

# The `ut-thesis` class <sup>\*</sup>

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## Abstract

The `ut-thesis` document class implements the formatting requirements of the University of Toronto School of Graduate Studies (SGS), as of Fall 2020.

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<sup>\*</sup>v3.1.2 [2021/08/25] CTAN repository: <https://ctan.org/pkg/ut-thesis>

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# 1 Installation

To use the `ut-thesis` class, you must first make the file `ut-thesis.cls` visible to your current  $\text{\LaTeX}$  distribution. There are two ways to do this:

- **local file:** Place the file `ut-thesis.cls` in your project directory. This is usually easiest, and works if you don't have write access in the  $\text{\LaTeX}$  distribution, such as if you use Overleaf.
- **installing:** Installation steps will depend on your  $\text{\LaTeX}$  distribution. Some helpful instructions can be found [here](#).

# 2 Usage

```
\documentclass{ut-thesis}  
\documentclass[ <options> ]{ut-thesis}
```

The default options produce a final copy, ready for submission to the University of Toronto School of Graduate Studies (SGS).

## 2.1 Options

The default class options are denoted like `option*`.

### 2.1.1 Font Size

`[10pt*]` The three standard font sizes are supported. SGS requires at least 10 pt font for the text,  
`[11pt]` but captions, footnotes, etc. can be smaller.  
`[12pt]`

### 2.1.2 Line Spacing

`[singlespacing]` Three options are available for line spacing. Note that `[singlespacing]` does not con-  
`[onehalfspacing*]` form to the SGS guidelines, but we provide it in case you ever prefer it while writing.  
`[doublespacing]`

### 2.1.3 Margins

**Sides:** Three variants of margins are defined, reflecting preferences for printing and binding, the first two being the same as in the `book` class:

`[oneside]` All pages behave as if they open to the right (wider left margin).

`[twoside*]` Most pages will alternate opening to the right and left; however, the commands: `\maketitle`, `\begin{abstract}` and `\mainmatter`, which create new pages, will always open to the right, sometimes requiring a blank page before to do so.

`[equalmargins]` The left and right margins are equal (averaged); all pages behave as if they open to the right.

**Opening:** Only if `[twoside]` is used, two additional options from the `book` class control how other new pages will open, including new pages created by: `\listoftables`, `\listoffigures`, and `\chapter{}`.

`[openright*]` These pages will always open to the right (like `\maketitle`, etc.).

`[openany]` These pages can open to the left or right.

**Widths:** Four widths of margins are defined based on the inner (left) and outer (right/top/bottom) dimensions:

`[narrowmargins]` Inner: 1.25 inch; outer: 0.75 inch (minimum SGS requirements)

`[normalmargins*]` Inner: 1.50 inch; outer: 1.00 inch

`[widemargins]` Inner: 1.75 inch; outer: 1.25 inch

`[extrawidemargins]` Inner: 2.00 inch; outer: 1.50 inch

#### 2.1.4 Book Options

This class inherits from the standard L<sup>A</sup>T<sub>E</sub>X `book` class, so all other `book` options are processed by that class. Two caveats are that `[titlepage]` / `[notitlepage]` have no effect and `[twocolumn]` has undefined behaviour.

## 2.2 Commands

### 2.2.1 Author Information

The following 5 commands should be used in the preamble to define the content of the titlepage (`\maketitle`) and abstract page (`abstract` environment).

`\author` Your full name.

`\title` The title of your thesis.

`\degree` The title of your degree (spelled out, like “Doctor of Philosophy” not “PhD”).

`\department` The name of your department. The optional first argument (`\department[this]{}`) can be used to replace or leave blank the default text “Department of” preceding the department name.

`\gradyear` The year of your degree completion.

If undefined, template values are used like “(author)”.

### 2.2.2 Document Parts

From the `book` class, four commands can be used to divide the document into major parts. These should be used in the order they appear here, as needed. The first two commands are necessary for the required SGS page numbering style.

- `\frontmatter` Turns off chapter numbers, uses roman numerals for page numbers.  
Suggested use: immediately after `\begin{document}`.
- `\mainmatter` Turns on chapter numbers, uses arabic numerals for page numbers.  
Suggested use: immediately before the first main `\chapter{}` command.
- `\appendix` Uses letters for chapter numbers, no change to page numbers.  
Suggested use: immediately before the first appendix `\chapter{}` command.
- `\backmatter` Turns off chapter numbers, no change to page numbers.  
Suggested use: immediately before `\printbibliography` or `\bibliography{}`.

### 2.2.3 Front Matter

From the `book` class, the following commands are available to generate the frontmatter. These should be used in the order they appear here, as needed.

- `\maketitle` Creates the title page according to SGS requirements, and adds a blank page following if using `[twoside]`.

(The abstract page should appear here; see § 2.3.1).

(The dedication and acknowledgements should appear here, as needed; see § 2.3.2).

- `\tableofcontents` Prints the table of contents, starting on a new page.
- `\listoftables` Prints the table of tables, starting on a new page.
- `\listoffigures` Prints a table of figures, starting on a new page.

