

HOW TO WRITE YOUR DISSERTATION OR THESIS USING LATEX/OVERLEAF

Thesis

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By

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ABSTRACT

HOW TO WRITE YOUR DISSERTATION OR THESIS USING LATEX/OVERLEAF

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Writing your dissertation/thesis with Latex (written as $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$) is way more efficient and cooler than using Microsoft Word. The document is written like a computer code, which is then compiled to produce the desired PDF output. Figure numbering, equation numbering and cross referencing can be handled very cleanly and efficiently. You can move chapters around, and all the re-numbering will be done automatically. Equations will look very professional, and are easy to edit.

Latex is open-source and can be found in any Linux distribution. It can also be easily installed in Microsoft Windows. Latex has been around since the 1980's, and has been continuously updated and improved.

Overleaf is a cloud implementation of Latex that allows for collaborative writing through a web browser. Much like GoogleDocs, the document can be shared, and two or more people can write simultaneously without having to send documents back and forth. All your documents will be saved online, and you can access them through a web browser. This is much more convenient than a standalone Latex installation. Overleaf's basic service is free, but it has size limitations. Students can get the paid version for \$8/month. IEEE members get the paid version for free.

For name of person(s) to whom you are dedicating your thesis

ACKNOWLEDGMENTS

I would like to acknowledge Leslie Lamport who originally developed \LaTeX . Without his pioneering work, \LaTeX would not exist. I am also thankful to John Hammersley and John Lees-Miller, who conceived Overleaf in 2011. I have never met any of these people, but I am sure they are fantastic folks.

TABLE OF CONTENTS

ABSTRACT	3
DEDICATION	4
ACKNOWLEDGMENTS	5
LIST OF FIGURES	7
LIST OF TABLES	8
CHAPTER I. INTRODUCTION	9
1.1 Creating Sections	9
1.2 How to Write Equations	9
1.3 More math	10
1.4 Adding Figures	10
CHAPTER II. HOW TO MAKE TABLES AND CITE REFERENCES	12
2.1 Section 1	12
2.2 How to cite references	13
2.3 Commenting out sections	13
CHAPTER III. A FEW TOOLS WORTH LEARNING	14
BIBLIOGRAPHY	15
APPENDICES	
A. Some Stuff at the End	16
B. This is another Appendix	17

LIST OF FIGURES

1.1	Image of a butterfly in svg format	11
1.2	Sine curve in eps format	11

LIST OF TABLES

2.1	Conversion	12
2.2	Another Table	12

CHAPTER I

INTRODUCTION

Your work is not only judged by its technical content, but also by its appearance. Although \LaTeX will take some effort to learn, in the end you will be extremely pleased with the outcome.

When you write in \LaTeX , you don't have to worry about line breaks and line spacing. You type in plain text just like you would into a notepad. The font size, line spacing, margins etc.. are all set by the style file. The University of Dayton dissertation template satisfies the format required by the graduate school and Ohiolink, so you can focus on your technical writing and not the format.

1.1 Creating Sections

Sections will be automatically numbered. You can also create subsections and subsubsections, and they will be automatically numbered. If you don't want to number a section, you can write it as `\section*{Creating Sections}`. The asterisks will tell Latex to omit numbering that section.

1.2 How to Write Equations

Writing equations is the best part about \LaTeX . You can produce beautifully formatted equations that is very pleasing to the eye. Equations will be automatically numbered unless you mark it with an asterisk.

Here is an equation.

$$\frac{d^2\mathbf{r}}{dt^2} + \frac{1}{\tau} \frac{d\mathbf{r}}{dt} + \omega_0^2 \mathbf{r} = -\frac{q}{m} \mathbf{E}(t). \quad (1.1)$$

You can give a label to an equation, and then reference it later. You don't have to remember the equation number. For example, equation (1.1) is the equation of motion of a damped oscillator. If you insert another equation later, everything will be automatically renumbered.

Here is an equation array.

$$H(\omega) = \int_{-\infty}^{+\infty} H(\Omega) \frac{1}{2} \left[\delta(\omega - \Omega) - \frac{j}{\pi(\omega - \Omega)} \right] d\Omega \quad (1.2)$$

$$= \frac{H(\omega)}{2} - \frac{1}{2\pi} \int_{-\infty}^{+\infty} \frac{jH(\Omega)}{\omega - \Omega} d\Omega. \quad (1.3)$$

The array allows us to align the equal signs to make it look nicer.

The possibilities with equations are endless. You can find out how to do something by searching the Latex discussion forums.

1.3 More math

You can write an inline equation like $\mathcal{F} = K\gamma(t)$. It is also simple to add math symbols like Ω within the text.

1.4 Adding Figures

If you want to include a figure, copy the figure into your latex folder in SVG, EPS, PNG, JPG etc... In Overleaf, you upload the figure into the main folder or a subfolder. Then you reference that file name in your text. EPS (encapsulated postscript) and SVG are vector formats and will give you the best quality. You can attach a label to figures and reference it within the text. For example, Fig 1.1 shows a butterfly image.

