

Writing a master thesis in LaTeX

The 'kulemt' v1.8 manual (2015-06-01)

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Preface

I would like to thank everybody who has kept me busy with writing, debugging, and documenting this LaTeX document class. My thanks goes especially to my supervisor and my mentors. I also thank my assessors, at least those who read this text.

Finally I would like to thank all the people who provided feedback, either with bug reports or by suggesting improvements.

Luc Van Eycken

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Abstract

This document describes the use of the LaTeX document class `kulemt`, which implements the KU Leuven Faculty of Engineering guidelines for writing a master thesis. Since there are slight differences between the actual guidelines of the different engineering masters, this class implements not only the common part, but it also provides the necessary options to adapt it to the specific requirements. So please check the guidelines of your master before using or tweaking typesetting options.

To illustrate the difference between the main text language and the master language, this document is written in English (as the main text language) for a Dutch master.

This manual (dated 2015-06-01) describes the `kulemt` class version 1.8.



Samenvatting

Dit document beschrijft de LaTeX-documentklas kulemt, die de richtlijnen van de Faculteit Ingenieurswetenschappen van de KU Leuven voor het schrijven van een masterproeftekst implementeert. Maar vermits de richtlijnen van de verschillende ingenieursopleidingen licht verschillen, voorziet de documentklas de nodige opties om het resultaat aan te passen. Hou dus bij het aanmaken van de tekst niet zozeer rekening met wat de documentklas toelaat, maar wel met wat jouw master als specifieke richtlijnen opgeeft.

Voor studenten van een Nederlandstalige master die hun masterproef in het Engels schrijven (bv. Erasmus-studenten) is een Nederlandse samenvatting verplicht. Als jouw master een uitgebreide samenvatting verlangt met figuren en tabellen kun je die best voorzien als een bijlage. Anders volstaat deze samenvatting van 1 bladzijde.

Om het effect van twee talen te illustreren is dit document geschreven als een Engelse tekst (verder ‘text language’ genoemd) voor een Nederlandstalige master (verder ‘master language’ genoemd).

Deze handleiding van 2015-06-01 beschrijft de LaTeX-documentklas kulemt versie 1.8.



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Writing a thesis in LaTeX

A LaTeX document class has been developed, which follows the guidelines described in [17]. The usage of this class is described in Chapter 2. The result can be customized and adapted to the masters' guidelines with the class options. Additional functionality is available through numerous LaTeX packages (cf. §1.1). Just make sure that the final result still conforms to the guidelines.

Appendix B contains a typical LaTeX template. Since each chapter is a logical unit and since it's usually several pages long, chapters should be put in independent files. They are called from the main file using the LaTeX `\include` mechanism. The bibliography is a special case. It is handled in §1.2.

If you are not (yet) familiar with LaTeX, you should first have a look at the documentation of the TeX Users Group on <http://tug.org/begin.html>. It also contains a list of on-line tutorials and manuals. The most popular (not so) short introduction to LaTeX is probably [11]. §1.1 contains some extra information on how to install LaTeX packages. It also lists some typically useful packages.

1.1 Using extra LaTeX packages

Most of the packages mentioned in this document are present a standard LaTeX installation, with the exception of the `kulemt` package. Apart from this `kulemt` package, only a few packages are required. An overview is given in Table 1.1.

When you want to install a package, you can follow the instructions found in the TeX-FAQ [3] under the heading "Installing (La)TeX files". If you only can or want to install packages for your personal use, make sure you read "Private installations of files".

The installation of the document class `kulemt` is done in the same way as the installation of any other package. The only difference is the fact that its source is not available from CTAN but from a local ftp server [18].

Apart from the required packages, a lot of packages are available from CTAN [1]¹, which can help you to make your text easier to understand or more impressive. Many of them are installed by default in a traditional LaTeX installation. Some typical examples are given in Table 1.2. The loading order can be important for some combination of packages: packages, which extend or redefine commands of other packages, must be loaded last.

¹ An alphabetic and a topical index is provided by the TeX Catalogue [2].

TABLE 1.1: Packages used by kulemt which may not be present in your LaTeX installation. If a package is desirable but not required, it is used when available and ignored otherwise.

Package		Remarks
memoir	[20]	Required; at least version 1.61 (2004-04-05)
microtype	[13]	Desirable unless option <code>nomicrotype</code> is used
lmodern (lm)	[6]	Desirable; required if <code>font=lm</code> is used
fourier	[4]	Only required if <code>font=utopia</code> is used

TABLE 1.2: Packages which can be useful to extend the kulemt class.

Package	Description
hyperref	Provide hyperlinks in PDF files
amsmath	Extra mathematical constructs
amssymb	Extra mathematical symbols* (only for the fonts <code>cm</code> & <code>lm</code>)
cite	Better references
babelbib	Multilingual or non-English bibliographies
flafter [†]	Put figures & tables always after their definition
rotating	Rotating material, e.g., figures en tables
listings	Typeset programming code
nomenc	Produce lists of symbols (nomenclature)
pgf	Create graphics in LaTeX
siunitx	Consistent use of SI units
textcomp [†]	Extra text symbols* (e.g., <code>\texteuro = €</code>)

* A list of all kind of symbols is found in [12].

[†] Information on this package is found in the TeX-FAQ [3].

If you are making a PDF file for on-line distribution, the use of the `hyperref` package [10] is a must. It not only automatically generates the bookmarks, but it also gives you all the linking facilities required in modern on-line documents².

The `microtype` package [13] enhances the typographic quality of the text. Therefore the `kulemt` class uses it by default. The most important enhancements provided by the package are character protrusion and font expansion. Character protrusion lets some characters enter the margin to provide optical margins. Font expansion creates fonts which are a little bit narrower or wider. It generates more equal interword spacing and it provides also more flexibility to avoid hyphenation. Both effects are illustrated in Figure 1.1.

The document class `memoir` includes or emulates a lot of packages. The exact list of packages included or emulated in `memoir` can always be found in the log file after a LaTeX run. The emulation not always corresponds to the latest version of the package, but the

² This document uses as `hyperref` options: `"pdfusetitle, colorlinks, filecolor={rgb}{0,0,1}, urlcolor={rgb}{0,0,1}, citecolor={rgb}{0,0,0.4}, linkcolor={rgb}{0,0,0.4}"`.

‘Margin kerning is the adjustments of the characters at the margins of a typeset text. A simplified employment of margin kerning is hanging punctuation. Margin kerning is needed for optical alignment of the margins of a typeset text, because mechanical justification of the margins makes them look rather ragged. Some characters can make a line appear shorter to the human eye than others. Shifting such characters by an appropriate amount into the margins would greatly improve the appearance of a typeset text.

Composing with font expansion is the method to use a wider or narrower variant of a font to make interword spacing more even. A font in a loose line can be substituted by a wider variant so the interword spaces are stretched by a smaller amount. Similarly, a font in a tight line can be replaced by a narrower variant to reduce the amount that the interword spaces are shrunk by. There is certainly a potential danger of font distortion when using such manipulations, thus they must be used with extreme care. The potentiality to adjust a line width by font expansion can be taken into consideration while a paragraph is being broken into lines, in order to choose better breakpoints.’ [Thành 2000, p. 323]

(a) Text typeset without using microtype.

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(b) The same text typeset using microtype (character protrusion & font expansion).

FIGURE 1.1: The effect of using the microtype package. These examples are borrowed from the microtype manual.

main functionality is usually present. So before installing a new package, first check the memoir manual to see if the functionality is not already present in the document class.

Since the document class kulemt is based on memoir it also includes all packages included or emulated by memoir³. It further includes some standard packages (babel, color, graphicx, and keyval) as well as the packages mentioned in Table 1.1.

1.2 Using BibTeX for the bibliography

The bibliography can be input as a list in the text, using the thebibliography environment. An alternative way to generate a bibliography is with the help of the BibTeX program, which is always included in a LaTeX distribution. More information on building a bibliography can be found in [8] and [15].

The bibliographic data is stored in one or more bibliographic files (files with extension “.bib”). For some disciplines existing data files can be used. They are declared with the \bibliography command. A personal data file can also be used [8, part 3]. It’s no problem if the data files contain unneeded items because only the referenced items will be used.

