

Masters Thesis and Graduate Research Project

This document explains what thesis and graduate research project are, and presents guidelines for conducting research as well as documenting the work.

Masters Thesis (EE699)

"the-sis: 1. A proposition, as one advanced by a candidate for an academic degree, that is maintained by argument. 2. A dissertation advancing an original point of view as a result of research, esp. as a requirement for an academic degree."; *The American Heritage dictionary, Second College Edition.*

A thesis project involves an in-depth study/investigation of the topic; it is a 6 credit hour project, in which, atleast about 20 hours of work per week is expected.

Thesis will be part of the permanent collection of the university library. It will be catalogued like a book, and hence can be accessed and borrowed from the archives of the library by anyone. Therefore, it is prepared carefully, by adhering to stringent guidelines.

Graduate Research Report (EE681/682)

Graduate research report remains in the department only. Hence it is prepared according to less stringent guidelines. A graduate research project involves a minimum of 3 credit hours of work. Therefore, atleast about 10 hours of work per week is expected.

a) Prerequisites

The prerequisites for undertaking research work in the area of RF Communication systems and circuits are the following courses: EE551 (RF communications Circuit Design), EE550 (Electromagnetic Wave Propagation and Antennas), EE552 (Wireless Communication Systems and Circuits) and EE531 (Communications Theory).

b) Research Topic

In applied research, typically, an original circuit or system/sub-system design idea within an area of interest to the student and research advisor is pursued, keeping specific applications in view.

c) Literature review

The published literature on the selected topic is reviewed thoroughly. The literature review narrows the scope of the study/investigation, and leads to a specific new design idea for further investigations, and finally implementation.

d) Preliminary investigations

Preliminary investigations include further in-depth studies of the published work, learning the simulation and design tools, device modeling, designs, simulations, test and measurement, set-ups and procedures, experiments..etc. These studies and investigations lead to specific project goals and plans.

e) Research proposal

The preliminary investigations culminate in a research proposal. Research proposal includes the goals, tasks, schedule, parts and equipment,..etc. Please refer to the project proposal guidelines for details.

f) Research work

The research work is carried out according to the tasks and schedules in the proposal. The goals and schedules may change slightly depending on outcomes of the various tasks. The work involves in-depth investigations leading to useful insights, design, fabrication, test and measurements, and development of design guidelines.

g) Documentation

Masters thesis as well as research report is structured like a book. The contents are divided into chapters. Each chapter begins with a short introduction to the chapter, and concludes with remarks. The entire thesis or report will conclude with an overall "summary and conclusion " Chapter. A typical structure consists of:

- Title page
- Thesis approval page
- Acknowledgments
- Abstract
- List of Illustrations
- List of Tables
- Table of contents
- Ch.I Introduction
- Ch.II Literature Review
- Ch.III Investigations (including simulations)
- Ch.IV Design
- Ch.V Fabrication, Test and Measurements
- Ch.VI Summary and Conclusions
- Bibliography and References

Appendices (Useful information and details related to contents of Chapters)

The number and contents of chapters depend on the specific project. They may vary from the typical structure given here.

** There is no stipulated upper limit to the number of pages.

The thesis or report should however be complete and self contained. It should be written in such a way that anyone interested in your work should find all the information needed to reproduce your results or extend your work.

** A masters thesis or report should be formatted according to the IEEE transactions guidelines (see the guidelines provided to you in EE 551). A masters thesis in addition should conform to certain guidelines of the graduate school (see graduate school brochure for preparing thesis).

** A masters thesis or report typically undergoes atleast 2 draft stages.

The final version of the report is submitted to the advisor. The contents of the report are presented to the advisor in an open seminar.

The final version of the thesis is submitted to the thesis committee (which includes the advisor, department graduate advisor, and one other faculty member) for their review, comments and recommendations. The committee will approve the thesis as it is or suggest shanges before approval. The contents of thesis is presented to the commitee in an open seminar. The thesis approval page is signed by the committee members on the day of the defence.

After the committee members sign the thesis approval page, the student should follow the graduate school guidelines for making the required nnumber of copies and binding.

Research: A Student- Teacher Partnership

Research is a partnership venture between student and advisor. The advisor is as much interested (sometimes more interested than the student!) in the outcomes of the research work as the student is. He contributes to the work as well.

Research is an adventure into unknown territories, in the pursuit of new knowledge. Curiosity is the driving force. The process (or means) is as important as the end result. The accumulation of knowledge (i.e. learning or education) and development of skills (i.e training), which are the primary goals, takes place during the process of research work. Hence, if the processes are appropriate, the primary goals are fulfilled irrespective of the outcome of the project.

PROJECT PROPOSAL

EE 681/682 (Graduate research); EE 699 (Masters Thesis)

The proposal shall be based on the literature review, and the work you have already done. It should include the following.

- 1] Title (tentative) and Project statement. What are the applications or uses of the device/system you are designing?
- 2] Functional block diagram (or a schematic) and brief description of the diagram. Include all inputs, outputs, power levels and frequencies; Include DC power requirements.
- 3] What is new? How is your idea different/better than others' or how does this study/investigation contribute to the existing body of knowledge? Briefly justify the project idea.

Here, briefly paraphrase what you have discovered in your literature review, and put your idea in context of what has already been accomplished by others. Give a comprehensive list of references/bibliography.
- 4] Outcomes of the project, including specific operational goals to be reached? List all important technical specs you hope your device/system will meet. Include size and cost info if possible.
- 5] Briefly present the significant results (show diagrams/graphs/tables) you have already obtained, and discuss them briefly. Include brief remarks.

Where would you go from here? What are the other design options you would like to investigate?, and why? Justify.
- 6] How are you going to test your device/system? Give block diagrams of set-ups; list laboratory components and equipment needed for tests and measurements; list the test and measurement procedures. Do we have in the lab all the components and equipment you need ?
- 7] Which transistor model will you use or are you using? Has the model been validated ? What needs to be done to arrive at a valid model? Address the issues related to the model.
- 8] What are the simulations (on HP-EEs of test benches) you need to do, and have already done? What are the other software needed?
- 9] What are the parts (passive and active components) you need for the project? List them. Do we have all of them in the lab?
- 10] List all tasks and milestones, and prepare an activities schedule (on Excel spread sheet) for completion of the project.
- 11] Prepare a report/thesis outline (table of contents).