Thesis Guidelines
2015-2016
Preface

These guidelines were established to help INI students prepare their thesis. If followed closely, students will produce quality, formal theses in a reasonable amount of time and under less stress. The entire process will be streamlined if students adhere to these guidelines.

The thesis represents a capstone experience and an original contribution in an interesting and relevant area of information networking and security.

Research may include internships, working on existing projects, designing new areas of research, or assisting faculty on their current research. Several INI students have either originated or contributed to research and projects that resulted in start-up companies and widely utilized technologies such as MindMatrix, Teragon Corporation, and RaveTel (which was purchased by dynamicsoft). Most notably, INI faculty, researchers, and students were the prime initiators and implementers of Wireless Andrew, the largest high-speed wireless network in the world, covering the entire Carnegie Mellon campus.

Once research is complete, students defend their thesis work and conclusions to an audience of their peers and faculty. Work culminates in a written, formal thesis (archived in the University Library and kept on file at the INI).
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1. Administrative Guidelines

1.1 Overview of the Thesis Process From Declaration to Submission

About four weeks before the last day of classes in the first spring semester, students must notify the INI Enrollment Services Office (INI ESO) will contact the INI MSIN, MSIS and MSIT-IS Kobe students to inquire about which curriculum option (either: course option, traditional research thesis, project-based technical report or industry practicum research project) they want to pursue via the ‘curriculum option form’ (COF). The students must submit their completed COF to the INI ESO. The INI ESO will send the COF to the respective advisor who will review and approve or deny the students COF.

Students, who elect to pursue a traditional research thesis, will spend the next two weeks finding an appropriate thesis advisor and reader as well as developing a thesis proposal. The students’ academic advisor can guide them in selecting a thesis topic and a faculty advisor. The thesis proposal is due to the INI ESO two weeks before the last day of classes in the first spring semester.

Students should consult with their thesis advisor and reader over email, in person, or over the phone. However, students are responsible for ensuring that all of the work is completed on time. Responsibilities for acquiring basic research techniques and identifying an initial research problem lie solely with the students. The students should arrange periodic meetings with their thesis advisors to assist with problems and assure adequate progress. These meetings are likely to be most frequent at the early stages of the research, but the thesis advisor should not expect to take on remedial work.

Upon completion of the research, students will defend their work and submit the thesis to his/her thesis advisor and reader for review, which will allow the advisor and reader to make comments and suggestions. Advisors may request additional work or additions to the thesis after the defense as well. Students should submit an electronic copy of their “final version” (before printing) to the INI ESO so the formatting can be checked.

We strongly encourage students to begin writing their thesis and requesting advisor and reader feedback prior to defending to ensure that he or she is on track. In addition, the INI ESO can check the formatting of the title page, signature page, document and references and provide feedback prior to the defense as well. Typically, the INI ESO will review a student’s thesis at least 3 times before approving the formatting. If followed, these practices should alleviate stress for all involved.

Theses that don’t adhere to the formatting guidelines will not be accepted. The final, printed thesis is due to the INI ESO at least 10 days before the final grades deadline for graduating students of the semester in which the student is submitting. Failure to submit a final thesis by the deadline WILL result in the delay of the student’s degree certification.

1.2 Role of Thesis Advisors and Readers

A good place to get ideas about potential advisors is from the websites of the ECE and CS departments, Tepper, and Heinz College. Advisors from the EPP department, the SEI, Robotics Institute, and many other corners of the university also have served as advisors over the years.
Students will need one primary advisor and one additional person to serve as a reader for their thesis. The eligibility requirements of people to serve as advisors are loosely drawn to allow students flexibility in their choice. CMU faculty, including research faculty, from any department may serve as advisors. On-campus pre-doctoral students generally are not permitted to serve as either advisors or readers. The INI Director has the final say on advisor eligibility in borderline cases (such as staff members with doctorates). If students are considering a staff member with a doctorate as their advisor or a PhD student as their reader, they must file a petition requesting permission to do so.

The thesis advisor(s) and reader are required to be present at the defense and must be available to sign the thesis signature page. This is a requirement without exception. Certification of the student’s degree can be delayed by the absence of your advisor or reader.

1.2.1 How Do Students Start a Relationship with Their Thesis Advisor?
Students should consider their initial contacts with a potential thesis advisor as a mutual courtship. Students can be of great help to a potential thesis advisor by doing good work on projects that are of interest to him or her. However, the thesis advisor will also need to spend some time and effort in training students and bringing them up to speed on his or her research topics and operating environment. Just as students are evaluating potential thesis advisors, they will be evaluating students. Students should prepare for their initial meeting by learning about the research of a potential thesis advisor by looking over the information on his or her website.

