### User Manual



# Manual for LATEX class ctuthesis

Tomáš Hejda et al.

# Acknowledgements

Děkuji ČVUT, že mi je tak dobrou  $\mathit{alma}$   $\mathit{mater}.$ 

## **Declaration**

Prohlašuji, že jsem předloženou práci vypracoval samostatně, a že jsem uvedl veškerou použitou literaturu.

V Praze, 10. March 2015

### **Abstract**

This manual shows how to use the ctuthesis LATEX class, what are the requirements, etc.

 $\label{eq:Keywords: Manual, degree project, Manual, Manual, degree project, Manual, Manual,$ 

### **Abstrakt**

Tento mánuál představuje ĽATEXovou třídu ctuthesis, její použití, požadavky na systém atd.

Klíčová slova: manuál, závěrečnná

práce,  $\LaTeX$ 

Překlad názvu: Manuál ke třídě

ctuthesis pro LATEX

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# Chapter 1

### Introduction

In this manual, we want to explain how to use the class ctuthesis. The manual consists of three main parts:

- basic user guide;
- reference manual;
- guide for template authors.

Students and other 'users' of the class should carefully read the basic user guide (Chapter 2), and visit the reference when needed (Chapter ??).

### Why was this project created

The ctuthesis LATEX template was written by Tomáš Hejda because there is wider demand for it at CTU. The aim has been to provide a LATEX tool to students and their advisors for writing qualification theses (e.g., bachelor, master, Ph.D.). LATEX as a tool for professional typesetting has had a significant group of users at CTU. The ctuthesis template can be selected and used voluntarily, i.e., if the student and the advisor agree on this.

There were several more local attempts in creating LATEX templates for qualification theses at CTU. Let us give only two examples. First, the package ctu, https://github.com/kyrcore/ctu-latex<sup>1</sup>. Its development seems to be interrupted since 2013. Second, the package CMPthesis written and maintained up to now by Vít Zýka, which is provided only internally at http://www-cmp.felk.cvut.cz/proceedings/TeX/texmf-cmp/tex/latex/cmpthesis/cmpthesis.pdf.

Petr Olšák from Department of Mathematics FEE came with the initiative to create a TEX package for qualification theses and offered it to the whole CTU in 2013, see http://petr.olsak.net/ctustyle.html (in Czech). The package is less spread because there are fewer TEX users than LATEX users at CTU.

The ctuthesis LATEX package, described in this document, was inspired by P. Olšák's TEX package. The aim is to preserve very similar graphical

<sup>&</sup>lt;sup>1</sup>All URLs in this section were retrived on March 15, 2015.

look. T. Hejda volunteered to write a LATEX package with similar properties as P. Olšák's ctustyle package. P. Olšák has supported this initiative.

The small team around the ctuthesis package (Tomáš Hejda, Václav Hlaváč, Petr Olšák) has attempted persuading CTU leaders to support this package and help offering it at university-wide scale for the voluntary use. As many students and supervisors use other publishing/typesetting tools, as, e.g., Microsoft Word, the mentioned team encourages someone to write a template, maybe with similar outer look to P. Olšák's TEX template ctustyle and T. Hejda's LATEX template ctuthesis.

# Chapter 2

# **User Guide**

### 2.1 Installing the class

The class comprises the files listed in Table 2.1. The class is build over the LATEX3 bundle, which is a project under development and new programming features are added regularly. This means that the class works as is only with TEX Live 2014. If you have an earlier version of LATEX distribution, you have basically two options:

File name	Description		
ctuthesis.cls	Class file itself		
ctu_logo_blue.pdf	Logo of the university; this file is subject to different license and copyright than the rest of the class files		
ctuthesis.ist	Nicely loooking style for makeindex		
latex3-tl2014.zip	ZIP file containing the "good" version of $\LaTeX$		
ctuman.pdf	This manual		
ctuman-*.tex	Source code to this manual		
ctuth-core.tex	Core definitions for the class; users do not need to ever load this file manually		
ctuth-pkg.tex	Package loading code for the class; users do not need to ever load this file manually		
ctuth-names.tex	Language-dependent part of the class; users should not need to modify this file or load it manually		
ctuth-templates.tex	Templates for various parts of the document; users may look inside this file and see how things are done; this is discussed in more detail in Chapter ??		

