Dissertation for Doctor of Philosophy degree

Advisor Kidae Han

A LaTeX Template for KoreaTech Theses

Including a Short Guide

February 2025

The Graduate School of
Korea University of Technology & Education

Department of Mechatronics Engineering
Mechatronics Engineering Major

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Mecha Kim's dissertation for Doctor of Philosophy degree in Mechatronics Engineering major is hereby approved by

Committee Chair	A	(Signature)
Committee Member	B	(Signature)
Committee Member	C	(Signature)
Committee Member	D	(Signature)
Committee Member	E	(Signature)

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Acknowledgements

Acknowledgments should not exceed one page.

Abstract in Korean

A LaTeX Template for KoreaTech Theses

국문요약은 2 page 이내로 작성한다. 주제어는 preamble에 위치한 `\keywords` 명령어를 이용하여 설정하되, 5단어 이내로 작성한다.

Abstract in Korean should be written in Korean and should not exceed two pages. The Korean keywords can be specified using the `\keywords` command in the preamble and are limited to no more than five keywords.

주제어: 주제어1, 주제어2, 주제어3, 주제어4, 주제어5

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1. Guidelines for LaTeX Thesis Template

Note: This document was originally written in Korean and then translated into English by a machine, followed by manual revisions by myself. You are kindly asked to take this into consideration.
This document was compiled using PdfLaTeX in TeXstudio version 4.8.7, with TeX Live 2020 as a LaTeX engine. It is therefore recommended to use these or later versions of both the LaTeX editor and engine to ensure full compatibility.

This LaTeX thesis template follows the standard thesis submission guidelines of Korea University of Technology and Education [1].

To compile this LaTeX thesis template, it is required to use the class file `koreatechthesis.cls`, which implements the official thesis format of KoreaTech [2]. This class file must be located in the same folder as the TeX base file `mythesis-eng.tex`. The correct output will be generated when the compilation is performed from the TeX base file.

To provide an example of efficient thesis management, this template organizes each chapter in a separate `*.tex` file using the `\include` command. For instance, Chapter 1 is written in `mythesis-eng_Guide.tex`, allowing for organized and modular chapter-wise file management.

1.1. Document Formatting and documentclass

The TeX base file `mythesis-eng.tex` begins with the `\documentclass{koreatechthesis}` command. The class file `koreatechthesis.cls` is designed to accept three categories of options. In terms of language, it allows the use of either the `kor` or `eng` option. For example, to write your thesis in English, the command

should be written as `\documentclass[eng]{koreatechthesis}`. The remaining two types of options will be explained in the following subsections.

1.1.1. oneside vs. twoside

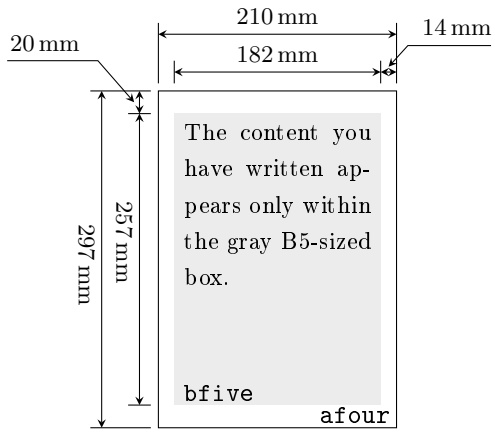
When the `twoside` option is specified in the class file, that is, `\documentclass[twoside,eng]{koreatechthesis}`, it follows the conventional typesetting practices used in printed books. In most commercially published books, chapters and tables of contents typically begin on odd-numbered (right-hand) pages. Consequently, the even-numbered page preceding a new chapter may sometimes appear as a blank page, depending on the layout of the previous chapter. The `twoside` option precisely follows this convention. If you intend to print your final thesis double-sided, then enable this option. For clarity, consider Chapter 1 in this template — its preceding page is a blank page under the `twoside` option. Another examples can be found in the front matter of this template, where all even-numbered pages appear as blank pages. If you imagine printing this file double-sided, then the reason for this formatting will become clear.

To print single-sided, the `oneside` option may be used. In this case, all blank pages that would appear with the `twoside` option are removed.

1.1.2. bfive vs. afour

This section explains the `bfive` and `afour` options. According to the official thesis guidelines [1], the final version of your thesis must be printed on B5 size paper ($182 \times 257\,\mathrm{mm}$)[1)]. To produce it in B5 format, the `bfive` option should

[1)] The size of A4 paper appears to be standardized internationally. It conforms to the ISO international standard, with dimensions of $210 \times 297\,\mathrm{mm}$. In contrast, the situation is different for B5 paper. In Korea, most of the publishing industry seems to follow the Japanese Industrial Standard (JIS) which defines B5 paper as $182 \times 257\,\mathrm{mm}$. Unfortunately, LaTeX adheres to the ISO international standard under which B5 paper measures $176 \times 250\,\mathrm{mm}$. This LaTeX template is configured to use the JIS standard B5 paper size in accordance with [1].



[Figure 1-1] Comparison between afour and bfive options

be used. Note however that while generating a PDF with this option presents no issues, printing on physical papers requires a printer that supports B5 paper size and has B5 sheets loaded in its tray.

