

# Guidelines for the Master of Science Capstone Project

## Overview

The Capstone Project involves a substantial document that describes all aspects of your project, from initial research and conception to design (and design choices) to final delivery, results, and analysis of those results and future implications. Your paper connects your project to the field, including previous and current work, and to stakeholders who will stand to benefit from your work.

The larger purposes of the Project include 1) demonstrating a master's level of work and reasoning and 2) communicating your findings to the wider field of Computer Science, so that other researchers, in turn, can understand, replicate, borrow from, and build on your work.

## General Guidelines

The Capstone Project should follow the structural conventions of the scientific research paper. This form is both highly structured and, in its variations, flexible enough to accommodate strategic departures based on your project. See the University of Washington [Word](#) or [LaTeX](#) templates for Master thesis or Doctoral dissertation, which you will need to adapt to fit a Capstone Project. See the last page of this document for a cover sheet template.

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

Each section of the paper has its own specific purpose(s), as described in the following subsections.

### 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. Follow the format given in the University of Washington [Word](#) or [LaTeX](#) templates, with appropriate modifications.

### Introduction

Purpose: To define your project goals, both general and specific, as well as the problem to be solved (or the opportunity it offers). *In this section you will:*

- Position your work in the field (generally)
- Identify the stakeholders, i.e., the groups who will benefit from your project
- Identify the specific practical benefits of your project, i.e., justify the need for your work
- Define central concepts or terms
- If your work is part of a group or collaborative project, position your contributions within the larger project; this could be done via a statement such as:

*This project is part of a larger group project [to \_\_\_\_/OR description], under the direction of \_\_\_\_\_ at the University of Washington Tacoma during the [quarters]. [OPTIONAL next sentence to extend description] The project team include[s/d] [names]. My responsibilities involved/included*

*/OR/ The goal of the current project is \_\_\_\_\_. For a full description of this team project, see Appendix X.*

### Literature Review (aka Related Work, or Background)

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

- 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 project 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 project, using clear topic sentences and transitions;
- Explain how your work builds on these related works, at both
  - the “macro” level of the larger computer science and systems context
  - the “micro” level of work most like your own

### **Methods, Design, or Architecture**

Note: Depending on your project, you may focus on one of these aspects or combine them under one heading (e.g., incorporate “design” description into your “Methods” section or vice versa).

Purpose: To explain your method, design, and/or architecture so clearly that others in the field can both understand it and replicate or borrow your design or method (or some part of your design or method). *This requires you to:*

- Describe experimental methodology, experimental design, and data collection strategy in order to allow others to replicate your results
- Describe quality metrics and target values so that you can reason about the quality of your results
- Describe the architecture, etc. in sufficient detail, including key aspects of your project design
- Specify supporting software used
- Outline the project development lifecycle process
- Narrate key junctures in the decision-making process, including explaining in detail 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
- Acknowledge sources of any key components of your design (when appropriate; this may be necessary even if you have already discussed a source in your Literature Review section).

### **Results**

Purpose: To present your results of your method/design/architecture. Specifically, *this means that you will:*

- 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 choices in light of the results

### **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 (lessons) learned in your project
- Discuss the implications of your results
- Acknowledge and discuss limitations of your project for the field and/or research area
- Propose areas for future work
- Propose “next steps” for improving yours or similar projects

### **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 project, so that other researchers can decide whether to read the full paper. *Specifically, you will:*

- Include key aspects of your project
- Reference your project’s 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)
- Avoid the first person singular (“I,” “me,” “my”)

## Cover Sheet Template

[Title of Your Report]

[Your Full Name (first and last)]

A report

submitted in partial fulfillment of the  
requirements of the degree of

Master of Science in Computer Science & Systems

University of Washington Tacoma

[Year (e.g., 2015)]

Project Committee:

[Name of project committee chair], Chair

[Name of project committee member]

[Name of project committee member]