

TEMPLE UNIVERSITY COLLEGE OF ENGINEERING

GUIDELINES FOR THESIS/DISSERTATION and PROPOSAL

Some of the frequently asked questions by master's students are: What is a thesis proposal? What is a typical length of a proposal? What should be included in a proposal? Is there any format for writing it? When should I submit the proposal? Students in the master's program more frequently ask these questions than those in the Ph.D. program since doctoral students have gone through the process of writing a proposal during their master's program, and know about the process. Thus these guidelines are written primarily for master's students; nevertheless it applies to doctoral dissertation as well.

One of the requirements for completion of a master's degree (in the thesis option) is a master's thesis. A thesis is a document describing the student's creative contribution to the student's field of interest. It is the culmination of a student's research, creativity, and scholarship. A thesis research involves not only solving an engineering problem, but also acquiring a better understanding of the general discipline and state-of-the-art technological development in which the student is working.

A thesis proposal is a document describing the student's proposed research towards completion of the master's thesis. The proposal is reviewed by a committee of faculty, and possibly, by an external examiner; the committee may ask the student to proceed with the proposed research, or modify the proposal. A thesis proposal can be viewed as a contract between a student and the university administration, and is often used as evidence when there is a legal dispute. A clear outline of proposed research is necessary for protection of both the student and the university.

Completion of a master's degree takes typically four semesters, although many students have completed the degree in just three semesters. Whenever possible, summer months should be utilized for preliminary research and literature review etc. A suggested time-line for completion of research leading to a master's degree is as follows:

1. 1. **1st semester: Selection of advisor**
2. 2. **2nd semester: Selection of a thesis topic, and literature review**
3. 3. **Summer months: Preliminary research, and literature review**
4. 4. **3rd semester: Preliminary research, writing, submission of proposal**
5. 5. **4th semester: Complete the proposed research, and submit the thesis**

There are a few steps towards completion of master's thesis:

1. 1. **Selection of an advisor**
2. 2. **Selection of a research topic**
3. 3. **Submission of the thesis proposal**
4. 4. **Conduct the actual research**
5. 5. **Documentation of the outcome of the research**
6. 6. **Submit and defend the thesis.**

1. 1. Selection of an advisor

Admission to a master's program is restricted only to those students who are academically bright. These students usually have a clear sense of their professional goals and objectives. As such, many universities require that students select an advisor immediately after admission into the program. At Temple, our approach is to give the student one semester to get acquainted with research of faculty members within the Department. This also gives the student a little time to adjust to a new environment since many of our students come from other universities within USA and abroad.

Selection of an advisor should be based on a match between the field of interests of the student and faculty. The student should review the research interests of faculty members of the College, and talk to the faculty about possible research directions. The student then selects an advisor, and informs the Director of Graduate Studies about the selection. It is also possible that the student selects two advisors, in which case one faculty serves as the primary advisor. Engineering research can be interdisciplinary requiring collaboration between engineering and other departments within Temple. Under the current guidelines of the College, a student may select a co-advisor from another department within Temple. A faculty member from another university, or an active researcher from industry can also be selected as a co-advisor. In every case, the primary advisor must be from within the student's home department of the College of Engineering. Selection of an advisor must be done by the end of the first semester in the program.

2. 2. Selection of a research topic

After the student identifies an advisor, the next phase is to narrow down the area of research, and select a specific topic. Selection of a research topic can be done in two ways: a) the student may propose a topic to the advisor, or b) the advisor may suggest a research topic to the student. The first option is more suitable for students who have some knowledge about the current trends of technology. In the second option, the advisor may already have an ongoing research project, and suggests a part of that project to the student as the topic for master's research.

In any case, the student should always do some initial research to get acquainted with the current trends in the field of interest. This can be done by reviewing recent conference proceedings and current issues of journals or transactions. This initial review process may not be an elaborate one, rather is needed to get an idea about the current trends in technological development. The best way for this initial review is to look at the title and abstract of articles published in recent conference proceedings and/or journals/transactions. Often the title of the article alone may be sufficient to give an indication about its contents. If an article seems interesting, and is in the student's main field of interest, further details of the scope of the article can be found in the 'Introduction' section of the article.

3. 3. Thesis Proposal

When should I start working on the thesis research?

