

This Shall be a Great Thesis Paper with an Extremely Long Title but who Cares because it is just an exemplary title

A Doctoral Thesis presented to the faculty Konstruktions-, Produktions- und
Fahrzeugtechnik, University of Stuttgart, in partial fulfillment of the requirements
for the degree of Doktor-Ingenieur (Dr.-Ing.)

submitted by

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Submitted on: 28th August 2015

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August 2015

Dies soll ein langer Titel der Arbeit sein damit er
extra lang ist aber das macht ja niemandem
etwas aus

Manche Arbeiten haben sogar Untertitel (und das sogar nur in Deutsch)

Eine Dissertation zur Vorlage an der Fakultät Konstruktions-, Produktions- und
Fahrzeugtechnik, Universität Stuttgart, zur Erlangung des akademischen Grades
Doktor-Ingenieur (Dr.-Ing.)

eingereicht von

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August 2015

Eklärung des Autors

Hiermit versichere ich, Maschinen Bauer, Autor der vorliegenden Doctoral Thesis mit dem Titel

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Manche Arbeiten haben sogar Untertitel (und das sogar nur in Deutsch)

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Autor

Datum

Abstract

The thesis abstract must not be longer than one page and there must still be room for the keywords given by \keywords{a, list, of, keywords}.

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Keywords: a, list, of, keywords

Zusammenfassung

Die Zusammenfassung der Arbeit darf nicht länger als diese eine Seite sein und es muss noch Platz sein für die Stichwörter angegeben mittels `\keywords{a, list, of, keywords}` bzw. in Deutsch `\keywords{eine, Liste, von, Schlagwörter}`.

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Stichwörter: a, list, of, keywords

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User Documentation

In this chapter, the user will get a general introduction to using the thesis template and will be enabled to start his/her work. Further information is given in the subsequent chapters. But don't be afraid, there is no need for you to read through all of it before starting your work. Instead, you might find it useful to just look at the table of contents and decide which sections you need to look at later when looking for a solution to a problem.

1.1 Introduction

1.1.1 Target Users

Writing a good thesis can be cumbersome if you have never done it before. Even for experienced researches having published a sum of papers, writing up a thesis is not the same. Without underestimating the complexity of writing a thesis, it is cumbersome to get it all nicely wrapped up and in layout that is consistent from start to end. This thesis template tries to fill the gap between content and layout by providing you with certain commonly used packages and styles set to have a consistent layout that you don't have to bother about maintaining.

1.1.2 Features of the Class

With this thesis template you write a simple, nicely typeset thesis without the hassle of needing to configure it such that it suits the needs of your department (it should have

applied all the necessary style guidelines already).

1.1.3 How to Get Started

In order to get your thesis started, there is a few things necessary to set up. One of them being obviously the choice of a good typewriting environment. The list out there for writing your thesis is longer than it should be so we will just briefly mention some of the most common editors (both IDE and simple text editors). Choose by your own needs

1.1.3.1 Configure Editor and System Settings

You must choose a L^AT_EX distribution and an editor. For a list of editors, please refer to or the following list (which is only an excerpt from the SO page). We prefer TeXstudio even though its implementation of using some keys can be cumbersome at times.

Emacs with AUCTeX

- *Platforms*: Windows, Mac (incl. Aquamacs fork), Unix
- *License*: Free software (GPL)
- *Languages*: de, dk, fr, is, it, jp, nl, pl, se, sk are supported by AUCTeX language styles
- *Unicode*: Yes, from Emacs 23, characters are represented using Unicode
- *RTL/bidirectional support*: From Emacs 24, through bidi-mode
- *% !TEX directives*: No, but has several realizations of file local variables
- *Syntax highlighting*: Yes, customisable through customize and Elisp
- *Code completion*: Yes, via Emacs Predictive Completion, which supports AUCTeX without further configuration
- *Code folding*: Yes
- *Spell checking*: Yes
- *SyncTeX*: Yes
- *Built-in output viewer*: Yes
- *Project management*: org-mode, reftex-mode, speedbar

Vim with LaTeX-suite

- *Platforms*: Windows, Mac, Linux and others
- *License*: Open Source Charityware
- *Languages*: ?
- *Unicode*: Yes
- *RTL/bidi support*: partially
- *% !TEX directives*: No, but has modelines
- *Syntax Highlighting*: Yes, customizable
- *Code Completion*: Yes (using Omni Completion, extendable with SnipMate plugin)
- *Code Folding*: Yes
- *Spell Checking*: Yes
- *SyncTeX*: Yes, see e.g. this question
- *Built-in Output Viewer*: No
- *Project Management*: ?

