Guidelines for writing a master's thesis at the KU Leuven Faculty of Engineering Science

Luc Van Eycken

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The evaluation of the master's thesis depends largely on the quality of the text. Because the master's thesis equals 40 % of the marks of the last year, it is important that the presented work is clearly described. But please refrain from repeating the course material. And of course, plagiarism will not be tolerated!

1 Contents of the thesis text

The master's thesis text should be complete, meaning that all of your thesis work is covered. However it is not a diary but a synthesis of your work. Therefore you shouldn't make the document needlessly long: you are judged by the contents, not by the number of pages.

The master's thesis text is not meant to be read only by your jury; it is a public text. This means that the text must be written in such a way that any engineer with a degree similar to yours must be able to understand it. If some of your work can't be disseminated to the broad public, e.g. because of pending patents, you can leave this information out of the text. But all your results must be communicated to your jury, even the parts which were removed from your text. So if you leave out important results from your text, consult your thesis supervisor ('promotor') and programme director for the exact guidelines.

The language used to write the text in is usually the same as the master's programme language (viz the official language of the master's programme). Your master's programme director can allow you to use another text language as a departure from this rule. This is typically the case for students who prepare their thesis abroad, such as Erasmus students. But as indicated below, some items (e.g., the front pages) are always typeset in the master's programme language, even if it differs from the text language.

The following sections describe the elements of the thesis text and the order in which they must appear in the printed thesis. Unless mentioned otherwise, all these sections are mandatory. Additionally the master's programme guidelines must be checked for extra requirements.

1.1 Front pages

The front pages consist of the cover page, the title page and the copyright page. All these pages have a fixed layout. You can generate them yourself using LaTeX with the document class kulemt [2]. If you are not familiar with LaTeX, consult the guidelines of your master's programme on how to get a printed copy of these pages.

These front pages are always typeset in the master's programme language, except for the title and the subtitle.

COVER PAGE ('KAFT') The cover page (Figure 1) contains the necessary logos, an identification of the master's degree, the academic year, the title (and if wanted a subtitle), and the names of the students and the thesis supervisor(s). The cover page is only necessary for the printed version, not for an electronic version.

The cover page uses colour and it must be printed as such. The colours of the banner containing the master's degree are defined in §3.2.

TITLE PAGE The title page (Figure 2) is the first page of the actual document. It contains the same information as the cover page as well as the complete jury names.

COPYRIGHT PAGE The copyright page (Figure 3) contains the necessary copyright statements and contact information. It is printed on the verso side of the title page. If the text language differs from the master's programme language, an additional copyright statement in the text language should be included.

1.2 Front matter

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

PREFACE ('VOORWOORD') The preface page contains personal comments from the author(s). The preface can also be used for general acknowledgements and to express one's thanks. This page is recommended but not required.

TABLE OF CONTENTS ('INHOUDSOPGAVE') The table of contents should be a clear representation of the breakdown of the chapters and the respective page numbers. Don't show too many levels here since it will make you loose the reader. So either restrict the table of contents to the chapter and the section level or add the subsection level in an unobstructive way.

KU LEUVEN

FACULTY OF
ENGINEERING SCIENCE

Een nieuwe hybride datastructuur voor efficiëntere iteratieve Krylov-deelruimte methodes voor het oplossen van partiële differentiaalvergelijkingen

De langste titel die voor zover gekend in 2010 gebruikt is

Een Auteur
Tweede Auteur

Thesis voorgedragen tot het behalen
van de graad van Master of Science
in de ingenieurswetenschappen:
bouwkunde, optie Civiele techniek

Promotor:
Prof. dr. ir. Paul Romotor

Academiejaar 2021 – 2022

Master of Science in de ingenieurswetenschappen: bouwkunde

Figure 1: The official cover page layout

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Promotor:
Prof. dr. ir. Paul Romotor

Evaluatoren:
Ir. W. Eetveel
W. Eetrest

Begeleiders:
Ir. A. Assistent
D. Vriend

Academiejaar 2021 – 2022

Figure 2: The official title page layout

Figure 3: The official copyright page layout

ABSTRACT ('SAMENVATTING') The abstract page gives a one page overview of the work emphasising the results. Try to avoid uncommon terminology, which will only be defined in the main text later on.

If the master's programme language differs from the main text language, a second abstract page is needed, which is written in the master's programme language. This is common practice for Erasmus students, where the main text language is determined by the host institute. However if the master's programme guidelines require a multi-page abstract with figures, it's probably better to put it into an appendix or into an additional chapter in the back matter.