The actual layout and formatting is determined by the bibliography style. This style is declared by the \bibliographystyle command, which refers to a file with extension “.bst”. The master guidelines or the thesis supervisor determine which bibliography style to use. If none is specified, you can choose whichever you find most suited for your text.

Some bibliography styles needs additional LaTeX commands for proper operation. These commands are defined in an accompanying LaTeX style file, which must be required with \usepackage. An example is IEEEtrantools, which defines the command \bstctlcite to control the parameters of the IEEEtran bibliography style⁴, which is used in this document. This bibliography style can be used to typeset a bibliography according to the rules of IEEE.

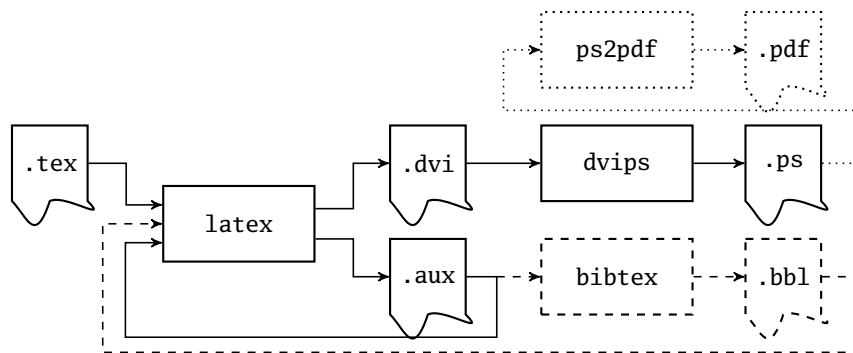
LaTeX packages can also be used to change the formatting of the citations in text. A popular one is the natbib package [5]. It is compatible with many bibliography styles and it allows both author-year and numerical citations.

1.3 Using latex or pdflatex?

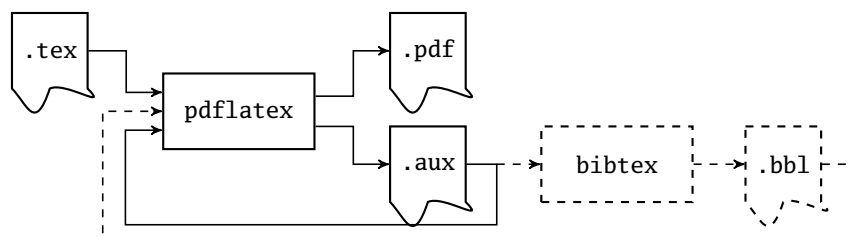
The ways to compile a LaTeX file are shown in Figure 1.2. The traditional way uses the latex program (Figure 1.2(a)). It outputs the typeset document to a .dvi file, which is rather TeX specific. So usually this is converted to a PostScript file using dvips or a PDF file using dvips + ps2pdf or dvi2pdf.

³ The memoir class dated 2005-09-25 emulates the packages abstract, appendix, array, booktabs, ccaption, chngcntr, chngpage, crop, dcolumn, delarray, enumerate, epigraph, framed, ifmtarg, ifpdf, index, makeidx, moreverb, needspace, newfile, nextpage, patchcmd, shortvrb, showidx, tabularx, titleref, titling, tocbind, tocloft, verbatim, and verse. The version dated 2009-11-17 adds the packages changepage, ifetex, ifluatex, ifxetex, mparhack, pagenote, parskip, and setspace.

⁴ Both the IEEEtran bibliography style and the IEEEtrantools style file are part of the IEEEtran package [14].



(a) Converting a LaTeX file to PostScript (or PDF with the dotted part added) using latex.



(b) Converting a LaTeX file to PDF using pdflatex.

FIGURE 1.2: Steps to compile a LaTeX file. The dashed part is needed only if a BibTeX bibliography is used. As long as the .aux file (or the .bbl file) changes, (pdf)latex must be invoked.

Several iterations of latex may be required. Each time the contents of an auxiliary file (such as .aux or .bbl) changes, latex must be invoked. This often means three iterations. The first invocation of latex generates a list of internal references and of referenced bibliography items in the .aux file. The latter is used by bibtex to produce the bibliography data in the .bbl file. A second iteration uses the bibliography data and the values from the references from the .aux file to generate the final content containing the table of contents and the bibliography. Because this may introduce new content, labelled items may shift. This requires an additional iteration of latex to get the changed references right. The exact number of iterations depends on how much references change from one version of the .tex file to the next version. If you use an intelligent editor, such as Emacs with AUCTeX, you needn't guess yourself: the editor will tell you when an extra iteration is needed.

If you want a PDF file as a result ⁵, it's easier to use pdflatex than latex, as illustrated in Figure 1.2(b). But pdflatex has other advantages too. It uses the pdfTeX engine, which is an enhanced implementation of the TeX engine used by latex. Therefore more advanced features, such as breaking hyperlinks (hyperref package) or font expansion

⁵ Every master thesis must also be submitted electronically in PDF!

(microtype package), are only possible with the pdfTeX engine. Additionally, the pdfTeX engine can directly include images in the JPEG or PNG file format as well as other PDF files. Simple PostScript (e.g., as generated by MetaPost) can also be included but general EPS (Encapsulated Postscript) not. You'll have to convert the latter to PDF with the `epstopdf` program.

Is there any reason to use latex? The most important reason is the fact that your text depends on packages which work only with PostScript output, such as `psfrag` or all kind of PSTricks packages. But often valid or even better replacements exist, such as the `pgf` package [16]. Conversion tools may also be available (e.g., the `pst-pdf` package). Another valid reason to stick to latex is the fact that your thesis supervisor wants you to use it. In this case I hope you can educate him/her to upgrade to a newer way of working.

You even have more choices than latex and pdflatex. A modern installation also provides `xelatex` and `lualatex`. Unless you know what you're doing, I wouldn't recommend them. Furthermore the LaTeX document class `kulemt` has never been tested with one of them. So it's very likely you run into problems if you use them.

A final word of advice: don't switch between engines gratuitously. To avoid errors and text drifting to other places, always use either latex or pdflatex.

The LaTeX document class kulemt

The document class `kulemt` can be used to generate a master thesis text which is conform to the guidelines of the KU Leuven Faculty of Engineering. It is actually an extension of the memoir document class [20], which already includes the functionality of the most useful LaTeX packages. So before starting to use the `kulemt` document class, you should read the memoir manual [19] first!

The default styling of the chapter and section headings is pretty plain. Of course you can tweak all parameters yourself, but the memoir class provides consistent alternatives using the `\headstyle` command [19, §6.9]. For changing only the chapter heading style, the `\chapterstyle` command [19, §6.5] is available. The chapter and headings style used by this document are available in the `kulemtx` document style, which is part of the `kulemt` package. More examples of chapter styles are available from [7].

By default, the `kulemt` class tries to load the `microtype` package, because this package contributes to the typographic quality of the text, as illustrated in Figure 1.1. It gives us less hyphenation (thanks to the use of font expansion) and optical alignment (thanks to character protrusion). Since this package only works properly with `pdflatex` in PDF mode, it's only loaded by default in this mode. The option `nomicrotype` (cf. page 14) cancels the loading of the package.

2.1 Options

The document class can be customized by the user through options. The options come in three flavors. A first set of options, called *document class options*, can only be used as options of the `\documentclass` command. They are processed in the order of appearance. The reason for having document class options is that an option is needed as a global option, which can also be used by other packages, or that an option is used during the initialization of the class itself. The other options can be used everywhere in the document preamble, either as option of `\documentclass` or as an argument of a `\setup` command. But some of these options, called *once-only options*, can only be given once. The remaining options, called *unrestricted options*, can be used multiple times.

Many options are specified as “`<key>=<value>`”. If the value contains a comma or a space, it must be enclosed in braces: “`<key>={<value>}`”. Due to the implementation of LaTeX2, options of the `\documentclass` can't contain commands or spaces, contrary to

the argument of `\setup`. Therefore it's better to put all options, except the document class options, in the argument of one or more `\setup` commands. The document preamble can contain multiple `\setup{<optionlist>}` commands. The `<optionlist>` is a comma separated list of options. If unrestricted or document class options are given multiple times, usually the last value survives unless mentioned otherwise (e.g., the `extralanguage` option).

