HUMBOLDT-UNIVERSITÄT ZU BERLIN

LaTeX for Linguists

LaTeX 1: Basics

Sebastian Nordhoff & Antonio Machicao y Priemer

www.linguistik.hu-berlin.de/staff/amyp

LOT 2019, Amsterdam

January 13, 2019

Contents

1. What is LaTeX?
   - History
   - WYSIWYG vs. WYGIWYN
2. Overleaf
3. Document structure 1
4. Document class
5. Commands
6. Document structure 2
   - Headlines
   - Cross references 1
   - Paragraphs & line breaks
   - Table of contents
   - Footnotes
7. Characters & spaces
   - Special characters
   - Space & line break
8. Commenting out
9. Text formatting
10. Text environments
    - Quotations
    - List environments
    - Abstract
11. Loading packages

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

History

- $\tau\epsilon\chi$ (TeX) was developed between 1977 and 1986 by Donald E. Knuth.
- LaTeX is an interface with helpful macros for the TeX system. It was written by Leslie Lamport (= **La**mport **TeX**).
- LaTeX works with markup tagging conventions – similar to HTML – to
  - define the structure of the document (e.g. chapters and sections),
  - for typographic marking (e.g. bold and italics),
  - for cross-references (e.g. citations)

WYSIWYG vs. WYGIWYN

- *MS Word* or *Libre Office*: **WYSIWYG** (*what-you-see-is-what-you-get*)

This is a headline

This word is **bold** and this one is in *italics*.

- LaTeX: **WYGIWYN** or **WYGIWYM** (*what-you-get-is-what-you-need/mean*)

```
\section{This is a headline}

This word is \textbf{bold} and this one is in \textit{italics}.
```

Overleaf

1. Go to: `https://www.overleaf.com`
   Overleaf is an online LaTeX editor.
2. **Register** with your email address and create a new blank project.
   Your project is not completely empty. Overleaf provides already some information. Later, we are going to change this information.
3. **Compile** your project: Click on the green button *Recompile*.
4. PDFLaTeX is the **standard compiler**. Write 5 ¿ 4 after the section *Introduction*, compile, and see what happens.
5. **Change compiler**: Click on the Overleaf menu icon above the file list panel, and set the *Compiler* setting to 'XeLaTeX'.
6. **Recompile** your project, and see what happens.

You will find the tasks for our course here:
`https://github.com/langsci/latex4linguists/blob/master/1-1.md`

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Document structure 1

A LaTeX document consists of (at least) two parts: **preamble** and **body**.

LaTeX preamble

part of the document where **global characteristics** of the document are specified.

LaTeX body

part of the document where **local characteristics** of the document are specified and where you write your document.

Exercise

- Insert the following lines in your `.tex` file and compile.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Compile: XeLaTeX BibTeX XeLaTeX XeLaTeX
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\documentclass{scrartcl}

%%%%%%%%%%%%%PACKAGES%%%%%%%%%%%%%

%%%%%%%%%%%%%COMMANDS%%%%%%%%%%%%%

%%%%%%%%%%%%%META DATA%%%%%%%%%%%%%

%%%%%%%%%%%%%END PREAMBLE%%%%%%%%%%%%%

%%%%%%%%%%BEGIN DOCUMENT%%%%%%%%%%

\begin{document}

This is my first \LaTeX\ file.

