# Reference Sheet for a Thesis with LATEX2e and KOMA-Script

- → All examples were tested with pdflatex.
- → The package mentioned in the headings has to be included (see B.2).
- → Compile three times after last change (esp. docs with references).

# A. LATEX Basics

#### A 1 Units

→ Available units for length and dimensions:

bp point (typographic) mm millimeter in inch em width of M px pixel (1/72in) cm centimeter pc pica ex height of x

- → Document dependent units z\textwidth, z\linewidth,  $z \subset \mathbb{Z}$ 0.55\textwidth means 55% of the actual width of the text.
- → \baselineskip minimum vertical space between the bottom of two successive lines in a paragraph.
- → Amounts like \smallskipamount. \medskipamount. \bigskipamount.

## A.2. Reserved Characters (see also E.2, cf. H)

\		introduces a command	\textbackslash
{	}	embraces arguments, creates logical parts	\{ \}
[	]	embraces optional arguments	[ ]
%		comments: code after % will be ignored.	\%
&		separates columns in tabular-like environments	\&
#		parameter for own command declarations	\#
\$		text style math mode (abbr. for \(\))	\\$
_^		index/exponent only valid in math mode, e.g. $a_1^2$	see E.2

# B. Preamble (before \begin{document})

B.1. Documentclass (necessary)

Use: \documentclass[opt,opt,...]{class}

Recommended classes: scrartcl, scrreprt, scrbook, scrlttr2 Non-KOMA-Script classes: beamer, koma-moderncvclassic

Common options with default Values available (subtotal) fontsize=11pt paper=a4, paper=portrait

10pt | 12pt (e.g. 12.5pt also valid) a3 | a5 | b4 | letter, landscape half | full

small | normal

true

headings=big chapterprefix=false

parskip=no

open=right (scrbook) any (scrartcl, scrreprt) | left

captions=oneline nooneline

captions=tablebelow,figurebelow tableabove, figureabove toc=nolistof listof | listofnumbered

bibliography=totoc | totocnumbered nottotoc

twoside=true (scrbook) false (scrartcl, scrreprt) twocolumn=false true

true (show overfull boxes)

→ Options of document class are passed to every loaded package. → Set or change options later in file, e.g. \KOMAoptions{twoside=true}

# B.2. Loading Packages

usepackage[options]{package}

\PassOptionsToPackage[options]{package}

B.3. Encoding Settings

\usepackage[utf8]{inputenc} % most IDEs use UTF8 \usepackage[T1]{fontenc} % most fonts needs T1

B.4. Language Settings with babel

Load: \usepackage[ngerman, main=english]{babel}

Use: \selectlanguage{\language} \foreignlanguage{\language}{\text}

\documentclass[italian]{scrbook} % global option \usepackage[british,main=italian]{babel} % package option \usepackage{csquotes} % package csquotes knows italian

#### C. Lavout

C.1. Changing Page Layout with geometry

→ Let KOMA-Script know of geometry by option usegeometry=true.

\usepackage[left=2cm, right=2, top=3cm, bottom=4cm, bindingoffset=1cm. inlcudeheadfootl{geometry}

- → Auto-completion determines unspecified dimensions (under or over specified as well), here width and height of text (see I.9).
- → Other options: paper=a4paper, landscape|portrait, includehead, includefoot, includeheadfoot, twocolumn
- → Changing page layout mid document: \newgeometry{ opt, opt, ... }

#### C.2. Header and Footer of Page (aka running heading)



% delete default settings and define your own \usepackage[automark]{scrlayer-scrpage} \clearpairofpagestyles \ohead[]{\headmark} \ofoot[\pagemark]{\pagemark}

% Variant for a thesis with horizontal rules at head and foot \usepackage[headsepline=0.005pt:,footsepline=0.005pt:, plainfootsepline,automark]{scrlayer-scrpage} \clearpairofpagestyles \ohead[]{\headmark} \ofoot[\pagemark]{\pagemark} \ModifyLayer[addvoffset=-.6ex]{scrheadings.foot.above.line} \ModifyLaver[addyoffset=-.6ex]{plain.scrheadings.foot.above.line}

# C.3. Linespread with setspace

Load: \usepackage[onehalfspacing]{setspace} for 1.5 line spacing.

# D. Document Structure (see also L)

\setkomafont{pageheadfoot}{\small}

# D.1. Start Document

\begin{document} Complete document contents. \end{document}

simple title:  $\arrange title {text} \arrange title {text} {$ title page self designed: \begin{titlepage} text \end{titlepage}

D.3. Table of Contents, List of Figures (for other List of see E.8 & G) \tableofcontents \listoftables \listoffigures

# D.4. Headings

\part{ title} \section{ title} \paragraph{ title}

\chapter{ title} \subsection{ title} \subparagraph{ title}

KOMAoption toc=listof (see B.1) generates entries for TOC.

