Ph.D. Thesis at ITC — The LaTeX way

manual to `utitcphd` class, version 0.98

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1.1 Overview

Writing up a Ph.D. thesis is a daunting task, requiring full attention to the subject matter, and deserving the best of tools for the editorial work. This document describes such a tool, which I hope will serve many Ph.D. candidates at ITC. The tool is based on the famous LaTeX typesetting system; this has been implemented in different ways, and a common implementation that people on Windows machines use is MiKTeX. If you are on a Mac, I can recommend TeXLive and an editor like TeXstudio. Note, however, that what is described below has been prepared for the case with MiKTeX, which is likely the common case amongst ITC users.

If you are new to LaTeX itself, just know that a great, free and on-line book on the LaTeX system is Tobi Oetiker's *The Not So Short Introduction to LaTeX2$_\epsilon$*. I am assuming below that you have working knowledge of LaTeX. If not, read the above book and start trying, or be on the look-out for another course run on Thesis writing with LaTeX that I occasionally offer in early summer.

The tool that this manual describes is a LaTeX class file that can be used for ITC Ph.D. thesis production, plus a small set set of support files, including this manual document.

Development of a thesis class for a large and critical Ph.D. candidate population is a somewhat dodgy undertaking. The variety of their research topics will give rise to a wide spectrum of functional needs in thesis typesetting, which cannot possibly be addressed all through a single class file. It is for this reason that the class file here discussed sets a somewhat minimum, but hopefully common, standard.

Our class is based on solid ground, however, provided by a number of packages that are well-known in the LaTeX community. This allows us to have a small manual and defer questions of how to do things to the manuals of those basal packages.

The tool has been in use for some time now, and I hope to receive supportive criticism from its users. This is no guarantee or promise that I will honour each and every request for added functionality, but it is a promise that I will repair functions that cause problems, or do not deliver

what they are supposed to. Any request to add functionality, I will test for generic usefulness to the wider audience, ease of implementation, and availability of my own time.

You need a working installation of MiKTeX, of which the preferred version 2.9.xxx can be obtained via the ITC Software manager. This needs to be done first, before any of the below described procedure can be expected to work. Next, you need to install the package `itc-latex-templates`, also via the ITC Software manager. This package contains the template files needed for M.Sc. and Ph.D. theses. It adds to your miktex installation.

The specific class file to be used is called `utitcphd.cls`.[1] It comes in its own package together with a main tex file that can be used as a start and example, as well as a special file for the first thesis pages, some support illustrations and this manual.

The package `itc-latex-templates` also installs the Lucida Fonts family. There are occasionally problems with the installation of these fonts. Especially the required changes that need to be made to the font map cfg file of MiKTeX. A useful resource that may prove helpful if you do not get the Lucida fonts up and running is the TUG readme file on Lucida installation.

1.2 Package genetics

Developing a new class can be done in two ways: totally anew, or based on already existing classes. The first technique requires the class constructor to be a versatile TEX programmer, which I am not. Thus, the `utitcphd` class has been developed from existing classes, which is an easier process that I master to some extent. If you want to understand what it requires to write a class file anew, open in your editor the file `book.cls` and browse it. This is all TEX programming code. Not for the faint-hearted.

This section intends to inform you about the classes that were used to build `utitcphd`. With that knowledge you will be able to make full use of the class itself, by understanding the base classes. I call this the *package genetics*.

1.2.1 Class `utitcphd` is `memoir` in a straight-jacket

Our class `utitcphd` is the class `memoir` in disguise. What we mean by that is the following:

- it loads `memoir`, and in addition
- it fixates the font family to use (Lucida in our case),
- it fixates the various page dimensions,

[1] For users, of Overleaf, we have a slightly adapted version called `utitcphd_overleaf.cls`.

- it fixates the various standard page lay-out matters, such as headers & footers, section headings, and so forth, and
- it sets (UK) English as *de facto* language for hyphenation.