\end{document}

%%%%%%%%%%END DOCUMENT%%%%%%%%%%
```

- Write something after the `\end{document}` command and compile again.

Document class

Global parameters of the layout can be specified in the `documentclass` command. The most commonly used classes are:

- `book` for books
- `article` for articles, without chapters, only with sections
- `beamer` for presentations, without chapters, only with sections

Variations of these classes (not in American formats) are provided by the `KOMA-Script`:

- `scrbook` for books
- `scrartcl` for articles, without chapters, only with sections

You can specify **options** in your `documentclass` command.

- **Font size** as default: `10pt`, `11pt`, `12pt`
  Default → `10pt`
- **Paper format**: `letterpaper`, `a4paper`
  Default → `letterpaper`

Specification of paper format in `KOMA-Script` classes: `paper=a4`, `paper=letter`

Exercise

- Specify the following options for your document `.tex` file and compile.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Compile: XeLaTeX BibTeX XeLaTeX XeLaTeX
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\documentclass[10pt, paper=a4, abstracton]{scrartcl}

%%%%%%%%%%%%%PACKAGES%%%%%%%%%%%%%

%%%%%%%%%%%%%COMMANDS%%%%%%%%%%%%%

%%%%%%%%%%%%%META DATA%%%%%%%%%%%%%

%%%%%%%%%%%%%END PREAMBLE%%%%%%%%%%%%%

%%%%%%%%%%%BEGIN DOCUMENT%%%%%%%%%%%

\begin{document}

This is my first \LaTeX\ file.

\end{document}

%%%%%%%%%%%END DOCUMENT%%%%%%%%%%%
```

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Commands

In LaTeX, there are normally **3 types of commands**:

- **declarations:** backslash + command name
  The scope of the command can be defined by an environment or with curly brackets.

```
\declaration ...
{\declaration ...} outside of scope
```

```
{\Huge Hello world!} outside of scope
```

- **simple commands:** backslash + command name + optional arguments (square brackets) + obligatory arguments (curly brackets)

```
\name[optional]{obligatory}
```

```
\textit{Text in italics}
```

- **environments:** `begin` + `end` command.
  Command applies between `begin` and `end`.

```
\begin{environment}[optional]
...
\end{environment}
```

```
\begin{center}
Hello world!
\end{center}
```

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Meta data

Specifying the **meta data** of your document **in the preamble**:

```
\author{first name last name \and first name last name}
\title{my title}
\subtitle{my subtitle}
\date{14th Februar 2019}
```

- Other options for date: `\date{\today}`, `\date{}`
  Default → `\date{\today}`

Use the command `\maketitle` after `\begin{document}` to include this information in your output.

Exercise

Specify the meta data in your document with two authors, use the `\maketitle` command, and try different commands for date.

```
\documentclass[10pt, paper=a4, abstracton]{scrartcl}

%%%%%%%%%%%%%PACKAGES%%%%%%%%%%%%%

%%%%%%%%%%%%%COMMANDS%%%%%%%%%%%%%

%%%%%%%%%%%%%META DATA%%%%%%%%%%%%%
\author{Sebastian Nordhoff \and Antonio Machicao y Priemer}
\title{\LaTeX\ for Linguists}
\subtitle{My first \TeX\ document}
\date{\today}

%%%%%%%%%%%%%END PREAMBLE%%%%%%%%%%%%%

%%%%%%%%%%%BEGIN DOCUMENT%%%%%%%%%%%

\begin{document}

\maketitle
```

Headlines

Commands for the structure of your text:

- `\part{title}` (only in `book`/`scrbook` and `report`/`scrreprt`)
- `\chapter{title}` (only in `book`/`scrbook` and `report`/`scrreprt`)
- `\section{title}`
- `\subsection{title}`
- `\subsubsection{title}`
- `\paragraph{title}`
- `\subparagraph{title}`

These commands can be used with an option, e.g.

```
\section[short title]{long title}
```

The text in the **option** – when used – appears in the **table of contents** and in the **headers**, otherwise only the text in the **argument** is used.

Cross references 1

To work with cross references, you need two things:

1. a `label` with an `ID`: `\label{ID}`
   The `ID` must be **unique** for the labelled element in your document.
2. a `reference`: `\ref{ID}`
   With the `ref` command, LaTeX will take the **number of element labelled** with the given `ID` and use it for cross references.

The `label` command must **follow** (if possible: immediately) the element it is labelling.

The command `\pageref{ID}` will give you the **page** in which the labelled element appears.

```
\section{Introduction}
\label{sec:Intro}

To see how cross referencing works, take a look at Section \ref{sec:Intro}
which is on page \pageref{sec:Intro}
```

For long works, it is **useful** to have **prefixes**. They help you to find your references faster.

