LaTeX for Beginners (PIASTA)

Niels Beuck

University of Hamburg

11. & 12.5.2013

Getting to know each other

- Name, Surname
- Country of origin
- Faculty, Department

PIASTA - Intercultural Living and Learning

PIASTA: International program for all students and alumni

- Welcome & Culture
- Training & Coaching $\Leftarrow$
- Information & Advising

Intercultural PIASTA Evening: every wednesday at 6pm at Rentzelstraße 17, Veranstaltungsraum (EG)

for mor information:

www.uni-hamburg.de/piasta/

Program – Day 1

10:00–10:30	Organizational
10:30–11:30	Introduction to LaTeX
11:30–13:30	Hands on: first steps
$\sim$ 12:15	Lunch break
13:30–14:15	Do it yourself, Exercises
14:15–14:30	Discussions

Some rules for this course

- Please do not eat in the computer room
- No put open bottles or the likes next to the keyboard
- Feel free to ask questions at any time
- You don't have to ask me for leaving the room briefly
- Please tell me if you are leaving early

Previous Knowledge, Expectations

What

- are your previous experiences with LaTeX?
- do you want to use it for?
- are your expectations for this course?

Goals

- Get to know the structure of a LaTeX document
- Get your first practical experience with LaTeX and the correspondent Software
- Be able to understand LaTeX and continue to learn with it on your own after the seminar
- Be able to write a scientific article with LaTeX
- Get ideas on how larger documents work

After the seminar you HAVE TO exercise. DO NOT GIVE UP! :)

Outline

Article

What kind of elements can be found in an article?

History

Donald E. Knuth and TEX

- Professor for computer science at Stanford
- Works on the book "The Art of Computer Programming" since 1962 (volume 4 of 7)
- Interrupted his life's work for a decade to develop TEX, since he was disappointed by the typesetting quality for his book.
- Featurecomplete since 1989
- Design philosophy for TEX:
  - High quality typesetting, especially for mathematical formulas
  - Allowing everyone to produce high quality books with reasonable effort
  - Platform independent: exact same output on all computers, now and in the future

History

Leslie Lamport and LaTeX (Lamport TeX)

- An extension for TeX written in the early 80s
- A set of so called macros written in and for TeX
- Makes TeX much more comfortable to use
- Most widespread method for using TeX
- The names TeX and LaTeXare often used interchangable these days

Some more facts about LaTeX

- TeX is the name of the typesetting system as well as the language to describe the input for it
- Creating documents with TeX is quite easy to learn, but really programming TeX is more difficult
- It is NOT an editor, you can open .tex files in any text editor
- LaTeX provides structural markup, content and layout are defined at different places
- It is a WYSIWYM, not a WYSIWYG system
- LaTeX is often used for mathematical texts
- LaTeX is ideal for scientific documents (e.g. articles, thesis, dissertation, etc), but can also be used for other documents (curriculum vitae, presentations, posters, etc.)
- LaTeX is pronounced different to what you might have guessed ('latech' instead of 'lateks')

Some advantages of LaTeX

- TeX is freely available
- Platform independent (all operation systems: Windows, Linux, MAC)
- .tex documents are portable, it doesn't matter where you edit or compile them
- The typographical quality of the output is very good
- Optimized for looking good in print
- LaTeX supports more than 50 languages in almost all the writing systems of the world
- TeX is extensible and there are large collections of such extensions

LaTeX vs. Word

Characteristics	**LaTeX**	**Word**
Short Documents	-	+
Longer Documents	++	-
Ease of use	-	++
Layout Quality	++	+
Mathematical Formulas	++	-
Formatting	++	-
Price, Availability	++	-
Compatibility	+	-

The Workflow

Step I	Edit a .tex document with a text editor
Step II	Compile it
Result	A PDF file you can view or print

Software

Any text editor can be used as the front-end

UNIX / LINUX

Front-end: **Kile**, emacs+auctex,

Engine: **TeX Live**

Windows

Front-end: **TeXnicCenter**, WinEDT, LEd, WinShell

Engine: **MikTeX**, proTeXt, Personal TeX, BaKoMa, TeX Live

MAC OS

Front-end: TexShop, TexMaker, Aquamacs, AlphaX

Engine: gwTeX, teTeX, CMacTeX, MacTex, OzTeX, Textures

Bibliography management (All platforms): JabRef

WYSIWYG tools: LyX (Linux); Textres, TeXniscope (MAC OS)