LIST OF FIGURES ('LIJST VAN FIGUREN') This list contains for each figure its sequence number, its caption and its page number. Such a list is often of limited use in a master's thesis. Therefore it's not required nor recommended unless the master's programme guidelines require or recommend it.

LIST OF TABLES ('LIJST VAN TABELLEN') This list contains for each table its sequence number, its caption and its page number. The same remark as for the list of figures is valid here.

NOMENCLATURE ('LIJST VAN SYMBOLEN') This list holds the nomenclature of the text. It shows all used symbols and abbreviations and their meaning. Also conventions such as "*vectors are printed in bold*" can be put in this list. This list is not required, but it is recommended if some non-evident symbols or abbreviations are used. It's useless to have a list of symbols indicating that α means the Greek letter alpha!

1.3 Main matter

The main matter forms the heart of the thesis text: it contains the real content. One should be able to read only the main matter to take in the whole story. The main matter is divided into chapters, which are the logical entities of the text. The chapters have a logical sequence, which must be made evident to the reader.

FIRST CHAPTER In this general introduction the reader must be informed about the research field of the master's thesis, situating it in a broader context. The goals of the thesis, as well as previous work, are described from a technical point of view. The structure of the thesis text is briefly explained.

OTHER CHAPTERS Each chapter, except the first and the last one, starts with an introduction to the contents of the chapter. If a reader would only read the introductions, he/she should have an overview of the contents of the master's thesis and the relation between the chapters.

Since chapters form a logical unit, it's expected that conclusions can be drawn at the end of each chapter about the work described in it. A concluding section can also help to link a chapter to the next one.

LAST CHAPTER The general conclusion summarises all results, criticises the methods used, and makes suggestions for further work. It can't contain any new elements.

APPENDICES ('BIJLAGEN') The appendices clarify or complete the text but are not an essential part of the work. Extra information which is essential for future work is also

included in appendices. Typical examples are: programme code and algorithms, detailed schematics, equipment specifications, mathematical derivations and an exhaustive argumentation.

If the master's programme guidelines gives a page limit for the text, it usually only includes the regular chapters, not the appendices. However appendices can't be used to by-pass this page limit because the evaluation of the thesis is mainly based on the regular chapters.

1.4 Back matter

The back matter conveys information ancillary to that in the main matter. Typical examples are a bibliography and a glossary.

BIBLIOGRAPHY The bibliography lists all referenced material. The format used for the bibliography items is probably determined by the master's programme guidelines or by the thesis supervisor. References are needed for all statements that aren't proven in the thesis. However references to courses are superfluous.

FILING CARD ('FICHE') Since 2020 filing cards are no longer required.

2 Typography

A good first overall impression is always very important. Therefore typography is a very important part of any masterpiece of text. And isn't your master's thesis a masterpiece?

Several good books have been written about typography and book design. A (not so) short overview is found in the memoir design notes [4].

2.1 Basic principles

The text must be written in a correct language, used in a consistent way. Spelling mistakes are unacceptable, so at least use a decent spelling checker. When in doubt, consult a dictionary or an official word list (known in Dutch as the 'Groene Boekje' [1]). A consistent spelling implies that either British or American spelling is used when writing an English text.

Consistency is also required for the grammar. Some sources suggest to use a passive voice such as "the results are found ...". Other sources suggest to rather use an active voice such as "we found this result ...". Whatever you use, always try to stick to the same kind of construction.

The master's thesis should be written in a very readable way because it is meant to communicate the results and scientific experience of the authors to others. Since a master's thesis is a scientific work, official metric units (a.k.a. SI units [3]) must be used. Identical concepts should be described with identical words or identical symbols, as well in the body text and equations as in figures and tables. To help the reader, it may be useful to add a list of symbols and abbreviations in the front matter.

One sentence shouldn't contain more than one thought and is therefore short. Ideas that belong together are kept together in one paragraph. Therefore a paragraph usually contains at least two sentences, spanning at least two lines.

2.2 Fonts

The body text is typeset using a proportional serif typeface. Well known examples are Times[1] (or Times New Roman), Cambria, Palatino (or Book Antiqua), Garamond, Utopia, Charter, and Minion. The font used in formulas, figures, and tables must be the same as the body text font. Symbols in the text and in formulas must be compatible with the chosen body text font.

