Kantonsschule Im Lee

Informatik

Maturaarbeit

Report Guidelines

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© Winterthur, October 29, 2024

Contents

1 Maturaarbeit Guidelines

1.1 Introduction

Your Matura thesis, or Maturaarbeit (MA) should satisfy certain quality and formality criteria. This document aims at helping students in their writing process by outlining the most important aspects, without any claim to be comprehensive.

1.2 Typesetting Tool

In general, we highly recommend the use of LaTeX for almost all MA theses as this will take care of almost all formatting and style aspects mentioned below. A tutorial on learning LaTeX can be found here: Link. For editing LaTeX code, we highly recommend the Integrated Development Environment (IDE) TeXstudio.

We highly recommend versioning your LaTeX code on `https://github.com`. To learn more about why code versioning is important and how to do it, consult this tutorial. For an easy and quick setup, consider installing GitHub Desktop, which contains an intuitive User Interface (UI).

If you'd still like to use Word or another typesetting tool, please stick to the following general rules:

- **Justification**: Block justification with hyphenation
- **Page margins**: Roughly 3 cm on the left and right page margins
- **Font size**: 11-12 pt
- **Line distance**: make sure one page contains between 25-30 lines of text.
- **Titles and numbering**: Similar to this document, using "1 [Section Name 1], 2 [Section Name 2], 3 [Section Name 3]" for Sections and "1.1 [Sub-Section Name 1]", "1.2 [Sub-Section Name 2]", "1.3 [Sub-Section Name 3]" for subtitles. Starting from the Appendix, number your Appendix Sections A, B, C etc. and number the appendix subsections A.1, A.2, A.3 etc. Again, if you're using LaTeX, you wont need to worry about most of these aspects (see section A below for a list of LaTeX-related tips) as they are being taken care of automatically. This document, which itself has been generated using LaTeX, can be used to see an example of such numbering.
- **Page numbering**: No page numbers on the title page and Table of Contents (TOC). Numbering starts at the first page of your MA thesis containing actual contents.

1.3 Length & Structure

The scope of the MA thesis should be defined by the topic. Typically, the number of pages should range anywhere between 10-20 written pages net, gross of further pages such as the title page, table of contents, references, table of figures, table of tables and further appendices.

Your thesis should have a logical and self-explanatory structure. Typically, your sections could be structured as follows:

- **Title Page**: Title, possibly subtitle, author, supervisor, school, class name, "Maturitätsarbeit", place and date
- **Table of Contents**: Overview of the sections and subsections of your thesis (in LaTeX: just one line `\tableofcontents`).
- **Introduction** (numbering applies from here: 1(.1, .2), 2(.2,.3) etc.): Question / objective of your thesis, motivations, approach.
- **Methodology**: Overview of possible approaches to address your question and in-depth presentation of your approach, *without*(!) presenting or discussing any results. If possible, also define a success metric (such as a number which you are trying to maximize, but can also be subjective) to assess the success of your thesis.
- **Results**: present the results of your thesis
- **Discussion**: Assess and discuss the results.
- **Outlook**: What could or should be done to further improve your work if more time was available? Don't try to be too self-critical here but rather, this should reflect the fact that there is always more work to do (and in the case of scientific works, grants to obtain ;))
- **Conclusion**: A summary of the most important results and personal experiences during the process. Any further thoughts regarding the topic can also be inserted here.

- **Appendices** (numbered Appendix A(.1, .2), B(.1,.2), etc.): Any appendix documents, such as questionnaires, code listings, further figures or tables, documents etc.
- **References**: Listing of all Materials, sources including online sources (in LaTeX: just one line `\printbibliography`, have a look at the package `biblatex`: Link)
- **Table of Figures** (in LaTeX: just one line `\tableoffigures`).
- **Table of Table** (in LaTeX: just one line `\tableoftables`)
- **Glossary**: List of abbreviations, if many abbreviations are used in the text (in LaTeX: just one line `\printglossaries`, have a look at the package `glossaries`: Link). An example glossary is shown at the end of this document.