## 2.3 Environments

### 2.3.1 Abstract

- `abstract` Creates the abstract page according to SGS requirements, and adds a blank page if using `[twoside]`. The abstract content should be added within the environment, and should be no more than 350 words for a PhD thesis or 150 words for a Master's thesis. We do not provide tools for counting words.

### 2.3.2 Dedication & Acknowledgements

`dedication` The `dedication` environment formats text flush right and 2/3 down a new page. Not necessary for SGS requirements, so you're welcome to redefine this environment.

`acknowledgements` The `acknowledgements` environment creates a centered heading using `\section*{}`, and a new page after the text. Not necessary for SGS requirements, so you're welcome to redefine this environment.

### 2.3.3 Base Environments

As in the `book` class, the base environments like `figure`, `table`, and `equation` are sub-numbered within the current chapter like "(2.1)" for Equation 1 in Chapter 2. The behaviour is equivalent to: `\counterwithin{equation}{section}`, and can be undone with: `\counterwithout{equation}{section}`.

For sub-figures, we recommend the `subcaption` package.

The `quote` and `quotation` environments from the `book` class are also available.

## 3 Implementation

### 3.1 Option Declaration

#### 3.1.1 Margins

First, we define three lengths to help us compute the margins: `\margin@v` is the top and bottom margins; `\margin@xhi` is the inner margin offset; `\margin@xho` is the outer margin offset.

```
1 \newlength{\margin@v}
2 \newlength{\margin@xhi}\setlength{\margin@xhi}{0.5in}
3 \newlength{\margin@xho}\setlength{\margin@xho}{0.0in}
```

The options are based off `\margin@v`:

```
4 \DeclareOption{narrowmargins}{\setlength{\margin@v}{0.75in}}
5 \DeclareOption{normalmargins}{\setlength{\margin@v}{1.00in}}
6 \DeclareOption{widemargins}{\setlength{\margin@v}{1.25in}}
7 \DeclareOption{extrawidemargins}{\setlength{\margin@v}{1.50in}}
```

For digital copies, `equalmargins` may be preferred. However, to keep the `\textwidth` consistent for any of the above margin options with and without `equalmargins`, we simply average the inner and outer offsets:

```
8 \DeclareOption{equalmargins}{%
9   {\setlength{\margin@xho}{0.5\margin@xhi}
10    \setlength{\margin@xhi}{0.5\margin@xho}}
```

Finally, we actually compute the margins using the above three lengths, and adjust the placement of the header, footer, and margin notes.

```
11 \AtEndOfClass{
12   \setlength{\leftmargin}{\dimexpr\margin@v+\margin@xhi}
13   \setlength{\rightmargin}{\dimexpr\margin@v+\margin@xho}
14   \geometry{
15     top      = \margin@v,
16     bottom   = \margin@v,
17     inner    = \leftmargin,
18     outer    = \rightmargin,
19     headsep  = \dimexpr 0.5\margin@v - \headheight,
20     footskip = \dimexpr 0.5\margin@v,
21     marginparwidth = \dimexpr \rightmargin - 0.25in,
22     marginparsep  = 0.125in,
23   }}
```

#### 3.1.2 Line Spacing

We're using the `setspace` package. We simply call one of the spacing commands after the class is loaded. So, be careful to place any line spacing commands within a group, or the global setting can be changed in the middle of the document. The default is

onehalfspacing.

```
24 \DeclareOption{doublespacing}{%
25   \AtEndOfClass{\doublespacing}
26 }
27 \DeclareOption{onehalfspacing}{%
28   \AtEndOfClass{\onehalfspacing}
29 }
30 \DeclareOption{singlespacing}{%
31   \AtEndOfClass{\singlespacing}
32 }
```

### 3.1.3 Book Options

Finally, we try to process all remaining options using the `book` class, so the usual options and default values should be defined, like:

- font size: e.g. `10pt`, `11pt`, `12pt`
- open side for twoside: e.g. `openright`, `openany`

```
33 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{book}}
```

### 3.1.4 Default Options & Processing

Executing the default options and processing. Any remaining options should now raise an error like: `LaTeX Warning: Unused global option(s): ...`

```
34 \ExecuteOptions{normalmargins,onehalfspacing} % ut-thesis
35 \ProcessOptions
```

## 3.2 Initialization

We load the `book` class and the required packages.

```
36 \LoadClass{book}
37 \RequirePackage{geometry} % for margins etc.
38 \RequirePackage{setspace} % for line spacing
```

## 3.3 Author Information

Getting the user inputs.

```
39 \renewcommand*{\author}    [1]{\gdef\@author{#1}}
40 \renewcommand*{\title}     [1]{\gdef\@title{#1}}
41 \newcommand*{\degree}      [1]{\gdef\@degree{#1}}
42 \newcommand*{\gradyear}    [1]{\gdef\@gradyear{#1}}
43 \newcommand*{\department}[2][Department of]%
44   {\gdef\@deptpre{#1}\gdef\@deptname{#2}}
```

Setting default values that will hopefully be overwritten.

```
45 \author      {(author)}
46 \title       {(title)}
47 \degree      {(degree)}
48 \department{(department)}
49 \gradyear     {(gradyear)}
```

