

# TECH MASTER THESIS TEMPLATE IN LATEX

by  
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A thesis submitted in partial fulfillment of the  
requirements for the degree of

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## Abstract

This document is meant to show the format of a master's thesis. The 'ugly' abstract is single spaced with no indents. Front matter page numbers are lowercase roman numerals. Keywords are automatically placed at the bottom of this page. To add more body to this paper, 'dummy' text will be placed throughout.

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Keywords: MT Tech, Thesis Template, L<sup>A</sup>T<sub>E</sub>X

## Dedication

This is where a dedication goes...Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

## Acknowledgments

This is where acknowledgments go... The purpose of  $\text{\LaTeX}$  is to make beautiful documents. An ugly thesis, and a pretty thesis template has been created. The ugly version is not a beautiful document, but a mish-mash of left over styles and blind formatting decisions. This template is to be used only out of necessity. The pretty version is more in line with the philosophy of  $\text{\LaTeX}$  and is subjectively easier on the eyes. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam lobortis facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis fringilla tristique neque. Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis. Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan semper.

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## Glossary of Terms

Term	Definition
L <sup>A</sup> T <sub>E</sub> X	A document preparation system. Favors logical design over visual design. Reportedly widely used in academia...
PSLF	Positive Sequence Load Flow. GE's power system simulation software.
PSDS	PSLF Dynamic subsystem.

## 1. Basic Formatting

This chapter will show basic formatting of text, figures, tables and equations. It will also be mostly filled with ‘dummy’ text so there is something to look at.

### 1.1. Body Text

Body text has a 1/2 inch indent on all paragraphs and double spaced lines. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

### 1.2. Figures, In-Text Citations, and Footnotes

Figure 1 is an example of how images can be formatted. Additionally, citations to references will be shown such [3]. Footnotes<sup>1</sup> will behave like this<sup>2</sup>.



**Figure 1: An Athletic logo?**

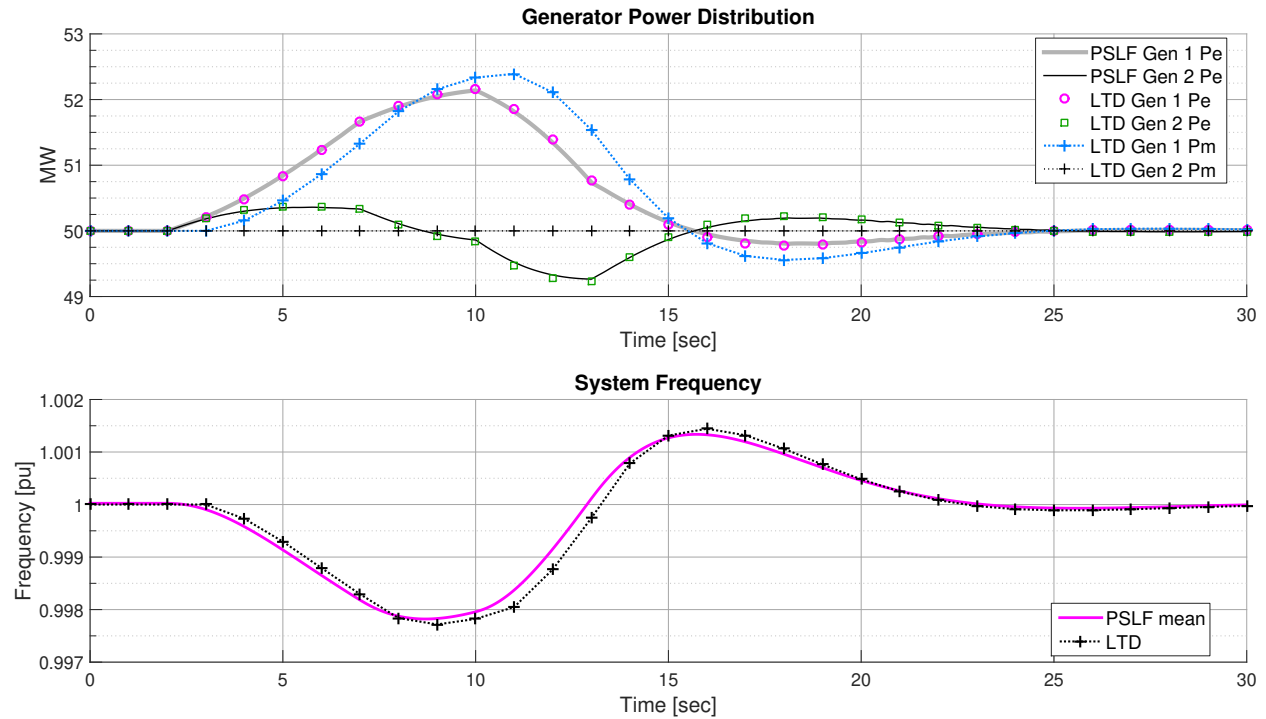
A larger graphic example is shown on Page 2 as Figure 2. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetur at, consectetur sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea

---

<sup>1</sup>This is a footnote text message that doesn't offer much information.

<sup>2</sup>This is another footnote.

dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.



**Figure 2:** This is a fairly large graphic but can easily be set to any desired width. Additionally, this is a super long caption that would break the table of contents formatting if it weren't for an optional 'short title' parameter. There's even a citation in here[6].