1.4 Quotation Style

You should clarify all contributions to your topic by citing any sources appropriately in your text. Again, citations are greatly facilitated if you use LaTeX. We recommend reading through the following tutorial in depth: Link. When you quote something in the middle of a sentence (always use quotation marks to do so), put the citation right after the quote, even if the sentence (in which the quote is embedded) has not been terminated yet. Conversely, in all other cases, meaning for sentences which are based on a source but do not contain literal quotes, add the citation in the end of the sentence, before the punctuation symbol.

Example

The recent breakthroughs in Machine Learning (ML) and Artificial Intelligence (AI) in computing power have set new accuracy standards in many computer vision tasks, including, but not limited to, medical applications, autonomous driving and remote sensing [1, 2, 3, 4]. [...]

If you are citing an author literally use the `\textcite` command instead of the `\cite` command: While `\cite` will only print the number of the relevant citation, `\textcite` will also print the author name(s).

Typically, all citation meta-information, such as title, year of publication, author, etc. is contained in a `.bib` file (see tutorial for more information). Citation information for a particular book or article can, many times, be obtained in LaTeX format automatically from a database such as `https://www.semanticscholar.org`. You would also add any online links to this file, starting with a `@online{...}` tag and you can quote it in the same way as other citations, such as here: [5]. For online sources, always add at least an author or institution name, the title of the webpage or video, the Uniform Resource Locator (URL), the the date when you accessed the URL last (field `urldate` in the `.bib` file).

1.5 Writing style

1.5.1 Passive Style

Wherever possible, use passive sentence styles and avoid the words “I” and “we”. This is standard in scientific writing, as it forces you into a more objective way of thinking.

Example

Instead of writing:

After I searched the internet, I found that there were many options for doing *xyz*...

You could write:

In order to achieve *xyz*, it seems that a variety of approaches are possible (insert citations!)

1.5.2 Figures and Tables

All figures and tables should add value to the text. This means that they should not only contain meaningful and added-value information but also a clear and informative caption stating what exactly can be seen in the figure or table. In addition, all figures and tables need to be referred to in the text explicitly (in LaTeX, this is done using the tags `\label{...}` and `\ref{...}`). References to other sections should be done using the same approach. For more information, refer to Overleaf’s tutorial on cross-referencing

1.5.3 Grammar Checks

In order to check your grammar and spelling, please consider the following advice:

- Have your MA thesis proofread by at least 2-3 close acquaintences or family members who are proficient in English.
- Use online tools such as `https://www.grammarly.com/grammar-check` or ChatGPT (but don't write your entire thesis using the tool – this greatly hampers creativity. Also, notice that there will be checks for plagiarism).

Feel free to suggest any clarifications and additions to these guidelines by contacting Cyril Wendl.

A Appendices

A LaTeX Related Advice

A.1 LaTeX Related Tutorials

Many good tutorials on LaTeX can be found online. In particular, tutorials provided by Overleaf can be a good starting point.

A.2 Section Numbering for Appendix

To change the section numbering style from numeric (numbers) to alphabetic (letters) use the following lines after the command `\appendix`:

```
% include the following line in the preamble: \usepackage{chngcntr}
\newpage
\renewcommand{\thesubsection}{\Alph{subsection}}
\counterwithin{figure}{subsection}
\counterwithin{table}{subsection}
\pagebreak

\section{Appendices}

\subsection{Code Documentation}
% put contents here
```

A.3 Bibliography Options

For bibliographies in LaTeX, we recommend studying the relevant Overleaf tutorial and using the following parameters for citations:

```
\usepackage[sorting=none,style=numeric,backend=biber]{biblatex}
```

The following listing contains the LaTeXcode used for compiling this document (without the preamble, which would be too long to include!).