Since most people print on A4 paper, the `afour` option is also provided for convenience. When the `afour` option is specified in `koreatechthesis.cls`, the output is generated with dimensions that precisely match those of standard A4 paper. This means it can be printed easily on most commonly available printers. However, as illustrated in Figure 1-1, the actual content is confined to the gray B5-sized area centered on the A4 page. Therefore, even though you switch back and forth between the `bfive` and `afour` options, the layout of your content — such as equations, figures, and tables — will remain unchanged. So, feel free to switch between the two options whenever necessary.

The following is a summary of Sections 1.1.1 and 1.1.2.

Theorem 1.1. *Regarding to this LaTeX template, if you intend to print*

- *the final version of your thesis for* double-sided *printing, then use*
  `\documentclass[bfive,twoside,eng]{koreatechthesis}`

- *the final version of your thesis for* single-sided *printing, then use*
  `\documentclass[bfive,oneside,eng]{koreatechthesis}`
- *an intermediate draft for review purposes, then use*
  `\documentclass[afour,twoside,eng]{koreatechthesis}`
  or `\documentclass[afour,oneside,eng]{koreatechthesis}`

Options other than these are not supported. □

Proof. The proof of Theorem 1.1 is omitted. ■

1.2. Miscellaneous

This section briefly introduces a few notes related to this LaTeX template. First, if your thesis has a subtitle, then you can use the `\subtitle` command in the preamble of the TeX base file `mythesis-eng.tex`. If it has no subtitle, simply leave the argument of `\subtitle` empty — that is, write it as `\subtitle{}`.

The approval page, which contains the signatures of the committee members, is designed to require *handwritten names and signatures* from each committee member. In accordance with the university regulations, the number of committee members, including the chair, must be no fewer than three and no more than five. Therefore, this template is constructed to allow flexible adjustment of the number of committee members according to the actual composition of the committee. Indeed, by specifying an appropriate integer as the argument of `\numberofcommitteemembers` in the preamble of the TeX base file `mythesis-eng.tex`, signature fields for that number of committee members (including the chair) will be generated. A more precise description is given below.

Lemma 1.2. *Let n be the integer you specified as the argument of the command* `\numberofcommitteemembers`. *Then, the signature fields for*

(a) three committee members if $n < 3$,

(b) five committee members if $n > 5$, and

(c) exactly n committee members otherwise

will be generated on the approval page. □

Chapters and sections are structured using the commands `\chapter` and `\section`, respectively. The section depth can go down to the subsubsection level. In other words, the hierarchy of chapters and sections supported by this LaTeX template is as follows.

```
\chapter
\section
\subsection
\subsubsection
```

However, according to [1] and the official university template [2] based on it, titles created using `\subsubsection` are not included in the Table of Contents. Accordingly, this LaTeX template is designed to include only up to the `\subsection` level in the Table of Contents.

In the preamble of `mythesis-eng.tex`, the `\newtheorem` command is used to define new environments for theorems and definitions. In this setup, the numbering for the environments is based on the chapter level. If you prefer to number them by section instead, you can simply change the option `chapter` to `section`.

This LaTeX template uses the `hyperref` package. As a result, red and green boxes are generated in the output PDF, and clicking these boxes will correctly navigate to the linked locations. Of course, these boxes are not printed when the PDF is sent to a physical printer.

This LaTeX template does not enforce a particular style for the bibliography. Therefore, you should write the `thebibliography` section in `mythesis-eng.tex` as specified in [1].

2. Basic Usage of LaTeX

Chapter 2 provides an overview of basic LaTeX syntax. If you are already familiar with LaTeX, you may skip this chapter. Nevertheless, it is still recommended that you read Section 2.4.

2.1. Handling Long Chapter or Section Titles that Span Multiple Lines in the Table of Contents

In such cases, a simplified version of the title can be specified for the Table of Contents. For example, you may write `\section[short title]{original long title}` to display a shorter title in the Table of Contents. See the corresponding entry for Section 2.1 in the Table of Contents of this LaTeX template.

2.2. Equations

Equations can be created using the standard LaTeX syntax. For example, you may write equations as follows:

$$\begin{aligned} \dot{x} &= Ax + Bu, \qquad x \in \mathbb{R}^n, \\ y &= Cx + Du. \end{aligned} \tag{2.1}$$

To refer to the equation, use the `\eqref` command — for instance, (2.1). Note that in this template, the equation numbering follows the chapter-based scheme.

You can also use the `\subequations` command to number a group of related equations. Refer to the following example.