Texmaker

- *Platforms*: Windows XP/Vista/7/8, OS X 10.5+, Linux
- *License*: GPL license, free
- *Languages*: cs, de, el, en, es, fa, fr, gl, hu, it, nl, pl, pt, pt (bra), ru, se, sr, zh (cn), zh (tw)
- *Unicode*: Yes
- *RTL/bidi*: ?
- *% !TEX directives*: No
- *Syntax Highlighting*: Yes, customizable
- *Code Completion*: Yes, customizable
- *Code Folding*: Yes
- *Spell Checking*: Yes
- *SyncTeX*: Yes
- *Built-in Output Viewer*: Yes, supports PDF
- *Project Management*: Yes

TeXstudio (formerly TexMakerX)

- *Platforms:* Windows XP/Vista/7, OS X, Linux, FreeBSD
- *License:* GPL v2
- *Languages:* cs, de, en, es, fr, hu, ja, pt_BR, zh_CN
- *Unicode:* Yes
- *RTL/bidi:* ?
- *% !TeX directives:* Yes
- *Syntax Highlighting:* Yes, customizable
- *Code Completion:* Yes, customizable and auto-customized
- *Code Folding:* Yes
- *Spell Checking:* Yes
- *SyncTeX:* Yes
- *Built-in Output Viewer:* Yes, supports PDF
- *Project Management:* Yes

TeXworks

- *Platforms:* Windows XP/Vista/7/8, OS X, Linux all pre-compiled plus source available
- *License:* GPL
- *Languages:* en, af, ar, ca, cs, de, fa, fo fr, it, ja, nl, ko, pl, pl, ru, sl, tr zh
- *Unicode:* Yes
- *RTL/bidi:* Yes
- *% !TEX directives:* Yes
- *Syntax Highlighting:* Yes, regex-based
- *Code Completion:* Yes, customizable based on 'known entry' list
- *Code Folding:* No
- *Spell Checking:* Yes, but have to install by hand
- *SyncTeX:* Yes
- *Built-in Output Viewer:* Yes, PDF (Poppler-based)
- *Project Management:* No

TeXnicCenter

- *Platforms:* Windows XP/Vista/7/8
- *License:* Open Source
- *Languages:* English, German, more dictionaries for spelling control downloadable
- *Unicode:* Yes (in version 2, which was released mid-september 2013).
- *RTL/bidi:* ?
- *% !TEX directives:* No
- *Syntax Highlighting:* Yes, customizable (also background colour)
- *Code Completion:* Yes
- *Code Folding:* Yes
- *Spell Checking:* Yes
- *SyncTeX:* Yes
- *Built-in Output Viewer:* No. You can config TeXnicCenter to use an external PDF viewer like Acrobat Reader or SumatraPDF with synchronized viewing.
- *Project Management:* Yes

1.1.3.2 Configuring the Document

Configuring your document to work should be quite easy. Once you open the file given to you by your supervisor (`thesis.tex`) you will find some pre-defined values for the documentclass. These need not be changed before you are actually submitting your thesis. Further down you will find several commented commands, namely

- `\title{}` Your thesis title as chosen by you and your advisor.
- `\subtitle{}` Theses may also have subtitles which can be set using this command.
- `\date{}` The date that you will be handing in your thesis.
- `\author{}` Your name. Obvious, right?
- `\matriculation{}` Your matriculation identification.
- `\examiner{}` The professor being the final examiner of your thesis.
- `\supervisor{}` Whoever helped you with the thesis. If you had multiple supervisors e.g., from a university and a company then you can separate them using. `\and` to have them type set correctly on the title page.
- `\partner{}` Name of the partner department of company that enabled your thesis.
- `\renewcommand{partnerlogo}{logo-partner}` Path to your partner's logo which will be placed on the very top of the title page next to the university's logo.