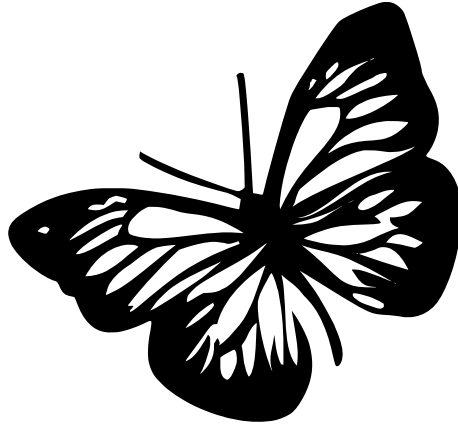


Figure 1.1: Image of a butterfly in svg format

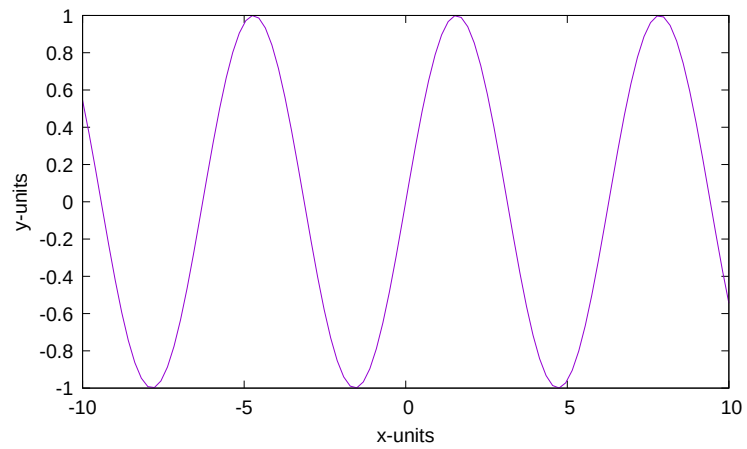


Figure 1.2: Sine curve in eps format

You can draw SVG or EPS figures using Inkscape. Plots can be produced using gnuplot. GIMP can be used to manipulate images. There are endless possibilities with open source programs.

CHAPTER II

HOW TO MAKE TABLES AND CITE REFERENCES

You can reference chapters with labels too. For example, in chapter I, we looked at the basic concepts. In this chapter we will look at tables and citations.

2.1 Section 1

Simple tables are very easy to create. Here is one.

Table 2.1: Conversion

From	To	Multiply by
mile	km	1.60934
km	mile	0.621371
lbs	kg	0.453592
kg	lbs	2.20462

More elaborate tables with merged cells or columns can also be created.

Table 2.2: Another Table

Cell 1	Cell 2	Cell 4	Cell 5	Cell 6
ABC	XYZ	RST		JKL
12	α	44	789	
$\Gamma\Theta z$	66	77		

You can also create a table online and paste the code into the document. If you google “latex table generator” you will find some sites.

2.2 How to cite references

A great feature of \LaTeX is how references are handled. References are placed in a separate bib file. They can be cited in the text by referencing their labels. Numbering is taken care of automatically. The style file will dictate how the cross references will appear, and how the references are listed at the end of the document.

Here is an example. The late Lord Rayleigh's scientific papers can be found in [1]. You can also cite books, conference proceedings and URLs. Principles of Optics [2] was first published in 1959.

The entry for the bib file does not have to be typed by hand. If you know the DOI for the publication, you can use online tools to automatically create the bib entry for that publication. Just google "doi to bib". Alternatively, you can save your bibliography archive in the cloud platforms like Mendeley. Overleaf will allow you to directly link your Mendeley account, which makes handling large bibliographies very easy.

2.3 Commenting out sections

You can comment out sections of text, just like a computer code. This will keep the text intact, but it will exclude it from the PDF output.

CHAPTER III

A FEW TOOLS WORTH LEARNING

The following open-source utilities are not directly related to Latex, but they are worth learning.

- Linux - a powerful and free operating system
- Gimp - for image manipulation
- Inkscape - for creating simple figures
- Krita - 2D drawing tool
- Gnuplot - for producing 2D and 3D plots
- Python - for general computing
- Sketchup - for simple 3D drawing
- Blender - for more ambitious 3D rendering

BIBLIOGRAPHY

- [1] RAYLEIGH, “The Late Lord Rayleigh's Scientific Papers,” *Nature*, vol. 113, no. 2842, pp. 570–570, Apr. 1924. [Online]. Available: <https://doi.org/10.1038/113570a0>
- [2] M. Born, E. Wolf, A. B. Bhatia, P. C. Clemmow, D. Gabor, A. R. Stokes, A. M. Taylor, P. A. Wayman, and W. L. Wilcock, *Principles of Optics*. Cambridge University Press, Oct. 1999. [Online]. Available: <https://doi.org/10.1017/cbo9781139644181>

APPENDIX A

Some Stuff at the End

This is Appendix A.

APPENDIX B

This is another Appendix

This is Appendix B.