

**UNIVERSITY OF SOUTHAMPTON**

Faculty of Engineering and Physical Science  
School of Electronics and Computer Science

# **How to use the University of Southampton LaTeX template.**

*by*

**Edward Longman**

ORCID: 0000-0002-1825-0097

*A thesis for the degree of  
Doctor of Philosophy*

January 2019



University of Southampton

Abstract

Faculty of Engineering and Physical Science  
School of Electronics and Computer Science

Doctor of Philosophy

**How to use the University of Southampton LaTeX template.**

by Edward Longman

-



# Contents

<b>Acknowledgements</b>	<b>vii</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Getting Started with this Template . . . . .	1
1.2 Learning L <sup>A</sup> T <sub>E</sub> X . . . . .	2
1.2.1 A (not so short) Introduction to L <sup>A</sup> T <sub>E</sub> X . . . . .	2
1.2.2 A Short Math Guide for L <sup>A</sup> T <sub>E</sub> X . . . . .	2
1.2.3 Common L <sup>A</sup> T <sub>E</sub> X Math Symbols . . . . .	2
1.3 Prerequisites . . . . .	3
1.3.1 L <sup>A</sup> T <sub>E</sub> X on Windows . . . . .	3
1.3.2 L <sup>A</sup> T <sub>E</sub> X on a Mac . . . . .	3
1.3.3 TeXlive GUI Installer . . . . .	3
<b>2 Getting Started</b>	<b>5</b>
2.1 File Structure . . . . .	6
2.2 Changes and additions . . . . .	6
2.2.1 University Organizational information . . . . .	6
2.2.2 Add a Glossary or Index . . . . .	7
<b>3 Rebuilding the Templates</b>	<b>9</b>
<b>4 Conclusions</b>	<b>11</b>
4.1 About this Template . . . . .	11
4.1.1 Some example figures . . . . .	11
<b>A Stuff</b>	<b>15</b>
<b>Bibliography</b>	<b>17</b>



## Acknowledgements

Sincere thanks must go to all those who worked on this before me. This template is the cumulative effort of a number of people, of whom I am just the most recent. The template relies on the work of Steve Gunn who started this work and C. J. Lovell who textually updated some parts. This guide is just an extension of the work of [Vel \(at latextemplates.com\)](#), and [Sunil Patel](#) who kindly gave permission for me to use their instructions as a base.





*To ...*



# Chapter 1

## Introduction

Welcome to this L<sup>A</sup>T<sub>E</sub>X Thesis Template, a beautiful and easy to use template for writing a thesis using the L<sup>A</sup>T<sub>E</sub>X typesetting system.

If you are writing a thesis (or will be in the future) and its subject is technical or mathematical (though it doesn't have to be), then creating it in L<sup>A</sup>T<sub>E</sub>X is highly recommended as a way to make sure you can just get down to the essential writing without having to worry over formatting or wasting time arguing with your word processor.

L<sup>A</sup>T<sub>E</sub>X is easily able to professionally typeset documents that run to hundreds or thousands of pages long. With simple mark-up commands, it *automatically* sets out the table of contents, margins, page headers and footers and keeps the formatting consistent and beautiful. One of its main strengths is the way it can easily typeset mathematics, even *heavy* mathematics. Even if those equations are the most horribly twisted and most difficult mathematical problems that can only be solved on a super-computer, you can at least count on L<sup>A</sup>T<sub>E</sub>X to make them look stunning.

### 1.1 Getting Started with this Template

If you are new to L<sup>A</sup>T<sub>E</sub>X it is recommended that you carry on reading through the rest of the information in this document. Otherwise go and install the class files in your usual place and write away!

This template complies with the style for the University Of Southampton. You should ensure that its style complies with the thesis style guidelines imposed by your institution if you are not at the University of Southampton. To see how to change this template see Section 3.

## 1.2 Learning L<sup>A</sup>T<sub>E</sub>X

L<sup>A</sup>T<sub>E</sub>X is not a WYSIWYG (What You See is What You Get) program, unlike word processors such as Microsoft Word or Apple's Pages. Instead, a document written for L<sup>A</sup>T<sub>E</sub>X is actually a simple, plain text file that contains *no formatting*. You tell L<sup>A</sup>T<sub>E</sub>X how you want the formatting in the finished document by writing in simple commands amongst the text, for example, if I want to use *italic text for emphasis*, I write the `\emph{text}` command and put the text I want in italics in between the curly braces. This means that L<sup>A</sup>T<sub>E</sub>X is a “mark-up” language, very much like HTML.