Software used in the Seminar

- Engine: Tex Live (pdflatex and bibtex)
- Editor: Kate
- Bibliography: JabRef (`http://jabref.sourceforge.net/`)

First Steps

Logging in

1. log in with your course account
2. open Kate
3. open a terminal
4. create a folder for the seminar

The bare minimum you need in a tex document

```
\documentclass{article}
\begin{document}
Text
\end{document}
```

Try to compile it

Safe the file

Open a terminal and make sure you are in the correct directory

Type **pdflatex filename** in the terminal

Elements in a .tex file

Text	will appear in the output
Commands	begin with a \(backslash) Example: \LaTeX produces LaTeX in the output
Environments	\begin { X } ... \end { X }
Comment	everything after a "%" character will be ignored

Some commands take optional parameters:
\command-name[optional]{parameters}

General form of a command:

NameOfCommand[**optional Parameter**]{**Argument**}
Like seen in *documentclass*[*a4paper, 12pt,oneside*]{*article*}

Anatomy of a command:

1. \(Backslash) – tells LaTeXthat a command is starting
2. *documentclass* – Name of the command, case-sensitive, **Textit** $\neq$ **textit**
3. *[a4paper, 12pt,oneside]* – optional parameters, can always be ommited, what parameters are allowed depends on the command
4. {*article*} – argument, i.e. what the command applies to, some commands have 0 or 2+ arguments Additional arguments need further pairs of brackets.

Packages

Importing Packages

\usepackage{name}

Support for German

usepackage[ngerman]{**babel**} – activates, among other things, the German syllable separation
usepackage[utf8]{**inputenc**} – allows the use of non-ascii characters, like "Umlaute" and other language specific characters. Otherwise you have to write \"a - for ä

Escaping

Certain characters need to be escaped

Character	Escape sequence
\	\textbackslash
^	\textasciicircum { }
|	\textbar
<	\textless
>	\textgreater
~	\textasciitilde
{	\{
same for }, $, %, #, & and _	

The Text Layout

LaTeX does most of the layout for you automatically,
especially spacing and line-breaking.

- extra spaces between words are ignored
- single line breaks are ignored

Paragraphs are separated by blank lines. Beyond that, it does not matter how the text is arranged in the editor.

Line Breaks

\par or a blank line: indicates a paragraph
How to do line breaks manually?

Line Breaks

\par or a blank line: indicates a paragraph

How to do line breaks manually?

Don't!

at least not for paragraphs

Line Breaks

\par or a blank line: indicates a paragraph
How to do line breaks manually?

- **newline** or \\ – cause a line break without starting a new paragraph and without stretching the line
- for other commands: see the handout

Summary – Text Layout

- use blank lines to separate paragraphs
- other spaces or line breaks are ignored
- you can force a line break via \\

Commands for the Title-Page

- **title**{Title} the title of the document
- **date**{Date} It is responsible for specifying the date of publication. With the command **today** you can output the current date. When no date is needed, use **date**{}
- **author**{Author} For several authors, separate the names by by **and**
- **maketitle** At the point where this command is used, all the title page commands are shown.

This is **structural markup**! How the title will look like is defined elsewhere (default for the article class will be used, if nothing else is defined)

Making the title

```
% the information, defined OUTSIDE of the document
environment
\title{Test document}
\author{Name Surname}
\date { \today }

\begin{document}
% the position INSIDE of the document
% usually right at the start
\maketitle
...
\end{document}
```

Abstract

Abstract is just another environment:
\begin{document}
\begin{abstract}
Here is the abstract
\end{abstract}
...

Sectioning Commands

\LEVEL[Short form]{Title}
Possible LEVELS:

- \part
- \chapter
- \section
- \subsection
- \subsubsection
- \paragraph
- \subparagraph

\section* (with a star) for an unnumbered section that does not appear in the table of contents

Sectioning Commands

\LEVEL[Short form]{Title}
Possible LEVELS:

- \part
- \chapter ← not in articles
- \section
- \subsection
- \subsubsection
- \paragraph
- \subparagraph

\section∗ (with a star) for an unnumbered section that does not appear in the table of contents

Table of Contents

A table of contents can be generated automatically from the section structure
tableofcontents

Cross-References

Example: "In Section 3.2 we showed ..."

subsection{section name} % name in the output document
label{labelname} % internal name

In Section **ref**{labelname} we showed ...