Students should also try to learn something about their potential advisor from other students who have worked with him or her. The thesis advisor and reader should help monitor and guide students’ research progress. It is the students’ job to educate each individual on the thesis timeline in order to graduate on time.

Students and their thesis advisor and reader should stay within the timeline created in the proposal as closely as possible. Ultimately, students are responsible for the timely completion of their thesis. If students are experiencing difficulties communicating with their advisor, they should inform the INI ESO as soon as they become aware that there is a potential problem.

Once students and their thesis advisor agree to work together, students should make sure they and their advisor have a clear idea (and the same idea!) of what will be done, what the scope of the research is, how they will evaluate the success of the work that was done, and what the “deliverables” will be. Students should also have shared expectations on what the timetable for completion is likely to be. Nevertheless, students should expect that some of the specifics of what goes on will have to be worked out as time progresses.

1.3 Project Grading
A thesis at the INI is worth 36 units and is posted to the students’ schedules during the semester in which they defend and submit their theses. Thesis units cannot be divided between semesters. Students will receive a letter grade from their thesis advisor. The thesis advisor communicates the final grade to the INI ESO, who will enter the grade.
Students can indicate on their transcript that they are working on their thesis in the semesters leading up to the defense and submission of their thesis. Students must communicate this to the INI ESO by the semester add deadline. INI ESO will post the appropriate course to the students’ schedules. The “working on thesis” course is considered as pass/no pass and isn’t factored into the students’ cumulative GPA. Students are responsible for notifying their thesis advisor that they requested to have “working on thesis” units posted to their schedule because their thesis advisor will grade the their progress on their research and assign a pass/no pass grade at mid and end of the semester.

2. The Thesis Proposal
Students should think of the thesis proposal as being a contract between them, their advisor, reader, and the INI.

2.1 Proposal Format
The thesis/ proposal is typically 3-6 pages long and should be divided in to five sections:

1. Introduction and background
This section sets the stage for motivating the work students will do. Students should outline what has already been done in the field of interest, and in particular, describe what are the limitations or shortcomings of the current state of the art that their work will address or improve.

2. What you will do
Students will state, as specifically as they can, what they will do for their thesis work and how it differs from what has already been done before by the rest of the world.

3. Evaluation of your work
Students should address two important issues: (1) how they will know when their work is completed, and (2) how they will evaluate how well they have done. While students may work on a wide variety of topics, no proposal will be accepted by the INI unless it includes a viable form of evaluation.

4. Deliverables
Students will state what artifacts they will leave behind. Minimally, this will form the basis of their thesis that ultimately could contain code, a hardware prototype, a working demonstration system, etc. In the proposal, however, these "artifacts" will merely be mentioned.

5. Expected timetable
Students should include the major milestones in the thesis and the expected completion date. Furthermore, students should plan to work on their entire project (from proposal stage to submission) for more than one semester.

2.2 Proposal Submission
Students are required to submit a hard copy of the thesis proposal to the INI ESO, along with a ‘Thesis Proposal Signature Page’ signed and dated with original signatures of the student, their project team members (if any), their project advisor(s) and reader. The INI ESO will forward the
proposals and signature pages to the appropriate academic advisor for approval. Students can find the appropriate ‘Project Proposal Signature Page Form’ here: http://www.ini.cmu.edu/current_students/grad_project/index.html.

The proposal should be submitted two weeks before the last day of class in the first spring semester. Faxed copies will not be accepted.

3. The Defense
At least one week before the last day of class during the semester students will defend and submit a thesis, they will hold a defense to the advisors, reader and the INI ESO. Fellow students are also invited to attend.

Students must submit a ‘Defense Scheduling Form’ (found on the Graduate Project section of INI’s website) to the INI ESO at least two weeks prior to the date they would like to present. Submitting the form initiates appropriate logistical planning for their defense. Without it, the INI community will not be adequately notified. Once the Defense Scheduling Form is submitted, the INI ESO will post the thesis course to the students’ schedule.

The defense should be treated as a formal and professional presentation. Students should be well prepared with a PowerPoint, demonstrations if applicable, and provide slide handouts for those in attendance. Students should be aware that their advisors, reader or INI ESO might request further changes to the thesis after the presentation.