1.1.3.3 Start Writing your Content

1.2 Conventions, Settings, Typesetting, etc.

Style Guide

In order to ensure consist style throughout your thesis and throughout all theses handed in at the department, there is a set of styles that has to be obeyed to. If you use L^AT_EX, there is not so much for you to think if (as the most styles are already set automatically by the compiler), but if you are using any other word processing tool and want to recreate this thesis, follow these guidelines in recreating the layout.

2.1 Typography

According to the definition on Wikipedia, typography can be defined as follows.

Typography is the art and technique of arranging type to make written language readable, appealing, and legible when displayed. The arrangement of type involves selecting typefaces, point size, line length, line-spacing (leading), letter-spacing (tracking), and adjusting the space within letters pairs (kerning).

2.2 Figures

Whether figures are used to visualize data acquired somehow (through simulation or experiments) or to show examples of applications, figures are an important part to every thesis. Besides what a figure must show, typesetting figures is also important.

Figures must always be centered on the page i.e., the distance left and right of the image must be equal (in terms of the printable area, not the page dimensions). To quickly accomplish this, use `\centering` as the very first command after you have opened a new figure (or subfigure) environment.

Make sure to set the width of your figure explicitly with the `width=` option to the `\includegraphics[]{}` command when including an image or to set the lengths `\figurewidth` and `\figureheight` when including figures that have to be type set i.e., TikZ pictures.

When setting the width of your figures, make sure to not enlarge them i.e., do not print them larger than they were designed for. A good estimate to the actual size of a picture in cm can be to multiple the number of pixels by 72. On the other hand, do not shrink images too much otherwise you run into troubles with text written onto them.

Figure heights are limited to $0.5\text{\texttt{\textbackslash textheight}}$ in order to not stretch them past half the page (no one wants to see a figure that is taller than half a page). If you happen to have images at odd dimensions and are not sure whether they will fit the available space, use the `keepaspectratio` option together with `width=\texttt{\linewidth}` and `height=0.5\texttt{\textheight}`. L^AT_EX will automatically determine the proper dimensions for your image included.

A standalone figure i.e., not part of a subfigure (matrix), must be set to a maximum width of $0.75\text{\texttt{\linewidth}}$ to not stretch it farther than the line width, the height can be chosen arbitrarily.

Figures can also be arranged in subfigures but no more than two per row. You can achieve this by setting each subfigure's width to be no larger than $0.475\text{\texttt{\linewidth}}$, the height can be chosen arbitrarily.

It's always best to use scalable graphics which will not be over- or undersampled when integrated into a document. This means, that you should use vector graphics wherever possible i.e., `*(e)ps` or `*.tikz` files.

Captions are a must to every figure and subfigure. These need to be placed below the image and must be self-explanatory so that the figure can be understood without its reference in the text. Not sure if your caption is too detailed or too short? Rule of thumb: Try to present the table or figure so that it would make sense even if ripped from the paper. Additionally, do not be afraid to use lengthy figure captions over confusing or incomplete ones.

Having a caption that is too long for the list of figures? There's an easy way to circumvent long captions in the list of figures: usage of the optional `lof-caption` argument to the `\caption` command which looks like `\caption[This short caption shows up in the list of figures or tables, respectively]{While this very long long caption actually shows up under the caption just to show that it would be too long and spans multiple lines in the list of figures or tables, respectively.}`.

Do not crowd a table or figure, neither within itself nor within your text; give it room to breathe. When it appears amidst your body text, skip at least one line above and below it.

If possible, label the axes of graphs with full words: "Temperature versus time" rather than "T versus t".

Always cite the figure or table if it—or its data—came from a source, using the same citation style that you have used throughout the paper. The most logical place for the citation to appear is at the end of the caption. See Section 5.3 of this manual for a thorough discussion of rules for source citation.

Listing 2.1: Sample code for type setting a figure.

```

1 \begin{figure}
   \centering
   \includegraphics[%
       width=\linewidth,%
5       height=0.5\textheight,%
       keepaspectratio%
   ]{imagename-without-extension}
   \caption{Note figure captions always end with a fullstop.}
   \label{fig:a-sample-figure}
10 \end{figure}

```

Be certain that your legend—that part of the figure where you define any symbols or other visual markers that appear—is readable, clear, and meaningfully placed. As long as it does not overwhelm the rest of the figure, do not be afraid to make the legend large to enhance its readability.