Interlude

A bit overwhelmed?

- How can I possibly remember all those commands?
- Do I really have to know all that stuff to be able write even a simple document?
- I already forgot all the details you told me. Maybe latex is not for me?

Interlude

You won't remember most of the details and you don't have to.

- Google is you friend
- copy example code
- some editors provide buttons for many common commands
- there will be a handout
- most important: reuse your old documents as templates!

Formatting

- Font size
- Font style (like bold or italics)
- Align text (center, left, right)
- Changing the font

Let's ask Google

Font Size

- \small: small
- \large: large
- \huge: huge

reset with *normalsize*

or limit scope by grouping:

or {\huge limit scope} by grouping:

Font Style

\textbf{bold face}: **bold face**

\textit{italics}: *italics*

Alignment

environments: flushleft, center and flushright

this text is centered

this text is right alligned

Font Type

- {\rmfamily with serifs}: with serifs
- {\sffamily without serifs}: without serifs
- {\ttfamily monospaced}: `monospaced`

Alternative: \textrm{}, \textsf{}, \texttt{}

You can also change the type for the hole document by loading a package for a font, like *usepackage*{*times*}

A warning

2 Here be a section title
something went terribly wrong here ...

```
{ \large \bfseries \sffamily 2 Here be a section title } \\
{ \rmfamily something went terribly wrong here ... }
```

Please don't do this :(

Lists

Lists are environments
Main types:

1. Enumeration - enumerate
2. List with bullets - itemize
3. Concept explanation, definition - description

Each item in a list is marked with \item.
For description you have to use the form:
\item[NAME:] Text describing the name

Footnotes

... some text **footnote*{*footnote text*}*. some more text ...*

This generates an automatically numbered footnote with the given text at the bottom of the same page.

Do it yourself

Try to install LaTeX on your computer at home
If you encounter problems: tell me

Tomorrow we will cover:

- Pictures
- Tables
- References
- Writing Formulas
- Bibliographies

Any additional topic you wish to see covered tomorrow?

Feedback?

Anything you would like to see changed tomorrow? Like more time for trying out things yourself?

See you tomorrow :)
(At **10:00** o'clock!)

Yesterday we learned about

- General structure of a document
- Text formatting
- Lists

Today we will learn about

- Graphics
- Tables
- Bibliography
- Writing Formulas
- Using styles
- Writing larger documents

Graphics

Needed package: \usepackage{**graphicx**}

Command: \includegraphics[options]{path/filename}

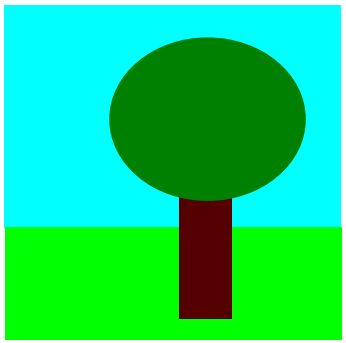
Optional parameters: (comma separated)

- height = 3cm
- scale = 1.5
- width = 0.5 \textwidth
- angle = -90
- viewport =30 30 120 150 % (left bottom , right top)
- clip useful when using a viewport, same effect: \includegraphics*

Hint: You can use subfolders for the image files

Graphics – An example

```
\usepackage{graphicx}
% there is also a package named graphics,
% but graphicx provides more options
...
\includegraphics[width=0.2\textwidth]{Tree.jpg}
```



Picture formats

Supported file types:

- .pdf
- .jpg / .jpeg
- .png

.ps and .eps are NOT compatible with **pdflatex**
use **latex** + **dvips** instead (not compatible with the formats above)

Floats

- Floats are elements that are not anchored in the text
- Latex moves them to where they fit best
- There are two types of floats: *figures* and *tables*

Figures

```
\begin{figure}
        \centering
        \includegraphics[width=0.2\textwidth]{Tree.jpg}
        \caption{A Tree}
        \label{fig:tree}
\end{figure}
```

