

BACHELOR'S THESIS

Tobi Defined

A beautiful thesis with a wonderful title

FAKULTÄT ELEKTRO-, MEDIEN- UND INFORMATIONSTECHNIK

Faculty of Electrical Engineering, Media and Information Technology

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A beautiful thesis with a wonderful title

Bachelor's thesis based on the examination and study regulations of the degree program *Bachelor of Science Elektrotechnik und Informationstechnik* at the Faculty of Electrical Engineering, Media and Information Technology of the University of Applied Sciences Hamburg

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Tobi Defined**Title of Thesis**

A beautiful thesis with a wonderful title

Keywords

Thesis, beauty, success

Abstract

As the title suggests, this is a really beautiful thesis. Because beauty lies in the eye of the beholder, it is up to you, to add glitter to this thesis. Good luck!

Tobi Defined**Thema der Arbeit**

Eine sehr schöne Arbeit mit einem wundervollen Titel

Stichwörter

Arbeit, Schönheit, Erfolg

Kurzzusammenfassung

Wie der Titel schon sagt, handelt es sich um eine sehr schöne Arbeit. Da Schönheit bekanntlich im Auge des Betrachters liegt, ist es Ihnen, dieser Arbeit zu angemessenem Glanz zu verhelfen. Viel Erfolg!

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1 Introduction

Well, you are about to write your thesis? There is no need to tell you that there are several months of hard work ahead. However, we try to support you by providing this L^AT_EX template, which is hopefully easy to use and needs only little explanation. This chapter is meant to help you to set up a project for your written thesis. Moreover, there are examples for frequent content such as, for instance, figures, listings, and references to literature as well as online resources.

1.1 Getting Started with this Template

Please start your journey by editing the main file *Thesis.tex* in the root directory. The file contains a section where you specify basic information (e. g., your name and degree course, the examiners, title of the thesis), layout settings, and the files containing your chapters and appendix. Most settings are described by comments in *Thesis.tex* and should be self-explanatory. Still, let us give you some further information.

Language Please specify the language you use for your written thesis as either German (*DE*) or English (*EN*). This setting must match the language of the officially registered title, but need not match the prevailing language used in lectures of your degree course. For instance, a student of the degree course *B.Sc. Elektrotechnik und Informationstechnik* may write a thesis in English.

```
\Language{EN}
```

Degree course Specify your degree course using one of the abbreviations listed in the respective comment in *Thesis.tex* (e. g., *IE* for *B.Sc. Information Engineering*).

```
\DegreeCourse{IE}
```

None-disclosure Set the value *Confidential* to 1, if and only if your thesis must not be published. This is typically the case for theses written at a company.

```
\Confidential{0}
```

Single-sided or double-sided Set *SingleSidedPrint* to 1 or 0 to generate a PDF for single-sided or double-sided printing, respectively. Many examiners prefer single-sided documents, because they can use the empty pages at the left of their printed copy for comments and corrections. However, obviously double-sided printing reduces the number of physical sheets of paper. It may be a good idea to align with your examiners before switching to double-sided printing.

```
\SingleSidedPrint{1}
```

Title's font size Typically, it looks strange when the title on the cover page uses more than two or three lines. You can adapt the font size by setting *TitleFontSize* to *large*, *normal*, or *small*.

```
\TitleFontSize{normal}
```

Examiners Please specify the gender of your supervisor and second examiner as either *male* or *female*. This setting is relevant for theses written in German, only, to print either “Prüfer” or “Prüferin” and “Zweitgutachter” or “Zweitgutachterin” on the page containing general information about the thesis.

```
\Supervisor{Prof. Dr.–Ing. Marc Hensel}{male}  
\SecondExaminer{Prof. Dr. rer. nat. Ulrike Herster}{female}
```

Bilingual abstract Please note that every thesis must contain the abstract page in German *and* English. Therefore, you must specify the title, keywords, and the text of the abstract in both languages.

```
\Titles{German}{English}  
\Keywords{German}{English}  
\Abstracts{German}{English}
```