3.1 Presentation Tips
- Begin to prepare early!
- Typical presentation outline: Introductory slide—project title, student’s name, advisor and reader, etc. Overview slide—be sure to inform the audience of what is to come (keeps them interested)
- Move into the “meat” of the thesis quickly. Don’t bore the audience with nitty-gritty details that, although they may be important, won’t contribute to the audience’s understanding of the student’s contributions
- Students should highlight their contribution…this is important!
- Don’t clutter the slides. Each slide should contain 2-3 important points with 1-2 sub-points each. Absolutely no full sentences—if it’s important enough for a full sentence, say it, don’t make the audience read it. The slides serve as a supplement to what you’re saying, not the other way around.
- Practice, practice, practice. Get volunteers for a mock-up of the final presentation and incorporate their comments and criticisms.
- Don’t include code during the body of the presentation unless your advisor/reader requests it. Have code sample prepared, however, in case someone requests it during the Q&A session.
- Make eye contact with the audience, students should avoid looking only at their advisor/reader. Keep the audience involved.
- Welcome or even invite questions periodically… don’t let the audience fall asleep!
4. The Master’s Thesis
The thesis should be a document of the highest professional standards. It is also a good practice to prepare a document that meets the publication criteria of relevant professional journals.

These instructions will guide masters’ candidates in the production of a high quality final thesis. It is primarily the responsibility of the students to meet these requirements before submitting their thesis.

In addition to these guidelines, students who are writing a master’s thesis should view the CIT website for all formatting and procedural information. http://www.cit.cmu.edu/current_students/graduates/thesis_dissertation_policies.html

If a student’s thesis fails to meet these standards, the student will be asked to resubmit the thesis with adequate changes. As a result, the student’s degree certification WILL be delayed.

4.1 Submission of the Master’s Thesis
Each candidate is expected to have a complete version of the thesis in the hands of the INI ESO at least 10 days before the final grades deadline for graduating students in the semester that they are defending and submitting their thesis. CIT has strict guidelines regarding thesis submission and a student’s failure to meet deadlines WILL result in delay of degree certification. Students who are completing a thesis must submit:

- One single-sided paper copy of the thesis to the INI ESO, including one signature page with original signatures of the thesis advisor; the INI ESO will obtain the academic advisor’s and Director’s signatures.
- One soft copy of the thesis in PDF format with the entire thesis, to the department, or to the relevant departments if the thesis or dissertation is for a joint degree.

As previously mentioned, students should send an e-copy of their “final version” to the INI ESO before printing. The INI ESO will check formatting of the title page, signature page, document and references. Typically, the INI ESO will review a student’s thesis at least 3 times before approving the formatting.

4.2 General Format of the Master’s Thesis
The INI provides a LaTeX template for our students to utilize when writing their thesis: http://www ini.cmu.edu/current_students/grad_project/index.html

If students choose not to use the template, it is imperative that they follow the formatting guidelines provided in the CIT Thesis and Dissertation policies. A summary of the Master’s Thesis format is provided below:

Order of Preliminaries
A) Signature Page
B) Title Page (page i, but number doesn’t appear on it)
C) Blank Page or Copyright Notice (no page number assigned)
D) Acknowledgments (page ii, must include funding source)
E) Abstract
F) Table of Contents
G) List of Tables
H) List of Figures and Illustrations

**Order of the Thesis**

A) Introduction
B) Main Body
C) Summary and Conclusions
D) References (IEEE style)
E) Appendices

**Margins:** Margins must be set at 1 inch on all four sides of the page.

**Page Numbering:** Preliminaries- use small Roman numerals (i, ii, iii, iv, etc.). The numbering begins with ii on the Acknowledgements page. The remainder of the Thesis- including the text, illustrations, appendices, and bibliography, use Arabic numerals (1, 2, 3, 4, etc.).

**Font:** should not exceed a 12 pt. font (applies to all text). Text included in graphs and charts should not be smaller than 8 pt. font (must be legible).

**Line Spacing:** Double-space: abstract, dedication, acknowledgements, table of contents, and body of the manuscript, except for quotations as paragraphs, captions, items in tables, lists, graphs, charts. Single-space: footnotes/endnotes, bibliographic entries, lists in appendices.

**Additional Guidance:** Students should refer to the IEEE Style Reference Guide: [http://libguides.murdoch.edu.au/IEEE](http://libguides.murdoch.edu.au/IEEE) to ensure their references are complete and correct.