Table 2.1: The files of the class ctuthesis.

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1. Install TEX Live 2014 or newer; it is not difficult and it will save you all the troubles. The installing guide is on TUG's website at http://tug.org/texlive/.

2. Install just the new version of LATEX3. This is tested to work on TEX Live from version 2010. The bundle is attached as a ZIP file, it is sufficient to extract all the files in the working directory.

### 2.2 Minimal example

The minimal example of a Bachelor project at the Nuclear Faculty looks like this:

```
\documentclass{ctuthesis}
\ctusetup{
    xdoctype = B,
    xfaculty = F4,
   mainlanguage = english,
    titlelanguage = english,
    title-english = {Planting Uranium},
    title-czech = {Sázení uranu},
    department-english = {Department of Mathematics},
    author = {Lolek Pilný},
    supervisor = {Prof. Krutoš Spravedlivý, CSc.},
    supervisor-address = {Pěstitelský ústav,\\ Zářivá 232,\\
      12000 Praha 2},
    month = 5,
    year = 2330,
}
\ctuprocess
\begin{abstract-english}
We develop \ldots
\end{abstract-english}
\begin{abstract-czech}
Rozvíjíme \ldots
\end{abstract-czech}
\begin{document}
\maketitle
\chapter{Introduction}
```

```
Foo bar
\chapter{Conclusion}
Lorep ipsum \cite{doe}
\begin{thebibliography}{1}
\bibitem{doe} J. Doe. \emph{Book on foobar.} Publisher X, 2300.
\end{thebibliography}
\end{document}
```

At the first sight, it may look complicated, but the basic structure is pretty simple:

### 2.3 Setting up the class

This section lists all various settings that can be made to the class. The ones marked ' $\bowtie$ ' are always mandatory. The ones marked ' $\bowtie$ ' are mandatory in almost all cases, with some small exceptions. For most of them, no errors are issued if they are missing, though.

#### 2.3.1 Options to \documentclass

The class ctuthesis itself takes an optional argument draft that sets some draft options (the ones common in LATEX). It also takes the option oneside which switches to one-sided mode; however, we strongly advice against using this option.

documentclass draft oneside 2. User Guide

#### 2.3.2 Parameters to \ctusetup

ctusetup The parameters can be diveded into several groups.

**Text fields.** Some of the fields — like the theses title — are language-dependent. They are marked key-<lamp> below, and it means that multiple keys exist: key-english, key-czech and key-slovak.

author

■ Mauthor — author's name, including titles.

supervisor

■ supervisor — supervisor's name, including titles.

supervisor-address

■ Supervisor-address — supervisor's affiliation and address; use \\ to format it with linebreaks.

year month ■ wyear, month, day — numerical values of the date of theses publishing.

day

■title-<lame> — title of the thesis.

title-<lang> subtitle-<lang>

■ subtitle-<lang> — subtitle.

university-<lang>

■ university-<lame> — name of the university (is preset for CTU).

university-endl-<lang>

university-endl-<lame> — name of the university broken in 4 lines using \\.

 ${\sf faculty-}{<}{\sf lang}{>}$ 

faculty-<lame of the faculty (set up automatically, see xfaculty below).

facultynum

■ facultynum — standard number of the faculty (set up automatically, see xfaculty below).

doctype-<lang>

doctype-<lame> — type of the document/thesis (set up automatically, see xdoctype below).

department-<lang>

 $\blacksquare$  department-<lamp> — name of the department.

fieldofstudy-<lang> subfieldofstudy-<lang>

■ ieldofstudy-<lamg>, subfieldofstudy-<lamg> — field of study.

keywords-<lang>

■ wkeywords - < lang > — comma-separated list of keywords.

#### General fields.

mainlanguage

■ ► mainlanguage — main language of the thesis; the choices are czech, english and slovak.

titlelanguage

 titlelanguage — language in which the title pages are typeset (defaults to mainlanguage).

secondlanguage

secondlanguage — language of the second abstract (set up automatically so that two abstracts appear: one in English and one in Czech, unless the thesis is in Slovakian, in which case the two abstracts are in English and in Slovakian).

