

The *new* MIT thesis template

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The MIT thesis template

L^AT_EX has changed tremendously since the original MIT thesis template was written in the 1980s. L^AT_EX 2.09 was replaced by L^AT_EX 2_ε in the 1994. Many packages and fonts were developed to accompany the original platform, particularly after 2000; and major updates to the L^AT_EX kernel began in 2018. Further, the MIT Libraries have changed the required format several times, especially as electronic thesis submission has become the norm. The original template served MIT well, but by the early 2020's, it was substantially out of date.

This *new* MIT thesis template was developed in 2023 at the request of the MIT Libraries. The title and abstract pages strictly follow the current requirements of the Libraries. The underlying code is entirely new.

System requirements

The new `mitthesis` class uses the features of L^AT_EX as of 2022, with limited backward compatibility. An up-to-date L^AT_EX system is therefore necessary when using this template.

L^AT_EX is a free, open source system. The entire system is distributed through the T_EX Live platform (<https://www.tug.org/texlive/>), including the basic format, packages, and user interfaces. The system operates on Windows, MacOS, and Unix/Linux. T_EX Live is formally updated each year in the spring, and the associated utility package allows users download the most current codes more frequently if they desire. (At the time of this writing, the commercial platform Overleaf.com provides similar functionality.)

If you are missing a package or documentation, you may obtain it at no cost from CTAN (ctan.org).

L^AT_EX engine

The template works with either pdfT_EX or unicode engines such as LuaL^AT_EX. With the latter, fonts that you install in your operating system can be configured for use in your thesis. LuaL^AT_EX also enables the direct use of lua code in your `.tex` file.

Downloading the template

The files needed for preparing your thesis are in the CTAN repository: <https://ctan.org/pkg/mitthesis>. Copy the subdirectory `MIT-thesis-template` onto your system. That directory contains files you can modify into your own thesis.

If `mitthesis.cls` is installed in your system (e.g., if you use an up-to-date version of T_EX Live), you are all set. If not, copy the file `mitthesis.cls` into your working directory. If you plan to use fonts other than the default fonts, you may also copy the subdirectory `fontsets` as a subdirectory of your working directory.

File structure

The new MIT thesis template consists of: `mitthesis.cls`; a root file `MIT-Thesis.tex`; a file to load the abstract, `abstract.tex`; a file for design options, `mydesign.tex`; and an optional file to change the fonts (see the subdirectory, `fontset`). You should change the name of the root file to something more descriptive of your own work (e.g., `JohnsThesis.tex`, `MagnumOpusScientiae.tex`,...). In addition, files must be loaded for acknowledgments, an optional biosketch, chapters, optional appendices, and bibliography.

Information you need to complete

Various fields and commands must be changed to your own information in the preamble of `MIT-Thesis.tex` and immediately after the `\begin{document}` command. This information includes the title, author, degree and other essential information. With the comments in `MIT-Thesis.tex`, this step should be self-explanatory. Nevertheless some comments follow.

In the `\hypersetup{. .}` command, change the sample file to match your own information (e.g., keywords, subject, etc.). These commands generate metadata that are incorporated into the pdf file.

The commands that define the title page are as follow.

- `\title{the title of your thesis}`
- `\Author{author full name}{author department}[1st PREVIOUS degree][2nd...`
Note that third, fourth, fifth, and sixth arguments are optional [...] and may be omitted. Use once for each author.
- `\Degree{name of degree}{department giving degree}`. Use once for each degree fulfilled by thesis. If the thesis satisfies two degrees from one department, leave the department argument blank for the *second* degree: `\Degree{2nd degree name}{}{}`
- `\Supervisor{supervisor name}{supervisor title}`. Use once for each supervisor.
- `\Acceptor{acceptor name}{acceptor title}{thesis related position}`. Professor who accepts theses for your department (e.g., the Graduate Officer). Use once for each department.
- `\DegreeDate{Month}{year}`. Date degree is awarded (February, May, June, or September).
- `\ThesisDate{date}`. Date that your final thesis is submitted to the department.