### 1.2.1 A (not so short) Introduction to L<sup>A</sup>T<sub>E</sub>X

If you are new to L<sup>A</sup>T<sub>E</sub>X, there is a very good eBook – freely available online as a PDF file – called, “The Not So Short Introduction to L<sup>A</sup>T<sub>E</sub>X”. The book's title is typically shortened to just *lshort*. You can download the latest version (as it is occasionally updated) from here: <http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf>

It is also available in several other languages. Find yours from the list on this page: <http://www.ctan.org/tex-archive/info/lshort/>

It is recommended to take a little time out to learn how to use L<sup>A</sup>T<sub>E</sub>X by creating several, small ‘test’ documents, or having a close look at several templates on:

<http://www.LaTeXTemplates.com>

Making the effort now means you're not stuck learning the system when what you *really* need to be doing is writing your thesis.

### 1.2.2 A Short Math Guide for L<sup>A</sup>T<sub>E</sub>X

If you are writing a technical or mathematical thesis, then you may want to read the document by the AMS (American Mathematical Society) called, “A Short Math Guide for L<sup>A</sup>T<sub>E</sub>X”. It can be found online here: <http://www.ams.org/tex/amslatex.html> under the “Additional Documentation” section towards the bottom of the page.

### 1.2.3 Common L<sup>A</sup>T<sub>E</sub>X Math Symbols

There are a multitude of mathematical symbols available for L<sup>A</sup>T<sub>E</sub>X and it would take a great effort to learn the commands for them all. The most common ones you are likely to use are shown on this page: <http://www.sunilpatel.co.uk/latex-type/latex-math-symbols/>

You can use this page as a reference or crib sheet, the symbols are rendered as large, high quality images so you can quickly find the  $\LaTeX$  command for the symbol you need.

## 1.3 Prerequisites

You should have installed a TeX distribution (MiKTeX or TexLive). How to do so can be found by searching the internet. A medium install of [Tex Live](#) is recommended, see Section 1.3.3. A Full installation is *large* (>4.5GB), a medium will be about 2GB.

### 1.3.1 $\LaTeX$ on Windows

When running the installer select “Custom Install”. You may need to run the installer as an Administrator (right click>Run as Administrator).

### 1.3.2 $\LaTeX$ on a Mac

The  $\LaTeX$  distribution is available for many systems including Windows, Linux and Mac OS X. The package for OS X is called MacTeX and it contains all the applications you need – bundled together and pre-customized – for a fully working  $\LaTeX$  environment and work flow.

MacTeX includes a custom dedicated  $\LaTeX$  editor called TeXShop for writing your .tex files and BibDesk: a program to manage your references and create your bibliography section just as easily as managing songs and creating playlists in iTunes.

### 1.3.3 TeXlive GUI Installer

The following process can be followed to select the collections required the result of which is shown in Figure 1.1.

- Choose the scheme when in the installer.
- Select Scheme-medium. Then choose Installation Collections.
- Remove any languages you do not need.
- Remove “ConTeX”, “MetaPost”, “XeTeX”
- Add “LaTeX Additional Packages”, “Graphics, Pictures, Diagrams”

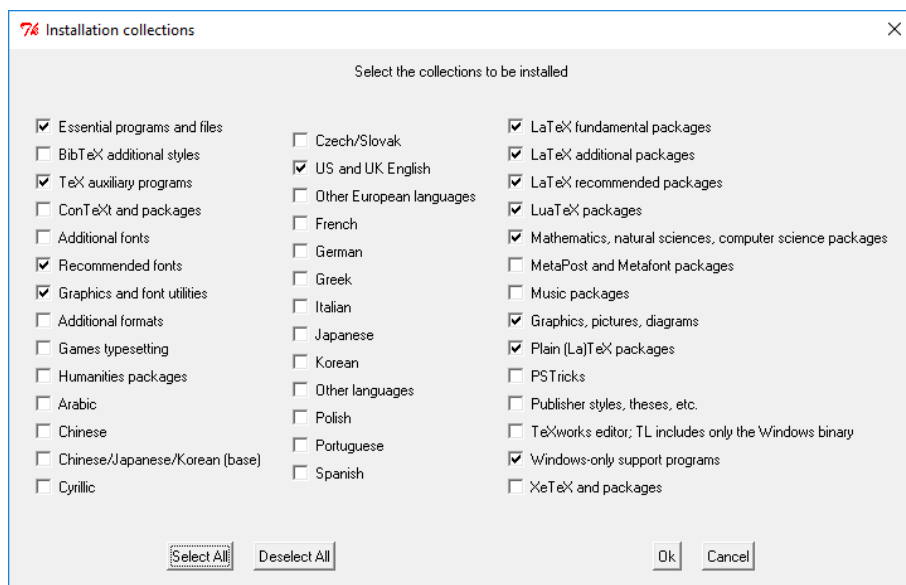


FIGURE 1.1: Required installation collections in Tex Live Windows/Unix Installer

- The installation of “TeXworks editor” is optional

Additionally for the copyright statement the Droid package is needed. It is recommended to install this using the “Tex Live Manager” after the main install, The TeX Live Manager is shown in Figure 1.2.