2.1.1 Selecting the master

OPTION “`master=<id>`” *(required document class option)*

The supported master `<id>`s are defined in the configuration file. The currently supported `<id>`s for the Faculty of Engineering are enumerated in §A.2.

The master option is used to indicate the master degree this thesis is written for. Only one master option can be given in the document, which makes it impossible to generate one text for different masters, even if it is a common work of two or more students from different masters. This scenario was considered too unlikely to support, also because each master may have its own additional requirements on content and layout.

New in v1.4

Obsolete master definitions may still be available for printing older material. See §A.2.4 for available obsolete masters. Note that an `<id>` may change when it becomes obsolete to avoid conflicts with valid `<id>`s.

OPTION “`masteroption=<mo>`” *(once-only option)*

This option specifies the master option (`'optie'`) or the major topic (`'afstudeer-richting'`) of the master degree. The value `<mo>` is either an abbreviation or a text describing the master option. The known master option abbreviations are also defined in the configuration file. The currently supported master option abbreviations for the Faculty of Engineering are enumerated in §A.2. If a text is used for `<mo>`, it must start with the appropriate word in lower case: “option ...” (`'optie ...'`) or “afstudeerrichting ...” in Dutch). Examples of full text can be found in §A.2. As mentioned above, if `<mo>` contains spaces, you can't use this as a document class option.

New in v1.7

Whether or not a master option must be specified depends on your master guidelines. Some masters even don't allow you to print a master option on the front pages. You can find all this information also in §A.2. An error is raised if the master requires you to specify a master option and `masteroption` is not used. An error is also raised if you use `masteroption` and your master disallows master options.

If a group of students from different master options produces a single text, the `<mo>` can be replaced by a comma separated list of `<mo>`s. Each of these list elements can either be an abbreviation or a full text.

New in v1.6

Obsolete master options may still be available for printing older material. Available obsolete options are also listed in §A.2. Note that abbreviations may change when they become obsolete to avoid conflicts with valid options.

2.1.2 Declaring the language(s)

The commands of the babel package can be used to select a language. Currently only Dutch and English are supported as text language, but other languages can be used for short fragments of text. The master language is defined by the master degree itself, so it can't be chosen.

Whatever language you choose, some parts are always in Dutch and some parts always in English. Since these two language must be available, an error is raised if their hyphenation patterns are not preloaded in your installation.

OPTIONS “dutch” or “english” *(document class options)*

These options select the text language, either Dutch or English. Both options are mutually exclusive: at most one of the options can be used. If none of the options is used, the text language is Dutch.

Since these options are document class options, they are global LaTeX options. This means that other packages which are language sensitive will also use these options.

OPTION “extralanguage=⟨lang⟩” *(document class option)*

To switch the language of text fragments commands such as `\foreignlanguage` from the babel package. But only languages which have been defined can be used. By default only English and Dutch are defined. If other languages are needed, they must be declared with this extralanguage option. The ⟨lang⟩ can be any language known to babel.

If multiple languages must be declared you have to use this option several times. This is one of the options where values accumulate instead of overwrite each other.

2.1.3 Information for the title page

These options provide the necessary information for the title page and the cover page. Since either of these pages must be present, most of the options are required.

OPTION “title=⟨title⟩” *(required unrestricted option)*

This option provides the official title ⟨title⟩ of the thesis. It must be written in the text language, which may be different from the master language.

OPTION “subtitle=⟨stitle⟩” *(unrestricted option)*

A subtitle ⟨stitle⟩ is optional. It is only used on the cover and the title page. It will not be used in any bibliographic reference.

OPTION “author=⟨authors⟩” *(required unrestricted option)*

This option provides the name ⟨authors⟩ of the author(s) of the thesis. The name consists of a non-abbreviated first name followed by the last name without a comma in between. If the thesis has multiple authors, they are all listed in ⟨authors⟩, separated by a command `\and`.

OPTION “promotor=⟨promoters⟩” *(required unrestricted option)*

This option lists the ⟨promoters⟩ (a.k.a. thesis supervisors). If the thesis has multiple supervisors and/or co-supervisors, they are all listed in ⟨promoters⟩, separated by a command `\and`. The name of each supervisor is preceded by his/her title unless stated otherwise in the master guidelines.

The *⟨promoters⟩* value also lists the co-supervisors. Co-supervisors are always given after the supervisor(s). Nothing is provided to differentiate between supervisors and co-supervisors. However your master may have additional guidelines about this.

New in v1.7

OPTION “*promoter=⟨promoters⟩*”

This option is an alias for the option “*promotor*”.

OPTION “*assessor=⟨assessors⟩*”

(required unrestricted option)

This option lists the *⟨assessors⟩* of the thesis separated by a command `\and`. The name of each assessor is preceded by his/her title unless stated otherwise in the master guidelines. For assessors from other universities or companies, their affiliation can be mentioned if the master guidelines require it.

New in v1.2

If you don't have any assessor, contrary to the faculty rules, you must use this required option but with an empty value for *⟨assessors⟩*, e.g., use “*assessor=*” as an option.

OPTION “*assistant=⟨assistants⟩*”

(required unrestricted option)

This option lists the *⟨assistants⟩* (a.k.a. mentors) of the thesis separated by a command `\and`. For mentors from other universities or companies, their affiliation can be mentioned if the master guidelines require it.

New in v1.2

If you worked without the help of a mentor, you can use this required option with an empty value for *⟨assistants⟩*, e.g., use “*assistant=*” as an option.

OPTION “*acyear=⟨acyear⟩*”

(unrestricted option)

This option sets the academic year the master degree is obtained. The *⟨acyear⟩* should have a format like “{2009_--_2010}”.

The default is the current academic year. If the latex run is after October 1, the current year defines the start of the academic year. Otherwise it defines the end of the academic year. So this option should probably only be used in case of emergency because the default works quite well.

2.1.4 Additional information for the filing card

Some masters require a filing card (known in Dutch as a ‘fiche’) either in the text itself or to be printed on a separate page¹. This also means that the required options in this section are only required if a filing card is used.

OPTION “*translatedtitle=⟨title2⟩*”

(required unrestricted option)

The faculty requires a translated title *⟨title2⟩* for Dutch masters: in English when the thesis is written in Dutch, and in English otherwise. A thesis in English of an English master doesn't need a translated title. In this case *⟨title2⟩* should be set to an empty value (cf. §B.1).

OPTION “*shortabstract=⟨short abstract⟩*”

(required unrestricted option)

The filing card also contains a short abstract, which should be no longer than 500 words. This option specifies the *⟨short abstract⟩*. The language of this abstract is the same as the main text language.

¹ The option `frontpagesonly` can be used to print the filing card.

Any LaTeX command or environment can be used in this *<short abstract>* except the `\par` command. Since a blank line corresponds to a `\par` command, blank lines can't be used either. If you want to start a new paragraph, you have to use the `\endgraf` command instead.

OPTION “`udc=<UDC nr>`” *(required unrestricted option)*

The *<UDC nr>* can be obtained either from your master secretary or from the library. Please consult your master secretary first.

OPTION “`keywords=<keywordlist>`” *(unrestricted option)*

A list of keywords can be added with this option. The *<keywordlist>* is a comma separated list of keywords with a space after each comma.

Some masters require this option to be used. Since the typically used keywords depend on the discipline, consult your thesis supervisor for suggestions if you are using this option.

OPTION “`articletitle=<arttitle>`” *(unrestricted option)*

Some masters require an additional article either to be included in the thesis text or to be provided separately. This optional option provides the title *<arttitle>* of the article for printing on the filing card.

2.1.5 Conditionally generating pages

The options in this section determine which pages are available in the output file.

OPTION “`coverpageonly`” *(unrestricted option)*

If this option is used, only the cover page is printed. This option supersedes any other option from this section.

OPTION “`frontpagesonly`” *(unrestricted option)*

If this option is used, only the front pages are printed instead of the entire document. The front pages include the title page, the copyright page and the filing card (if wanted). You can use this option to generate these pages when you are using other text processing software to write your thesis.

OPTION “`filingcard`” *(unrestricted option)*

By default no filing card is included in the text unless the master is known to require one. With this option you can force the inclusion of a filing card in your text.

2.1.6 The layout of the typeblock

These options customize the layout of the text area on the page. Most of them are options available to all traditional LaTeX document classes.