Nulla in ipsum. Praesent eros nulla, congue vitae, euismod ut, commodo a, wisi. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Aenean nonummy magna non leo. Sed felis erat, ullamcorper in, dictum non, ultricies ut, lectus. Proin vel arcu a odio lobortis euismod. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Proin ut est. Aliquam odio. Pellentesque massa turpis, cursus eu, euismod nec, tempor congue, nulla. Duis viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

### 1.3. Equations

A somewhat fancy equation involving symbols and an integral is pretty easy to put together. Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper,

leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetur.

$$x(t) = \Phi(t)x(0) + \int_0^t \Phi(t - \tau)Bu(\tau)d\tau. \quad (1)$$

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio. Unlike Equation 1, Equation 2 is pretty basic.

$$a + b = c \quad (2)$$

Aligned rows of equations are also possible using the `align*` environment and a custom numberthis command. The following math is very math.

$$\begin{aligned} G(\$) &= \frac{20}{\$(\$ + 5)(\$ + 10)} \\ \zeta &= 0.59116, \Phi_M = 58.59 \\ \therefore \omega_{\Phi_M} &= \omega \angle -121.41^\circ \\ \text{From Bode: } \omega_{\Phi_M} &= 1.9 \\ |\omega_{\Phi_M}| &= -14.3 \\ \therefore K &= 10^{\frac{14.3}{20}} = 5.188 \text{ abs} \end{aligned} \quad (3)$$

## 1.4. Tables

Tables can look like Table I. Notice the slimming effect of no vertical lines.... Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus.

**Table I: An example table with no vertical lines.**

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Old	29.631	17.333	222.999	11.222
Not Old	54.321	166.233	556.123	54.666
Almost New	118.791	54.289	445.321	88.122
New	222.897	10.000	777.000	90.100

Table style may be altered to a slightly different style if it seems appropriate. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Notice that chapters start on a new page.

## 2. Chapters and Sections

This chapter is used only to show nesting of sections and space around chapter and section headings.

### 2.1. First Section

This is the First Section. It will have two sub sections. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus.

#### 2.1.1. First SubSection

This is the first... Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus.

##### 2.1.1.1. A subsubsection

This is a fairly nested sentence. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus.

##### 2.1.1.2. The second subsubsection

Seems like going any deeper than a subsubsection could be a bit much, but is possible to configure  $\LaTeX$  to number paragraphs like sections if required.

#### 2.1.2. Second Subsection

This is the second. This subsection will actually have another subsection in it. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla.

### 2.2. Second Section

A second section. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc.

### 2.3. Third Section

A third Section. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc.

### 3. Bibliography

- [1] P. M. Anderson and A. A. Fouad, *Power System Control and Stability*, Second Edition. Wiley-Interscience, 2003.
- [2] J. D. Glover, M. S. Sarma, and T. J. Overbye, *Power System Analysis & Design*, 5e. Cengage Learning, 2012.
- [3] M. Goossens, F. Mittelbach, and A. Samarin, *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, 1993.
- [4] P. Kundur, *Power System Stability and Control*. McGraw-Hill, 1994.
- [5] P. Kundur, *Power System Stability and Control Duplicate*. McGraw-Hill, 1994.
- [6] M. Stajcar, “Power system simulation using an adaptive modeling framework,” Master’s thesis, Montana Tech, 2016.

## 4. Appendix A: Formatting Examples

This appendix is included to show how appendices work, blowing up of numbering, and to also serve as an easy  $\text{\LaTeX}$  formatting template. Despite this being an appendix, it is still numbered like a chapter.

### 4.1. Numberings in Equations

Additionally, a reminder of Ohm's law

$$V = IR \tag{42}$$

shows that equation numbering has blown up. This is to show spacing on the table of contents.

### 4.2. Numberings in Tables

Table XIV is full of nonsense data and is numbered artificially large.

Table XIV: Another Table.

One	Two	Three	Four	Five
2.35	45.87	9.00	1.00	0.33
5.88	48.01	7.85	2.35	0.45

### 4.3. Numberings in Figures

Finally, Figure 67 shows how figure numbers look when double digit.



Figure 67: A boxcat in its natural environment.



#### 4.4. Code using Minted

Code can be added using the minted package. The example below is for a Python example, but can be configured other ways. Note that a `--shell-escape` command had to be added to the T<sub>E</sub>XStudio build command due to peculiarities with the package. Additionally, the minted L<sup>A</sup>T<sub>E</sub>X package requires python to be installed with the pygments package. This can be done via the `'py -m pip install -U pygments'` console command.

```

1  def sumPe(mirror):
2      """Returns sum of all electrical power from active machines"""
3      sysPe = 0.0
4
5      # for each area
6      for area in mirror.Area:
7          # reset current sum
8          area.cv['Pe'] = 0.0
9
10         # sum each active machine Pe to area agent
11         for mach in area.Machines:
12             if mach.cv['St'] == 1:
13                 area.cv['Pe'] += mach.cv['Pe']
14
15         # sum area agent totals to system
16         sysPe += area.cv['Pe']
17
18     return sysPe

```

Figure 68: Code listing as a figure.

Other packages exist for code insertion, but they may or may not be as pretty. Remember, as with anything, this is totally optional and voluntary...