Use footnotes (a simple asterisk to indicate them will do) for explanatory material such as the number of respondents to a survey or the fact that certain values were estimated.

To help you with the proper code for typesetting a figure, refer to Listing 2.1.

2.3 Tables

A lot of the guides given in Section 2.2 must be applied to tables as well. However, a few amendments have to be made.

Tables have their caption set above the table content i.e., before `\begin{tabular}`. This is due to the fact that the table caption is used to introduce the content of the table. And it looks better.

If you use any units of properties listed in the table's body, then specify the units in the column headings. Make especial use of the `\si{}` command to properly set the units.

Spare with rules in your tables. There is no need to have a column rule between every column and a row rule between every row. Lines of demarcation are used to set legend, headers, data, and footnotes apart from one another. Just use two to three rules depending on the style of your table. At least you should be using `\toprule` and `\bottomrule` right after the definition of the columns and after the last row, respectively. If you have a table header, separate it by a `\midrule` from the table's body.

Footnotes are used to clarify points in the table, or to convey repetitive information about entries. They may be set inside the table body cells or the header cells and shown at the bottom of the page. Footnotes may also be used to denote statistical differences among groups.

Columns can be ragged differently, but spare with mixing the column ragging. Tables are most easily read if all columns are set left. In case you put your table header in the first column and not the first row, you may rag this column right and all other columns left.

Tables, or parts of tables, may be colored, but must be keep to a minimum. A table header may be colored by triggering `\rowcolor{TableHeader}` before giving your definition of the table header. Coloring columns is as easy is using the `\columncolor{color}` command where its syntax is

`\columncolor[<color model>]{<color>} [<left overhang>][<right overhang>]`.

If you need to highlight a single cell, then use the following code snippet to get you started for a left-aligned cell colored in the primary cell highlighting color

`\multicolumn{1}{>{\rowcolor{TableCellHighlight}}}`.

However, there are some caveats to using colored rows as the rows are colored independent of their meaning to the table. Since this approach has some caveats especially when it comes to tables with headers, we provide you with two commands to be run before you are setting tables. The commands are `\tablecolorwithouthead` to trigger the correct colors for tables with out a header and `\tablecolorwithhead` to, obviously, trigger the correct coloring for tables with a header. Additionally, you can use the commands `\theadbegin` and `\theadend` before and after you have defined your table head to trigger the appropriate style changes. To apply an even better header style, use `\thead{arg1}` to type set your table header cells (this is quite similar to HTML's markup for a table).

To help you with proper code for a table, use the code samples from Listings 2.2 and 2.3 which results are rendered in Tables 2.1 and 2.2, respectively.

Listing 2.2: *Sample code for type setting small table.*

```
1 \begin{table}
   \centering
   \caption{First, set the caption, then the table.}
   \tablecolorwithouthead
5   \begin{tabular}{ll} \toprule
      Column 1.1 & Column 2.1 \\
      Column 2.1 & Column 2.2 \\
   \bottomrule
   \end{tabular}
10  \label{tbl:a-sample-table-small}
   \end{table}
```

Table 2.1: *First, set the caption, then the table.*

Column 1.1	Column 2.1
Column 2.1	Column 2.2

Listing 2.3: Sample code for type setting table with a header.

```

1 \begin{table}
  \centering
  \caption{This table has its caption above, too, and%
4      has a header and colors and all that fancy%
      stuff (plus a caption that spans multiple lines).}
  \tablecolorwithhead
  \begin{tabular}{lll}%
    \theadbegin%
9      \thead{Col 1} & \thead{Col 2} & \thead{Col 3} \\
    \theadend
      Cell 1.1 & Cell 1.2 & Cell 1.3 \\
      Cell 2.1 & Cell 2.2 & Cell 2.3 \\
      Cell 3.1 & Cell 3.2 & Cell 3.3 \\
14     Cell 4.1 & Cell 4.2 & Cell 4.3 \\
    \bottomrule
  \end{tabular}
  \label{tbl:a-sample-table-large}
\end{table}

```

Table 2.2: This table has its caption above, too, and has a header and colors and all that fancy stuff (plus a caption that spans multiple lines).

