The cu-thesis class*

Conner Bradley
bradley@advtech.ca

November 6, 2022

1   Introduction

This is documentation for the `cu-thesis` class, a LaTeX document class that conforms the Carleton University's thesis formatting guidelines. There have been prior efforts to create a package that formats a document to Carleton's guidelines; however, these prior efforts either clash with newer LaTeX document classes, or fail to meet the thesis formatting requirements. This package attempts to extend these prior efforts by integrating them with the LaTeX `book` and KOMA-script `scrbook` document classes to provide a cleaner end-user experience. We used one prior implementation[1] as a starting point and extended off of it, porting it into a document class with an extended feature set.

2   Usage

Simply use `cu-thesis` as a document class. Provide arguments that you see fit, either ones that are specific to the `cu-thesis` class, or ones that are from the base class (book, scrbook) that you select. Customization of various aspects of the document (thesis title, degree, etc.) are done through configuration macros described below.

```
\documentclass[{ARGS}]{cu-thesis}
```

2.1   Class arguments

scrbook
listoffigures
listoftables
glossary

use the KOMA-script scrbook class instead of book. places a list of figures after the table of contents. places a list of tables after the table of contents. places a list of tables after the table of contents.

2.2   Input Macros

The following macros are used to set inputs to the various templates this class provides.

\title   This macro sets the document title which is used in the title page and PDF

---

*This document corresponds to `cu-thesis` v1.0, dated 2022/11/04.

[1] http://www.sce.carleton.ca/faculty/esfandiari/ThesisTemplate.zip which is based off the cam-thesis class

metadata.

`\author` — This macro sets the author's name which is used in the title page and PDF metadata.

`\thesistype` — This macro sets the type of thesis as shown in the title.

`\submittedto` — This optional macro sets who the thesis was submitted to, the default value is "the Faculty of Graduate and Postdoctoral Affairs".

`\degree` — This macro sets the degree that the thesis counts towards as shown in the title.

`\program` — This macro sets the program that the degree applies to in the title.

`\submissionnotice` — This (optional) macro can be used to override the submission notice in the title page. By default, the submission notice is "A {thesistype} submitted to {submittedto} in partial fulfillment of the requirements for the degree of".

`\institution` — This (optional) macro describes the institution the thesis took place, default value is "Carleton University".

`\location` — This (optional) macro describes the location of the institution, default value is "Ottawa, Ontario".

`\abstract` — This macro sets the abstract for the thesis, which is rendered by the `frontmatter` command.

`\acknowledgements` — This macro sets the acknowledgements for the thesis, which is rendered by the `frontmatter` command.

2.3 Utilities and Formatting

`\frontmatter` This macro creates the frontmatter of the document, which consists of

- Title page

- Abstract

- Acknowledgements

- Table of Contents

- List of Tables (if `listoftables` option is set)

- List of Illustrations (if `listoffigures` option is set)

- List of Appendices (if `glossary` option is set)

3 Example Document

Here is an example document that uses this class.

```
\documentclass{cu-thesis}
\begin{document}
    Hello, world!
\end{document}
```

4 Implementation

First off, declare a simple (internal) macro for creating simple boolean options.

```
1 \newcommand{\cu@boolopt}[1]{%
2     \expandafter\newif\csname ifcu@#1\endcsname\csname cu@#1false\endcsname%
3     \DeclareOption{#1}{\csname cu@#1true\endcsname}%
4 }
```

Next, declare all package options

```
5 %% scrbook - use the KOMA-script scrbook class instead of book
6 %
7 \cu@boolopt{scrbook}
8
9 %% listoffigures - puts the list of figures (after the TOC).
10 %
11 \cu@boolopt{listoffigures}
12
13 %% listoftables - puts the list of tables (after the TOC).
14 %
15 \cu@boolopt{listoftables}
16
17 %% glossary - puts the glossary (after the TOC).
18 %
19 \cu@boolopt{glossary}
20
21 %% index - puts the index at the end of the thesis.
22 %
23 \cu@boolopt{withindex}
24
25 %% final - puts the index at the end of the thesis.
26 %
27 \cu@boolopt{final}
```

For ease of use we will use the default LaTeXbook class. More advanced users may prefer to use KOMA-scripts **scrbook** class, which is also supported.

