#### HUMBOLDT-UNIVERSITÄT ZU BERLIN



# LATEX for Linguists

LATEX 1: Basics

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LOT 2019, Amsterdam

January 14, 2019

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# What is LATEX?

- $\tau \epsilon \chi$  (TEX) was developed between 1977 and 1986 by Donald E. Knuth.
- Later TeX is an interface with helpful macros for the TeX system. It was written by Leslie Lamport (= Lamport 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)

\text{\section(This is a headline)}

This word is \textbf{\textbf} \text{\textbf} \text{\text} \

## Overleaf

- Go to: https://www.overleaf.com Overleaf is an online LATEX editor.
- 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*.

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

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## 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.

## MTEX 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.

#### \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%%%%%%%%%%%%

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## 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 ... {\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] \begin{center}
... Hello world!
\end{environment} \end{center}
```

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### 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  $\mbox{\mbox{$ 

#### 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%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%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}

\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:

- a label with an ID: \label{ID}

  The ID must be unique for the labelled element in your document.
- a reference: \ref{ID} With the ref command, LATEX will take the number of the 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** on 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.

ETEX 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 a 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 a 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 a 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.}

IATEX for Linguists
Document structure 2

Footnotes

## 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.

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# 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**:

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

- (1) ÄÖäöáòβûñ ÄÖβ
- 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

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

• escaping with macros or math mode

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

- Sometimes angled brackets <> can be used in XeLATEX without further commands.
- Square brackets [] can be used in plain text, but they can also mark the option of a command (e.g. in \section[short title]{title}).
   In this case use \[ \] for the brackets.

#### More on special characters:

https://en.wikibooks.org/wiki/LaTeX/Special\_Characters

# Space & line break

LATEX has a 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.

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# Commenting out

In  $\[ \]$ TEX, 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. %These 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: Rindfleischetikettierungsüberwachungsaufgabenübertragungsgesetz.

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# 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<sup>up</sup>
ex<sub>down</sub>
```

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}
```

```
tinv
scsize
fnsize
small
normal
large
Large
LARGE
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!

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## 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 on 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** with 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:
  - roots
  - prefixes
  - 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}
```

- standard symbol
- + customized
- + customized
- customized
- 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!

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# Loading Packages

- The functions LATEX offers are restricted. Most **extra features** you will need come with **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, LATEX packages are already **pre-installed** in your TEX distribution (e.g. MikTeX).
- Almost every other package (with 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: lipsum or blindtext \usepackage{blindtext}URLs: url \usepackage{url}

• Links (e.g. for cross references): hyperref

 $\verb|\usepackage[bookmarksnumbered, hidelinks]| \{ | hyperref \}|$ 

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 (XelateX vs. PDFlateX).

## Exercise

Go to  $\label{limits} $$ $$ $$ https://github.com/langsci/latex4linguists/blob/master/1-1.md and follow the instructions of the $$ 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 T<sub>E</sub>X 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  $7^{th}$  linguistischer Methodenworkshop in the Humboldt-Universität zu Berlin – 22–24 February 2016.

https://www.linguistik.hu-berlin.de/de/staff/amyp/latex-einfuehrung.