Overflowing title page. If your title page overflows (from too many authors, degrees, etc.), you can scale down the signature block at the bottom by issuing this command: `\SignatureBlockSize{\small}`. You may also compress the acceptor fields by putting the position into the 2nd argument and leaving the 3rd argument blank: `\Acceptor{acceptor name}{acceptor title and thesis related position}{}{}`.

Copyright license

If you wish to make your thesis available under a Creative Commons License, issue the following command between `\begin{document}` and `\maketitle`: `\CClicense{license type}{license url}`. For example,

`\CClicense{CC BY-NC-ND 4.0}{https://creativecommons.org/licenses/by-nc-nd/4.0/}`.

Table 1: Options to the document class

Package option	Effect
fontset	is a keyvalue, <code>fontset = <name></code> , which selects the set of fonts used for the thesis. See description below.
lineno	this option loads the <code>lineno</code> package, which provides line numbers, as for editing. The <code>lineno</code> package provides additional commands to control line numbering.
mydesign	this option loads the file <code>mydesign.tex</code> , which in turn loads the packages <code>xcolor</code> , <code>titlesec</code> , <code>enumitem</code> , <code>caption</code> , <code>subcaption</code> , and anything else that affects document design. You may edit <code>mydesign.tex</code> as you prefer.
twoside	gives facing-page behavior for two-sided printing; omitting it will eliminate the even-numbered blank pages.

Package options

Package options may be specified for `\documentclass[...]{mitthesis}`. These options are described in Table 1 and the subsections that follow.

Font loading

By default, `mitthesis.cls` will load the traditional \LaTeX fonts, computer modern (pdf \TeX) or latin modern (unicode engines). By using the key value `fontset=...` in the `\documentclass` command, you can select a different set of fonts.

Ten fontsets are predefined, including the default set (see Table 2). Three work only with pdf \TeX , four work only with unicode engines, and three work with either. These options include a mixture of serif or sans serif text and math fonts, as shown in the table. To access the predefined font sets, you *must* have the directory `fontsets` as a subdirectory of your working directory, including its files as named.

Among the predefined fonts, `Termes` and `NewTX` are serified fonts similar to the digital font Times New Roman. `STIX Two` is more similar to the original metal-type Times font. `Linux Libertine` is a serif font inspired by 19th century book type. `Lucida` is a serified font designed for high legibility at small size or on low resolution devices. This font is excellent for mathematics and includes a complete bold-face math font, but it is not free. `Heros` and `NewTX-sans` are sans-serif text fonts similar to Helvetica. `NewTXsf` is a sans-serif math font which draws upon glyphs from the STIX font. `Fira` is a humanist sans-serif text font designed in association with the Firefox browser. Finally, `Computer Modern` (and its extension `Latin Modern`)—the traditional “ \LaTeX font”—is a Didone font, with high contrast between thick and thin elements.

You may also place your own fontset file, say `Myfontset.tex`, in your working directory, and load it with

```
\documentclass[fontset=Myfontset]{mitthesis}
```

Design options

The thesis will follow the default styles of the \LaTeX report class for sections headings, captions, and lists. If you prefer different styles you can use the class option `[mydesign]` which loads the file `mydesign.tex`.

With `mydesign.tex`, you can set options for packages that manage color, e.g. `xcolor`, that change the margins, or that change the design of titles, captions, and lists: `titlesec`, `caption`, or `enumitem`. You can also load other packages. The `mitthesis` class will insert these commands at the appropriate point (prior to loading `babel`, fonts, or `hyperref`). You should not need to edit the class file.