List of figures etc. You can enable or disable lists of figures, tables, and listings by setting the respective value to 1 or 0. In case of doubt, align with your supervisor which lists to include in your thesis.

```
\ListOfFigures{1}  
\ListOfTables{1}  
\ListOfListings{1}
```

Chapters and appendix Specify the L^AT_EX files containing your chapters and appendix. We recommend to store the **.tex* files in the subfolders *.\Chapters* and *.\Appendix*, respectively, and image files in corresponding subfolders of *.\Figures*. Leave the command *Appendix* empty, in case your thesis does not contain an appendix.

```
\Chapters{  
  \input{Chapters/Introduction}  
  \input{Chapters/Fundamentals}  
  \input{Chapters/Requirements}  
  ...  
}  
\Appendix{  
  \input{Appendix/Appendix}  
  ...  
}
```

1.2 Specific Files

Apart from *Thesis.tex* there are only few provided files that you should or must modify. Let's have a look.

Additional packages The file *.\Preamble\Packages.tex* contains frequently used packages (e. g. math, listings, TikZ drawings). This is a great place to add further required packages, isn't it?

Bibliography Add literature to *.\SpecialPages\Bibliography.bib*. The file contains sample BibTeX entries for theses [4], books [1, 2], and articles [3]. For further entry types and additional information refer to, for instance, the related Wikipedia article¹.

¹<https://de.wikipedia.org/wiki/BibTeX> (Accessed: 15.09.2026)

Please note that a bibliography should contain only sources that are not subject to potential changes (e. g., books, manuals, theses, ISO standards). Other sources – in particular online resources such as the Wikipedia article referred to in the previous paragraph – should be referenced using a footnote with url and the date of access.

```
HAW Hamburg\footnote{\url{www.haw-hamburg.de}} (Accessed: 15.09.2026)}
```

Use of AI tools Be aware that you *must* declare all use of AI tools in the declaration on page 12. Modify the table in `.\SpecialPages\DeclarationOnUseOfAI.tex` accordingly.

1.3 Online and Local Editors

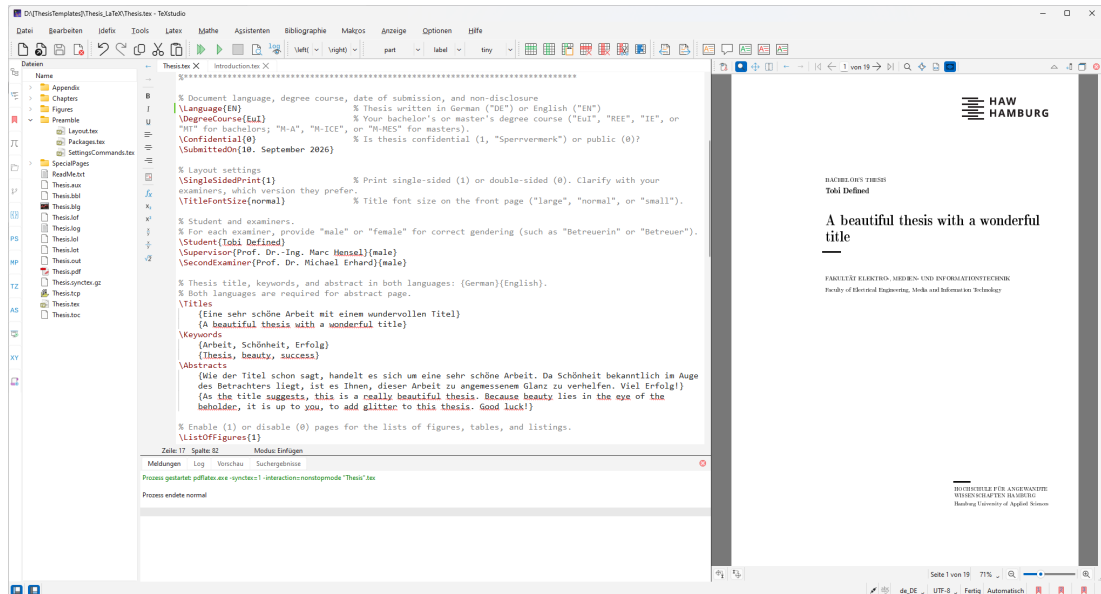
The prior sections served the purpose to clarify how to use the template. In the following, let's briefly discuss online and local editors. We recommend using a local $\text{\LaTeX}$ environment, which is easy to set up, easy to use, works without internet connection, and does not introduce risks with respect to the protection of confidential data.