- `sec` for sections, subsections, ...
- `fig` for figures
- `tab` for tables
- `it` for numbered items in lists
- `eq` for equations
- `fn` for footnotes

```
\section{Introduction}
\label{sec:Intro}

To see how cross referencing works, take a look at Section \ref{sec:Intro}
which is on page \pageref{sec:Intro}
```

Paragraphs & line breaks

- new **paragraph**: twice ⟨ENTER⟩ (↵) key
- **line** break: `\newline` or `\\` cause a line break without ending the paragraph.
- new **page**: `\newpage` or `\clearpage`
- `\noindent` **prevents** the **indentation** after a line break.

Table of contents

To **generate** a **table of contents** just include the following command in the body of your document at the position where you want the toc to appear.

LaTeX generates your toc taking the **information from your structuring commands** (e.g. `\section[short title]{title}`).

```
\tableofcontents
```

```
%%%%%%%%%%BEGIN DOCUMENT%%%%%%%%%%

\begin{document}

\maketitle

\tableofcontents


\section[Introduction]{A short introduction}

This is an sample text. The only purpose of this text is to show how to work with \LaTeX . It is
not necessary that this text has any meaning. It should only show some properties of the
system we are using.


\subsection{A note on the data}

This is an sample text. The only purpose of this text is to show how to work with \LaTeX . It is
not necessary that this text has any meaning. It should only show some properties of the
system we are using.


\end{document}

%%%%%%%%%%END DOCUMENT%%%%%%%%%%
```

Footnotes

To generate a footnote use the following command at the position where the **footnote index** should appear.

```
\footnote{content of the footnote}
```

Example

```
This is an sample text. The only purpose of this text\footnote{A text
(literary theory) is any object that can be read.} is to show how
to work with footnotes in \LaTeX .\footnote{\LaTeX\ is a document preparation
system.}
```

Exercise

Go to
`https://github.com/langsci/latex4linguists/blob/master/1-1.md`
and follow the instructions of the **first four blocks** in your `.tex` file.

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Characters & spaces

- The following characters can be used without problems:

```
a...z A...Z 0...9
. , : ; ? ! ‘ ’ " ( ) + - * =
```

- With XeLaTeX, you can write **accents** and **umlauts** without further commands. Another option is to use **commands** for that:

```
\"A \"O \"a \"o \’a \‘o \ss{} \^u \~n

\"{A} {\"O} {\ss}
```

(1) Ä Ö ä ö á ò ß û ñ
Ä Ö ß

- The following characters have a **special meaning** in TeX.
You must **escape** their function to use them. (It depends on your compiler e.g. XeLaTeX vs. PDFLaTeX)

```
# $ & _ { } \ < > | ~ ^ [ ] %
```

- escaping with **backslash**

```
\# \$ \& \_ \{ \} \%
```

(2) # $ & _ { } %

- escaping with **macros** or **math mode**

```
\textbackslash \textasciitilde \textasciicircum
\textgreater $>$ \textless $<$ \textbar $\vert$ $|$
```

(3) \ ~ ^ > > < < | | |

- **Angled brackets** ¡ ¿ can be used in XeLaTeX without further commands.
- **Square brackets** [ ] can be used in plain text, but they can mark also the **option** of a command (e.g. in `\section[short title]{title}`).
  In this case use `\[ \]`

More on special characters:
`https://en.wikibooks.org/wiki/LaTeX/Special_Characters`

Space & line break

special treatment of **spaces** and **line breaks** to avoid typographic errors

- **no difference** between a **blank** and a **tab**
- **Consecutive blanks** are treated as only one blank.
- A **blank** at the **beginning of a line** is ignored.
- One **line break** (1x ⟨ENTER⟩) is interpreted as a blank.
- One **empty line** (2x ⟨ENTER⟩) is interpreted as the end of a paragraph.
- **More than one empty line** is interpreted as one empty line.