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- otherlanguages allows more languages to be loaded by babel pack- otherlanguages age, accepts a comma-separated list.
- **xfaculty** takes values F1, F2, ..., F8 and sets up the faculty name xfaculty and number automatically.
- wxdoctype takes values B (bachelor), M (master) or D (dissertation) and xdoctype sets up the document type automatically; for non-thesis-like documents, use doctype-<lamp>.
- Specification-file the path to the specification file (usually something like zadani.pdf, the current directory is searched for the file of course).
- front-specification if set to true, the specification will appear just front-specification after the titlepage (defaults to false).
- front-list-of-figures, front-list-of-tables says whether the list of figures/tables will be set in the frontmatter (default to true) front-list-of-tables
- monochrome switches to optimized monochrome setup, in case the monochrome work will not be printed in colour.
- **savetoner** disables background and other too dark things to save savetoner toner while printing drafts.

**Default package loading.** The class attempts to set up some packages nicely if the user wants to use them. So for instance, the package listings can be pre-set to include the blue background of all listings. In order to leave the user the chance to mess with things "his own way", options are offered to enable or disable certain packages. The format of the option name is always pkg-<packagename> and it accepts either true or false

- pkg-hyperref (default: true) sets up all the fields of the PDF pkg-hyperref document.
- pkg-listings (default: false) sets up \ttfamily font for all listings, and adds a background to all display listings. For inline listings, this is a bit more complicated; we rather implemented a new macro \ctulst(color)[settings]!<text>! that behaves exactly like ctulst \lstinline!<text>!, but applies the background; the color is an optional argument (in parentheses ()) and defaults to the blue background color seen in this manual. Any printable symbol but one of [({}} can be used in place of !. Using none makes the background transparent.
- pkg-amsthm (default: true) sets up nicely the basic styles for theorems, but does not set up the theorem environment themselves. More information is in Section ??
- pkg-biblatex (default: false) more details in Section ??.

#### 2.3.3 Text environments used in the preamble

There is a small number of environments that should be used in the preamble in order to set up various text fields, mostly used in the front matter.

abstract-<lang>

■ ⋈{abstract-<lang>} — abstract; the language has to be always specified.

thanks

■ [ thanks ] — acknowledgements; can be used for both personal and grant ackowledgements.

declaration

■ ► {declaration} — students are oblidged to declare that the works is their works, and maybe some more things, depending on the faculty's or department's regulations.

### 2.4 Various parts of the document

#### 2.4.1 Frontmatter

maketitle

Typically, the frontmatter will be only one command: \maketitle. This typesets the titlepage, the acknowledgements, the declaration, the two abstracts, the table of contents, and possibly the lists of figures and tables. Afterwards, it immediately switches to \mainmatter.

frontmatter

mainmatter

Another option, which should be used only in special cases, is to start the frontmatter with \frontmatter, include whatever material should be there and close it by \mainmatter. This is discussed in detail in Chapter ??.

#### **2.4.2** Mainmatter and backmatter. Sectioning

chapter section subsection subsubsection paragraph subparagraph part Standard sectioning commands are suported, they are \chapter, \section, \subsection, \subsection. These ought to follow the hierarchy from top to bottom. There is also \paragraph and \subparagraph which can be used as lowest-level sectioning commands. Long works can be divided into parts using \part; its numbering is independent of the other ones. All these commands take standard optional argument and star; however, we advice against using starred sections.

appendix

The appendices are introduced by command \appendix. Then, each appendix is a chapter, so the standard \chapter command ought to be used. In appendix, even chapters started by \chapter\* such as the bibliography and the index are numbered. (In a document without appendices, these should be unnumbered. Once appendices are used, all indexes and alike should be standard numbered appendices.) For unnumbered appendices, \chapter\*\* can be used.

appendix\*
appendix\*\*

If the document is divided into parts, the appendices are introduced by a part-like title "Appendices", both in the document and in the table of contents. This can be suppressed by using \appendix\* (keeps the line in the table of contents) or \appendix\*\*.

specification as chapter

If the project specification is to be included as an appendix, it can be done

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by \ctutemplate{specification as chapter}.