Overleaf Many students seem to use the online editor Overleaf² to work on their written thesis. To create your project, choose *Existing project (.zip)* and select or drag and drop the provided zip file of this template. Note that in our tests the compilation process frequently ran into timeout errors. The cause is not fully understood yet, however, following workaround typically solved the issue during our tests:

1. Change the language to German (*DE*) in *Thesis.tex*.
2. Do any modification in `.\Preamble\Packages.tex` (e. g., change a comment and change it back to its original text).
3. Press the red button *Clear cached files* in the lower right of the window.
4. Select *Recompile from scratch* from the drop-down menu next to the green button *Recompile*.
5. If necessary, press *Recompile* several times until the PDF is generated. Once compilation is successful, you may change the language back to English.

Alternatively, use a local installation where in our experience such issues do not exist.

²<https://www.overleaf.com> (Accessed: 15.09.2026)

Figure 1.1: $\text{\LaTeX}$ editor TeXstudio

Local environments Instead of using an online editor, you should consider working with a local $\text{\LaTeX}$ environment. This approach brings only little initial effort and has some advantages (e. g., protection of confidential data). While there are different software packages available, in my experience it is comfortable to first install MiKTeX³ as $\text{\TeX}$ distribution and use TeXstudio⁴ as editor. There is no need to create a project. Instead, open the main file *Thesis.tex* to start editing (Fig. 1.1). A good alternative is the editor TeXnicCenter⁵ (Fig. 1.2), which requires initial configuration.

1.4 Figures, Tables, and Listings

Finally, let's take advantage of the fact that the $\text{\LaTeX}$ sources of this document are available to you. This gives us the opportunity to provide examples how to include, for instance, figures, tables, and listings in your thesis.

Figures and tables Naturally, the following is a recommendation, not a strict rule. However, it is good practice to position figures and tables at the top of a page with the

³<https://miktex.org/> (Accessed: 15.09.2026)

⁴<https://texstudio.org/> (Accessed: 22.09.2026)

⁵<https://www.tenriccenter.org/> (Accessed: 15.09.2026)

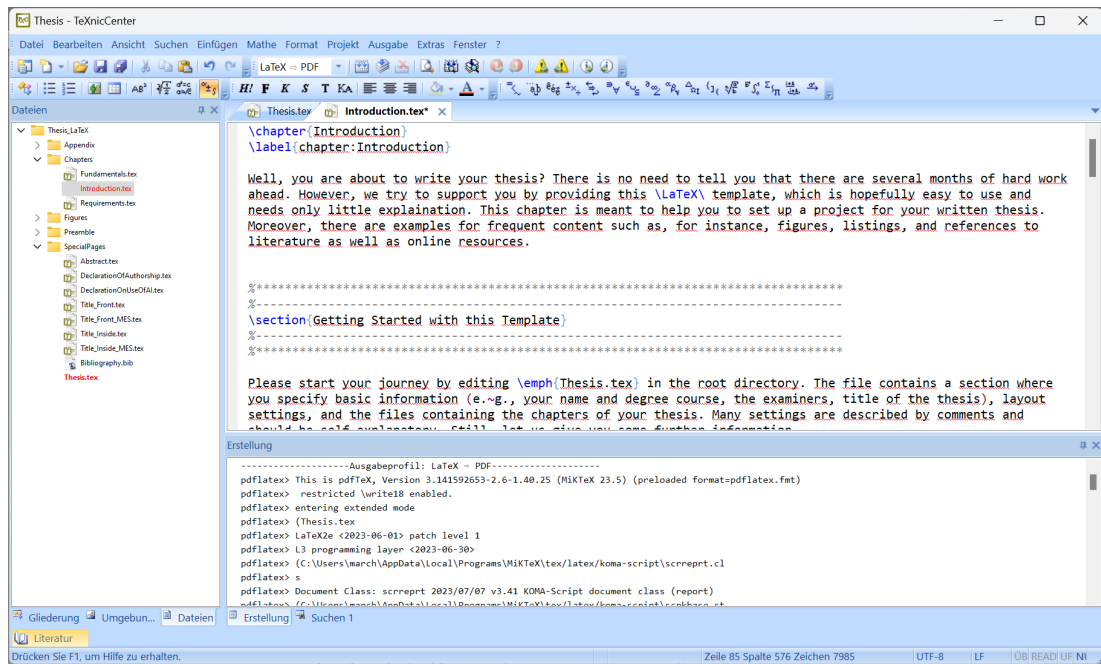
Figure 1.2: $\text{\LaTeX}$ editor TeXnicCenter