The **book** and **scrbook** class arguments are not perfectly compatible, thus we have to conditionally enable some flags in certain classes.

```
28 \newcommand{\cu@idocclass}{book}
29 \ifcu@scrbook
30     \renewcommand{\cu@idocclass}{scrbook}
31 \fi
32 \PassOptionsToClass{oneside}{\cu@idocclass}
33 \PassOptionsToClass{12pt}{\cu@idocclass}
34 \ifcu@final
35     \PassOptionsToClass{final}{\cu@idocclass}
36 \fi
```

A noteworthy snippet: all undefined options get passed through to the underlying document class. This way, you can directly interact with all documented options for the document class we are building on.

```
37 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{\cu@idocclass}}

38 \ProcessOptions\relax
39 \LoadClass{\cu@idocclass}
40
```

```
41 \raggedbottom
```

At this point our document class is loaded. We can load in helpful dependencies we need.

```
42 \RequirePackage{xparse}
43 \RequirePackage[utf8]{inputenc}
44 \RequirePackage{calc}
45 \RequirePackage[
46     pdffitwindow=true,
47     pdfpagelabels=true,
48     colorlinks=false,
49     pdfborder={0 0 0},
50     pdfusetitle=true
51 ]{hyperref}
52 \RequirePackage[all]{hypcap}

53 \ifcu@glossary
54     \RequirePackage[toc,nonumberlist,acronyms]{glossaries}
55     \makeglossaries%
56     \setglossarystyle{listdotted}
57 \fi
```

For page formatting, refer to the following Carleton guidelines for thesis formatting

All written and illustrative material on an 8 1¨ x 11¨ page, including page numbers, must fall within the following margins: one and one-half inches on the left margin and one full inch on the other three sides. Margins may be wider but not narrower than the stated requirements.

For theses written in landscape format, please allow one and one-half inches on the top margin and one full inch on the other three sides.

Within this context, use the `geometry` package to format the page within these bounds. A noteworthy point is that all text *including page numbers* must fall within these margins.

```
58 \RequirePackage[letterpaper]{geometry}
59 \newlength{\cu@bottom}
60 \newlength{\cu@marginparwidth}
61 \let\oldgeometry\geometry
62 \let\oldnewgeometry\newgeometry
63 \renewcommand{\geometry}[5][0.7]{
64     \setlength{\cu@marginparwidth}{#2}
65     \addtolength{\cu@marginparwidth}{-2.5mm}
66     \setlength{\cu@bottom}{#5}
67     \oldgeometry{letterpaper,left=#2,right=#3,top=#4,
68         bottom=\cu@bottom+#1\cu@bottom,
69         footskip=#1\cu@bottom,
70         marginparwidth=\cu@marginparwidth,
71         marginparsep=2mm
72         }
73 }
74 \renewcommand{\newgeometry}[5][0.7]{
75     \setlength{\cu@marginparwidth}{#2}
76     \addtolength{\cu@marginparwidth}{-2.5mm}
```

```
77      \setlength{\cu@bottom}{#5}
78      \oldnewgeometry{left=#2,right=#3,top=#4,
79      bottom=\cu@bottom+#1\cu@bottom,
80      footskip=#1\cu@bottom,
81      marginparwidth=\cu@marginparwidth,
82      marginparsep=2mm
83      }
84 }
85 \geometry{1.5in}{1in}{1in}{1in}
86 \reversemarginpar
```

Next is the line spacing (double), straightforward

```
87 \RequirePackage[doublespacing]{setspace}
```

Environments used to fill sections of the thesis

We can create a macro that helps with generating these. Use xparse to create these commands, as it easily lets us define a second optional argument.

```
88 \NewDocumentCommand{\cu@isectioninput}{ m o }{%
89      %\expandafter\newif\csname ifcu@input#1\endcsname\csname cu@input#1false\endcsname%
90      \expandafter\newcommand\csname cu@input#1\endcsname{#2}%
91      \expandafter\newcommand\csname #1\endcsname[1]{%
92          %% Confirm that this has been overriden
93          %\expandafter\csname cu@input#1true\endcsname%
94          %% Set the value
95          \expandafter\renewcommand\csname cu@input#1\endcsname{##1}%
96      }
97 }
```

abstract placed at the beginning of the thesis

```
98 \cu@isectioninput{abstract}
```

acknowledgements (The text that will be instered into the acknowledgments of the thesis.)

```
99 \cu@isectioninput{acknowledgements}
```