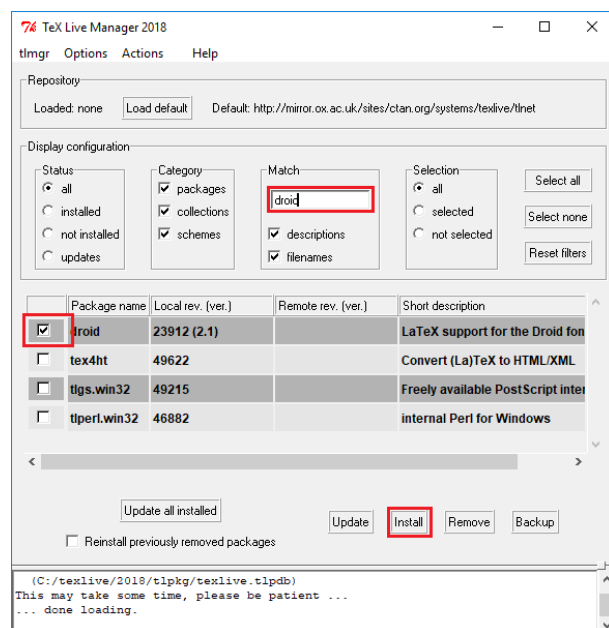


FIGURE 1.2: Required installation collections in Tex Live Windows/Unix Installer

The particular packages required following a MiKTeX installation are not documented as it was not tested with this.

## Chapter 2

# Getting Started

You probably have downloaded the templates as a zip file. This zip file should be *extracted to the texmf* folder that will either need to be created in your user directory or will be near your installation directory. For TeXLive this defaults to `<userdirectory>\texlive` on Windows. It can be found by running the command `kpsewhich -var-value=TEXMFHOME`. For MiKTeX see <https://miktex.org/kb/texmf-roots>.

The structure of this folder should look like this.

---

```

+-texmf
  +-bibtex
  | +-bib
  | | +-ecsdocs
  | +-bst
  | +-ecsdocs
+-doc
  +-latex
  | +-ecsdocs
+-templates
  +-latex
  | +-ecsdocs
+-tex
  +-latex
  | +-ecsdocs
+-source
  +-docstrip
  +-ecsdocs

```

---

The `templates/latex/ecsdocs` folder contains the files to get you started. The base file is `Thesis.tex` for a thesis and `Progress.tex` for a progress report.

The base files have dependancies for the sections and the figures. These files are: `Definitions.tex`, `Introduction.tex`, `Conclusion.tex`, `AppendixA.tex`, `figure.eps`, `ECS.bib`. To start using the templates, copy the base file and the dependancies into your working directory.

These files are designed as a starting point for the structure of your thesis. If you are familiar with L<sup>A</sup>T<sub>E</sub>X, go and explore the template and use it. Maybe start with putting your info in the section *THESIS/DOC INFORMATION* block of the `Thesis.tex` or `Progress.tex` file. You can then modify the rest of this file to your unique specifications based on your degree/university. If you are new to L<sup>A</sup>T<sub>E</sub>X then read about the file structure below.

## 2.1 File Structure

The `Thesis.tex` file is composed of two main parts. Firstly, `frontmatter` is all the information that goes before your and `mainmatter`.

It is advisable to write each chapter (and possibly section) in a separate file to keep each file of a manageable size. They are included into the main file with an `\include{Filename}` statement. Also keep Appendix and Listings files separate if possible.

## 2.2 Changes and additions

### 2.2.1 University Organizational information

The template assumes that you are in the [Cyber Physical Systems Group, School of Electronics and Computer Science, Faculty of Engineering and Physical Science](http://www.soton.ac.uk) at the [University of Southampton](http://www.soton.ac.uk). This can be easily changed at the top of your latex file by redefinition of the variables. These commands are:

---

```

\university    {\texorpdfstring{\href{http://www.soton.ac.uk}
                        {University of Southampton}}
                {University of Southampton}}
\UNIVERSITY    {\MakeUppercase{\univname}}
\department    {}
\DEPARTMENT    {\MakeUppercase{\deptname}}
\group         {}
\GROUP         {\MakeUppercase{\groupname}}
\faculty       {}
\FACULTY       {\MakeUppercase{\facname}}

```

---

The all caps command version must be run after changing the normal case command for it to change the default. The university example here also has a link embedded.