Col 1	Col 2	Col 3
Cell 1.1	Cell 1.2	Cell 1.3
Cell 2.1	Cell 2.2	Cell 2.3
Cell 3.1	Cell 3.2	Cell 3.3
Cell 4.1	Cell 4.2	Cell 4.3

2.4 Math Equations

In many cases, there will be some math equations in your thesis. Even though L^AT_EX allows many different formats of inputting your equations, there are preferred environments. One of these, apparently, is the `align` environment which can be used as shown in Listing 2.4 and renders as follows.

$$(2.1) \qquad E = mc^2$$

Listing 2.4: *Sample code for proper typesetting of math equations.*

```
1 \begin{align}
   E &= m c^2 \quad \text{\label{eq:einsteins-equation}}
\end{align}
```

The Very First Chapter With a Very Long Title Just to See What it Looks Like Since it Spans Multiple Lines in the ToC

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus.

Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetur.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetur at, consectetur sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

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urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus.

Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, lobortis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper leo. Morbi dui. Aliquam sagittis. Nunc placerat. Pellentesque tristique sodales est. Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum tortor, vel consectetur odio sem sed wisi.

Sed feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetur eu, nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean vel lectus. Nunc imperdiet justo nec dolor.

Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetur tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

CHAPTER 4

Another Chapter

Etiam ac leo a risus tristique nonummy. Donec dignissim tincidunt nulla. Vestibulum rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

Nulla in ipsum. Praesent eros nulla, congue vitae, euismod ut, commodo a, wisi. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Aenean nonummy magna non leo. Sed felis erat, ullamcorper in, dictum non, ultricies ut, lectus. Proin vel arcu a odio lobortis euismod. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Proin ut est. Aliquam odio. Pellentesque massa turpis, cursus eu, euismod nec, tempor congue, nulla. Duis viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

Nulla mattis luctus nulla. Duis commodo velit at leo. Aliquam vulputate magna et leo. Nam vestibulum ullamcorper leo. Vestibulum condimentum rutrum mauris. Donec id mauris. Morbi molestie justo et pede. Vivamus eget turpis sed nisl cursus tempor. Curabitur mollis sapien condimentum nunc. In wisi nisl, malesuada at, dignissim sit amet, lobortis in, odio. Aenean consequat arcu a ante. Pellentesque porta elit sit amet orci. Etiam at turpis nec elit ultricies imperdiet. Nulla facilisi. In hac habitasse platea dictumst. Suspendisse viverra aliquam risus. Nullam pede justo, molestie nonummy, scelerisque eu, facilisis vel, arcu.

Curabitur tellus magna, porttitor a, commodo a, commodo in, tortor. Donec interdum. Praesent scelerisque. Maecenas posuere sodales odio. Vivamus metus lacus, varius quis,

imperdiet quis, rhoncus a, turpis. Etiam ligula arcu, elementum a, venenatis quis, sollicitudin sed, metus. Donec nunc pede, tincidunt in, venenatis vitae, faucibus vel, nibh. Pellentesque wisi. Nullam malesuada. Morbi ut tellus ut pede tincidunt porta. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam congue neque id dolor.

Donec et nisl at wisi luctus bibendum. Nam interdum tellus ac libero. Sed sem justo, laoreet vitae, fringilla at, adipiscing ut, nibh. Maecenas non sem quis tortor eleifend fermentum. Etiam id tortor ac mauris porta vulputate. Integer porta neque vitae massa. Maecenas tempus libero a libero posuere dictum. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aenean quis mauris sed elit commodo placerat. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Vivamus rhoncus tincidunt libero. Etiam elementum pretium justo. Vivamus est. Morbi a tellus eget pede tristique commodo. Nulla nisl. Vestibulum sed nisl eu sapien cursus rutrum.

Nulla non mauris vitae wisi posuere convallis. Sed eu nulla nec eros scelerisque pharetra. Nullam varius. Etiam dignissim elementum metus. Vestibulum faucibus, metus sit amet mattis rhoncus, sapien dui laoreet odio, nec ultricies nibh augue a enim. Fusce in ligula. Quisque at magna et nulla commodo consequat. Proin accumsan imperdiet sem. Nunc porta. Donec feugiat mi at justo. Phasellus facilisis ipsum quis ante. In ac elit eget ipsum pharetra faucibus. Maecenas viverra nulla in massa.

