Sample Thesis Template for UBC Okanagan graduate students (mostly) in computer science and mathematics

by

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

The College of Graduate Studies

(Computer Science)

THE UNIVERSITY OF BRITISH COLUMBIA

(Okanagan)

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The following individuals certify that they have read, and recommend to the College of Graduate Studies for acceptance, a thesis/dissertation entitled:

Sample Thesis Template for UBC Okanagan graduate students (mostly) in computer science and mathematics

submitted by Jane Mary Doe in partial fulfilment of the requirements of the degree of Master of Science

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Abstract

The abstract:

– Is a concise and accurate summary of the thesis.

– Should state the problem, the methods of investigation, and the general conclusions.

– Must not contain tables, graphs or illustrations.

– Must not exceed 350 words.

– Should contain keywords that will facilitate automated information retrieval.

– Must be the only abstract in the thesis.

Lay Summary

Effective January 2018, all theses and dissertations must include a lay summary. The lay summary explains the key goals and contributions of the research/scholarly work in terms that can be understood by the general public. It does not use technical terms and discipline-specific language. It must not exceed 150 words in length.

Preface

The Preface must include only the following:

- A statement indicating the relative contributions of all collaborators and co-authors (including supervisors and members of the supervisory committee) of publications or material submitted for publication, emphasizing details of the student's contribution and stating the proportion of research and writing conducted by the student. The statement must include details about the student's contribution to the following:
  - Identification and design of the research.
  - Contributions to the various parts of the research.
  - Analysis of the research data, if applicable.
  - Preparation of manuscripts, if any.
  - If the student was the sole contributor to all work involved in the thesis or dissertation and in the writing of the thesis or dissertation, a statement should be included to that effect.
- A concise description of all use of generative artificial intelligence (AI) in the research described, the drafting of, and the preparation of the thesis or dissertation. If generative AI was not used in any way, a clear statement that generative AI was not used for any aspects of this work must be included. For a clear description of what constitutes generative AI, visit `https://genai.ubc.ca/`
- A list of any publications or submissions arising from work presented in the thesis/dissertation including the title of the article and name of the publisher (only if the article has been accepted or published), and the chapter(s) of the thesis/dissertation in which the work is located.
- The name of the particular UBC Research Ethics Board, and the Certificate Number(s) of the Ethics Certificate(s) obtained, if ethics approval was required for the research.

– If copyrighted materials are included in the thesis/dissertation, they need to be documented here. Please check the requirements in the "Copyright" section below.

Table of Contents

List of Tables

List of Figures

Acknowledgements

In this section you can:

- Acknowledge the extent to which assistance has been given by members of staff, fellow students, data technicians, editors, and/or others.
- Recognize the supervision and advice given by your supervisor and committee members.
- Acknowledge colleagues with whom you have written journal articles.

Dedication

The dedication is usually quite short, and is a personal rather than an academic recognition. The dedication is usually quite short, and is a personal rather than academic recognition. You can use any font or language you wish for the dedication page.

The *Dedication* does not have to be titled, but it must appear in the table of contents. If you want to skip the chapter title but still enter it into the Table of Contents, use this command `\chapter[Dedication]{}`.

Chapter 1

Introduction

The thesis must clearly state its theme, hypotheses and/or goals (sometimes called "the research question(s)"), and provide sufficient background information to enable a non-specialist scholar to understand them. It must contain a thorough review of relevant literature, perhaps in a separate chapter.

Note: The thesis must only contain one section titled "Introduction". (Please see an exemption for published material in the "Including Published Material in a Thesis or Dissertation section below).

For more detail on the structure, see `https://gradstudies.ok.ubc.ca/academics/thesis-and-dissertation/preparation/`

This sample thesis discusses changes from the sample thesis of Michael Forbes, that make the thesis compliant with UBCO College of Graduate Studies standards. If you need more information about the template and LaTeX, please check out the sample thesis of Michael Forbes at

http://alum.mit.edu/www/mforbes/projects/ubcthesis/.

[Ait11, AL08, ALI11, BBEM10, BC11, Ber10, BGLW08a, BGLW08b]

1.1 Packages

There are several packages included in `ubcostyle.sty`. So before you add a new package, check first if it is already included there.

1.2 Glossary

You need to provide a glossary of notation. The ubcostyle file uses the package `glossaries`. Please read the documentation for this package.

