



University of Stuttgart
Germany

Project Description

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

*Some Theses Even Have Subtitles Which Should Not be as Long as This Subtitle Is Because
it is too Long*

submitted by

Maschinen Bauer

1234567

on

28th August 2015

Draft

A project description presented to the faculty

KONSTRUKTIONS-, PRODUKTIONS- UND FAHRZEUGTECHNIK (MASCHINENBAU)

UNIVERSITY OF STUTTGART

in partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE (B.Sc.)

Examiner:

Jun.-Prof. Dr.-Ing. Andreas Pott

Major:

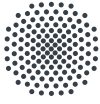
Mechatronik

Supervisor:

Dipl.-Ing. Philipp Tempel

Dipl.-Ing. Martin Wehr





Universität Stuttgart

Projektexposé

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

eingereicht von

Maschinen Bauer

1234567

am

28. August 2015

Entwurf

Eine Projektbeschreibung zur Vorlage an der Fakultät
KONSTRUKTIONS-, PRODUKTIONS- UND FAHRZEUGTECHNIK (MASCHINENBAU)
UNIVERSITÄT STUTTGART
zur Erlangung des akademischen Grades
BACHELOR OF SCIENCE (B.Sc.)

Prüfer:

Jun.-Prof. Dr.-Ing. Andreas Pott

Studiengang:

Mechatronik

Betreuer:

Dipl.-Ing. Philipp Tempel

Dipl.-Ing. Martin Wehr



Eklärung des Autors

Hiermit versichere ich, Maschinen Bauer, Autor der vorliegenden project description mit dem Titel

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

1. Dass ich meine Arbeit bzw. bei einer Gruppenarbeit den entsprechend gekennzeichneten Anteil der Arbeit selbständig verfasst habe.
2. Dass ich keine anderen als die angegebenen Quellen benutzt und alle wörtlich oder sinngemäß aus anderen Werken übernommenen Aussagen als solche gekennzeichnet habe.
3. Dass die eingereichte Arbeit weder vollständig noch in wesentlichen Teilen Gegenstand eines anderen Prüfungsverfahrens gewesen ist.
4. Dass ich die Arbeit weder vollständig noch in Teilen bereits veröffentlicht habe.
5. Dass das elektronische Exemplar mit den anderen Exemplaren übereinstimmt.

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}.

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.

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}`.

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.

Stichwörter: a, list, of, keywords

Contents

Abstract	vii
Zusammenfassung	ix
List of Figures	xiii
List of Tables	xv
1 User Documentation	1
1.1 Introduction	1
1.1.1 Target Users	1
1.1.2 Features of the Class	1
1.1.3 How to Get Started	2
1.2 Conventions, Settings, Typesetting, etc.	6
2 Style Guide	7
2.1 Typography	7
2.2 Figures	7
2.3 Tables	9
2.4 Math Equations	11
3 The Short Title of the Chapter Showing Up in the TOC and the Page Headers	13
4 A Second Chapter	15
4.1 A First Section	15
4.1.1 A Sample Subsection	16
5 The Main Template	19
5.1 Document Structure	19
5.2 Coloring	23
5.3 Referencing	23
Bibliography	25
Appendices	27
A Some Lengthy Mathematical Equations	29
A.1 First Section of Appendix One	29
A.2 Second Section of Appendix One	29

B	Some Lenghty Source Code Listings	31
B.1	First Section of Appendix Two	31
B.2	Second Section of Appendix Two	31
B.3	Third Section of Appendix Two	31

List of Figures

5.1	A sample figure of the New York Hotel at Las Vegas, NV, USA showing the effect of a loooong loooooong caption.	20
5.2	Even subfigures of two figures are possible and the left one is referenced like so (a) while the right one is referenced like so (b).	21
5.3	Even subfigures of four figures are possible.	21

List of Tables

2.1	First, set the caption, then the table.	10
2.2	This table has its caption above, too, and has a header and colors and all that fancy stuff (plus a heading that spans multiple lines).	10
5.1	A sample table	20
5.2	Tables can look nice, even for many many data to display	22
5.3	List of available color codes and a sample colored box	24

Todo list



User Documentation

In this chapter, the user will get a general introduction to the usage of the thesis template and will be enabled to start with his 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).

{sec:user-
documentation:in-
roduction}
{sec:user-
documentation:target
users}

{sec:user-
documentation:fea-
tures}

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

{sec:user-documentation-system}

configure-■

You must choose a \LaTeX 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.

`{sec:user-
documentation;conf
document}`

1.1.3.3 Start Writing your Content

1.2 Conventions, Settings, Typesetting, etc.

{sec:user- documentatio ing}

{sec:user- documentatio tings}



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.

{cha:style-guide}

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).

{sec:style-guide:typography}

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.

{sec:style-guide:figures}

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 `\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 $0.49\text{\texttt{\linewidth}}$, 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.

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.

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.

st:figure}

LISTING 2.1: Sample code for type setting a figure.

```

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

```

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

2.3 Tables

{sec:style-
guide: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}}1}`.

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.

{lst:table-small}

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

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

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

Column 1.1	Column 2.1
Column 2.1	Column 2.2

{tbl:a-sample-table-small}

TABLE 2.2: *This table has its caption above, too, and has a header and colors and all that fancy stuff (plus a heading 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

{tbl:a-sample-table-large}

st:table-
ge}LISTING 2.3: *Sample code for type setting table with a header.*

```

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

```

LISTING 2.4: *Sample code for proper typesetting of math equations.*{lst:math-
align}

```

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

```

2.4 Math Equations

ec:math-
equations}

In many cases, there will be some math equations in your thesis. Even though \LaTeX 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) {-eq:einsteins-equation"} $E = mc^2$

CHAPTER 3

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.

CHAPTER 4

A Second Chapter

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.

4.1 A First Section

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.

4.1.1 A Sample Subsection

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.

4.1.1.1 A Sample Subsubsection

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.

A Sample Paragraph 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.

A Sample Subparagraph 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.



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 (in \chapter)



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

{fig:sample-figure}

15. Appendix or appendices

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`

{tbl:sample-table}

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 so (a) while the right one is referenced like so (b).



(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

- Don't forget to keep the aspect ratio of images if you change their width.
- 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 than confusing or incomplete ones.
- 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.


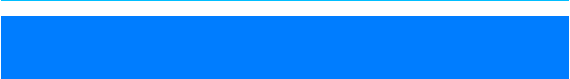
5.3 Referencing

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.

{sec:referencing}

- Capitalise 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>

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	

{tbl:color-samples}

Bibliography

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