Table 2: Predefined font sets

fontset	pdfT _E X	unicode	text font	math font	details
fira-newtxsf	yes	no	sans	sans	included in T _E X Live
newtx	yes	no	serif	serif	included in T _E X Live
newtx-sans-text	yes	no	sans	serif	included in T _E X Live
default	yes	yes	serif	serif	CM & LM fonts are included in T _E X Live
libertine	yes	yes	serif	serif	in T _E X Live for pdfT _E X. For unicode, OpenType text fonts freely available here https://sourceforge.net/projects/linuxlibertine/ and the math font here https://github.com/alrque/libertinus
lucida	yes	yes	serif	serif	the lucida fonts are available from the T _E X User's Group, https://tug.org/store/lucida
heros-stix2	no	yes	sans	serif	http://www.gust.org.pl/projects/e-foundry/tex-gyre https://github.com/stipub/stixfonts fonts are free
stix2	no	yes	serif	serif	https://github.com/stipub/stixfonts , fonts are free
termes	no	yes	serif	serif	http://www.gust.org.pl/projects/e-foundry/tex-gyre fonts are free
termes-stix2	no	yes	serif	serif	http://www.gust.org.pl/projects/e-foundry/tex-gyre https://github.com/stipub/stixfonts fonts are free
Typewriter (monospaced) fonts are also loaded for unicode					Inconsolata (sans serif): https://ctan.org/tex-archive/fonts/inconsolata Cursor (serif): http://www.gust.org.pl/projects/e-foundry/tex-gyre

Hyperlink colors and pdf bookmark or viewing options from the `hyperref` package can be changed by using `\hypersetup{...}` in the preamble or using `\AtBeginDocument{ \hypersetup{...}}` in the `mydesign.tex` file.

If you have two different style files, say `styleA.tex` and `styleB.tex`, you can switch between them with the options `[mydesign=styleA]` and `[mydesign=styleB]`.

Single-sided vs. double-sided layout

The sample template uses the option `[twosided]`, which starts major sections (abstract, table of contents, chapters, etc.) on odd-numbered pages. This arrangement is suitable for two-sided printing, but can lead to empty even-numbered pages. If you do not wish to have this behavior, omit that option. By default, even and odd page margins are the same; this can be changed in the `mydesign.tex` file if necessary.

PDF/A compatibility

PDF/A-2b compliance will be automatic if the `\DocumentMetadata{...}` command is issued before the `\documentclass{...}` command and *provided that your graphics are also compliant*. This command was added to L^AT_EX in June 2022. For older versions of L^AT_EX, the `mitthesis` class will fall back to loading

hyperxmp to support pdf metadata, but PDF/A compliance will require post-processing (for example, by using the PreFlight function of Adobe Acrobat). An up-to-date \LaTeX installation is preferred.

Current \LaTeX development (ca. 2023) is working toward fully accessible PDF/A out of the box (e.g., PDF/A-2a). Unicode compliance (e.g., PDF/A-2u) depends greatly on your fonts and figures.

Packages for math, chemistry, code listings, and more

The `mitthesis` class loads the `amsmath` package and its extension `mathtools`. These packages provide many useful macros for typesetting equations and symbols, such as: environments for aligning and splitting equations or groups of equations; tools for matrices; a wide variety of operators and symbols; tools to define new math operators and paired delimiters; and much, much more. If you are including equations, look at the documentation for these packages: <https://ctan.org/pkg/amsmath> and <https://ctan.org/pkg/mathtools>.

Packages used by `mitthesis` are listed in Table 3.

Specialized packages for many disciplines can be found in CTAN. These include subjects like [chemistry](#), [linguistics](#), and [physics](#). As examples of such packages, the sample thesis template uses the package `mhchem` to set chemical equations and the package `listings` to list computer code.

When selecting a package to use, check that it is currently maintained (with relatively recent updates), and compare it to other packages that perform similar functions. Some packages are better than others, and some obsolete packages remain online.

Nomenclature

An optional nomenclature environment is provided by the class. This environment can support either chapter-by-chapter nomenclature (at the section level) or a single nomenclature for the entire thesis (at the chapter level). The environment has three optional arguments: [1] adjust space between symbol and definition; [2] name (heading) of the nomenclature list; and [3] level, which can be “chapter” or “section” depending on whether you have one nomenclature list for whole thesis or one for each chapter (default = section).

For example, the following code

```
\begin{nomenclature}[2em][Nomenclature for Chapter 1][section]
\EntryHeading{Roman letters}
\entry{ $\mathcal{C}$ }{material curve}
\entry{ $\mathbf{u}$ }{velocity [m s-1]}
\EntryHeading{Greek letters}
\entry{ $\Gamma$ }{circulation [m2 s-1]}
\entry{ $\rho$ }{mass density [kg m-3]}
\end{nomenclature}
```

produces the nomenclature list below

Nomenclature for Chapter 1

Roman letters

\mathcal{C} material curve
 \mathbf{u} velocity [m s⁻¹]

Greek letters

Γ circulation [m² s⁻¹]
 ρ mass density [kg m⁻³]

Resources for L^AT_EX

L^AT_EX documentation is easy to find online. A few useful resources, among many, are these:

L^AT_EX Wikibook. <https://en.wikibooks.org/wiki/LaTeX>. An online tutorial book.