OPTIONS “`10pt`” or “`11pt`” *(document class options)*

The default font size of the main text can be set to 10 pt or 11 pt. The options are mutually exclusive. The default size is 11 pt.

All other fonts used in the text are scaled proportionally. Additionally the line width of a 10 pt text is decreased by 1 cm because of readability reasons.

OPTIONS “oneside” or “twoside” *(document class options)*

These mutually exclusive options declare whether the document will be printed on both sides of the paper or only on one side. The default value is `twoside`.

The `twoside` option indicates that the text will be printed on both sides of the paper. The `oneside` option indicates that it either will be printed on one side or it will be available for on-screen viewing only.

The `kulemt` document class has been designed to guarantee that the only thing which changes, when changing between `oneside` and `twoside`, is the horizontal position of the typeblock and eventually the locations of margin paragraphs. This means that you can without problems use the `twoside` option to generate the printed version and the `oneside` option for the PDF version.

OPTIONS “openright” or “openleft” or “openany” *(document class options)*

These options determine the page on which a new chapter in the main matter starts:

- `openright`: Each main matter chapter starts on a recto page.
- `openleft`: Each main matter chapter starts on a verso page.
- `openany`: A main matter chapter can start on any page.

The three options are mutually exclusive. The default value is `openright`. For one-side printing only recto pages are used, so these options are irrelevant.

The `memoir` class also provides the `\openright`, `\openleft`, and `\openany` commands to change this inside the document itself.

OPTION “bind=⟨binding length⟩” *(document class option)*

When you open a two-side printed book, some paper of the inner margins is invisible due to the binding of the book. It seems as if the inner margins are smaller than specified. This option specifies the amount ⟨binding length⟩ of the invisible inner margin of a page. This amount is specified as a length (e.g., 3mm) and it defaults to 0 mm.

New in v1.6

OPTION “bindcover=⟨binding tape width⟩” *(unrestricted option)*

New in v1.7

Because of the new layout of the cover page, this option has become obsolete. So it has no effect.

2.1.7 The text encoding

The text encoding specifies the character encoding of the input files. By default a pure ASCII encoding is expected.

OPTION “inputenc=⟨enc⟩” *(once-only option)*

This option lets you select another encoding of the input files using the `inputenc` package. As a value of ⟨enc⟩ any option of the `inputenc` package is allowed. Typical examples are ‘`latin1`’ for ISO Latin-1 encoding (aka ISO-8859-1 encoding) or ‘`utf8`’ for UTF-8 encoding. See the documentation of the `inputenc` package for more information. When some LaTeX packages are installed on your system, they define additional encodings, e.g., the extended UTF-8 encoding ‘`utf8x`’ is installed by the `ucs` package.

TABLE 2.1: Predefined font families. The default one is cm.

$\langle fnt \rangle$	typefaces				$\langle fntopt \rangle =$ options from
	serif	sans	fixed width	math	
cm [*]	Computer Modern				—
lm	Latin Modern				—
palatino	Palatino	Helvetica	Latin Modern	Palatino	mathpazo
times	Times	Helvetica	Latin Modern	Times [†]	mathptmx
utopia	Utopia	Helvetica	Latin Modern	Utopia	fourier

^{*} This family uses the old OT1 font encoding instead of the new T1 encoding.

[†] No math version ‘boldmath’ available.

New in v1.7

The inputenc package is initially loaded with its `ascii` option. This helps you to detect a missing inputenc option in your source file, since it will result in an error message such as

```
! Package inputenc Error: Keyboard character used is undefined
(inputenc)                  in inputencoding ‘ascii’.
```

2.1.8 Selecting fonts

The guidelines only give some general hints about fonts, but they don’t enforce specific fonts. The following options predefine some font combinations which are available in most LaTeX distributions. But you don’t have to choose one of them; you can select your own combination of fonts using standard LaTeX packages. If no fonts are defined, either with the options below or with LaTeX packages, the default LaTeX fonts (Computer Modern) are used.

A font encoding tells LaTeX how to print a character with a font [9]. E.g., ‘ß’ is character 25 of font `cmr` (OT1 encoding) but it is character 255 of font `lmr` (T1 encoding). Modern LaTeX fonts can best be used with the newer T1 encoding; some of them are even not available in the old default OT1 encoding.

OPTION “font= $\langle fnt \rangle$ ” or “font= $\langle fnt \rangle$: $\langle fntopts \rangle$ ” (once-only option)

This option chooses a predefined font family $\langle fnt \rangle$. The allowed values of $\langle fnt \rangle$ are given in Table 2.1, which shows the most important characteristics of the font families. For each family three related typefaces are defined: a serif typeface for normal text and math, a sans-serif typeface and a fixed-width typeface. If possible the T1 font encoding is used. Some of these font families may require additional packages to be installed as indicated in Table 1.1.

Finding a matching math font is often a problem. Math fonts are available for all predefined fonts, although Times lacks a `boldmath` version. Often additional symbols are available for specific math fonts. For more information take a look at the documentation of the package, which loads the math fonts. The name of this math package is given in the last column of Table 2.1. The second format of the font option lets you specify additional options $\langle fntopts \rangle$ for the math package.

The default font family is cm (in OT1 encoding), because this is the LaTeX default.

2.1.9 Other options

OPTION “draft” *(document class option)*

The draft option is a global option which influences many packages. The main effect is to mark overfull lines and to not show graphics content.

OPTION “fleqn” *(document class option)*

By default displayed math equations are centered. This use of this option puts all displayed equations at the left margin, indented by an amount of `\mathindent`.

OPTION “nomicrotype” *(document class option)*

Normally the microtype package is loaded automatically if possible. Using this option inhibits the automatic loading. It can be useful if the package conflicts with other packages or if you want to load it yourself with non-default options.

2.2 Additional commands and environments

The (extensive) basic functionality of the memoir class, complemented by existing LaTeX packages, provides most of the commands to write a master thesis according to the guidelines. This section describes the additional commands and environments defined by the kulemt class to extend the user capabilities.

One of the new commands is `\setup{<optionlist>}`. It is used to set options with values which contain other commands. This command is described on page 8.

2.2.1 The preface environment

The preface environment contains the preface text to be typeset on the preface page.

The environment has one optional argument, which holds the preface author. It defaults to the value of the author option (cf. page 9). This argument is typeset at the right margin in italics after the preface text. The argument can be used to remove the preface author (by providing an empty argument) or to add information such as a date to it. Just try out the following example after right after `\begin{document}`:

```
\begin{preface}[The Author\\ \textup{1 January 2010}]
  The text of the preface. A few paragraphs should follow.
\end{preface}
```

2.2.2 The abstract* environment

The existing abstract environment typesets an abstract page in the text language. An additional abstract* environment is defined to typeset an additional abstract page in another language. The language of the abstract* environment is given in the optional argument. It defaults to the official master language. It is typically used to add an additional abstract page if the thesis is written in a language different from the master language.

2.2.3 The `\listoffiguresandtables` command

Normally all “List of...” overviews are printed on a separate page. However, for shorter texts like a master thesis these lists may be smaller than half a page. Therefore an additional command `\listoffiguresandtables` is provided, which combines the list of figures and tables without a page break.

The list of figures and tables are put in separate sections of one chapter, first the figures then the tables. The command `\listfiguresandtablesname` holds the title of the chapter.

Appendices

A

Information about the masters

This appendix gives an overview of the masters of the Faculty of Engineering. These masters are supported by default by the LaTeX document class kulemt. But all of this information is also valid for non-LaTeX documents.

A first section gives an overview of the predefined master colors. The second section describes the additional master information which is stored in the kulemt.cfg configuration file.

A.1 Master colors

The master colors are shown below for all masters which have colors defined by the Faculty of Engineering. These are the official colors, which means that only the Faculty can change them. If a master wants to have its colors added or changed, it should contact the Faculty secretary.

All colors should be defined as coordinates in the CMYK color space which is normally used by printers. White corresponds to (0,0,0,0) and black to (0,0,0,1) in CMYK.

