Sample Thesis Template for UBC O graduate students

by

Jane Mary Doe

B.Sc. Hons., The University of British Columbia, 2008
M.Sc., The University of British Columbia, 2010

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

MASTER OF SCIENCE

in

THE COLLEGE OF GRADUATE STUDIES

(Interdisciplinary Studies - Optimization)

THE UNIVERSITY OF BRITISH COLUMBIA

(Okanagan)

April 2010

© Jane Mary Doe, 2010

Abstract

This is a sample thesis based on the `ubcthesis.cls` template from Michael Forbes. The thesis includes the additional style file `ubcostyle.sty` in accordance to the official standards for the UBCO College of Graduate Studies. This sample thesis together with the style files and templates produces a document that is officially accepted by the UBCO College of Graduate Studies.

If you need a package, look into ubcostyle.sty to see if it is not already loaded there. See the file README.txt for additional instructions to produce the bibliography, index, and glossary automatically.

Preface

Preface stuff

If any part of your thesis was co-written, you must include a Co-Authorship statement. Also indicate if part of the thesis was published with the reference.

Table of Contents

Abstract . . . . . **ii**

Preface . . . . . **iii**

Table of Contents . . . . . **iv**

List of Tables . . . . . **vi**

List of Figures . . . . . **vii**

Glossary of Notation . . . . . **viii**

Acknowledgements . . . . . **ix**

Dedication . . . . . **x**

Chapter 1: Introduction **1**
1.1 Packages 1
1.2 Glossary 1
1.3 Epigraph 2

Chapter 2: Sample Content Using Mathematical Notations . **5**
2.1 Facts and theorems 5
2.2 Propositions and lemmas 5

Chapter 3: Landscape Mode **7**

Chapter 4: Conclusion **9**

Bibliography **11**

Index **13**

Appendix 15
Appendix A: Tables 16
Appendix B: Figures 18

List of Tables

Table 4.1 A publication quality table. Very very very very very very very very very very very long title. 9

Table A.1 A publication quality table. Very very very very very very very very very very very long title. 16

List of Figures

Figure 1.1 Sample figure. 2

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. 3

Figure 1.3 An example of putting two figures side by side using the subfigure package. 4

Glossary of Notation

$\mathbb{R}$	Real numbers. 5
$\mathbb{R}_+$	Nonnegative real numbers. 5
$\mathbb{R}^n$	Real n-vectors ($n \times 1$ matrices). 5
$\mathcal{A} \times \mathcal{B}$	Cartesian product $\{(x, y) : x \in \mathcal{A}, y \in \mathcal{B}\}$. 5
∞	Infinity. 5
$\inf \mathcal{S}$	The infimum of set S. 5

Acknowledgements

This is the place to thank professional colleagues and people who have given you the most help during the course of your graduate work.

Dedication

The dedication is usually quite short, and is a personal rather than an academic recognition. 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

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.

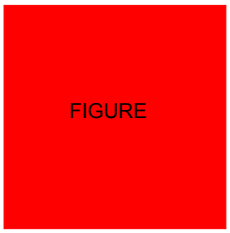


Figure 1.1: This is a sample figure Note that we have used the optional argument for the caption command so that only a short version of this caption occurs in the list of figures.

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

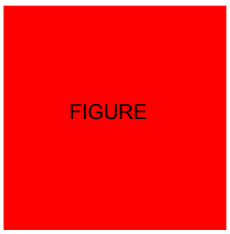
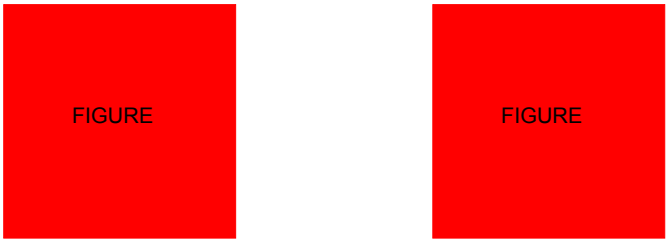


Figure 1.2: This is the same sample figure with still a long caption but this time we did not use a short caption command in the table of figures.



(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 subfigure package.

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.

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

For citations, please use BibTex. A sample article to verify formatting and style is [BGLW08a]. Use the bibliography style `ubco`, which is basic `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 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 16

[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 5

Index

a, 10
    sub A, 10
        sub sub A, 10
    sub B, 10
α, 10
aa, 10
aaa, 10
aaaa, 10
aaab, 10
aaac, 10
aaad, 10
aaae, 10
aaaf, 10
aaag, 10
aaah, 10
aaai, 10
aaaj, 10
aaak, 10
aaal, 10
aaam, 10
aaan, 10
aaao, 10
aaap, 10
aaaq, 10
aaar, 10
aaas, 10
aaat, 10
aab, 10
aac, 10
aad, 10
aae, 10
aaf, 10
aag, 10
aah, 10
aai, 10
aaj, 10
aak, 10
aal, 10
aam, 10
aan, 10
aao, 10
aap, 10
aaq, 10
aar, 10
aas, 10
aat, 10
ab, 10
ac, 10
ad, 10
ae, 10
af, 10
ag, 10
ah, 10
ai, 10
aj, 10
ak, 10
al, 10
am, 10
an, 10
ao, 10
ap, 10
aq, 10
ar, 10
as, 10

at, 10

b, 10

c, 10
compliant, 1

d, 10

e, 10

f, 10

g, 10

h, 10

i, 10

j, 10

k, 10

l, 10

m, 10

n, 10

o, 10

p, 10
packages, 1

q, 10

r, 10

s, 10
sample, 1

t, 10
theorem, 5
thesis, 1

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.

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

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 :-).