The `memoir` class is an extremely versatile class that offers many options, and can be viewed itself as a compilation of best-of-breeds LaTeX packages. I have used it as the base for `utitcphd` because it is solid, and because it likely will provide direct answers to future requests for more functions from our Ph.D. students, allowing me an easy implementation or just a reference to the `memoir` manual. The memoir manual is a treasure trove of things, and must certainly be consulted if you want to do anything out of the ordinary. But I haste to add to this: try such only after your graduation date, and not in the rare free time you have before that date.

Subsequently, `utitcphd` goes on and loads and makes available a few more things that were judged to be useful. The most important additions are the inclusions of a number of packages:

`amsmath` is the American Mathematical Society's package for math formulas.

`graphicx` is used for the inclusion of graphics.

`tikz` is currently also loaded; it is an advanced package for the creation of vector+text illustrations. I am including it on an experimental basis because it provides professionally typeset illustrations, but has a bit of a learning curve.

`colortbl` allows to have coloured entries and cells in tables. We provide a column type H for black cells with white text.

`multirow` is a tabular extension that allows you to have a single cell match with multiple rows, essentially what `\multicolumn` does for columns.

`pdflscape` is included to allow occasional pages be typeset in landscape mode, while retaining the position of the page's ornamentals (header, footer, page number).

`url` is included so you can have properly typeset web addresses.

`hyperref` is the last included package, and it provides hyperlinking functionality to the produced pdf output. At present, the settings are such that this remains (mostly) invisible in print.

For the moment, these are the functions that I judged useful for the wider Ph.D. community at ITC. When making use of `utitcphd`, you can always load additional packages with `\usepackage` in your main file's preamble. But I want to advice to first research whether what you want to have is not already available in `memoir`, by checking its manual. That package already loads many other packages, namely, and adds its own things to the toolbox. With respect to `hyperref`, I should also mention that that package has such a vast impact on LaTeX's internal definitions that it always wants to be loaded last. There is a stated risk for loading extra packages after it, and if you experience funny behaviour of your LaTeX run, think about this warning in the first place.

Support for three languages is provided: UK English, US English and Dutch, with the first being the default. If you want to switch to another language, use `\selectlanguage{dutch}`, for instance, which would be convenient to typeset your abstract, hmm ..., your samenvatting. The `babel` package operates behind the scenes.

Finally, the energetic ITC Ph.D. candidate is likely to be, in the long term, dissatisfied with this package's offerings, and will generate extra wishes, if only perhaps to give her/his thesis a personal touch. That's all legitimate. We will provide some guidance for personal tweaking in Section 1.5 below. But once more, I want to add: many students have fared well just with the default.

1.2.2 Ph.D. thesis specifics

The class `utitcphd` was designed to produce Ph.D. theses, however, it can be used for a few other things, as this manual to the class proves. A Ph.D. thesis is just a book with a few very special pages in the front, and those pages are provided for with their own small template `tex` file. You should find it in the distribution as `thesis_frontpages.tex`. We will call it "the front file" for the rest of this section. One word of warning here: make sure you are using a version of this file that matches with the version of the `utitcphd.cls`. The first lines of both files provide that information.

I want to strongly discourage that you make changes to the front file. It 'implements' the university's regulations to the first pages of the thesis, and is supposed to provide you with the guarantee that the Doctorate Board accepts your thesis' format.

The front file takes care of the first six pages of your thesis. The rest of the content comes from the main file and its inclusions. We provide a template main file, by the name `thesis_itcphd.tex`, with many of the regular components already in place.

1.3 Package installation

To work with `utitcphd`, you need to have already installed the MiKTeX package, either straight from the miktex website or from the ITC Software manager. We have tested this for version 2.9. You will also need to install the second package, `itc-latex-templates`. This brings you the needed templates.

If you work with Overleaf instead, at present you will need to put your version of the template tex file in your Overleaf project, as well as the front file, the `ITC-UTlogo.jpg` file and the class file, which is called `utitcphd_overleaf.cls`.

1.3.1 Class installation

The above install of the templates package should have created a directory in your local root of the shape `../tex/latex/thesis/` The following files should now be in that directory:

- `utitcphd.cls`
- `ITC-UTlogo.jpg`
- `thesis_frontpages.tex`
- `manual_utitcphd.pdf` (this document)

When these files are there, you need to refresh your FNDB with the MiKTeX settings application.