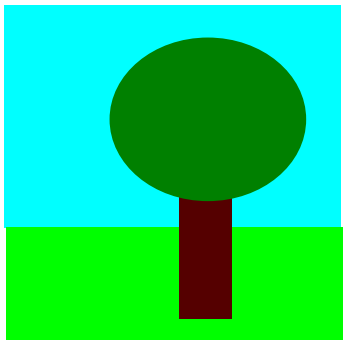


Figure: A Tree

Controlling where figures go

\begin{FLOAT_NAME}**[htbp]**

- h: Here
- t: Top of a page
- b: Bottom of a page
- p: Page (a new page just for figures)

Tables

```
\begin{table}[htbp]
	\begin{tabular}{c|c}
		Column 1 & Column 2 \\
		\hline
		Value 1 & Value 2 \\
	\end{tabular}
	\caption{Test}
	\label{tab:Test}
\end{table}
```

Column 1	Column 2
Value 1	Value 2

Table: Test

More on Tables

- Allignment: c=center, l=left, r=right
- Multi-columns: \multicolumn{no}{c or l or r}{NAME}
- Similar for multirow

More on http://en.wikibooks.org/wiki/LaTeX/Tables

Cross-References

You can make references to any element that is labeled via \label{LABEL_NAME}.
Make a reference via \ref{LABEL_NAME}.
You can make references to tables, images, chapters, sections, etc.
You can create clickable hyperlinks with \hyperref[label]{text}.
You will need the package **hyperref**

Bibliography

The commands:

- \bibliography{BIB_FILE}
- \bibliographystyle{NAME}
- \cite{LABEL}

Hint: for more control over how citations look like, use the package **natbib**

Bib Styles

Possible styles:
alpha, abbrv, plain, acm, apalike
or read from a .bst file
The styles influence:

- the order (alphabetically or as cited in the text)
- the way the citation is done (number, author+year, etc.)

.bib files

Format:
@ REFERENCE_TYPE {LABEL,
FIELD1={Value},
FIELD2={Value},
...
}
only cited refenrences appear in the document

Workflow for bibtex

1. write a .bib file (e.g. with jabref)
2. add \bibliography and \bibliographystyle to your .tex
3. add citations
4. make sure the labes do match
5. call **pdflatex** on your .tex file
6. call **bibtex** on your .tex file
7. call **pdflatex** on your .tex file again
8. and **pdflatex** again

Formulas

Sometimes new packages are needed: *amssymb*,*amsmath*, *theorem*
Environments:

- \$ . . . \$ or \\(. . . \\) or the environment *math* – inline
- \$\$ . . . \$\$ or \\[. . . \\] or the environment *displaymath* – own line unnumbered
- \begin{equation} . . . \end{equation} – own line, automatically numbered

A Selection of Useful Commands in Math Mode

- _ for subscript: \$A_1\$ $\rightarrow A_1$
- ^ for superscript: \$A^1\$ $\rightarrow A^1$
- for more than one character: \$A_{long}\$ $\rightarrow A_{long}$
- \frac for fractions: \$\frac{a+b}{a b}\$ $\rightarrow \frac{a+b}{ab}$
- multiplication: \$X \cdot Y \$ $\rightarrow X \cdot Y$
- greek letters: \alpha \Omega $\rightarrow \alpha\ \Omega$
- arrows: \rightarrow for $\rightarrow$

very useful link:
http://web.ift.uib.no/Teori/KURS/WRK/TeX/symALL.html
(google for: latex math symbols)

Other Document Types

More document classes besides **article**

- Class **beamer** - Slides (This presentation was made like this)
- Class **book** or **report** - Diploma thesis, PhD thesis, Master thesis etc.
- Koma script – better versions of the above classes: **scrartcl, scrreprt, scrbook**
- Class **a0poster** - Poster

Managing Larger Documents

- Write each chapter in its own .tex file
- Include them all in the main .tex file via
  \input {file name without .tex}
- Compile only the main file
- Editors like Kile and TeXnicCenter provide project support

Index and Glossary

- mark words in the text that should appear in the index via \index
- use \makeindex and \printindex to generate

for glossary check the package **glossaries**

Style Files

- Conferences and journals usually provide a style file (.sty)
- The style changes the looks of your document
- Only one line needs to be changed:
  \usepackage { filename without .sty }

Example: ACL style

The End

- Write your first latex document as soon as possible
- Use the .tex file you wrote here as a copy&paste toolbox
- Don't give up!
- I will upload all the materials and send you an email

Discussions and Feedback

- Discussions
- Feedback sheets
- Certificates