

Guidelines for the CSS Master of Science Thesis

Overview

The purpose of the MS Thesis is to make a contribution to the theory or practice of computer science.

Like the MS project paper, the thesis connects your work to the field. Beyond your immediate audience, i.e., your chair and committee, other CSS faculty and graduate students, the thesis is written for other computer scientists and software engineers, whether academic or in the industry. The thesis also shares features with the MS project paper, including previous and current work and research, design and design choices, evaluation and metrics, results and discussion of results, applications and stakeholders, and future implications.

However, the thesis differs in scope (breadth), depth (thoroughness and detail), and scholarly engagement.

General Guidelines

The Thesis should follow the structural conventions of the scientific research paper. This form is both highly structured and, in its variations, flexible enough to accommodate the demands of your own thesis.

In addition:

- Avoid passive voice. Passive voice often introduces ambiguity about who did what when, is less interesting to read, and weakens your prose. (See [here](#) for more on this topic.)
- For every artifact (e.g., figure, diagram, photo, illustration) you include:
 - Include a caption.
 - Size the artifact to minimize the area necessary to communicate what is important for the reader to know.
 - Explain in the text what the reader should attend to in that artifact. It is your job to make sense of the artifact for the reader, connecting it to the prose and highlighting the important aspects of the artifact to attend to.
 - See [here](#) for more on this topic.
- Avoid using determiner words such as “this” and “those” which often introduce ambiguity for the reader. Instead, use the noun you are referring to.
- See the University of Washington Bothell’s Writing and Communication Center’s [Resources](#) website for additional information about writing well.
- For each claim or assertion you make:
 - Provide evidence to support the claim.
 - Beware of making claims that are stronger than can be supported by the evidence. If necessary, use a qualified claim to appropriately weaken your claim (see [here](#)).
- The clarity of your use of language and terminology reflect upon the clarity of your thinking. Just as in programming, it is important to use consistent terminology with

consistent capitalization and wording. Avoid using multiple terms for the same concept. Refactor your terminology as you evolve your understanding of the system you are designing and building.

- Strive for consistency within your document. If you use Microsoft Word, use [paragraph styles](#) to ensure consistent formatting of paragraphs and text. And use Word's [References / Cross-reference](#) feature to ensure that Figure / Table / Appendix / Section etc. numbers are correctly updated as needed.
- Ask your committee for any additional requirements or interpretations of these requirements.
- For more information on how to do research, write, evidence arguments, and so on see [The Craft of Research, Third Edition](#) by Booth et al.

Section-by-Section Guidelines

The thesis typically comprises 5 or 6 chapters (this may vary, depending on your area of study).

Title Page

Purpose: To include the appropriate meta-data about the project paper, and make it clear that this paper is written in partial fulfillment of the requirements for a Master of Science degree

Chapter 1: Introduction

Purpose: To define your research area and goals, both general and specific, as well as the problem (or opportunity) which it addresses: *In this section you will:*

- Define your research area
- Position your work in the field, by describing current practice (approaches) and research (overview)
- Define central terms and concepts
- Describe goals and criteria
- Explain motivation
- Identify the stakeholders, i.e., the groups or research areas that stand to benefit from your work
- Identify the specific practical benefits of your research, i.e., justify the need for your research
- Provide the reader with an overview (map) of the chapters that follow.

Chapter 2: Literature Review (aka Related Work, or Background)

Purpose: To position your work in relation to other systems. While you will do this in a general way in the Introduction (see above), here your description of others' work will be both more detailed and more comprehensive. *In this section you will:*

- Summarize previous relevant work explained in your sources (i.e., research papers, theses, etc.)
- Organize this discussion in a logical way that makes sense for your thesis focus (this should not be a “serial” or “box-car” discussion of Source 1, Source 2, Source 3...)
- Clarify the connections between these sources/work and your own research, using clear topic sentences and transitions; explain how your work builds on this research, at both the “macro” level of the larger computer science and software engineering context and the “micro” level of research interests most closely aligned with or relevant to your own.

Chapters 3 and following (depends on thesis)

Purpose: To enable other computer scientists, developers, etc. to learn from, precisely replicate, build on, and otherwise make use of your thesis research. Because of the variability of thesis, these chapter headings will vary. Typically middle chapters are devoted to topics such as Technique(s) and Tool Support. *Depending on your thesis, you will likely need to:*

- Describe the architecture etc. in detail, including key aspects of your software design
- Specify supporting software used
- Specify implementation
- Outline the software development lifecycle process
- Explain the rationale for all of the major design decisions you made
- Describe any alternatives you considered, and explain why these were ultimately rejected in favor of your design choice
- Acknowledge trade-offs
- Detail process, including steps for replicating your research (where applicable)
- Acknowledge sources of any key components of your design (when appropriate; this is necessary even if you have already discussed a source in your Literature Review section)
- Describe usage scenarios, e.g., business or specific industry
- Describe challenges, e.g., with implementation, and workarounds

Chapter (number may vary): Results

Purpose: To present your results of your research. Specifically, *this means that you will:*

- Describe case study, experiment, or other evaluation method in detail
- Evaluate how successful you were in meeting your goals and achieving the desired level of quality
- Acknowledge, detail, and attempt to explain any unexpected or surprising results

- Explain how you measured success (desired measure of quality)
- Explain how you defined and measured “quality”
- Evaluate your design and other choices in light of the results.

Chapter (number for this final chapter may vary): Conclusion

Purpose: To present your conclusions as you propose and/or reflect on “next steps” for your and related work in the field. *This means that you will:*

- Summarize the key results and takeaways
- Discuss the implications of your results
- Acknowledge and discuss limitations of your thesis for the field and/or research area
- Propose areas for future work
- Propose “next steps” for improving your and others’ future work.

Abstract

Note: *Despite its late appearance on these guidelines, the Abstract goes before the Introduction; however, you usually will write it last.*

Purpose: To present an accurate synopsis of your research thesis, so that other researchers can decide whether to read the full paper. *Specifically, you will:*

- Include key aspects of your work
- Reference your thesis’ relevance (to the field) and the problem it addresses (or opportunity it offers)
- Reference results, surprises, and limitations
- Write concisely, using a progressive levels of disclosure (most important ideas first)
- Check with your committee about whether to avoid the first person singular (“I,” “me,” “my”)