Master of Science in de ingenieurswetenschappen: architectuur

Background color: (0.93,0.52,0.35,0.11)

Text color: (0,0,0,0)

Master of Science in de ingenieurswetenschappen: biomedische technologie

Background color: (0.6,0,0.3,0)

Text color: (0,0,0,1)

Master of Science in de ingenieurswetenschappen: bouwkunde

Background color: (0.2,0.7,1,0)

Text color: (0,0,0,0)

Master of Science in de ingenieurswetenschappen: chemische technologie

Background color: (0.9,0.26,1,0.13)

Text color: (0,0,0,0)

**Master of Science in de ingenieurswetenschappen:
computerwetenschappen**

Background color: (0,0,1,0)

Text color: (0,0,0,1)

Master of Science in de ingenieurswetenschappen: elektrotechniek

Background color: (0,0.2,0.7,0)

Text color: (0,0,0,1)

Master of Science in de ingenieurswetenschappen: energie

Background color: (0.5,0,1,0)

Text color: (0,0,0,1)

Master of Science in de ingenieurswetenschappen: materiaalkunde

Background color: (0.3,0,0.3,0)

Text color: (0,0,0,1)

**Master of Science in de ingenieurswetenschappen: verkeer, logistiek en
intelligente transportsystemen**

Background color: (0,0,0.33,0)

Text color: (0,0,0,1)

Master of Science in de nanowetenschappen en de nanotechnologie

Background color: (0,0.8,0.7,0)

Text color: (0,0,0,0)

**Master of Science in de ingenieurswetenschappen:
wiskundige ingenieurstechnieken**

Background color: (0.9,0.94,0.02,0.07)

Text color: (0,0,0,0)

Master of Science in de ingenieurswetenschappen: werktuigkunde

Background color: (0.6,0.3,0,0)

Text color: (0,0,0,0)

Master of Science in Biomedical Engineering

Background color: (0.6,0,0.3,0)

Text color: (0,0,0,1)

Master of Science in Chemical Engineering

Background color: (0.9,0.26,1,0.13)

Text color: (0,0,0,0)

Master of Science in Chemical Engineering (Engineering Rheology)

Background color: (0.9,0.26,1,0.13)

Text color: (0,0,0,0)

Master of Science in Engineering: Computer Science

Background color: (0,0,1,0)

Text color: (0,0,0,1)

Master of Science in Electrical Engineering

Background color: (0,0.2,0.7,0)

Text color: (0,0,0,1)

Master of Science in Engineering: Energy

Background color: (0.5,0,1,0)

Text color: (0,0,0,1)

EIT-KIC Master in Energy

Background color: (0.5,0,1,0)

Text color: (0,0,0,1)

**Erasmus Mundus Joint Master of Economics and Management of
Network Industries**

Background color: (0.5,0,1,0)

Text color: (0,0,0,1)

Master of Science in Materials Engineering

Background color: (0.3,0,0.3,0)

Text color: (0,0,0,1)

Master of Science in Nanoscience and Nanotechnology

Background color: (0,0.8,0.7,0)

Text color: (0,0,0,0)

Erasmus Mundus Master of Science in Nanoscience and Nanotechnology

Background color: (0,0.8,0.7,0)

Text color: (0,0,0,0)

Master of Science in Mathematical Engineering

Background color: (0.9,0.94,0.02,0.07)

Text color: (0,0,0,0)

Master of Science in Mechanical Engineering

Background color: (0.6,0.3,0,0)

Text color: (0,0,0,0)

A.2 Additional information from kulemt.cfg

The master specific information is stored in the kulemt.cfg file. Apart from the master color information described in the previous section, it contains information about the master language, its faculty, the need for a filing card, known master options, and copyright contact information.

This section describes the kulemt.cfg file dated 1 May 2013. If no faculty name is shown, the master is an inter-faculty master.

A.2.1 Dutch initial masters

- arc** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: ARCHITECTUUR
Dutch master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't allow you to mention a master option.
- bin** MASTER OF SCIENCE IN DE BIO-INFORMATICA
Dutch master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
- bmt** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: BIOMEDISCHE TECHNOLOGIE
Dutch master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
- bwk** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: BOUWKUNDE
Dutch master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– ct ('optie Civiele techniek')
– gt ('optie Gebouwentechniek')
– vk ('optie Verkeerskunde')
- cit** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: CHEMISCHE TECHNOLOGIE
Dutch master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– cbpe ('optie Chemische en biochemische proces engineering')
– me ('optie Milieu engineering')

- pe ('optie Product engineering')
 - obsolete:
 - cbr.2012 ('optie Chemische en biochemische reactorkunde')
 - ct.2012 ('optie Chemische technologie')
 - mv.2012 ('optie Milieu en veiligheid')
- cws** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: COMPUTERWETENSCHAPPEN
 Dutch master of the Faculty of Engineering. A filing card is required.
 Contact info: the Departement Computerwetenschappen, Celestijnenlaan 200A bus 2402, B-3001 Heverlee, +32-16-327700 or by email info@cs.kuleuven.be
 The master doesn't require you to mention a master option.
 Known master option abbreviations:
 - ai ('hoofdspecialisatie Artificiële intelligentie')
 - ci ('hoofdspecialisatie Computatieve informatica')
 - db ('hoofdspecialisatie Databases')
 - gs ('hoofdspecialisatie Gedistribueerde systemen')
 - mmc ('hoofdspecialisatie Mens-machine communicatie')
 - se ('hoofdspecialisatie Software engineering')
 - vs ('hoofdspecialisatie Veilige software')
 obsolete:
 - ai.2011 ('optie Artificiële intelligentie')
 - gs.2011 ('optie Gedistribueerde systemen')
 - mmc.2011 ('optie Mens-machine communicatie')
 - vs.2011 ('optie Veilige software')
- elt** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: ELEKTROTECHNIEK
 Dutch master of the Faculty of Engineering. A filing card is not required.
 Contact info: ESAT, Kasteelpark Arenberg 10 postbus 2440, B-3001 Heverlee, +32-16-321130 or by email info@esat.kuleuven.be
 One of the following master options *must* be used: eg, im.
 Known master option abbreviations:
 - eg ('optie Elektronica en geïntegreerde schakelingen')
 - im ('optie Ingebedde systemen en multimedia')
 obsolete:
 - ge.2012 ('optie Geïntegreerde elektronica')
 - ms.2012 ('optie Multimedia en signaalverwerking')
 - tt.2012 ('optie Telecommunicatie en telematica')
- ene** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: ENERGIE
 Dutch master of the Faculty of Engineering. A filing card is not required.
 Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350
 The master doesn't allow you to mention a master option.
- mtk** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: MATERIAALKUNDE
 Dutch master of the Faculty of Engineering. A filing card is not required.
 Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,

B-3001 Heverlee, +32-16-321350

The master doesn't require you to mention a master option.

Known master option abbreviations:

- mb ('optie Materialen in de biomedische sector')
- mk ('optie Metalen en keramieken')
- mn ('optie Materialen voor nanotechnologie')
- pc ('optie Polymeren en composieten')
- pp ('optie Productie en processen')

vlit MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: VERKEER, LOGISTIEK EN INTELLIGENTE TRANSPORTSYSTEMEN

Dutch master of the Faculty of Engineering. A filing card is not required.

Contact info: Centre for Industrial Management, Celestijnenlaan 300A Bus 2422, B-3001 Heverlee, +32-16-322567

The master doesn't require you to mention a master option.

Known master option abbreviations:

- lt ('optie Logistiek en transport')
- vi ('optie Verkeer en Infrastructuur')

nan MASTER OF SCIENCE IN DE NANOWETENSCHAPPEN EN DE NANOTECHNOLOGIE

Dutch master of the Faculty of Engineering. A filing card is not required.

Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350

The master doesn't require you to mention a master option.

Known master option abbreviations:

- nm ('optie Nanomaterialen en nanochemie')
- ne ('optie Nano-elektronicaontwerp')
- nc ('optie Nanocomponenten en nanofysica')
- nb ('optie Nanobiotechnologie')
- obsolete: – bi . 2014 ('afstudeerrichting bio-ingenieur')
- ir . 2014 ('afstudeerrichting burgerlijk ingenieur')
- nw . 2014 ('afstudeerrichting natuurwetenschappen')

sta MASTER OF SCIENCE IN DE STATISTIEK

Dutch master. A filing card is not required.

Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350

The master doesn't require you to mention a master option.