Example

```
  This is      a sample          text with too  many spaces. Here, I use one
line break.
This is a sample text. Now, I use one blank line.

This is a sample text. Now, I use 3 blank lines.



This is a sample text.
```

This is a sample text with too many spaces. Here, I use one line break. This is a sample text. Now, I use one blank line.
This is a sample text. Now, I use 3 blank lines.
This is a sample text.

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Commenting out

In LaTeX, text following the character **%** in a line will be **ignored**.

- **hiding code/text**, without deleting it;
- **finding errors** in sections;
- **avoiding blanks** and **empty lines** in a long input line;
- **writing comments** without seeing it in the output.

```
This is a sample text. %This are just notes
%Here is a special characters and a command: & \small

A comment can divide a word:
Rindfleischetikettierungs% 5 morphemes
überwachungsaufgaben% 6 morphemes
übertragungsgesetz.
```

This is a sample text.
A comment can divide a word: Rindfleischetikettierungsüberwachungsaufgaben-übertragungsgesetz.

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

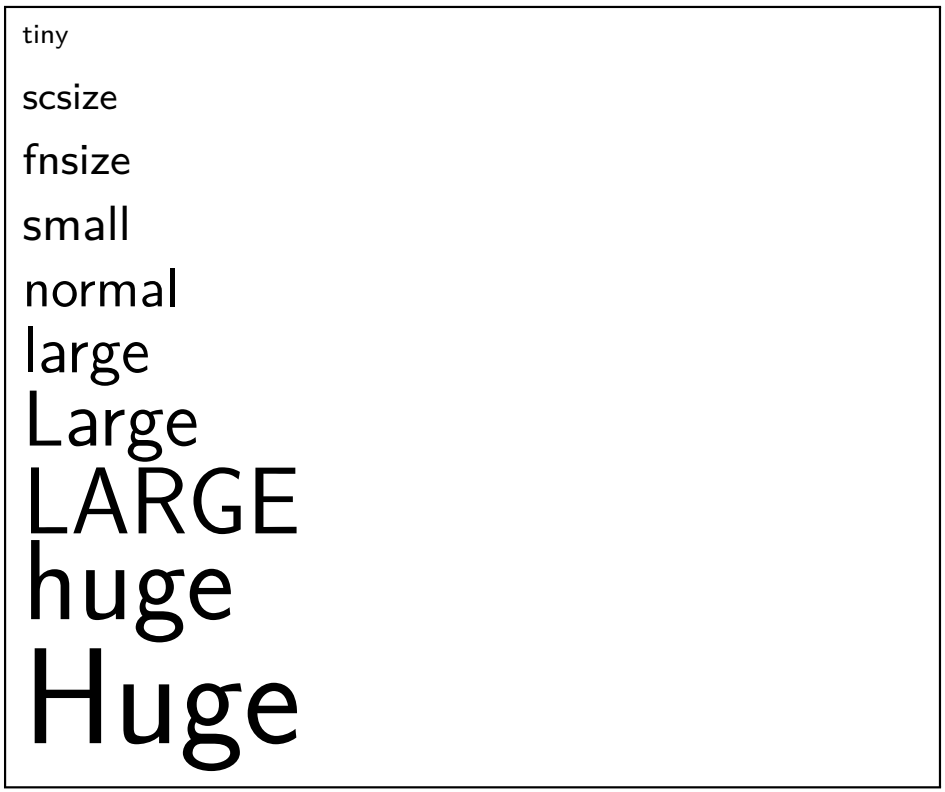
Text formatting

```
\textbf{bold}
\textit{italics}
\textsl{slanted}
\emph{emphasized}
{\it test \textup{upright} test}
\texttt{typewriter}
\textsc{small caps}
ex\textsuperscript{up}
ex\textsubscript{down}
```

bold
italics
slanted
emphasized
test upright *test*
`typewriter`
SMALL CAPS
ex$^{\text{up}}$
ex$_{\text{down}}$

Some of these commands can be also used as **declarations**.

```
{\tiny tiny}
{\scriptsize scsize}
{\footnotesize fnsize}
{\small small}
{\normalsize normal}
{\large large}
{\Large Large}
{\LARGE LARGE}
{\huge huge}
{\Huge Huge}
```



The commands for font size can be used as **declarations** or as **environments**.