Definition 2.1. *A singularly perturbed system consists of a slow subsystem*

$$\dot{x} = f(t, x, z, \epsilon) \tag{2.2a}$$

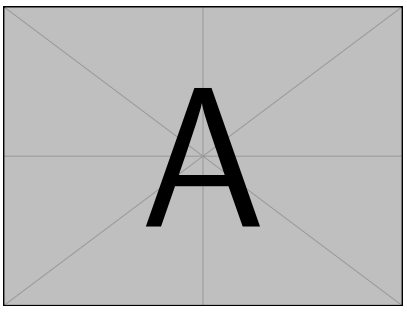
and a fast subsystem

$$\epsilon \dot{z} = g(t, x, z, \epsilon). \tag{2.2b}$$

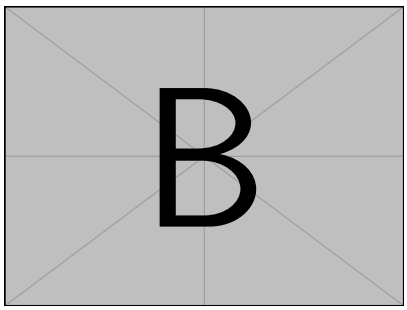
If the algebraic equation $0 = g(t, x, z, 0)$*, obtained by setting* $\epsilon = 0$ *in* (2.2b)*, has a well-defined solution* $z = h(t, x)$*, then the system* (2.2) *is said to be in standard form [3].* □

2.3. Figures

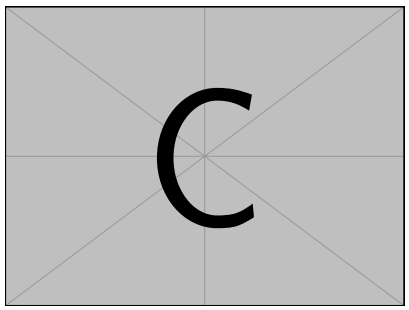
Figures can also be inserted using the standard LaTeX syntax, and the class file `koreatechthesis.cls` automatically formats captions according to the guidelines specified in [1]. For instance, the caption of Figure 2-1 is center-aligned and typeset in boldface. If you wish to include multiple images within a single figure environment, then you may use the `subfig` package. See Figure 2-2 for an example with two subfigures.



[Figure 2-1] An example of inserting a figure



(a) First figure



(b) Second figure

[Figure 2-2] Two subfloats

On the other hand, if your thesis does not contain any figures, you should either delete or comment out the following lines in `mythesis-eng.tex`:

```
\listoffigures
\addcontentsline{toc}{chapter}{List of Figures}
```

so that the List of Figures does not appear in the output PDF.

2.4. Tables

To comply with the formatting guidelines for tables specified in [1], the `threeparttable` package is used in this template. Therefore, when creating tables, you should use the `threeparttable` environment whenever appropriate. Example usages are shown in Tables 2-1 and 2-2 for your reference. Note that according to [1], the table itself should be center-aligned but the caption of the table should be left-aligned.

<Table 2-1> A table example: threeparttable

aaa	bbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbb

<Table 2-2> A table example: threeparttable w/ tnote

aaa[1)]	bbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbbb

[1)] Explanation of the first item

[2)] Explanations regarding the table itself and/or related aspects

If additional explanations are needed for table items or for the table itself, you can use the `\tnote` command and the `tablenotes` environment from the `threeparttable` package. See Table 2-2 for an example.

Lastly, as with the case of figures, if your thesis does not contain any tables, you should either delete or comment out the following lines in `mythesis-eng.tex`:

```
\listoftables
\addcontentsline{toc}{chapter}{List of Tables}
```

so that the List of Tables does not appear in the output PDF.

Bibliography

[1] Guidelines on Formatting and Submission of Master's and Doctoral Dissertations, *Korea University of Technology & Education*, Revised on Nov. 30, 2023.

[2] English ver. dissertation sample, *Korea University of Technology & Education*, `https://www.koreatech.ac.kr/menu.es?mid=a50403020000`

[3] H. K. Khalil, *Nonlinear Systems (3rd ed.)*, Prentice Hall, 2002.

ABSTRACT

A LaTeX Template for KoreaTech Theses

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Abstract should be written in English and should not exceed two pages. The keywords can be specified using the `\keywordseng` command in the preamble and are limited to no more than five keywords.

Keywords: keyword 1, keyword 2, keyword 3, keyword 4, keyword 5

Appendix

<Appendix 1> Appendix Structure

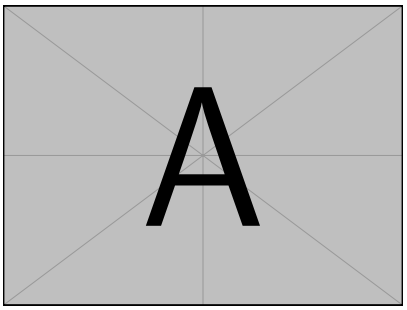
In LaTeX, appendices are typically treated as chapters. Therefore, if further division within an appendix is needed, then use the `\section` command appropriately. The appendix section in this template has also been designed in accordance with [1]. If your thesis does not include any appendices, then you may delete or comment out all the appendix-related code in this template.

<Appendix 2> Numbering

All appendix numbering starts with the letter A. For example, the numbering of equations appears as follows.

$$\int_0^{2\pi} \sin x \, dx = 0. \tag{A.1}$$

Likewise, the numbering of figures is as follows.



[Figure A-1] A figure example in the Appendix

This LaTeX template guide for KoreaTech theses ends here. I hope this guide and template support your smooth and successful thesis submission.