Known master option abbreviations:

- asm ('specialisatie Algemene statistische methodologie')
- bm ('specialisatie Biometrie')
- bs ('specialisatie Business statistiek')
- is ('specialisatie Industriële statistiek')
- sgp ('specialisatie Statistiek in de sociale, gedrags- en pedagogische wetenschappen')
- so ('specialisatie Statistiek en onderwijs')

- wit MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN:
WISKUNDIGE INGENIEURSTECHNIEKEN
Dutch master of the Faculty of Engineering. A filing card is required.
Contact info: the Departement Computerwetenschappen, Celestijnenlaan 200A bus
2402, B-3001 Heverlee, +32-16-327700 or by email info@cs.kuleuven.be
The master doesn't require you to mention a master option.
- wtk MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: WERKTUIGKUNDE
Dutch master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't allow you to mention a master option.

A.2.2 English initial masters

- ebmt MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
- ebin MASTER OF SCIENCE IN BIOINFORMATICS
English master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
- ecit MASTER OF SCIENCE IN CHEMICAL ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
 - cbpe ('option Chemical and biochemical process engineering')
 - me ('option Environmental engineering')
 - pe ('option Product engineering')
- ect MASTER OF SCIENCE IN CHEMICAL ENGINEERING (ENGINEERING RHEOLOGY)
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.

- ecws** MASTER OF SCIENCE IN ENGINEERING: COMPUTER SCIENCE
English master of the Faculty of Engineering. A filing card is required.
Contact info: the Departement Computerwetenschappen, Celestijnenlaan 200A bus 2402, B-3001 Heverlee, +32-16-327700 or by email info@cs.kuleuven.be
The master doesn't require you to mention a master option.
Known master option abbreviations:
– ai ('specialisation Artificial Intelligence')
– ss ('specialisation Secure Software')
- eelt** MASTER OF SCIENCE IN ELECTRICAL ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Departement Elektrotechniek, Kasteelpark Arenberg 10 postbus 2440, B-3001 Heverlee, +32-16-321130 or by email info@esat.kuleuven.be
One of the following master options *must* be used: ei, em.
Known master option abbreviations:
– ei ('option Electronics and Integrated Circuits')
– em ('option Embedded Systems and Multimedia')
- eene** MASTER OF SCIENCE IN ENGINEERING: ENERGY
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350
The master doesn't allow you to mention a master option.
- ekene** EIT-KIC MASTER IN ENERGY
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350
The master doesn't allow you to mention a master option.
- ememn** ERASMUS MUNDUS JOINT MASTER OF ECONOMICS AND MANAGEMENT OF NETWORK INDUSTRIES
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
- emtk** MASTER OF SCIENCE IN MATERIALS ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200, B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– mc ('option Metals and Ceramics')
– mn ('option Materials for Nanotechnology')
– pc ('option Polymers and Composites')

- enan** MASTER OF SCIENCE IN NANOSCIENCE AND NANOTECHNOLOGY
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– nm ('option Nanomaterials and Nanochemistry')
– ne ('option Nanoelectronic Design')
– nd ('option Nanodevices and Nanophysics')
– nb ('option Nanobiotechnology')
obsolete: – be.2014 ('major subject Bioscience engineering')
– eng.2014 ('major subject Engineering')
– ns.2014 ('major subject Natural sciences')
- emnan** ERASMUS MUNDUS MASTER OF SCIENCE IN NANOSCIENCE AND NANOTECHNOLOGY
English master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– bb ('graduation option Biophysics and Bionanotechnology')
– ne ('graduation option Nanoelectronics')
– nn ('graduation option Nanophysics and Nanochemistry')
- esta** MASTER OF SCIENCE IN STATISTICS
English master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– ars ('option All Round Statistics')
– bm ('option Biometrics')
– bs ('option Business Statistics')
– gsm ('option General Statistical Methodology')
– is ('option Industrial Statistics')
– qas ('abridged programme – Quantitative Analysis in the Social Sciences')
– sbe ('option Social, Behavioral and Educational Statistics')
- ewit** MASTER OF SCIENCE IN MATHEMATICAL ENGINEERING
English master of the Faculty of Engineering. A filing card is required.
Contact info: the Departement Computerwetenschappen, Celestijnenlaan 200A bus
2402, B-3001 Heverlee, +32-16-327700 or by email info@cs.kuleuven.be
The master doesn't require you to mention a master option.

ewtk MASTER OF SCIENCE IN MECHANICAL ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't allow you to mention a master option.

A.2.3 Post-initial masters

cms MASTER OF SCIENCE IN CONSERVATION OF MONUMENTS AND SITES
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.

mai MASTER OF SCIENCE IN ARTIFICIAL INTELLIGENCE
English master. A filing card is not required.
Contact info: the Departement Computerwetenschappen, Celestijnenlaan 200A bus
2402, B-3001 Heverlee, +32-16-327700 or by email info@cs.kuleuven.be
The master doesn't require you to mention a master option.
Known master option abbreviations:
– cs ('option Cognitive Science')
– ecs ('option Engineering and Computer Science')
– slt ('option Speech and Language Technology')

mhs MASTER OF SCIENCE IN HUMAN SETTLEMENTS
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.

mms MASTER OF SCIENCE IN DE MEDISCHE STRALINGSFYSICA
Dutch master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.

mne MASTER OF SCIENCE IN NUCLEAR ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.

- mse** MASTER OF SCIENCE IN SAFETY ENGINEERING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
One of the following master options *must* be used: p, ps.
Known master option abbreviations:
– p ('option Prevention')
– ps ('option Process Safety')
- mss** MASTER OF SCIENCE IN SPACE STUDIES
English master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– slpbm ('major subject: Space Law, Policy, Business and Management')
– ss ('major subject: Space Sciences')
– sta ('major Subject: Space Technology and Applications')
- usp** MASTER OF SCIENCE IN URBANISM AND STRATEGIC PLANNING
English master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
Known master option abbreviations:
– sp ('option Spatial Planning')
– u ('option Urbanism')

A.2.4 Obsolete masters

- gmk** MASTER OF SCIENCE IN DE INGENIEURSWETENSCHAPPEN: GEOTECHNIEK EN MIJNBOUWKUNDE
Dutch master of the Faculty of Engineering. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.
- mtw** MASTER IN DE MILIEUTECHNOLOGIE EN DE MILIEUWETENSCHAPPEN
Dutch master. A filing card is not required.
Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350
The master doesn't require you to mention a master option.

mim MASTER OF INDUSTRIAL MANAGEMENT

English master of the Faculty of Engineering. A filing card is not required.

Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350

The master doesn't require you to mention a master option.

Known master option abbreviations:

- ese ('option Environment, Safety and Energy')
- ict ('option Information and Communication Technology')
- plp ('option Production and Logistics Planning')

mvt MASTER IN DE VEILIGHEIDSTECHNIEK

Dutch master of the Faculty of Engineering. A filing card is not required.

Contact info: Faculteit Ingenieurswetenschappen, Kasteelpark Arenberg 1 bus 2200,
B-3001 Heverlee, +32-16-321350

The master doesn't require you to mention a master option.

B

LaTeX Template

LaTeX templates are provided for a Dutch master as well as for an English master. The Dutch and English examples can be found respectively in the directories ‘sjabloon’ and ‘template’ of the documentation directory (the directory where the file you’re reading is installed). For each main file (either `masterproef.tex` or `thesis.tex`) the resulting typeset PDF file is available as a reference.

The following sections give examples of the most important files of the template: the main file (§B.1), a sample chapter (§B.2), and the bibliography database (§B.3). Translated versions for a Dutch master can be found in the directory ‘sjabloon’. Finally §B.4 gives an example of a main file for a Dutch master but written in English.

All the examples below use the `lipsum` package to generate dummy text. Of course this is only needed as an example to quickly generate a lot of text. Because you will never need it in your real text, you can start by removing all invocations of `\lipsum` in all files as well as the lines 30–37 of the main files (§B.1 and §B.4).

You can also ignore the last four lines of each `.tex` file. These comment lines are only used by the Emacs editor to easily edit and compile multi-file LaTeX documents.