Statistically speaking, students who start their thesis research in the third semester seldom complete the thesis by the end of fourth semester, which is presumably the last semester for a master's program. Thus it is advisable to start the thesis research during the second semester. Selection of a thesis topic, and at the very least, a literature review should be completed during the second semester. Literature review involves collection of technical articles from various journals/conference proceedings, and critical review of the article for its contents, especially its strengths and weaknesses. Literature review takes a lot of time since appropriate journals or

books may not be available in our libraries. In that case the student submits a request to the inter-library loan department. It may take about two weeks to get a copy of an article from another library. Most students begin their graduate studies in Fall, and anticipated graduation date is May of 4th semester. However, note that the deadline for submission of thesis to the committee is March 31. This means that everything must be completed before this date. Deadline for submission of the final signed copy of thesis to the Graduate School is middle of April.

Is there any specific format for writing the proposal?

There is no specific format for a thesis proposal that is required by the graduate school. However, it is strongly recommended that students follow the general thesis guidelines when preparing the proposal, which can be found at <http://isc.temple.edu/grad>. The objective is that the proposal should be written in a way so that (most of) it can be used into the final thesis with possibly minor modifications. A well-written thesis proposal not only saves time in the long run, but also helps the student get a better understanding of the subject matter of research.

What should be included in a thesis proposal?

A thesis proposal should include

- a) **a) Proposed Research: what you plan to do,**
- b) **b) Engineering relevance of the problem,**
- c) **c) Literature review: what has been done by other people in the past,**
- d) **d) Preliminary Research: what you have done so far,**
- e) **e) Further Research: what you plan to do in next few months, and**
- f) **f) Expected results.**

The thesis proposal should be organized in several chapters as described below. Titles of various chapters or sections should be modified as necessary. Also additional sections/subsections or chapters may be added if appropriate. The outline given below is only a suggestion; consult with your advisor for organization of your thesis.

TITLE PAGE
ABSTRACT
CONTENTS LIST

Chapter 1 INTRODUCTION

- 1.1 Introduction of the subject matter
- 1.2 Introduction of the research area
- 1.3 Problem statement and engineering relevance
- 1.4 Scope of research
- 1.5 Organization of the proposal

Chapter 2 BACKGROUND/LITERATURE REVIEW (one or more chapters)

- 2.1 Introduction
- 2.2 Background material from books or technical reports if necessary
- 2.3 Critical review of technical articles
- 2.4 Concluding remarks

Chapter 3 PRELIMINARY RESEARCH

- 3.1 Introduction
- 3.2 Present status of your research

Chapter 4 PROPOSED RESEARCH

- 4.1 Introduction
- 4.2 Proposed research
- 4.3 Expected results
- 4.4 Concluding remarks

REFERENCES
BIBLIOGRAPHY
APPENDICES

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Each chapter should start with an introductory statement or a section 'Introduction' to let the reader know about what is presented in that chapter. Also a chapter should end with statements about what is coming up in the next chapter. There should be a continuity of flow from one chapter to the next.

Chapter 1: This chapter should start with appropriate introductory material suitable for a general audience who may not be expert in the field. Technical details, analysis, results, graphs, etc. should be avoided. This chapter should also state the proposed research in appropriate technical language along with motivation and engineering relevance of the proposed research. Scope of the proposed research should be carefully stated. Scientific research is often open-ended that may be extended and expanded in many different directions. 'Scope of research' should include discussions on exclusions, inclusions, and assumptions required in the proposed research, experimental verification of research results, verification of research results in a practical environment, etc. It is important that you don't want to propose a project that you may not be able to accomplish within the given time frame and resources, and at the same time the proposed research must be at an advanced level to make it acceptable for a master's thesis. Your advisor will be able to make this determination.

Chapter 2 should include review of the current status of the proposed research. This may include appropriate background material taken from various books, journals, reports, etc, which must not be copied, but stated in your own words. Strengths and weaknesses of research conducted by others should be discussed in this chapter.

Some preliminary research should always be done before a proposal is submitted. This is important to determine technical feasibility of the proposed research. **Chapter 3** should contain the progress that you may have made by the time proposal is submitted.

Plans for further research form **Chapter 4**. Try to be as specific as possible in stating your plans for the proposed research. It doesn't mean, however, that you have to follow the stated plan word-for-word in the actual research, but it should reflect your state of mind at the time of writing the proposal, and should be considered as a guideline for conducting the research. This chapter should also discuss anticipated results of the proposed research.

'References' contains the bibliographical details, namely, author(s) of the article, journal/conference name, page numbers, and year published. These are the articles that have been referenced within the proposal.

'Bibliography' is a list of additional articles that are relevant to the proposed research, but have not been directly used in the proposal.

Appendices may be added to a thesis or proposal if necessary. Usual appendices are computer programs, certain mathematical derivations, company literature related to the proposed research, etc.

There is no limit on the maximum or the minimum number of pages for a thesis or a thesis proposal; the essential requirement is the contents.