B LaTeX code of this very document

```
\lstset{language=[LaTeX]TeX}
\def\arrayB{"ledger","pencil","laptop","technologist","divide","satellite-antenna","
    globe-with-meridians"}
\maketitlepage{Maturaarbeit}{Report Guidelines}
\newpage
\tableofcontents\thispagestyle{empty}
\newpage
\setcounter{page}{1}

\section{Maturaarbeit Guidelines}
\subsection{Introduction}

Your Matura thesis, or \gls{MA} should satisfy certain quality and formality criteria.
    This document aims at helping students in their writing process by outlining the
    most important aspects, without any claim to be comprehensive.

\subsection{Typesetting Tool}
In general, we highly recommend the use of \LaTeX{} for almost all \gls{MA} theses as
    this will take care of almost all formatting and style aspects mentioned below. A
    tutorial on learning \LaTeX{} can be found here: \href{https://www.overleaf.com/
```

```
learn/latex/Learn_LaTeX_in_30_minutes}{Link}. For editing \LaTeX{} code, we highly
recommend the \gls{IDE} \href{https://www.texstudio.org}{TeXstudio}.

We highly recommend versioning your \LaTeX{} code on \url{https://github.com}. To learn
more about why code versioning is important and how to do it, consult \href{https
://docs.github.com/en/get-started/start-your-journey/about-github-and-git}{this
tutorial}. For an easy and quick setup, consider installing \href{https://desktop.
github.com/download/}{GitHub Desktop}, which contains an intuitive \gls{UI}.

If you'd still like to use Word or another typesetting tool, please stick to the
following general rules:

\begin{itemize}
\item \textbf{Justification}: Block justification with hyphenation
\item \textbf{Page margins}: Roughly 3 cm on the left and right page margins
\item \textbf{Font size}: 11-12 pt
\item \textbf{Line distance}: make sure one page contains between 25-30 lines of text.
\item \textbf{Titles and numbering}: Similar to this document, using ``1 [Section Name
1], 2 [Section Name 2], 3 [Section Name 3]'' for Sections and ``1.1 [Sub-Section
Name 1]'', ``1.2 [Sub-Section Name 2]'', ``1.3 [Sub-Section Name 3]'' for
subtitles. Starting from the Appendix, number your Appendix Sections A, B, C etc.
and number the appendix subsections A.1, A.2, A.3 etc. Again, if you're using \
LaTeX, you wont need to worry about most of these aspects (see section \ref{sec:
latex} below for a list of LaTeX-related tips) as they are being taken care of
automatically. This document, which itself has been generated using \LaTeX{}, can
be used to see an example of such numbering.
\item \textbf{Page numbering}: No page numbers on the title page and \gls{TOC}.
Numbering starts at the first page of your MA thesis containing actual contents.
\end{itemize}


\subsection{Length \& Structure}

The scope of the MA thesis should be defined by the topic. Typically, the number of
pages should range anywhere between 10-20 written pages net, gross of further pages
such as the title page, table of contents, references, table of figures, table of
tables and further appendices.

Your thesis should have a logical and self-explanatory structure. Typically, your
sections could be structured as follows:
\begin{itemize}
\item \textbf{Title Page}: Title, possibly subtitle, author, supervisor, school, class
name, ``Maturitätsarbeit'', place and date
\item \textbf{\acrlong{TOC}}: Overview of the sections and subsections of your thesis (
in \LaTeX: just one line \lstinline|\tableofcontents|).
\item \textbf{Introduction} (numbering applies from here: 1(.1, .2), 2(.2,.3) etc.):
Question / objective of your thesis, motivations, approach.
\item \textbf{Methodology}: Overview of possible approaches to address your question
and in-depth presentation of your approach, \textit{without}(!) presenting or
discussing any results. If possible, also define a success metric (such as a number
which you are trying to maximize, but can also be subjective) to assess the
success of your thesis.
\item \textbf{Results}: present the results of your thesis
\item \textbf{Discussion}: Assess and discuss the results.
\item \textbf{Outlook}: What could or should be done to further improve your work if
more time was available? Don't try to be too self-critical here but rather, this
should reflect the fact that there is always more work to do (and in the case of
```

```
    scientific works, grants to obtain ;))
\item \textbf{Conclusion}: A summary of the most important results and personal
    experiences during the process. Any further thoughts regarding the topic can also
    be inserted here.
\item \textbf{Appendices} (numbered Appendix A(.1, .2), B(.1,.2), etc.): Any appendix
    documents, such as questionnaires, code listings, further figures or tables,
    documents etc.
\item \textbf{References}: Listing of all Materials, sources including online sources (
    in \LaTeX: just one line \lstinline|\printbibliography|, have a look at the package
     \lstinline|biblatex|: \href{https://de.overleaf.com/learn/latex/Bibliography_
    management_with_biblatex}{Link})
\item \textbf{Table of Figures} (in \LaTeX: just one line \lstinline|\tableoffigures|).
\item \textbf{Table of Table} (in \LaTeX: just one line \lstinline|\tableoftables|)
\item \textbf{Glossary}: List of abbreviations, if many abbreviations are used in the
    text  (in \LaTeX: just one line \lstinline|\printglossaries|, have a look at the
    package \lstinline|glossaries|: \href{https://www.overleaf.com/learn/latex/
    Glossaries}{Link}). An example glossary is shown at the end of this document.

\end{itemize}


\subsection{Quotation Style}
You should clarify all contributions to your topic by citing any sources appropriately
    in your text. Again, citations are greatly facilitated if you use \LaTeX. We
    recommend reading through the following tutorial in depth: \href{https://de.