B.1 The main file

template/thesis.tex

```

1 \documentclass[master=eelt,masteroption=ei]{kulemt}
2 \setup{title={The best master thesis ever},
3   author={First Author\and Second Author},
4   promotor={Prof.\,dr.\,ir.\, Knows Better},
5   assessor={Ir.\,Kn. Owsmuch\and K. Nowsrest},
6   assistant={Ir.\, An~Assistent \and A.~Friend}}
7 % The following \setup may be removed entirely if no filing card is wanted
8 \setup{filingcard,
9   translatedtitle=,
10  udc=621.3,
11  shortabstract={Here comes a very short abstract, containing no more than 500
12    words. \LaTeX\ commands can be used here. Blank lines (or the command
13    \texttt{\string\pa r}) are not allowed!
14    \endgraf \lipsum[2]}}
15 % Uncomment the next line for generating the cover page
16 %\setup{coverpageonly}

```

```

17 % Uncomment the next \setup to generate only the first pages (e.g., if you
18 % are a Word user.
19 %\setup{frontpagesonly}
20
21 % Choose the main text font (e.g., Latin Modern)
22 \setup{font=lm}
23
24 % If you want to include other LaTeX packages, do it here.
25
26 % Finally the hyperref package is used for pdf files.
27 % This can be commented out for printed versions.
28 \usepackage[pdfusetitle,colorlinks,plainpages=false]{hyperref}
29
30 %%%
31 % The lipsum package is used to generate random text.
32 % You never need this in a real master thesis text!
33 \IfFileExists{lipsum.sty}%
34 { \usepackage{lipsum}\setlipsumdefault{11-13}}%
35 { \newcommand{\lipsum}[1][11-13]{\par And some text: lipsum ##1.\par}}
36 %%%
37
38 %\includeonly{chap-n}
39 \begin{document}
40
41 \begin{preface}
42   I would like to thank everybody who kept me busy the last year,
43   especially my promotor and my assistants. I would also like to thank the
44   jury for reading the text. My sincere gratitude also goes to my wife and
45   the rest of my family.
46 \end{preface}
47
48 \tableofcontents*
49
50 \begin{abstract}
51   The \texttt{abstract} environment contains a more extensive overview of
52   the work. But it should be limited to one page.
53
54   \lipsum[1]
55 \end{abstract}
56
57 % A list of figures and tables is optional
58 %\listoffigures
59 %\listoftables
60 % If you only have a few figures and tables you can use the following instead
61 \listoffiguresandtables
62 % The list of symbols is also optional.
63 % This list must be created manually, e.g., as follows:
64 \chapter{List of Abbreviations and Symbols}
65 \section*{Abbreviations}
66 \begin{flushleft}
67   \renewcommand{\arraystretch}{1.1}
68   \begin{tabularx}{\textwidth}{@{}p{12mm}X@{}}
69     LoG   & Laplacian-of-Gaussian \\
70     MSE   & Mean Square error \\

```

```

71      PSNR & Peak Signal-to-Noise ratio \\
72      \end{tabularx}
73 \end{flushleft}
74 \section*{Symbols}
75 \begin{flushleft}
76      \renewcommand{\arraystretch}{1.1}
77      \begin{tabularx}{\textwidth}{@{}p{12mm}X@{}}
78          42      & ‘‘The Answer to the Ultimate Question of Life, the Universe,
79                  & and Everything’’ according to \cite{h2g2} \\
80      $c$ & Speed of light \\
81      $E$ & Energy \\
82      $m$ & Mass \\
83      $\pi$ & The number pi \\
84      \end{tabularx}
85 \end{flushleft}
86
87 % Now comes the main text
88 \mainmatter
89
90 \include{intro}
91 \include{chap-1}
92 \include{chap-2}
93 % ... and so on until
94 \include{chap-n}
95 \include{conclusion}
96
97 % If you have appendices:
98 \appendixpage*          % if wanted
99 \appendix
100 \include{app-A}
101 % ... and so on until
102 \include{app-n}
103
104 \backmatter
105 % The bibliography comes after the appendices.
106 % You can replace the standard "abbrv" bibliography style by another one.
107 \bibliographystyle{abbrv}
108 \bibliography{references}
109
110 \end{document}
111
112 %%% Local Variables:
113 %%% mode: latex
114 %%% TeX-master: t
115 %%% End:

```

B.2 A sample chapter

template/chap-1.tex

```

1 \chapter{The First Chapter}
2 \label{cha:1}
3 A chapter is a logical unit. It normally starts with an introduction, which

```

```

4  you are reading now. The last topic of the chapter holds the conclusion.
5
6  \section{The First Topic of the Chapter}
7  First comes the introduction to this topic.
8
9  \lipsum[55]
10
11 \subsection{An item}
12 Please don't abuse enumerations: short enumerations shouldn't use
13 ‘‘\verb|itemize|’’ or ‘‘\texttt{enumerate}’’ environments.
14 So \emph{never write}:
15 \begin{quote}
16   The Eiffel tower has three floors:
17   \begin{itemize}
18     \item the first one;
19     \item the second one;
20     \item the third one.
21   \end{itemize}
22 \end{quote}
23 But write:
24 \begin{quote}
25   The Eiffel tower has three floors: the first one, the second one, and the
26   third one.
27 \end{quote}
28
29 \section{A Second Topic}
30 \lipsum[64]
31
32 \subsection{Another item}
33 \lipsum[56-57]
34
35 \section{Conclusion}
36 The final section of the chapter gives an overview of the important results
37 of this chapter. This implies that the introductory chapter and the
38 concluding chapter don't need a conclusion.
39
40 \lipsum[66]
41
42 %%% Local Variables:
43 %%% mode: latex
44 %%% TeX-master: "thesis"
45 %%% End:

```

B.3 The bibliography database

template/references.bib

```

1  @Book{h2g2,
2    author = {Adams, Douglas},
3    title = {The Hitchhiker's Guide to the Galaxy},
4    publisher = {Del Rey (reprint)},
5    year = 1995,
6    note = {ISBN-13: 978-0345391803}}

```

```

7
8 @Book{pratchett06:_good_omens,
9   author = {Pratchett, Terry and Gaiman, Neil},
10  title = {Good Omens:
11           \emph{The Nice and Accurate Prophecies of Agnes Nutter, Witch}},
12  publisher = {HarperTorch (reprint)},
13  year = 2006,
14  note = {ISBN-13: 978-0060853983}}
15
16 @Misc{wiki,
17   author = {Wikipedia},
18   title = {Thesis or dissertation},
19   howpublished = {URL: \url{http://en.wikipedia.org/wiki/Thesis_or_dissertation}},
20   last checked on 2010-01-07}}

```

B.4 The main file of an English text for a Dutch master

The main differences between an English text for an English master (§B.1) and an English text for a Dutch master are:

- the use of the english option (line 1);
- a translated title is needed for a Dutch master (line 9);
- an additional abstract* environment is needed (lines 57–63).

```

template/masterproef.tex
1 \documentclass[master=elt,masteroption=eg,english]{kulemt}
2 \setup{title={The best master thesis ever},
3   author={Een Auteur\and Tweede Auteur},
4   promotor={Prof.\,dr.\,ir.\ Weet Beter},
5   assessor={Ir.\,W. Eetveel\and W. Eetrest},
6   assistant={Ir.\ A.\,Assistent \and D.\,Vriend}}
7 % De volgende \setup mag verwijderd worden als geen fiche gewenst is.
8 \setup{filingcard,
9   translatedtitle={Beste masterproef ooit al geschreven},
10  udc=621.3,
11  shortabstract={Hier komt een heel bondig abstract van hooguit 500
12    woorden. \LaTeX\ commando's mogen hier gebruikt worden. Blanco lijnen
13    (of het commando \texttt{\string\pa r}) zijn wel niet toegelaten!
14    \endgraf \lipsum[2]}}
15 % Verwijder de "%" op de volgende lijn als je de kaft wil afdrukken
16 %\setup{coverpageonly}
17 % Verwijder de "%" op de volgende lijn als je enkel de eerste pagina's wil
18 % afdrukken en de rest bv. via Word aanmaken.
19 %\setup{frontpagesonly}
20
21 % Kies de fonts voor de gewone tekst, bv. Latin Modern
22 \setup{font=lm}
23
24 % Hier kun je dan nog andere pakketten laden of eigen definities voorzien
25
26 % Tenslotte wordt hyperref gebruikt voor pdf bestanden.