A general rule in typography is: *"using fewer typefaces usually means better readability"*. But it makes sense to add one or two extra typefaces for specific types of data to identify them more easily in running text. To represent the name or contents of a file or a screen, one typically uses a fixed width font, such as Courier or Consolas. For non-body text (e.g., titles, headers, footers, captions) a proportional sans serif font is sometimes used. Well known examples are Helvetica (or Arial), Calibri, Univers, and Myriad. Just in case you're curious about it, the fonts used in this document are Utopia, `Luxi Mono`, and `Bera Sans`.

A font size of 11 pt or 10 pt with a proper leading[2] must be used for text and symbols. On A4 paper the 11 pt size is preferred. If you don't know the proper leading for your font, choose 2.5 pt for the 11 pt font and 2 pt for the 10 pt font. Headings can be made more attractive and outstanding by typesetting them in a larger font size and/or italics or bold.

2.3 Layout

The text is printed on both sides of A4 paper with odd numbered pages on the recto[3] side. This implies that the inner margins (left on recto, right on verso) are smaller than the outer margins, as shown on Figure 4. Contrary to printed books, electronic versions are often only read from the screen, one page at a time. In the latter case it makes more sense to have equal left and right margins.

A page contains a one column typeblock and optionally a header and a footer. The typeblock contains the regular text, the tables and figures, and the footnotes. To improve the readability of the text, the width of the typeblock is limited to 14 cm when using an 11 pt font and to 13 cm when using a 10 pt font.

The pages should be numbered consecutively, except for the front pages. It is customary for front matter pages to use lowercase roman numbers and for other pages to use arabic numbers. In this case the page number is reset to 1 on the first page of the main matter.

Only chapters in the main matter are numbered: regular chapters with arabic numbers and appendices with uppercase letters. Chapters in the front and back matter are unnumbered. Numbered chapters normally start on a recto page. Inside a chapter, only sections and subsections are numbered, always with arabic numbers. Too many document levels will confuse the reader instead of helping him/her.

One should be able to unambiguously interpret the figures, tables and equations and they should be numbered, preferably by chapter. Each reference to equations, figures, and tables should mention the corresponding number. Each figure should have a caption below it which briefly indicates what is shown. The main text should refer at least once to

[1] Since the typeface Times was developed for newspapers with small columns, it is not a good typeface for single column texts on A4 paper!

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

[3] The recto page is the right-hand page of a printed book. The left-hand page is called the verso page.

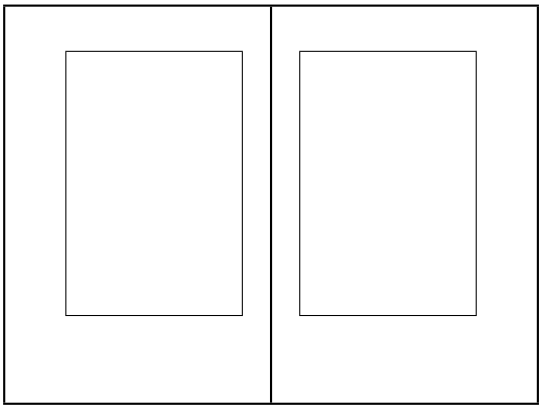

Figure 4: In a spread, showing a recto and a verso page, the combination of the two inner margins is perceived as a single margin. Therefore the width of an outer margin is comparable to two times the width of an inner margin.

each figure and its content should be discussed in the text. The author needs to do the interpretation of the figures, not the reader. The same is true for tables, but traditionally the table caption is put above the table.

3 Master's programme specific data

This section describes some master's programme specific data as it was known on 11 March 2021.

3.1 Specifying the master's programme option

Most master's programmes allow you to specify your option ('optie') or major topic ('afstudeerrichting') of the master's degree, if you want. But there are some exceptions:

- The following master's programmes are known to *oblige* you to mention the option or major topic on the front pages:
  - Master of Science in de ingenieurswetenschappen: elektrotechniek
  - Master of Science in Electrical Engineering
  - Master of Science in Safety Engineering
- The following master's programmes are known to *disallow* you to mention the option or major topic on the front pages:
  - Master of Science in de ingenieurswetenschappen: architectuur
  - Master of Science in de ingenieurswetenschappen: energie
  - Master of Science in de ingenieurswetenschappen: werktuigkunde
  - Master of Science in Engineering: Energy
  - EIT-KIC Master of Science in Energy
  - Master of Science in Mechanical Engineering

3.2 Master's programme colours

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

All colours are defined as coordinates in the CMYK colour 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 colour: $(0.93,0.52,0.35,0.11)$ Text colour: $(0,0,0,0)$