Nulla ac nisl. Nullam urna nulla, ullamcorper in, interdum sit amet, gravida ut, risus. Aenean ac enim. In luctus. Phasellus eu quam vitae turpis viverra pellentesque. Duis feugiat felis ut enim. Phasellus pharetra, sem id porttitor sodales, magna nunc aliquet nibh, nec blandit nisl mauris at pede. Suspendisse risus risus, lobortis eget, semper at, imperdiet sit amet, quam. Quisque scelerisque dapibus nibh. Nam enim. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nunc ut metus. Ut metus justo, auctor at, ultrices eu, sagittis ut, purus. Aliquam aliquam.

Etiam pede massa, dapibus vitae, rhoncus in, placerat posuere, odio. Vestibulum luctus commodo lacus. Morbi lacus dui, tempor sed, euismod eget, condimentum at, tortor. Phasellus aliquet odio ac lacus tempor faucibus. Praesent sed sem. Praesent iaculis. Cras rhoncus tellus sed justo ullamcorper sagittis. Donec quis orci. Sed ut tortor quis tellus euismod tincidunt. Suspendisse congue nisl eu elit. Aliquam tortor diam, tempus id, tristique eget, sodales vel, nulla. Praesent tellus mi, condimentum sed, viverra at, consectetur quis, lectus. In auctor vehicula orci. Sed pede sapien, euismod in, suscipit in, pharetra placerat, metus. Vivamus commodo dui non odio. Donec et felis.

Etiam suscipit aliquam arcu. Aliquam sit amet est ac purus bibendum congue. Sed in eros. Morbi non orci. Pellentesque mattis lacinia elit. Fusce molestie velit in ligula. Nullam et orci vitae nibh vulputate auctor. Aliquam eget purus. Nulla auctor wisi sed ipsum. Morbi porttitor tellus ac enim. Fusce ornare. Proin ipsum enim, tincidunt in, ornare venenatis, molestie a, augue. Donec vel pede in lacus sagittis porta. Sed hendrerit ipsum quis nisl. Suspendisse quis massa ac nibh pretium cursus. Sed sodales. Nam eu neque quis pede dignissim ornare. Maecenas eu purus ac urna tincidunt congue.

Donec et nisl id sapien blandit mattis. Aenean dictum odio sit amet risus. Morbi purus. Nulla a est sit amet purus venenatis iaculis. Vivamus viverra purus vel magna. Donec in justo sed odio malesuada dapibus. Nunc ultrices aliquam nunc. Vivamus facilisis pellentesque velit. Nulla nunc velit, vulputate dapibus, vulputate id, mattis ac, justo.

Nam mattis elit dapibus purus. Quisque enim risus, congue non, elementum ut, mattis quis, sem. Quisque elit.

Maecenas non massa. Vestibulum pharetra nulla at lorem. Duis quis quam id lacus dapibus interdum. Nulla lorem. Donec ut ante quis dolor bibendum condimentum. Etiam egestas tortor vitae lacus. Praesent cursus. Mauris bibendum pede at elit. Morbi et felis a lectus interdum facilisis. Sed suscipit gravida turpis. Nulla at lectus. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Praesent nonummy luctus nibh. Proin turpis nunc, congue eu, egestas ut, fringilla at, tellus. In hac habitasse platea dictumst.

Vivamus eu tellus sed tellus consequat suscipit. Nam orci orci, malesuada id, gravida nec, ultricies vitae, erat. Donec risus turpis, luctus sit amet, interdum quis, porta sed, ipsum. Suspendisse condimentum, tortor at egestas posuere, neque metus tempor orci, et tincidunt urna nunc a purus. Sed facilisis blandit tellus. Nunc risus sem, suscipit nec, eleifend quis, cursus quis, libero. Curabitur et dolor. Sed vitae sem. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Maecenas ante. Duis ullamcorper enim. Donec tristique enim eu leo. Nullam molestie elit eu dolor. Nullam bibendum, turpis vitae tristique gravida, quam sapien tempor lectus, quis pretium tellus purus ac quam. Nulla facilisi.