    overleaf.com/learn/latex/Bibliography_management_with_biblatex}{Link}. When you
    quote something in the middle of a sentence (always use quotation marks to do so),
    put the citation right after the quote, even if the sentence (in which the quote is
     embedded) has not been terminated yet. Conversely, in all other cases, meaning for
     sentences which are based on a source but do not contain literal quotes, add the
    citation in the end of the sentence, before the punctuation symbol.

\begin{tcolorbox}[title=Example]
\begin{quotation}
The recent breakthroughs in \gls{ML} and \gls{AI} in computing power have set new
    accuracy standards in many computer vision tasks, including, but not limited to,
    medical applications, autonomous driving and remote sensing \cite{Volpi2017DenseSL,
     kampffmeyer, Zhu2017DeepLI, Shelhamer2015FullyCN}. [...]
\end{quotation}

\end{tcolorbox}

If you are citing an author literally use the \lstinline|\textcite| command instead of
    the \lstinline|\cite| command: While \lstinline|\cite| will only print the number
    of the relevant citation, \lstinline|\textcite| will also print the author name(s).

Typically, all citation meta-information, such as title, year of publication, author,
    etc. is contained in a \texttt{.bib} file (see \href{https://de.overleaf.com/learn/
    latex/Bibliography_management_with_biblatex}{tutorial} for more information).
    Citation information for a particular book or article can, many times, be obtained
    in \LaTeX{} format automatically from a database such as \url{https://www.
    semanticscholar.org}. You would also add any online links to this file, starting
    with a \lstinline|@online{...}| tag and you can quote it in the same way as other
    citations, such as here: \cite{Datenstrukturen}. For online sources, always add at
    least an author or institution name, the title of the webpage or video, the \gls{
    URL}, the  the date when you accessed the \gls{URL} last (field \lstinline|urldate|
     in the \texttt{.bib} file).
```

```
67
68
69 \subsection{Writing style}
70 \subsubsection{Passive Style}
71 Wherever possible, use passive sentence styles and avoid the words ``I'' and ``we''.
       This is standard in scientific writing, as it forces you into a more objective way
       of thinking.
72
73 \begin{tcolorbox}[title=Example]
74 Instead of writing:
75 \begin{quotation}
76 After I searched the internet, I found that there were many options for doing \textit{
       xyz}...
77 \end{quotation}
78 You could write:
79 \begin{quotation}
80 In order to achieve \textit{xyz}, it seems that a variety of approaches are possible (
       insert citations!)
81 \end{quotation}
82 \end{tcolorbox}
83
84 \subsubsection{Figures and Tables}
85 All figures and tables should add value to the text. This means that they should not
       only contain meaningful and added-value information but also a clear and
       informative caption stating what exactly can be seen in the figure or table. In
       addition, all figures and tables need to be referred to in the text explicitly (in
       \LaTeX{}, this is done using the tags \lstinline|\label{...}| and \lstinline|\ref
       {...}|). References to other sections should be done using the same approach. For
       more information, refer to Overleaf's \href{https://www.overleaf.com/learn/latex/
       Cross_referencing_sections%2C_equations_and_floats}{tutorial on cross-referencing}
86
87 \subsubsection{Grammar Checks}
88 In order to check your grammar and spelling, please consider the following advice:
89 \begin{itemize}
90 \item Have your \gls{MA} thesis proofread by at least 2-3 close acquaintences or family
        members who are proficient in English.
91 \item Use online tools such as \url{https://www.grammarly.com/grammar-check} or ChatGPT
        (but don't write your entire thesis using the tool - this greatly hampers
       creativity. Also, notice that there will be checks for plagiarism).
92 \end{itemize}
93
94 Feel free to suggest any clarifications and additions to these guidelines by contacting
        \href{\mainauthormail}{\mainauthor}.
95
96 \newpage
97
98 \renewcommand{\thesubsection}{\Alph{subsection}}
99 \counterwithin{figure}{subsection}
100 \counterwithin{table}{subsection}
101 \pagebreak
102 \appendix
103 \section{Appendices}
104
105 \subsection{\LaTeX{} Related Advice}
106 \label{sec:latex}
107
108 \subsubsection{\LaTeX{} Related Tutorials}
```

```
Many good tutorials on \LaTeX{} can be found online. In particular, \href{https://www.google.com/search?client=safari&rls=en&q=overleaf+tutorial&ie=UTF-8&oe=UTF-8}{tutorials} provided by Overleaf can be a good starting point.

\subsubsection{Section Numbering for Appendix}
To change the section numbering style from numeric (numbers) to alphabetic (letters) use the following lines after the command \lstinline|\appendix|:

\begin{lstlisting}
% include the following line in the preamble: \usepackage{chngcntr}
\newpage
\renewcommand{\thesubsection}{\Alph{subsection}}
\counterwithin{figure}{subsection}
\counterwithin{table}{subsection}
\pagebreak

\section{Appendices}

\subsection{Code Documentation}
% put contents here
\end{lstlisting}

\subsubsection{Bibliography Options}
For bibliographies in \LaTeX{}, we recommend studying the relevant \href{https://de.overleaf.com/learn/latex/Bibliography_management_with_biblatex}{Overleaf tutorial} and using the following parameters for citations:

\begin{lstlisting}
\usepackage[sorting=none,style=numeric,backend=biber]{biblatex}
\end{lstlisting}
The following listing contains the \LaTeX code used for compiling this document (without the preamble, which would be too long to include!).

\subsection{\LaTeX{} code of this very document}
\lstinputlisting{Various/MA Thesis/MA Thesis Guidelines.tex}

\newpage
\printbibliography

\newpage
\printglossary
```