Exercise

Go to
`https://github.com/langsci/latex4linguists/blob/master/1-1.md`
and follow the instructions of the **fifth block** in your `.tex` file.

Test further commands!

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Text environments

You will normally need the following text environments:

- quotations,
- lists,
- abstracts,
- ...

Quotations

- In LaTeX there are two environments for quotations `quote` and `quotation`.
- Both show a different output dependent on the document class (e.g. `beamer` vs. `article`).

```
This is a sentence before the \texttt{quote} environment.
\begin{quote}
Furthermore, each actual ‘‘language’’ will incorporate a periphery of borrowings
    ,
historical residues, inventions, and so on, which we can hardly expect to -- and
indeed would not want to -- incorporate within a principled theory of UG. [\dots]

Viewed against the reality of what a particular person may have inside
his head, core grammar is an idealization.
\hfill (Chomsky,~1981:~8)
\end{quote}
This is a sentence after the \texttt{quote} environment.
```

List environments

LaTeX has 3 pre-defined and 1 general list environments:

- `itemize`,
- `enumerate`,
- `description`,
- `list`.

Every environment begins with the `\begin{ }` and ends with the `\end{ }` command. Each point in the list begins with `\item`.

```
\begin{itemize}
\item syntax
\item semantics

\begin{itemize}
\item lexical semantics
\item propositional semantics
\end{itemize}

\item morphology
\end{itemize}
```

- syntax
- semantics
  - lexical semantics
  - propositional semantics
- morphology

The `description` list can be used for terms with their definitions.

```
\begin{description}
\item[Morpheme:] smallest grammatical unit in a language bearing a meaning

\begin{description}
\item[Allomorph:] phonetic variant of a morpheme
\end{description}

\item[Phoneme:] systematic unit of sound (or gesture in the case of sign
languages, see chereme) that distinguish one word from another in a particular
language
\end{description}
```

Morpheme: smallest grammatical unit in a language bearing a meaning

  Allomorph: phonetic variant of a morpheme

Phoneme: systematic unit of sound (or gesture in the case of sign languages, see chereme) that distinguish one word from another in a particular language

Combining lists

Lists can be **combined** and **embedded** in other list types.

```
\begin{description}
\item[Morpheme:] smallest grammatical
unit in a language bearing a meaning

\begin{itemize}
\item minimal unit in morphology
\item subtypes:

\begin{enumerate}
\item roots
\item prefixes
\item suffixes
\item \dots
\end{enumerate}

\end{itemize}

\end{description}
```

Morpheme: smallest grammatical unit in a language bearing a meaning

- minimal unit in morphology
- subtypes:
  1. roots
  2. prefixes
  3. suffixes
  4. ...

Customizing lists

Bullet points can be customized with an **optional parameter**.

```
\begin{itemize}
\item standard symbol
\item[+] customized
\item[--] customized
\item[--] customized
\end{itemize}
```

- standard symbol
+ customized
– customized
– customized

```
\begin{enumerate}
\item standard symbol
\item[+] customized
\item[+] customized
\item[--] customized
\item standard symbol
\end{enumerate}
```

1. standard symbol
+ customized
+ customized
– customized
2. standard symbol

Abstract

For automatic abstracts, use the option `abstracton` in the `\documentclass` command.

```
\begin{abstract}
An abstract is a brief summary of a research article, thesis, or any in-depth
analysis of a particular subject and is often used to help the reader quickly
ascertain the paper's purpose.\par
When used, an abstract always appears at the beginning of a manuscript, acting
as the point-of-entry for any given academic paper.
\end{abstract}
```

Abstract

An abstract is a brief summary of a research article, thesis, or any in-depth analysis of a particular subject and is often used to help the reader quickly ascertain the paper's purpose.
When used, an abstract always appears at the beginning of a manuscript, acting as the point-of-entry for any given academic paper.