In short, you need to define glossary entries with a keyword at the beginning of the document. You can use the `glsadd` with the keyword to add the corresponding page number to the glossary, where the glsadd command appears. In general, only use this at the place where a symbol or notation is introduced the first time. Sorting can be done with the sort keyword.

You can use subgroups (like number sets, operator families, etc.). However, within a group, sorting should be according to appearance in the document.

Once you have all your entries defined, compile your LaTex document. After that, open a command line terminal and `cd` into the directory of your thesis. If your thesis file name is `ubc_2010_spring_doe_jane.tex` (which is standard file name required by UBC circle when uploading the thesis), then type `makeglossaries ubc_2010_spring_doe_jane`
and compile your document again. The glossary should be there.

1.3 Epigraph

If you want to add an epigraph to a chapter (epigraph in the sense of a literary inscription, not a function epigraph), you can use the command `epigraph` after the chapter. Check out the documentation of the `epigraph` package for more information.

The following are examples of how to incorporate graphics into your thesis.

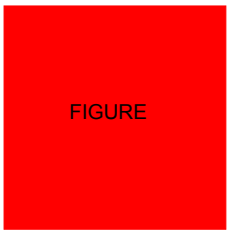


Figure 1.1: This is a sample figure Note that we have used the optional argument for the caption command so that only a short version of this caption occurs in the list of figures.

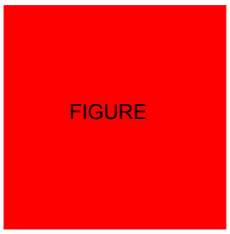
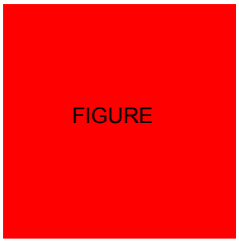


Figure 1.2: This is the same sample figure with still a long caption but this time we did not use a short caption command in the table of figures.

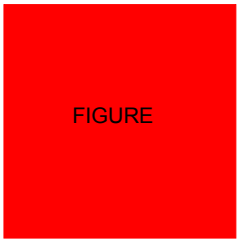
Table 1.1: Short table title

You should really put text in between figures so LaTeX has more flexibility to place the figure at the appropriate location.

Table 1.2: Short table title



(a) Figure on the left side is identical to the one on the right.



(b) Figure on the right side is identical to the one on the left.

Figure 1.3: An example of putting two figures side by side using the subcaption package.

Figure 1.4: Another Figure

Figure 1.5: Another Figure with a very long title to check the alignment in the lof

Figure 1.6: Another Figure

Figure 1.7: Another Figure

Figure 1.8: Another Figure

Figure 1.9: Another Figure

Figure 1.10: Another Figure

Table 1.3: Long table title that wraps around several lines and goes on and on and on and on and on

Table 1.4: Short table title

Table 1.5: Short table title

Table 1.6: Short table title

Table 1.7: Short table title

Table 1.8: Short table title

Chapter 2

Sample Content Using Mathematical Notations

2.1 Facts and theorems

If we use a well established fact or theorem, we state it with a citation in the paragraph title of the fact or theorem. The following is from a well known textbook.[1]

Fact 2.1. *[HUL93, Theorem IV.2.4.2] Define the* marginal function γ *associated with* $g : \mathbb{R}^n \times \mathbb{R}^m \to \mathbb{R} \cup \{+\infty\}$ *by* $z \mapsto \gamma(z) := \inf_x g(x, z)$*. If* g *is a proper convex function and is bounded below on the set* $\mathbb{R}^n \times \{z\}$ *for all* z*, then* γ *is convex.*

2.2 Propositions and lemmas

Here is a lemma followed by its proof.

$$D = \left\{(x, \lambda) \in \mathbb{R}^d \times \mathbb{R}^+ : \frac{x}{\lambda} \in C\right\}.$$

Lemma 2.2. *Assume* C *is a nonempty closed convex set. Then the set* D *is a nonempty closed convex cone.*

Proof. The fact that D is nonempty and closed follows from C being nonempty and closed. One can check directly that D is a cone....

Hence D is convex. □

Make sure that the qed symbol is always on the last line of the proof. If the last line is an equation, you can enforce the qed on the same line with the `qedhere` command.

For citations, please use BibTex. A sample article to verify formatting and style is [BGLW08a]. Use the bibliography style `ubco`, which is basic

[1] Note that in this definition, we use the `glsadd` command for the newly used symbols.