Duis aliquet dui in est. Donec eget est. Nunc lectus odio, varius at, fermentum in, accumsan non, enim. Aliquam erat volutpat. Proin sit amet nulla ut eros consectetur cursus. Phasellus dapibus aliquam justo. Nunc laoreet. Donec consequat placerat magna. Duis pretium tincidunt justo. Sed sollicitudin vestibulum quam. Nam quis ligula. Vivamus at metus. Etiam imperdiet imperdiet pede. Aenean turpis. Fusce augue velit, scelerisque sollicitudin, dictum vitae, tempor et, pede. Donec wisi sapien, feugiat in, fermentum ut, sollicitudin adipiscing, metus.

Donec vel nibh ut felis consectetur laoreet. Donec pede. Sed id quam id wisi laoreet suscipit. Nulla lectus dolor, aliquam ac, fringilla eget, mollis ut, orci. In pellentesque justo in ligula. Maecenas turpis. Donec eleifend leo at felis tincidunt consequat. Aenean turpis metus, malesuada sed, condimentum sit amet, auctor a, wisi. Pellentesque sapien elit, bibendum ac, posuere et, congue eu, felis. Vestibulum mattis libero quis metus scelerisque ultrices. Sed purus.

4.1 A First Section

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Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

4.1.1 A Sample Subsection

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Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

4.1.1.1 A Sample Subsubsection

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The Main Template

5.1 Document Structure

You are free in organizing your document, however, it is recommended that a certain order of chapters is always obeyed to. The chapters must be given in the following order

1. Titlepage
2. Titlepage in second language (in German or English if thesis written in English or German, respectively)
3. Dedication (not mandatory)
4. Copyright (not mandatory)
5. Declaration of Authorship (mandatory only for student theses)
6. Table of Contents
7. List of Figures
8. List of Tables
9. List of Abbreviations (textual abbreviations like e.g., CDPR; not mandatory)
10. List of Symbols (math symbols and alike; not mandatory)
11. Acknowledgments (not mandatory)
12. Abstract (with keywords)
13. Abstract in second language (in German or English if thesis written in English or German, respectively)
14. The main content (separate them by use of `\chapter`)
15. Appendix or appendices



Figure 5.1: *A sample figure of the New York Hotel at Las Vegas, NV, USA showing the effect of a loooong loooooong caption.*

16. Bibliography

For figures, the guidelines are:

- Always center images using `\centering` as the very first command of the figure environment.
- Make sure to set the width of your included images explicitly using the `width=` option. Have a single figure's width set to `width=0.75\linewidth`, while two figures side by side must be set to `width=\linewidth` as long as you set the width of the surrounding minipage or subfigure to `0.49\linewidth`.
- Don't forget to keep the aspect ratio of images if you change their width.

Table 5.1: *A sample table*

Item		
Animal	Description	Price (\$)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99



(a) Picture 1.



(b) Picture 2.

Figure 5.2: Even subfigures of two figures are possible and the left one is referenced like (a) so, while the right one is referenced like (b) so.



(a) Picture 1.



(b) Picture 2.



(c) Picture 3.



(d) Picture 4.

Figure 5.3: Even subfigures of four figures are possible.

Table 5.2: *Tables can look nice, even for many many data to display*

m	$\operatorname{Re}\{\mathfrak{X}(m)\}$	$-\operatorname{Im}\{\mathfrak{X}(m)\}$	$\mathfrak{X}(m)$	$\frac{\mathfrak{X}(m)}{23}$	A_m	$\varphi(m) / ^\circ$	$\varphi_m / ^\circ$
1	16.128	8.872	16.128	1.402	1.373	-146.6	-137.6
2	3.442	-2.509	3.442	0.299	0.343	133.2	152.4
3	1.826	-0.363	1.826	0.159	0.119	168.5	-161.1
4	0.993	-0.429	0.993	0.086	0.08	25.6	90
5	1.29	0.099	1.29	0.112	0.097	-175.6	-114.7
6	0.483	-0.183	0.483	0.042	0.063	22.3	122.5
7	0.766	-0.475	0.766	0.067	0.039	141.6	-122
8	0.624	0.365	0.624	0.054	0.04	-35.7	90
9	0.641	-0.466	0.641	0.056	0.045	133.3	-106.3
10	0.45	0.421	0.45	0.039	0.034	-69.4	110.9
11	0.598	-0.597	0.598	0.052	0.025	92.3	-109.3