Review of the proposal

Every thesis proposal is reviewed by a committee of faculty (and an external examiner if appropriate). For master's thesis, the student's advisor chairs the committee. The committee looks for answers to the following questions:

- What are the goals of the proposed research?**
- Is the proposed research technically feasible?**
- Is the proposed research of current interest to the engineering community?**
- Does the student have the background knowledge to carry out the research?**
- Can the proposed research be carried out within a reasonable time?**
- Does the College have resources for the proposed research?**

Public Presentation

After the proposal is submitted to the Committee, the student is required to present it at an open seminar. During the presentation, the committee members may ask the student questions related to the background material to determine the student's depth of knowledge on the subject matter. The student may also be asked questions on the proposed research. It is not unusual for the committee to suggest that the student makes changes in the proposed research and resubmit the proposal.

After the proposal is accepted, the student then proceeds to carry out the proposed research, and eventually submits the final thesis. A grade is also assigned for the Thesis Proposal; however, it is usually done only after the final thesis is submitted.

4. Final Thesis

A final requirement for the MSE degree is a master's thesis, which is a compilation of the research results proposed in the thesis proposal. The final thesis can be written more or less following the same style as the thesis proposal. Specifically, the first two chapters of thesis proposal can be used in the final thesis with possibly minor modifications. This should be followed by new chapters on new results obtained during the research. Often it is preferable to present the research results in several chapters based on logical progression of the research. For example, one chapter could be on analytical results, another chapter on simulation or experimental results, etc. The final chapter of a thesis includes conclusions and directions for further research. The overall style of a thesis is given below:

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TITLE PAGE
CONTENTS LIST
LIST OF FIGURES
LIST OF TABLES

Chapter 1 INTRODUCTION
1.1 Introduction of the subject matter
1.2 Introduction of the research area
1.3 Problem statement and engineering relevance
1.4 Scope of research

1.5 Organization of the proposal

Chapter 2 BACKGROUND/LITERATURE REVIEW (one or more chapters)

- 2.1 Introduction
- 2.2 Background material from books or technical reports if necessary
- 2.3 Critical review of technical articles
- 2.4 Concluding remarks

Chapter 3 RESULTS (one or more chapters)

- 3.1 Introduction
- 3.2 Analytical results
- 3.3 Simulation results
- 3.4 Experimental results
- 3.5 Concluding remarks

Chapter 4 CONCLUSIONS

- 4.1 Conclusions
- 4.2 Suggestions for Further Research

REFERENCES

BIBLIOGRAPHY

APPENDICES - Software Code

Formatting and typographical guidelines for writing the final thesis can be found at the graduate school website <http://astro.ocis.temple.edu/~pip/handbook.htm>. Note that formatting requirements described in the guidelines of the graduate school must be strictly followed for preparing the final thesis. **Students are required to submit a draft of the thesis to the Graduate School, and get it approved before the final submission is made.** Note however that Graduate School reviews the typographical details only, not the technical contents. Submit the draft to the Graduate School well before the deadline for submission of the final signed copy of the thesis, since it takes at least a week or two to have it reviewed by the Graduate School.

Typical Problems in formatting: Carefully check the following: page margin – 1.5 in on the left, and 1in on other three sides; font size and type – 12 point Times Roman or equivalent, must not be smaller than 9 point anywhere in thesis including figures; figures -- must not exceed the allowable page area, must be clearly readable; numbering of figures and tables; equation numbers on the right margin; avoid widow and orphan lines; and page numbering.

After the final thesis is submitted, the student is required to make a public presentation of the research results. The style of presentation of both the thesis and the thesis proposal must be professional, much like how engineers interact with fellow engineers in engineering corporations. The student is expected to defend his or her research results in front of an examining committee. A grade is assigned for the thesis after it is successfully presented and defended.

Whenever possible, master's students are encouraged to publish their research results in a technical journal or conference, although it is not a requirement for the degree. A publication record certainly looks excellent in a resume, and furthermore, publications are required by many universities from students seeking admission into a doctoral program. Doctoral students are required to publish at least two articles based on their research results before the Ph.D. degree is awarded.

SAMPLE TITLE PAGE
STRUCTURAL DESIGN OF INTEGRATED FR/ATM
INTERWORKING UNIT (IWU)

A Thesis
Submitted to
the Temple University Graduate Board

in Partial Fulfillment
of the Requirements for the Degree
Master of Science in Engineering

By
John Doe
August, 2000

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Dr.Saroj K. Biswas
Director of Graduate Studies
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Committee Member

Dr.Mathew N.O.Sadiku
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