## 3.4 Front Matter

### 3.4.1 Matter Commands

We enforce that the `\frontmatter` and `\mainmatter` use the right page numbering and styles. Also, if we are using `[twoside]`, then we need to reduce all page numbers in the front matter by 1, so that the `abstract` is page “ii”, because adjusting the `page` counter directly causes typesetting problems, such as incorrect alternating margins.

```
50 \newcommand{\@romanskip}[1]{\@roman{\if@twoside\numexpr#1-1\else#1\fi}}
51 \g@addto@macro\frontmatter{\pagenumbering{romanskip}\pagestyle{plain}}
52 \g@addto@macro\mainmatter {\pagenumbering{arabic}\pagestyle{headings}}
```

### 3.4.2 Title Page

We don’t enforce firm distances between lines, but use `\vfill` to stretch and fill the space evenly, except for a double-sized gap after the author name. There is one part of space above the title, while the copyright is pushed all the way to the bottom.

```
53 \renewcommand*{\maketitle}{%
54   {\thispagestyle{empty}
55     \begin{center}
56       \large
57       \singledspacing
58       \null
59       \vfill
60       \textsc{\@title}
61       \vfill
62       by
63       \vfill
64       {\@author}
65       \vfill
66       \vfill
67       A thesis submitted in conformity with the requirements\\
68       for the degree of {\@degree}\\[1ex]
69       {\@deptpre} {\@deptname}\\
70       University of Toronto\\
71       \vfill
72       {\copyright} Copyright {\@gradyear} by {\@author}
73     \end{center}
74     {\pagestyle{empty}\ocleardoublepage}}
75 }
```



### 3.4.3 Abstract Page

The abstract is an environment, but it creates its own page (and possibly an extra empty page if using `twoside`). The author and title info is centered and singlespaced. The word “Abstract” uses the `\section*` style, without any numbering. The abstract content is doublespaced.

```
76 \newenvironment*{abstract}%  
77   {\thispagestyle{plain}  
78     \begin{center}  
79       \singlespacing  
80       {\@title}\[2ex]  
81       {\@author}\[  
82       {\@degree}\[1ex]  
83       {\@deptpre} {\@deptname}\[  
84       University of Toronto\  
85       {\@gradyear}\[  
86       \section*{Abstract}  
87     \end{center}  
88     \begingroup  
89     \doublespacing}%  
90   {\par\endgroup\cleardoublepage}
```

### 3.4.4 Dedication

As described above.

```
91 \newenvironment*{dedication}%  
92   {\thispagestyle{plain}  
93     \null  
94     \vfill  
95     \begin{flushright}}%  
96   {\end{flushright}  
97     \vfill  
98     \vfill  
99     \clearpage}
```

### 3.4.5 Acknowledgements

As described above.

```
100 \newenvironment*{acknowledgements}%  
101   {\thispagestyle{plain}  
102     \begin{center}  
103       \section*{Acknowledgements}  
104     \end{center}  
105     \begingroup}%  
106   {\endgroup\clearpage}
```

## 3.5 Page Styles

### 3.5.1 Blank Pages

By default, all blank pages will have page style `plain`, but the original definition is stored in `\ocleardoublepage`.

```
107 \let\ocleardoublepage\cleardoublepage
108 \def\cleardoublepage{\newpage\pagestyle{plain}\ocleardoublepage}}
```

### 3.5.2 Headers & Footers

We redefine the `headings` page style with a new formatting hook `\headerstyle{}`, but is otherwise similar to the original `headings`.

```
109 \newcommand{\headerstyle}[1]{\footnotesize\MakeUppercase{#1}}
110 \if@twoside
111 \renewcommand*{\ps@headings}%
112   {\let\@mkboth\markboth
113    \let\@oddfoot\@empty
114    \let\@evenfoot\@empty
115    \def\@oddhead{\headerstyle{\rightmark\hfil\thepage}}%
116    \def\@evenhead{\headerstyle{\thepage\hfil\leftmark}}%
117    \def\chaptermark##1{\markboth{%
118      \if@mainmatter\headerstyle{\@chapapp\ thechapter.\ ##1}\fi}}}
119    \def\sectionmark##1{\markright{%
120      \if@mainmatter\headerstyle{\thesection.\ ##1}\fi}}}
121 \else
122 \renewcommand*{\ps@headings}%
123   {\let\@mkboth\markboth
124    \let\@oddfoot\@empty
125    \let\@evenfoot\@empty
126    \def\@oddhead{\headerstyle{\rightmark\hfil\thepage}}%
127    \def\chaptermark##1{\markright{%
128      \if@mainmatter\headerstyle{\@chapapp\ thechapter.\ ##1}\fi}}}
129 \fi
```

Default page style.

```
130 \pagestyle{headings}
```

## 3.6 Spacing Adjustments

The default spacing below captions is too small for captions on top of floats (e.g. for tables), so we make it consistent above and below.

```
131 \setlength\abovecaptionskip{1ex}
132 \setlength\belowcaptionskip{1ex}
```