L^AT_EX2e: An unofficial reference manual. <https://latexref.xyz/dev/latex2e.html>. A comprehensive explanation of each L^AT_EX command, from the T_EX User's Group.

T_EX Stack-Exchange. <https://tex.stackexchange.com/>. More than 250,000 answered questions, and you can ask your own!

ChatGPT. At the time of this writing, ChatGPT, a large language model-based chatbot, could both answer some L^AT_EX-related questions and write acceptable L^AT_EX and expl3 code.

Additional commands

The class also provides `\DegreeYear`, `\DegreeMonth`, and `\CopyrightAuthor`. The latter combines all author names into a single token list, e.g., “Joseph O. Hirschfelder, Charles F. Curtiss and R. Byron Bird”; a period at the end of the final name (e.g., as in “John F. Nash Jr.”) is removed.

Use outside MIT

If you wish to adapt this template for use at a different institution, you can put the following commands in your preamble.

- Use `\Institution{Your Institution}` to change MIT to your own institution on the title page.
New with v1.06.
- Use `\maketitle*` (in place of `\maketitle`) to drop the MIT copyright permission statement
- Omitting `\Acceptor` commands will drop the “Accepted by:” field. To suppress the resultant error message, put `\SuppressAcceptorError` before `\maketitle*`.
New with v1.06.

Please do not remove the license/copyright text from the sources files — it took me some time to compose all this!

Good luck with your thesis and your thesis defense! – jhl

Table 3: External packages used. For documentation, visit CTAN, <https://ctan.org>. Alternatively, if you have **T_EX Live** installed, you can open a terminal window and type `% texdoc package-name`.

Package	Class	User
bm	defines commands to access bold math symbols (loaded for default fonts)	with pdfT _E X, the command <code>\bm{...}</code> produces a bold math symbol
bookmarks	is loaded automatically under the new pdf-management system	customize pdf bookmarks
doi	support for hyperlinking DOIs	hyperlink a doi number: <code>\doi{...}</code>
etoolbox	extend or modify other macros	can use in preamble if needed
iftex	check which L ^A T _E X engine is running	macros to check which engine, e.g., <code>\ifpdf</code> <code>tex</code>
geometry	set page size and margins	can use <code>\newgeometry</code> in <code>mydesign.tex</code>
graphicsx	support for inserting images	use to include graphics
hyperref	support for hyperlinks and metadata	must complete setup in preamble
hyperxmp	fallback if no <code>\DocumentMetadata{...}</code>	—
kvoptions	key values for systems pre 2022/11/01	—
mathtools	loads and extends amsmath	many useful math macros available. See documentation for amsmath and mathtools
xparse	for systems older than 2020/10/01	macros to define new commands
lineno	loaded if class option is given	keyvalue lineno will give line numbers; lineno package has additional commands that control line numbering
caption	also loaded by <code>mydesign.tex</code>	support for caption styling
subcaption	also loaded by <code>mydesign.tex</code>	support for subfigures within figures
titlesec	also loaded by <code>mydesign.tex</code>	support for styling section headings
xcolor	also loaded by <code>mydesign.tex</code>	support for colors, including colored fonts
babel	—	if you use multiple languages, load babel in a fontset file before loading fonts
biblatex	—	sample template uses this bibliography tool. Change to natbib if you prefer
fontenc	—	load this in a fontset file if using pdfT _E X
fontspec	—	load this in a fontset file if using a unicode engine (unicode-math loads fontspec by default)
lipsum	—	create filler text (see sample template, Chapter 1)
listings	—	for listing computer code (see sample template, Appendix A)
mhchem	—	to format chemical formulæ (see sample template, Chapter 1)
setspace	—	can be loaded to change the default line spacing, if desired (e.g., for “double-spacing”)
unicode-math	—	load in a fontset file if using a unicode engine