Master of Science in de ingenieurswetenschappen: biomedische technologie

Background colour: $(0.6,0,0.3,0)$ Text colour: $(0,0,0,1)$

Master of Science in de ingenieurswetenschappen: bouwkunde

Background colour: $(0.2,0.7,1,0)$ Text colour: $(0,0,0,0)$

Master of Science in de ingenieurswetenschappen: chemische technologie

Background colour: $(0.9,0.26,1,0.13)$ Text colour: $(0,0,0,0)$

Master of Science in de ingenieurswetenschappen: computerwetenschappen

Background colour: $(0,0,1,0)$ Text colour: $(0,0,0,1)$

Master of Science in de ingenieurswetenschappen: elektrotechniek

Background colour: $(0,0.2,0.7,0)$ Text colour: $(0,0,0,1)$

Master of Science in de ingenieurswetenschappen: energie

Background colour: $(0.5,0,1,0)$ Text colour: $(0,0,0,1)$

Master of Science in de ingenieurswetenschappen: mobiliteit en supply chain

Background colour: $(0,0,0.33,0)$ Text colour: $(0,0,0,1)$

Master of Science in de ingenieurswetenschappen: materiaalkunde

Background colour: $(0.3,0,0.3,0)$ Text colour: $(0,0,0,1)$

Master of Science in de nanowetenschappen, nanotechnologie en nano-engineering

Background colour: (0, 0.8, 0.7, 0) Text colour: (0, 0, 0, 0)

Master of Science in de ingenieurswetenschappen: wiskundige ingenieurstechnieken

Background colour: (0.9, 0.94, 0.02, 0.07) Text colour: (0, 0, 0, 0)

Master of Science in de ingenieurswetenschappen: werktuigkunde

Background colour: (0.6, 0.3, 0, 0) Text colour: (0, 0, 0, 0)

Master of Science in Biomedical Engineering

Background colour: (0.6, 0, 0.3, 0) Text colour: (0, 0, 0, 1)

Master of Science in Chemical Engineering

Background colour: (0.9, 0.26, 1, 0.13) Text colour: (0, 0, 0, 0)

Master of Science in Engineering: Computer Science

Background colour: (0, 0, 1, 0) Text colour: (0, 0, 0, 1)

Master of Science in Electrical Engineering

Background colour: (0, 0.2, 0.7, 0) Text colour: (0, 0, 0, 1)

Master of Science in Engineering: Energy

Background colour: (0.5, 0, 1, 0) Text colour: (0, 0, 0, 1)

EIT-KIC Master of Science in Energy

Background colour: (0.5, 0, 1, 0) Text colour: (0, 0, 0, 1)

EIT-KIC Master of Science in Sustainable Materials

Background colour: (0.3, 0, 0.3, 0) Text colour: (0, 0, 0, 1)

Master of Science in Mobility and Supply Chain Engineering

Background colour: (0, 0, 0.33, 0) Text colour: (0, 0, 0, 1)

Master of Science in Materials Engineering

Background colour: (0.3, 0, 0.3, 0) Text colour: (0, 0, 0, 1)

Master of Science in Nanoscience, Nanotechnology and Nanoengineering

Background colour: (0, 0.8, 0.7, 0) Text colour: (0, 0, 0, 0)

Erasmus Mundus Master of Science in Nanoscience and Nanotechnology

Background colour: (0, 0.8, 0.7, 0) Text colour: (0, 0, 0, 0)

Master of Science in Mathematical Engineering

Background colour: (0.9, 0.94, 0.02, 0.07) Text colour: (0, 0, 0, 0)

Master of Science in Mechanical Engineering

Background colour: (0.6, 0.3, 0, 0) Text colour: (0, 0, 0, 0)

Bibliography

[1] Nederlandse Taalunie. *Woordenlijst Nederlandse Taal*. Lannoo Uitgeverij, Tielt, 2005. URL: ⟨https://woordenlijst.org/⟩.

[2] L. Van Eycken. The kulemt package [online]. Mar. 2021. URL: ⟨https://eng.kuleuven.be/docs/kulemt⟩.

[3] Wikipedia. International System of Units [online]. URL: ⟨http://en.wikipedia.org/wiki/International_System_of_Units⟩ [cited 2013-04-12].

[4] P. Wilson. *A Few Notes on Book Design*, Sept. 2009. URL: ⟨http://mirror.ctan.org/info/memdesign/memdesign.pdf⟩.