- Never ever under sample images. In other words: never ever enlarge images.
- It's best to use vector graphics i.e., *.eps or *.tikz for proper quality in both PDFs as well as on screen.
- Add a caption to your image. Captions must be below the image.
- Let the labels be handled automatically by L^AT_EX. A best practice is to set the prefix of figures' labels to `fig:`.
- For a good example see Fig. 5.1 and its code at ?? (this reference was created using the `\cref{}` command).
- Always add a full stop to your figure captions like so.
- Do not be afraid to use lengthy figure and table captions-better that than confusing or incomplete ones.
- Figure and table captions must be elaborative i.e., do not fear having captions that span multiple lines. No really, don't.
- If your table or figure caption is too long in the list of figures or list of tables, respectively, use the short-caption option to `\caption` which looks like `\caption[This short caption shows up in the list of figures/tables]{While this very long long caption actually shows up under the caption just to show that it would be too long and spans multiple lines in the list of figures/tables.}`.
- If your figure or table is essentially the same as or based on another authors, but you recreated or adapted it, it is standard to include the words "Adapted from" or "After" followed by the authors name and a citation at the end of the caption.

- Always cite the figure or table if it—or its data—came from a source, using the same citation style that you have used throughout the paper. The most logical place for the citation to appear is at the end of the caption. See Section 5.3 of this manual for a thorough discussion of rules for source citation.
- Do not crowd a table or figure, neither within itself nor within your text; give it room to breathe. When it appears amidst your body text, skip at least one line above and below it.
- Rule of thumb: Try to present the table or figure so that it would make sense even if ripped from the paper.
- If possible, label the axes of graphs with full words: “Temperature versus time” rather than “T versus t.”
- Be certain that your legend—that part of the figure where you define any symbols or other visual markers that appear—is readable, clear, and meaningfully placed. As long as it does not overwhelm the rest of the figure, do not be afraid to make the legend large to enhance its readability.
- Use footnotes (a simple asterisk to indicate them will do) for explanatory material such as the number of respondents to a survey or the fact that certain values were estimated.



For tables, the guidelines are

- The legend (sometimes called the caption) goes above the Table.
- Units are specified in column headings wherever appropriate.
- Lines of demarcation are used to set legend, headers, data, and footnotes apart from one another.
- Footnotes are used to clarify points in the table, or to convey repetitive information about entries.
- Footnotes may also be used to denote statistical differences among groups.

5.2 Coloring

There are a few basic colors that are set for some default coloring of tables and should be used primarily for other things, where applicable. For all the available color commands and a sample of the rendered color, please see Table 5.3.

Table 5.3: *List of available color codes and a sample colored box*

Color Code	Color Sample
MainColorVeryLight	
MainColorLight	
MainColor	
MainColorDark	
MainColorVeryDark	
PrimaryColorVeryLight	
PrimaryColorLight	
PrimaryColor	
PrimaryColorDark	
PrimaryColorVeryDark	
SecondaryColorVeryLight	
SecondaryColorLight	
SecondaryColor	
SecondaryColorDark	
SecondaryColorVeryDark	

5.3 Referencing

Referencing may be done using `\ref{label}` even though usage of `\cref{label}` is encouraged for that it automatically typesets the appropriate type like `Eqn.` or `Fig.`, `Tbl.`, or `Listing` to whatever is being reference. At the beginning of a sentence, `\Cref{label}` must be used to fully give the referenced type in words. Figure 5.1 refers to a sample figure at the beginning of a sentence, while Fig. 5.1 refers to a sample figure in text.

- Capitalize and write in words the reference object at the beginning of a sentence.
- Otherwise use the abbreviated forms of `Fig.`, `Eqn.`, and `Tbl.` for referencing figures, equations, and tables, respectively.
- Refer to the `cleveref` package documentation at <http://www.ctan.org/pkg/cleveref>.

5.3.1 Subsection

5.3.1.1 Subsubsection

Paragraph

Subparagraph

Appendices



Some Lengthy Mathematical Equations

A.1 First Section of Appendix One

A.2 Second Section of Appendix One



Some Lengthy Source Code Listings

B.1 First Section of Appendix Two

B.2 Second Section of Appendix Two

B.3 Third Section of Appendix Two