Table 1.1: Selected template commands

Command	Valid values
Language	DE, EN
SingleSidedPrint	0, 1
TitleFontSize	large, normal, small

text passages below (e. g., Figures 1.1 and 1.2, Table 1.1). To achieve this layout, pass the option t to the environment of the figure or table, for instance:

```
\begin{figure}[t]
...
\end{figure}
```

Listings The *listings* package provides support for source codes. In particular, use the environment *lstlisting* to generate code within the running text

```
int sum = 0;
```

as well as numbered listings like Listing 1.1. To customize the layout, such as color

```
int main()
{
    cv::Mat image = cv::imread("D:/Docks.jpg", cv::IMREAD_ANYCOLOR);
    cv::imshow("Image", image);
    cv::waitKey(0);
    return 0;
}
```

Listing 1.1: Open and display an image

schemes, line numbers, language-dependent syntax highlighting, and so on, please refer to the appropriate section of the file `.\Preamble\Packages.tex` and the documentation⁶ of the package.

⁶<https://ctan.org/pkg/listings> (Accessed: 15.09.2026)

2 Fundamentals

2.1 Some Wonderful Technology

...

2.2 State of the Art

...

3 Requirements Analysis

3.1 System Environment

...

3.2 Stakeholders

...

3.3 Use Cases

...

3.4 Requirements

...

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A Appendix

A.1 Test Series

...

Declaration on the Use of AI Tools

I hereby declare that I have used no other AI-based tools and for no other purpose than detailed in the table below.

AI tool	Used for	Chapters	Remarks
ChatGPT (GPT-5)	Support with literature research: suggestions for German and English search terms regarding modeling approaches and numerical solution methods for the system under investigation, as well as a summary of abstracts for the preliminary selection of relevant publications.	2.1–2.3	Accessed in March 2026. The actual research was conducted using specialized databases (e. g., IEEE Xplore, ScienceDirect). All cited sources were read in their original form; the AI-generated summaries served only for preliminary selection and are not used as sources.
Claude (Claude Sonnet 5.5)	Code generation and debugging assistance for Python helper functions: reading and processing measurement and reference data (pandas), plotting functions for simulation results (matplotlib), and troubleshooting an incorrect unit conversion during data processing.	4.2, App. B	The model equations, the implementation of the simulation model, and the evaluation logic were developed without AI assistance. The generated code was reviewed, validated using test datasets, and marked with comments in the source code.
ChatGPT (GPT-5)	Linguistic revision of one’s own text drafts: suggestions regarding style and sentence structure, as well as translation of the German summary into English (abstract).	1 and 6, abstract	Only original texts containing no personal or confidential data were entered. Suggestions were reviewed individually and adopted only in part; technical statements and terminology were not altered by the AI.

Declaration of Authorship

I hereby declare that I have elaborated this thesis, including all its parts, using no other sources, references, or aids than specified in this work. I have disclosed all AI-based tools used, including product names and version numbers, where applicable.

I take over the full responsibility for all machine-generated content; and I am fully liable for erroneous or misleading content, incorrect references, violations of data protection or copyright laws, or instances of plagiarism resulting from the use of AI.

City

Date

Original signature