More detail can be found in the class docs file. Found in `doc\latex\ecsdocs` of the `texmf` directory distribution.

The other common commands already exist in the top level template file.



### 2.2.2 Add a Glossary or Index

*Both Indexes and Glossaries involve an extra build step so you will need to read the manual before inserting these.* They should be put after a `\cleartoeven` as is convention for indexes to start on the left. Some people may want to have an index or prefer Glossary instead of a list of symbols. The `glossaries` package can be used. Inserting the `\printglossaries` command will put the glossary where you want it. The list of symbols command can be removed in this case. Inserting the `\printindex` command will put the glossary where you want it. The recommended index package is `makeidx`.



## Chapter 3

# Rebuilding the Templates

In most cases this template style and layout will be suitable. If it is not, it may only require a small change to bring the template in line with your institution's recommendations. Quick modifications will need to be done on the `ecsdocs.cls` file in the `tex/latex/ecsdocs` file. Modification of all the templates or major modifications should be made to the original source/docstrip/ecsdocs

To change the templates you should understand how the templates are made. The templates are built using the docstrip package. "The package prepares a L<sup>A</sup>T<sub>E</sub>X kernel or package source file for actual use, by removing the documentation and meta-data" (Mittelbach) It also creates a document containing some documentation for the created files.

The docstrip utility comes as a latex package so when the main file (.dtx) is run with the command `latex esdocs.dtx` it creates all the class files plus the example templates. When this tool is run it creates lots of auxiliary files. To help with managing these auxiliary files GNU Make is used. "GNU Make is a tool which controls the generation of executables and other non-source files of a program from the program's source files." (Free Software Foundation, Inc.).

The make command can be run in several different configurations. `make all` creates all of the class, template, bibliography and figure files from the source files. `make install` moves all of the created files into the users texmf directory ready for use.



## Chapter 4

# Conclusions

It is impossible to explain even a small proportion of what *you* want to show in your thesis. This guide can only realistically explain the structure of the Template. To find out how to do anything particular ask the L<sup>A</sup>T<sub>E</sub>X community. <http://tex.stackexchange.com> is a very good place to search for and ask questions.

### 4.1 About this Template

The L<sup>A</sup>T<sub>E</sub>X templates are based off a L<sup>A</sup>T<sub>E</sub>X class from Steve Gunn at the University of Southampton. The original is no longer available.

#### 4.1.1 Some example figures

Here are some of the nice things you can do with the template.

Training Error	Testing Error
0	$\infty$

TABLE 4.1: The Results

Figure 4.1 shows why this is the case.

This page shows you a subfigure example in Figure 4.2.

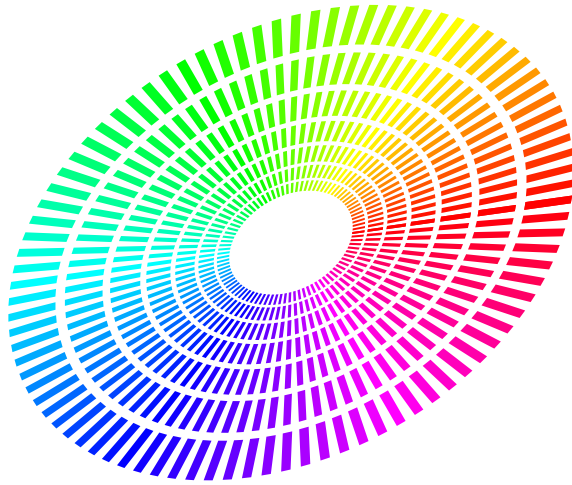
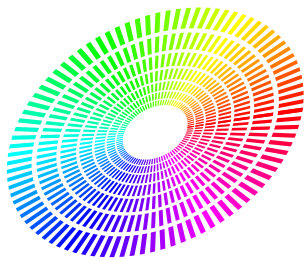
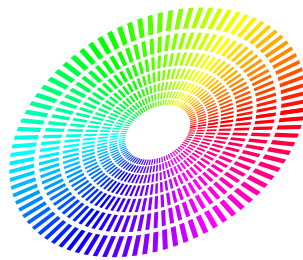


FIGURE 4.1: A colourful picture.



(a) The left caption



(b) The right caption

FIGURE 4.2: A doubly colourful picture.

---

```
This is a test listing
```

```
It has several lines  
That  
say not much at all
```

---

LISTING 4.1: Without a title it doesn't appear in the table





## **Appendix A**

### **Stuff**

The following gets in the way of the text....



# Bibliography

Free Software Foundation, Inc. [Gnu make](#).

Frank Mittelbach. [docstrip – remove comments from file](#).