References

[1] Michele Volpi and Devis Tuia. "Dense semantic labeling of sub-decimeter resolution images with convolutional neural networks." In: *IEEE Trans. Geoscience and Remote Sensing* 55 (2017), pp. 881–893.

[2] M. Kampffmeyer, A. B. Salberg, and R. Jenssen. "Semantic Segmentation of Small Objects and Modeling of Uncertainty in Urban Remote Sensing Images Using Deep Convolutional Neural Networks." In: *2016 IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*. 2016, pp. 680–688.

[3] Xiao xiang Zhu, Devis Tuia, Lichao Mou, Gui-Song Xia, Liangpei Zhang, Feng Xu, and Friedrich Fraundorfer. "Deep learning in remote sensing: a review." In: *CoRR* abs/1710.03959 (2017).

[4] Evan Shelhamer, Jonathan Long, and Trevor Darrell. "Fully Convolutional Networks for Semantic Segmentation." In: *2015 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)* (2015), pp. 3431–3440.

[5] Felix Friedrich. *Vorlesung: Datenstrukturen und Algorithmen an der ETH Zürich*. 2018. URL: https://lec.inf.ethz.ch/DA/2018/slides/daLecture1.handout.2x2.pdf (visited on 12/04/2023).

Glossary

AI Artificial Intelligence. 3

IDE Integrated Development Environment. 2

MA Maturaarbeit. 1, 3
ML Machine Learning. 3

TOC Table of Contents. 2

URL Uniform Resource Locator. 3