```



```

27 % Dit mag verwijderd worden voor de af te drukken versie.
28 \usepackage[pdfusetitle,colorlinks,plainpages=false]{hyperref}
29
30 %%%
31 % Om wat tekst te genereren wordt hier het lipsum pakket gebruikt.
32 % Bij een echte masterproef heb je dit natuurlijk nooit nodig!
33 \IfFileExists{lipsum.sty}%
34 { \usepackage{lipsum}\setlipsumdefault{11-13}}%
35 { \newcommand{\lipsum}[1][11-13]{\par Hier komt wat tekst: lipsum ##1.\par}}
36 %%%
37
38 %\includeonly{chap-n}
39 \begin{document}
40
41 \begin{preface}
42   I would like to thank everybody who kept me busy the last year,
43   especially my promotor and my assistants. I would also like to thank the
44   jury for reading the text. My sincere gratitude also goes to my wife and
45   the rest of my family.
46 \end{preface}
47
48 \tableofcontents*
49
50 \begin{abstract}
51   The \texttt{abstract} environment contains a more extensive overview of
52   the work. But it should be limited to one page.
53
54   \lipsum[1]
55 \end{abstract}
56
57 \begin{abstract*}
58   In dit \texttt{abstract} environment wordt een al dan niet uitgebreide
59   Nederlandse samenvatting van het werk gegeven.
60   Wanneer de tekst voor een Nederlandstalige master in het Engels wordt
61   geschreven, wordt hier normaal een uitgebreide samenvatting verwacht,
62   bijvoorbeeld een tiental bladzijden.
63
64   \lipsum[1]
65 \end{abstract*}
66
67 % Een lijst van figuren en tabellen is optioneel
68 %\listoffigures
69 %\listoftables
70 % Bij een beperkt aantal figuren en tabellen gebruik je liever het volgende:
71 \listoffiguresandtables
72 % De lijst van symbolen is eveneens optioneel.
73 % Deze lijst moet wel manueel aangemaakt worden, bv. als volgt:
74 \chapter{List of Abbreviations and Symbols}
75 \section*{Abbreviations}
76 \begin{flushleft}
77   \renewcommand{\arraystretch}{1.1}
78   \begin{tabularx}{\textwidth}{@{}p{12mm}X@{}}
79     LoG   & Laplacian-of-Gaussian \\
80     MSE   & Mean Square error \\

```

```

81      PSNR & Peak Signal-to-Noise ratio \\
82      \end{tabularx}
83 \end{flushleft}
84 \section*{Symbols}
85 \begin{flushleft}
86      \renewcommand{\arraystretch}{1.1}
87      \begin{tabularx}{\textwidth}{@{}p{12mm}X@{}}
88          42      & ‘‘The Answer to the Ultimate Question of Life, the Universe,
89                  & and Everything’’ according to \cite{h2g2} \\
90          $c$     & Speed of light \\
91          $E$     & Energy \\
92          $m$     & Mass \\
93          $\pi$   & The number pi \\
94      \end{tabularx}
95 \end{flushleft}
96
97 % Nu begint de eigenlijke tekst
98 \mainmatter
99
100 \include{intro}
101 \include{chap-1}
102 \include{chap-2}
103 % ... en zo verder tot
104 \include{chap-n}
105 \include{conclusion}
106
107 % Indien er bijlagen zijn:
108 \appendixpage*      % indien gewent
109 \appendix
110 \include{app-A}
111 % ... en zo verder tot
112 \include{app-n}
113
114 \backmatter
115 % Na de bijlagen plaatst men nog de bibliografie.
116 % Je kan de standaard "abbrv" bibliografiestijl vervangen door een andere.
117 \bibliographystyle{abbrv}
118 \bibliography{references}
119
120 \end{document}
121
122 %%% Local Variables:
123 %%% mode: latex
124 %%% TeX-master: t
125 %%% End:

```



Terminology

BACK MATTER

The back matter conveys information ancillary to that in the main matter, such as a bibliography, an index, or a glossary.

COPYRIGHT PAGE

Second (unnumbered) page of the thesis, containing the copyright statements. It is part of the front pages.

COVER PAGE

The cover page ('kaft' in Dutch) is the outside front page. Although it is part of the front pages, it is not part of the printed or electronic thesis. It is generated separately.

DOCUMENT CLASS OPTION (LaTeX)

A document class option can only be used as an option of the `\documentclass` command.

ENGINE (LaTeX)

In TeX parlance, the engine is the program which compiles the TeX document using a macro package. Several engines currently exist: TeX (the original by D. Knuth, outputting `.dvi`), eTeX (TeX with some extended capabilities), pdfTeX (extended eTeX and additional PDF output), XeTeX (eTeX which can use system fonts), and LuaTeX (scriptable pdfTeX, still under development). All these engines can preload the LaTeX macro package. On modern systems, `latex` means pdfTeX in compatibility mode (equivalent to the TeX engine) with LaTeX preloaded and `pdflatex` means pdfTeX with LaTeX preloaded (generating `.pdf` output).

FILING CARD

The filing card ('fiche' in Dutch) is a one-page summary containing all administrative information about the thesis. When included in the text, it is part of the back matter.

FONT

A font is a set of visual representations of characters in a specific typeface.

FONT FAMILY

A font family is a set of fonts designed to work harmoniously together. Typically

this means at least a roman font and an italic font. But it can be extended to combinations of serif and sans-serif fonts.

FRONT MATTER

The front matter is the part of the thesis, which contains the introductory material such as a preface, an abstract, and content lists (table of contents, list of tables, list of figures, list of symbols, etc.).

FRONT PAGES

In this text the front pages refer to the the cover page, the title page and the copyright page.

LEADING

Leading is the vertical space between two lines of text. The line spacing is the font size plus the leading.

MAIN MATTER

The main matter is the middle part of the thesis, between the front and the back matter. It contains the actual information of the thesis in regular chapters and appendices.

MASTER LANGUAGE

The master language refers to the official language of the master. Usually it is the same as the text language but not necessarily.

ONCE-ONLY OPTION (LaTeX)

A once-only option can only be used once, either as an argument of a `\setup` command or as an option of the `\documentclass` command.

OPTICAL ALIGNMENT OF MARGINS

Some characters (e.g., punctuation) can make a line appear shorter than others to the human eye. Shifting such characters by an appropriate amount into the margins (called character protrusion) gives the impression that the margins are aligned and not ragged.

POINT (PT)

A point (pt) is a printer's unit: $72.27\text{ pt} = 1\text{ inch} = 25.4\text{ mm}$. PostScript and other popular software, such as word processors, use a slightly larger point size: $72\text{ pt} = 1\text{ inch}$.

PREAMBLE (LaTeX)

The document preamble is the part of a LaTeX document, which comes before the `\begin{document}` command.

PROTRUSION

See 'Optical alignment of margins'.

RECTO PAGE

The recto page is the right-hand page of a printed book. It normally corresponds to odd numbered pages.

REPEATABLE OPTION (LaTeX)

A repeatable option can be used as an option of the `\documentclass` command

or as an argument of a `\setup` command. It can be used multiple times without problem.

SERIF

A serif is a cross stroke at the bottom of a letter. Compare a serif and a sans-serif typeface: “A serif” and “A sans-serif”.

TEXT LANGUAGE

The text language refers to the language used to write the text in. Usually it is the same as the master language but not necessarily.

TITLE PAGE

The first (unnumbered) page of the thesis. It is part of the front pages.

TYPEFACE

A typeface is a visual style to represent characters, regardless of their size. This sentence uses the typeface ‘Utopia’.

VERSO PAGE

The verso page is the left-hand page of a printed book. It normally corresponds to even numbered pages.



Bibliography

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Fiche masterproef

Student: Luc Van Eycken

Titel: Writing a master thesis in LaTeX

Nederlandse titel: Een masterproeftekst schrijven met LaTeX

UDC: 621.3

Korte inhoud:

This document serves as the user manual for the kulemt document class. The source of the class as well as the information for developers is described in another document.

This manual (dated 2015-06-01) describes the kulemt class version 1.8.

Thesis voorgedragen tot het behalen van de graad van Master of Science in de ingenieurswetenschappen: elektrotechniek, optie Ingebedde systemen en multimedia

Promotor: Prof. dr. ir. Y. Berbers

Assessor: Werkgroep masterproef

Begeleiders: P. Wilson

D. Knuth