We are almost there. One more file is in the directory:

- `thesis_itcphd.tex`, the template main file.

Copy this file to a directory in which you are working on your thesis. Do a test run, and `pdflatex thesis_itcphd`. If this has worked, you are all set to create a great thesis, by using that copy of the `thesis_itcphd.tex` file. But read on.

1.4 Package usage

At this stage, if everything seems to work, you should go and create proper, scientific content. But we need to make a few further suggestions.

1.4.1 The `thesis_frontpages` file

Do not change any other part of this hidden file; this is the one bit that we at ITC want to see standardized. Now continue to work on your main tex file, and work any miracle there. If you do edit this file, your warranty becomes void.

1.4.2 The `thesis_itcphd` file

Almost equally simple:

- edit `thesis_itcphd.tex` and provide values to the things being defined in the preamble (or fake them as the original template file does). I think this will speak for itself. This `tex` file is your main file for the thesis.
- run `pdflatex` on the main file. A first run will possibly lead to installation of various packages not yet on your machine, and so that first run will be slow. If you are prompted for install [yes/no] questions, say yes all the time, or we won't get anywhere. If `pdflatex` continues to complain about missing packages, check whether the MiKTeX Settings application first tab has the 'Yes' answer to 'Install packages on the fly'. It should.

1.5 Do it yourself

If the saying ever applied, then it applies here:

"*if it ain't broke, don't fix it.*"

The package should be used as is, and you should in no circumstance change the file `utitcphd.cls`. If you do change it, you are losing warranty, so to say. If you believe the class has errors, please do inform me, and I will look into the issues and provide, where needed, the corrections. This will allow all Ph.D. candidates to benefit.

You should also not change the file `thesis_itcphd.tex`, except for its edit zones, where your inputs are needed to personalize your thesis.

The regular changes that you are expected to provide are `\include` statements in that main file for inclusion of your chapters and appendices. I will also expect you to define additional macros that are handy to use in your thesis; these would go into the preamble of your main file as `\newcommand` or `\newenvironment` statements.

You may still find yourself in need of additional typesetting machinery. Before you go off and trace a LaTeX package that can come to the rescue for this, ascertain that that package is not already offered through `memoir` or `utitcphd`, and check the above. Also verify against the `memoir` manual, for which a link is provided in Section 1.7.

If all of these options leave you empty-handed, please ask yourself whether what you want to add would be of general use to others, and if so, you may want to propose having it added to `utitcphd`. If it all makes sense just for your case, use the package through `\usepackage` in the preamble of the main file in the usual LaTeX way.

1.6 Thanks

Let me ignore the LaTeX community at large, though without its efforts clearly this package would never have appeared. My big thanks go to Riham Abdel Kader, who kindly handed me the important templates that were the basis of her own thesis work, and from which I could develop the `utitcphd` class. I also want to thank Arne Bröring, Juan Sanchez and Chris Hecker for test driving early versions of the templates package.

With the help of future users I hope we can maintain the package to give all new Ph.D. candidates a flying start into thesis production, with the professional tools that their respective research efforts deserve.

I do not consider the current package complete, and actually expect problems in its use for some time to come. Please let me know what they are, so that we can look into improvements.

1.7 Useful links

The most important links I want to offer here are those that are references to packages that `utitcphd` is using under the hood. They are:

memoir	The megapackage that is the basis for most things in `utitcphd`
amsmath	The AMS mathematics package.
graphicx	For inclusion of graphics.
tikz	Vector+text illustrations inline in your tex file
colortbl	For tables with coloured cells and coloured text
pdflscape	For having landscape illustrations come out as landscape, and not affect page furniture.
multirow	For cells in tabular that span multiple rows.
url	For inclusion of web addresses.
hyperref	For hyperlinked document production.

Some of these manuals may already be available on your machine, in the `doc` section of your MiKTeX installation. It may be wise to have shortcuts set up to some of the fundamental manuals.

Finally

This document may signal to you that working with LaTeX is hard. This is not true, but yes, the start may be a little tricky. Once your system is set up, the use of the templates is straightforward, and actually relieves you from issues you would have with other packages for thesis authoring.