Exercise

Go to
`https://github.com/langsci/latex4linguists/blob/master/1-1.md`
and follow the instructions of the **blocks 6–8** in your `.tex` file.

Test further commands!

1 What is LaTeX?
2 Overleaf
3 Document structure 1
4 Document class
5 Commands
6 Document structure 2
7 Characters & spaces
8 Commenting out
9 Text formatting
10 Text environments
11 Loading packages

Loading Packages

- The functions LaTeX offers are restricted. Most **extra features** you will need are in **packages** that you can load in your TeX document.
- Packages must be loaded in the **preamble** of your document.

```
\usepackage[parameter1, parameter2]{package name}
```

- Normally, (many) LaTeX packages are already **pre-installed** in your TeX distribution (e.g. MiKTeX).
- (Almost) every other package (and its manual) can be **downloaded** from CTAN – The Comprehensive TeX Archive Network (http://www.ctan.org/)
- With the command `usepackage` your TeX distribution loads the package – or **downloads it automatically** if necessary.

These packages can be useful:

- Language package: `babel` `\usepackage[ngerman, english]{babel}`
- Font: `libertine` `\usepackage{libertine}`
- Blind text: `blindtext` `\usepackage{blindtext}`
- URLs: `url` `\usepackage{url}`
- Links (e.g. for cross references): `hyperref`
  `\usepackage[bookmarksnumbered, hidelinks]{hyperref}`

Sometimes the **order** in that packages have been installed can affect the compilation (e.g. `gb4e` and `forest`).

Also, not all packages are **compatible** with each other or with your compiler (XeTeX vs. PDFLaTeX).

Exercise

Go to
`https://github.com/langsci/latex4linguists/blob/master/1-1.md`
and follow the instructions of the **blocks 9–11** in your `.tex` file.

Test further commands!

Internet sources I

- Graphic: File Extensions – xkcd, A webcomic of romance, sarcasm, math, and language
  `https://xkcd.com/1301/`
  [Access: 10/04/2017]
- Link: Akzente und Sonderzeichen in LaTeX.
  `https://de.wikibooks.org/wiki/LaTeX/_Akzente_und_Sonderzeichen`
  [Access: 10/10/2017]
- Link: KOMA-Script.
  `https://www.komascript.de/`
  [Access: 02/01/2019]
- Link: Overleaf.
  `https://www.overleaf.com`
  [Access: 02/01/2019]
- Link: LaTeX/Special Characters.
  `https://en.wikibooks.org/wiki/LaTeX/Special_Characters`
  [Access: 02/01/2019]
- Link: CTAN – The Comprehensive TeX Archive Network .
  `http://www.ctan.org/`
  [Access: 02/01/2019]

Internet sources II

- Software: `MiKTeX`
  `https://miktex.org/`
  [Access: 10/0472017]
- Software: `TeXstudio`
  `https://www.texstudio.org/`
  [Access: 10/04/2017]

Literature I

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris Publications.

Freitag, Constantin & Antonio Machicao y Priemer. 2015. LaTeX-Einführung für Linguisten. Manuscript. `https://www.linguistik.hu-berlin.de/de/staff/amyp/latex-einfuehrung`.

Knuth, Donald E. 1986. *The TeX book*. Boston: Addison-Wesley.

Kopka, Helmut. 1994. *LaTeX: Einführung*, vol. 1. Bonn: Addison-Wesley.

Machicao y Priemer, Antonio & Robyn Kerkhof. 2016. LaTeX-Einführung für Linguisten – Slides. Presentation at the 7th linguistischer Methodenworkshop in the Humboldt-Universität zu Berlin – 22–24 February 2016. `https://www.linguistik.hu-berlin.de/de/staff/amyp/latex-einfuehrung`.