`alphaurl` style with inline links enabled. Please compile multiple times when generating the references. The last entry in a reference are the back references to the pages with the citation. They need an additional compilation, once the bibtex entries are generated.

Note that the bibliography style is discipline dependent so feel free to use the style adopted by your discipline, for example siam for mathematics.

Chapter 3

Landscape Mode

The landscape mode allows you to rotate a page through 90 degrees. It is generally not a good idea to make the chapter heading landscape, but it can be useful for long tables etc.

This text should appear rotated, allowing for formatting of very wide tables etc. Note that this might only work after you convert the `dvi` file to a postscript (`ps`) or `pdf` file using `dvips` or `dvipdf` etc.

Chapter 4

Conclusion

Here comes the conclusion.

Table 4.1: A publication quality table. Very very very very very very very very very very very very long title.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

Your conclusion can go on for several pages.

Bibliography

[Ait11] Myelkebir Aitalioubrahim. On second order nonconvex sweeping process with nonconvex perturbation. *Commun. Korean Math. Soc.*, 26(3):515–530, 2011. → pages 1

[AL08] Dalila Azzam-Laouir. Mixed semicontinuous perturbation of a second order nonconvex sweeping process. *Electron. J. Qual. Theory Differ. Equ.*, pages No. 37, 9, 2008. → pages 1

[ALI11] Dalila Azzam-Laouir and Sabrina Izza. Existence of solutions for second-order perturbed nonconvex sweeping process. *Comput. Math. Appl.*, 62(4):1736–1744, 2011. → pages 1

[BBEM10] M. Bačák, J. M. Borwein, A. Eberhard, and B. S. Mordukhovich. Infimal convolutions and Lipschitzian properties of subdifferentials for prox-regular functions in Hilbert spaces. *J. Convex Anal.*, 17(3-4):737–763, 2010. → pages 1

[BC11] H.H. Bauschke and P.L. Combettes. *Convex analysis and monotone operator theory in Hilbert spaces*. CMS Books in Mathematics / Ouvrages de Mathématiques de la SMC. Springer, New York, 2011. With a foreword by Hédy Attouch. → pages 1

[Ber10] Frédéric Bernicot. Perturbation stochastique de processus de rafle. In *Séminaire: Équations aux Dérivées Partielles. 2008–2009*, Sémin. Équ. Dériv. Partielles, pages Exp. No. XIX, 13. École Polytech., Palaiseau, 2010. → pages 1

[BGLW08a] Heinz H. Bauschke, Rafal Goebel, Yves Lucet, and Xianfu Wang. The proximal average: Basic theory. *SIAM J. Optim.*, 19(2):768–785, 2008. → pages 1, 6

[BGLW08b] H.H. Bauschke, R. Goebel, Y. Lucet, and X. Wang. The proximal average: basic theory. *SIAM J. Optim.*, 19(2):766–785, 2008. → pages 1

[Fea05] Simon Fear. Publication quality tables in LaTeX [online]. 2005 [cited April 18, 2010]. → pages 15

[HUL93] Jean-Baptiste Hiriart-Urruty and Claude Lemaréchal. *Convex Analysis and Minimization Algorithms*, volume 305–306 of *Grundlehren der Mathematischen Wissenschaften*. Springer-Verlag, Berlin, 1993. → pages 6

Appendix

Appendix A

Tables

Here you can have additional tables. Table captions are always on top.

In order to use publication quality tables, one should use the guidelines in [Fea05]. In short, do not use vertical rules or double rules, units in the column heading (not in the body of the table), precede decimals with a digit, and do not use ditto signs. Table A.1 is according to the guidelines.

For tables, the caption goes on top, for figures, the caption goes on the bottom. If possible, always position tables and figures at the top of a page.[2] Use the option `tbph` for the placement.

Table A.1: A publication quality table. Very very very very very very very very very very long title.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

[2] In this case, the chapter heading prevents the table from being at the top.

Table A.2: Another table

Table A.3: Another table

And other table materials (I needed to generate two pages for that appendix to test the formatting of the table of content).

Table A.4: Another table

Table A.5: Another table

Table A.6: Another table

Table A.7: Another table

Table A.8: Another table

Table A.9: Another table

Table A.10: Another table

Table A.11: Another table

Appendix B

Figures

Here you can have additional figures. Figure captions are always at the bottom.

And other additional figures (again I needed to generate two pages :-).