institution. Default to Carleton University, but can be overriden if you so wish.

```
100 \cu@isectioninput{institution}[Carleton University]
```

location (The location of the thesis writer's institution, which will appear just below their name.)

```
101 \cu@isectioninput{location}[Ottawa, Ontario]
```

keywords (These keywords will appear in the PDF meta-information called 'pdfkeywords'.)

```
102 \cu@isectioninput{keywords}
```

subjectline (This subject will appear in the PDF meta-information called 'pdfsubject'.)

```
103 \cu@isectioninput{subjectline}
```

submissiondate (The date of the submission of this thesis.)

```
104 \cu@isectioninput{submissiondate}
```

type (The type of document, e.g., thesis, thesis proposal, dissertation.)

```
105 \cu@isectioninput{thesistype}
```

submitted to

```
106 \cu@isectioninput{submittedto}[the Faculty of Graduate and Postdoctoral Affairs]
```

submissionnotice (The submission notice is shown on the bottom of the title page.) Faculty of Graduate and Postdoctoral Affairs

107 `\cu@isectioninput{submissionnotice}[A {\cu@inputthesistype} submitted to {\cu@inputsubmittedto`

degree (The degree for which this thesis is written.)

108 `\cu@isectioninput{degree}`

program (The program for which this thesis is written.)

109 `\cu@isectioninput{program}`

Chapter and section numbering

110 `\setcounter{secnumdepth}{3}`
111 `\setcounter{tocdepth}{3}`

Command to create the title page that follows Carleton's template

```
112 \newcommand{\cu@maketitle}{
113     \begin{titlepage}
114         \begin{center}
115             {
116                 \Large\bfseries
117                 \@title
118             }
119             \bigbreak
120             {
121                 by
122             }
123             \bigbreak
124             {
125                 \Large\bfseries
126                 \@author
127             }
128             \vfill
129             {
130                 \cu@inputsubmissionnotice
131             }
132             \vfill
133             {
134                 \large\bfseries
135                 \cu@inputdegree
136             }
137             \bigbreak
138             {
139                 in
140             }
141             \bigbreak
142             {
143                 \large\bfseries
144                 \cu@inputprogram
145             }
146             \vfill
147             {
148                 \cu@inputinstitution\\
149                 \cu@inputlocation
150             }
151             \vfill
```

```
152            {
153                    \textcopyright~\cu@inputsubmissiondate\\
154                    \@author
155            }
156        \end{center}
157    \end{titlepage}
158 }
```

Implementation of command to create the frontmatter Frontmatter follows the following format

- Title page

- Abstract

- Acknowledgements

- Table of Contents

- List of Tables

- List of Illustrations

- List of Appendices Start off by creating the frontmatter command, create the title page

```
159 \renewcommand{\frontmatter}{
160    \cu@maketitle
161
```

Set up the page formatting for the rest of the paper

```
162    \pagestyle{plain}
163    \newgeometry[0]{1.5in}{1.5in}{1.5in}{1.5in}
164    \ifcu@final
165    \else
166        \pagenumbering{roman}
167        \setcounter{page}{0}
168        \thispagestyle{empty}
169        \listoftodos
170        \newpage
171    \fi
172    \pagenumbering{roman}
173    \setcounter{page}{0}
174    \thispagestyle{empty}
175
176    \hypersetup{pdfsubject={\cu@inputsubjectline},pdfkeywords={\cu@inputkeywords}}
177
178    \newpage
179    \restoregeometry
180
```

Create abstract page

```
181    \chapter*{Abstract}
182    \addcontentsline{toc}{chapter}{Abstract}
183    \cu@inputabstract
184    % Acknowledgements
```

Create acknowledgements page

```
185     \chapter*{Acknowledgements}
186     \addcontentsline{toc}{chapter}{Acknowledgements}
187     \cu@inputacknowledgements{}
```

Create TOC

```
188     % TOC
189     \tableofcontents
```

Create list of tables if option is set

```
190     \ifcu@listoftables%
191         \listoftables
192     \fi
```

Create list of figures if option is set

```
193     \ifcu@listoffigures%
194         \listoffigures
195     \fi
```

Create glossaries if option is set

```
196     \ifcu@glossary%
197         \printglossaries
198     \fi
199     \newpage
```

End of frontmatter, use arabic numbers for rest of thesis. Ready to start chapter 1.

```
200     \setcounter{page}{1}
201     \pagenumbering{arabic}
202 }
```