There is no true backmatter behaviour defined in the class. The only thing that would belong to the backmatter is the colophon (' $tir\acute{a}$ '). Users are advised to use **\cleardoublepage\* \thispagestyle{empty}** and then typeset the colophon to their liking.

#### 2.4.3 Bibliography

There are three ways how to include the bibliography:

- 1. Using Biblatex. In that case, setting up pkg-biblatex = true is recommended. The bibliography is then included using \addbibresource and \printbibliography.
- 2. Using BibTeX. No special setting is needed, and the bibliography is included using \bibliographystyle and \bibliography.
- 3. By direct input. The standard environment {thebibliography} can be used for this.

We kindly ask users to consult the manuals to the specific packages for their usage.

#### 2.4.4 Index

To generate the index, use pkg-makeidx = true, and put \printindex where the index should appear. We provide an in-house style for the index called ctuthesis.ist. The index generation is dependent on calling the external tool makeindex, in a similar way in which the bibliography generation depends on bibtex or biber. The proper way how to call this tool is the following:

makeidx makeindex printindex

```
makeindex -s ctuthesis.ist <filename>
```

where <filename> is the root name of your main project file (without .tex). ctuthesis.ist

#### 2.4.5 List of notation. Nomenclature

We do not preset any special environment for typesetting appendices such as list of notation or nomenclature. One of the possible standard way how to do it is with the help of the packages tabularx, array and booktabs as follows:

tabularx array booktabs

```
\documentclass{ctuthesis}
\ctusetup{ mainlanguage = english }
\ctuprocess
\usepackage{tabularx, array, booktabs}
\begin{document}

\appendix
\chapter*{List of Notation}
```

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```
\noindent
\begin{tabularx}{\linewidth}
    { 1 >{\raggedright\arraybackslash}X }
\bfseries Symbol & \bfseries Meaning \\Midrule
$\alpha$ & The angle of attack \\
$\mathbb{R}$ & The real numbers \\
\end{tabularx}
\end{document}
```

It the case the notation is longer than one page, the package ltxtable or ltablex can be used.

#### 2.4.6 Floating objects: Figures and tables

figure Float introduction. Floats are input either as {figure} or {table} environment. All floats are automatically typeset centered, so a typical code for a figure is the following:

```
\begin{figure}
\includegraphics[width=0.8\linewidth]{mygraphicfile.pdf}
\caption{We depict a foo-bar here.}
\label{fig:foobar}
\end{figure}
```

For a table, it is the following:

```
\begin{table}
\begin{ctucolortab}
\begin{tabular}{cc}
\bfseries Foo & \bfseries Bar \\Midrule
foo1 & bar1 \\
foo2 & bar2
\end{tabular}
\end{ctucolortab}
\caption{Table of foo-bar.}
\label{tab:foobar}
\end{table}
```

ctucolortab Midrule midrule Note the usage of the environment {ctucolortab} to make the table get a blue background, and the usage of \Midrule to get a horizontal line in the table (a thinner line can be obtained using \midrule). Also note the deliberate absence of vertical rules.

#### 2.4.7 Mathematics

All standard concepts for typesetting mathematics are working as in any other LaTeX class. We only emphasize how the class behaves in relation to theorem-like environments and proofs. The default behaviour is that the package

ctuthesis t1503242320 ctuman 150412 amsthm is loaded and theorem styles plain, definition and note. Theorems (plain style) are by default slanted rather than italic, should italic theorems be preferred, use plainit. However, no theorem-like environments are predefined, everybody can do this to their liking. The preamble declarations could look like this:

The environment {proof} is provided by default. All theorem handling can be disabled by \ctusetup{ pkg-amsthm = false }.

#### 2.4.8 Colors

The class uses internally many named colors. For the general use, two non-standard colors are provided:

ctublue ctublue;

ctublue

ctulightblue ctulightblue.

ctulightblue

The colours are used for the headers, rules in the titles, title texts, backgrounds for listings and tables etc.

. . .

# Appendix A

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