# The MSc Thesis Proposal Structure

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This document is a brief guideline for writing an MSc Thesis Proposal, intended for my graduate students. It explains the format and structure of the document and the role of each section. The document should be prepared in LaTeX, with references in BibTeX, using `natbib` style. Samples of past proposals are available.

The document needs to include the following:

1. **Introduction**

   This section motivates and states the problem to be explored, and briefly presents all the other elements of the thesis proposal. All essential high-level information needed to assess the significance of proposed work appears here; the rest elaborates what the Introduction previews. In other words, one cannot claim that some feature of the work is significant for assessing the whole unless that feature has been mentioned and its significance highlighted in the Introduction.

   The style of the Introduction should not be narrowly technical. It should give a reader without specialist background a clear general idea of what the work is about, what the nature of the expected contribution is, and what is the claimed significance of that contribution. At the same time, the argument must be rigorously supported with clear reasoning and references to appropriate literature, enabling the reader to verify, from authoritative sources, any claims about background facts and results that your argument relies on.

   The final paragraph in the Introduction is a roadmap for the remaining text. It must enable the reader to easily find the elaboration of any statement made in the Introduction.

   This part is drafted first and then updated as the work progresses; it is also revisited and updated last, when all the other parts have been completed. Once the Proposal is defended, this section becomes a basis for the Introduction section of your thesis.

2. **Background and Related Work**

   This section has two purposes.

   First, you need to provide the background definitions and context that the reader will need in order to fully understand what you are proposing to do. In selecting what to include you face two contradicting requirements. On the one hand, you wish to make the reading reasonably self-contained. Your background section should enable the reader to follow the rest of the text. On the other hand, the section should not become a full tutorial on the background material; it should provide the basics needed to understand the rest of the text, along with references to authoritative literature sources where a full account of the matter can be found that confirms your claims.

   Second, you need to describe and explain the relevant work of others that underlies your approach, or that provides alternatives against which your approach needs to be carefully positioned and justified. Note that in this section you make no references to what you intend to do; however, the selection of material is guided by your intended research. Typically, the closer some related work is to what you are proposing, the more detailed will be your treatment.

   Since this section by definition speaks about the work that is not yours, you should leave out of it any ideas or viewpoints that you wish to claim as your own original contributions. Conversely, in later sections, while explaining your own work, you may again refer to and analyze the work of others for comparison, but in case that you need to reproduce further details of their work, those details should be retrofitted into this section, to avoid the impression that you regard them as a part of your contribution.

   It should be emphasized that you start working on your background section as soon as you start your technical reading in the prospective area of your future thesis. When you read a paper, you should summarize the key points from your perspective, as it is difficult to do it later without detailed re-reading. As you converge towards your proposal, you will select, revisit, and adapt that material in order to shape the background section.

3. **The Problem Statement**

   In this section you explain the problem that you intend to address.

   You need to clearly formulate the questions that you propose to explore, explain why they need to be addressed and what are the expected benefits in answering them, and refer to the background and related work section for evidence that they have not been resolved in a manner that leads to the claimed benefits.

   The starting point of this argument is usually an analysis that identifies some gaps, limitations, or shortcomings in the status of existing research in the field. This analysis must be firmly supported and documented by the background presented in the previous section, and you should explicitly refer to it where appro-

priate. In presenting such observations, you need to keep in mind the importance of separating your own new ideas and viewpoints from those already present in the field. The observations about the limitations of existing solutions that have already been identified in the literature should be included in the background section, with an objective and balanced treatment. The observations, ideas, and viewpoints that you see as a part of your contributions should appear in this section, with a careful and convincing argument.

Once you are done, the significance and originality of what you propose to investigate must be clearly established. Even though the required level and magnitude of research contributions are lower for a research MSc thesis than for a doctoral dissertation, a demonstration of your ability to correctly identify, recognize, and argue the merits of a research contribution is essential in both cases.

4. **Solution Strategy and Expected Results**

   This section explains how you intend to investigate the questions that you have formulated in the problem statement, and what form the outcomes of that investigation will have. Do you intend to build a system and explore its capabilities, develop mathematical models and prove theorems, perform practical laboratory experiments and draw conclusions from statistical analysis of results, build tools that facilitate future studies or your own current studies, develop simulation models and draw conclusions from simulation experiments, or something else?

   The case needs to be made that the methodology is suitable for the proposed investigation.

   Also, this is the point where you need to consider the feasibility of proposed work with the background preparation and the resources you have. Are the proposed extent and scope of the work reasonable? What are the expected milestones and time lines?

5. **Evaluation of the Work**

   This section explains what happens after the work described in the previous section is completed. Once you have the results in the form you specified, how will that answer the questions that you have stated in the problem statement? What process of evaluation of results will lead to those answers? Furthermore, one needs to account for all possible outcomes, both optimistic and pessimistic. If you are trying to confirm a hypothesis, will a negative result also count?

6. **Summary**

   Here you again summarize the key points, this time with hindsight. Compared to the Introduction, here there is less emphasis on justification arguments, and more emphasis on the exact technical content. This is now easier to do, since the technical concepts have been explained. However, the summary should also be relatively self-contained.

## 7. References

Each reference should include complete bibliographical information. Digital libraries often provide BibTeX entries for the articles they contain. In the case of book chapters, include full information both for the volume and for the chapter you cite. In the case of web downloads, include the date of site access.

Whenever possible, cite authors whose authority is recognized and publication venues that have thorough refereeing. If that is not available, look for additional evidence to test and justify your assumptions. A cornerstone assumption upon which you base your work must not depend on a dubious reference.