If you already have some preliminary results when you are writing up the project proposal, that is even better.

2 Administrative Sections

A good proposal may also contain the following administrative sections:

Scope: Clearly delimit the boundary of your project scope. Be very concrete so that you do not over-promise. What does not fall within the scope of your project could be as important as what falls within. Disclaim anything that you do not think you can address. The heuristic is always that you focus on a small problem, but then you do a very thorough job. Always aim for depth rather than breadth. For example, do a smaller implementation, but then do a good job in testing, performance measure, and case studies of usefulness.

A piece that is full of quotes after quotes induces the impression that you are stitching materials just to fill space. Lastly, failing to adhere to these norms of quoting and citing constitutes an academic misconduct commonly known as plagiarism, which in most North American institutes is a serious offence that could lead to reduction of grade, suspension, or expulsion.

Deliverables and/or Anticipated Results: If your project involves system engineering, name this section *Deliverables*, and specify what you will deliver by the end of the project. A design only? A prototype? A report? Documentation? If your project is a study involving theorizing or experimentation rather than system engineering, then name this section *Anticipated Results*, and outline the anticipated outcome of your study.

Timeline and/or Milestones: Divide the project into discrete tasks, milestones, or phases. Give an estimated completion date for each.

Again, the last point deserves some further elaboration. Many graduate students (including myself when I was young) are romantics. To them, research is about inspiration. Inspiration cannot be planned. So logic dictates that research cannot be planned. Unfortunately, like every other kinds of projects, improperly planned research projects do tend to fail. A plan, usually in the form of a timeline, is a must for tracking your progress. With a timeline, you know your progress, you know if you are falling behind, and you know if you need to do adjustments such as reducing the scope of the project when you are lagging behind the proposed timeline. Yes, research is “risky”, in that you do not foresee everything that you will encounter, but that does not mean that you don’t need to plan. It means that it is even more important for you to plan ahead, so you have the project management tools to handle uncertainties.

An aspect of grantsmanship that is not included in the above is budgeting. In a real grant proposal, you are supposed to outline how you are to use the funds you request. For each projected expense item, you articulate and defend why that proposed amount is reasonable. For example, you say that you need to buy some equipment for your students, and you think you need \$ X for that. Okay, let’s specify, over the next four years, how many students you expect you will supervise. To be realistic, you say that you will offer admission to two PhD students and one MSc student per year. On average, a PhD takes four years to complete, and an MSc takes two years to complete. This works out to ten students at any given year. So you need ten pieces of equipment. For each student, let’s specify what equipment you plan to buy. This means coming up with an actual configuration of, say, a desktop computer. To make it specific, let’s go to some computer store to get a real quote of such a computer with the specified configuration. Ask them to give you a written quote. Include the quote in your proposal. Multiply that quoted price by ten, you get \$ X . And now the funding agency may believe you.

You can practice budgeting in your term project proposal by learning to *budget time*. This is an exercise I highly recommend you to try out to make your timeline realistic. Write something along the following line. Excluding lectures, teaching assistantship, child rearing, etc, you plan to allocate 12 hours per week to work on this project. There are still 8 weeks to go between the time you submit the proposal and the time you need to submit the term project report. So you have $12 \times 8 = 96$ hours to work on the project. Now you allocate hours to each task in your timeline, and if everything adds up, then you have a realistic plan. If you find that the hours needed to complete tasks are larger than what you can realistically afford, then you probably want to scale down your project. Do you know that, in an NSERC grant proposal, researchers are required to do some form of time budgeting as well?

Consult the appendix for a sample outline and marking scheme of a term project proposal.

3 What About The Two-Page Proposal?

Contrary to my expectations, some students expect proposals to be short. That is probably because they have previously submitted proposals for scholarships that are one to two pages long.

In the real world of grantsmanship, there is indeed a place for a two-page document in a grant application process, and that is called a *Letter of Intent*. A letter of intent is usually used by a funding agency to filter away applications that are not in the scope of their grant programs. As such, a letter of intent usually outlines, in abstract, what the proposed research project is, and argues that the project is within the scope of the grant program in question.

In my graduate courses, I ask students to write a *project pre-proposal* for an analogous purpose. A pre-proposal outlines a preliminary research topic, and argues why it is appropriate to undertake the proposed project in the context of this course. The intention is that this component helps students identify a project topic. The pre-proposal shall address the following questions:

- What is the research problem? Why is it significant?
- What approach is proposed to address this problem?
- What are the anticipated results?
- Why is the research relevant to this course? Do so by identifying the expected learning experiences generated by the project, and arguing that they match the learning objectives of the course.

4 Further Readings

Consult [3] for an excellent guide on how to write a grant proposal. You will also benefit from reading the grant application materials of a major granting agency. For instance, you may want to check out the following document from the National Sciences and Engineering Research Council of Canada:

- *How to Prepare a Winning Proposal* [2]
- *Guidelines for the Preparation and Review of Applications in Engineering and the Applied Sciences* [1]

References

- [1] *Guidelines for the Preparation and Review of Applications in Engineering and the Applied Sciences*.

http://www.nserc-crsng.gc.ca/_stats/wdownload.asp?d=_doc/NSERC-CRSNG/prepEngAS-prepGenSA_eng.pdf.

- [2] *How to Prepare a Winning Proposal*.

http://www.nserc-crsng.gc.ca/Professors-Professeurs/Grants-Subs/DGIGPWinningProposal-PSIGPPropositionGagnante_eng.asp.

- [3] Simon Peyton Jones and Alan Bundy. Writing a good grant proposal.
<http://research.microsoft.com/Users/simonpj/papers/Proposal.html>.

Appendix: Sample Outline of a Project Proposal

Project Title

A Project Proposal

Author of Proposal

Other identification information such as Student ID

1 Introduction (10%)

1.1 Motivation

1.2 Project Goal

2 Background (25%)

Alternatively, provide a *Related Work* section.

3 Approach (50%)

4 Scope (5%)

5 Deliverables (5%)

Alternatively, provide an *Anticipated Results* section.

6 Timeline (5%)