\subsubsection{title}

- → \chapter only valid in documentclass scrbook and scrreprt
- → Use \* variants for headings without numbering, no change in counter and no entry in table of contents.
- → Use the optional parameter for short titles in headings and table of contents, e.g. \section[short title]{title}
- → Use \addpart, \addchap or \addsec for unnumbered headings, but with running heading and entry in table of contents. The \* variants delete the running heading.
- → Layout of paragraph and subpargraph similar to other headings: \RedeclareSectionCommands[afterskip=1sp]{paragraph,subparagraph} \setcounter{secnumdepth}{\subparagraphnumdepth} \setcounter{tocdepth}{\subparagraphtocdepth}

## D.5. Justification

Environment	Declaration	Other
\begin{center}	\centering	text \par\vfill text
\begin{flushleft}	\raggedright	text \hfill text
\begin{flushright}	\raggedleft	\raggedbottom, \flushbottom

#### D.6. Lists

\begin{itemize} with bullets \item or \item[symbol]

\begin{enumerate} with numbers \item \begin{description} with bold words \item[word] \begin{labeling}[separator]{labelinglabel} \item[word]

\begin{enumerate} \item First item

\item Second item\label{it:second} % see References \end{enumerate}

#### D.7. Enhanced Lists with enumitem

Load: \usepackage{enumitem}

Example (for enumerate):

\setlist[enumerate,1]{label=\Alph\*)} \setlist[enumerate,2]{label=\alph\*)}

a) one \setlist[enumerate,3]{label=\roman\*)} b) two \setlist[enumerate.4]{label=\arabic\*)} B) two

Example (for legal list):

\newlist{legal}{enumerate}{10}

\setlist[legal]{label\*=\arabic\*.,noitemsep} Use: \begin{legal} \item ...\end{legal}

1 one 1.1 two 1.1.1. three

1.1.2. strawberry

A) one

# D.8. Separate Files

- → After preamble within the text place:\include{file} Text starts and ends on a new page. file has to be in the same directory as the master file. Otherwise specify a path: \include{path/file}
- → In preamble place: \includeonly{file1,file2} to run only these files.
- → Use \input{file} includes a file without starting/ending on a new page (\includeonly not valid).

#### E. Text.

E.1. Paragraphs ( $\approx$  "new idea in content")

Paragraphs are separated by an empty line in the code or by \par. A \\ produces a new line – use sparingly, seldom needed outside tabulars. Correct Overfull Box Warnings with more than 4pt (look into log file).

# E.2. Text Symbols/Characters (see also A.2)

A lot of diacritic symbols can be typed directly, e.g. è é ê ñ ç

\_ \textunderscore{} ~ \textasciitilde{} ^ \textasciicircum{} ... \ldots \textbar

Other symbols need packages, e.g. € \texteuro (textcomp)

# E.3. Fonts

Command	Declaration	Effect
\textrm{text}	{\rmfamily text}	Roman family
\textsf{text}	{\sffamily text}	Sans serif family
\texttt{text}	{\ttfamily text}	Typewriter family
\textmd{text}	{\mdseries text}	Medium series
\textbf{ text}	{\bfseries text}	Bold series
\textup{ text}	{\upshape text}	Upright shape
\textit{text}	{\itshape text}	Italic shape
\textsl{text}	{\slshape text}	Slanted shape
\textsc{text}	{\scshape text}	SMALL CAPS SHAPE
More general comm	ands:	
\emph{ text}	{\em text}	Emphasized
\textnormal{text}	{\normalfont text}	Document font

# E.4. Font Size

Font size is relative to the base font size, specified in the document class.

\Large Large \tinv \scriptsize scriptsize **LARGE LARGE** \footnotesize footnotesize \small small \huge huge \normalsize normalsize \Huge Huge large \large

Use: {\small text} or {\huge text\par} to limit the size change. Example: \setkomafont{pageheadfoot}{\small}

#### E.5. Colors with xcolor

\usepackage{xcolor} \definecolor{DarkBlue}{RGB}{0, 115, 207} \colorlet{col\_section}{DarkBlue} \textcolor{red}{text in red} or {\color{red}text} \colorbox{gray!25}{color gray faded by 25\%}

#### Predefined colors:

gray black red green blue cyan magenta yellow

Fade a color with color! value between 0 and 100 Headings in color: \setkomafont{disposition}{\color{color}}

# E.6. Footnotes

\footnotemark

\footnote{text} Print footnote marker in text and footnote at

bottom of page

Print footnote marker in text (e.g. within tabu-

lar or caption)

\footnotetext{text} Print footnote at bottom of page

### E.7. References with hyperref (loads url implicitly)

\autocite{citekey} Cite a bibliographic reference (package biblatex) Set a marker for cross reference, often if the form \label{marker} \label{sec:item} or \label{fig:diag1}

Give type name and number of marker \autoref{marker} \autopageref{marker} Give abbreviation of "page" and page number of marker

\url{url} Print clickable web page Print clickable link \href[options]{url}{text} Print clickable reference \hyperref[marker]{text}

Style: \urlstyle{xx} with xx a style like "tt", "rm", "sf" or "same". Names for autoref (package babel):

\renewcaptionname{\language}{\typenameautorefname}{\text}, e.g. \renewcaptionname{english}{\subsectionautorefname}{section}

#### E.8. Acronyms with acro

\usepackage{acro,hyperref,longtable,tabu} %next 5 to praeambel \acsetup{list-style=longtabu,list-heading=addchap} \DeclareAcroListStyle{longtabu}{table}{table=longtabu, table-spec=@{}>{\bfseries}lX@{}} \DeclareAcronym{ecm}{short=EM,long=Electro Machining}

\ac{EM} or \Ac{EM} for capitalized first letter

# F. Figures & Tables (floating environments)

# F.1. Figures with graphicx

Load: \usepackage{graphicx}

Use: \includegraphics[opt]{file} (png, jpg, pdf)

With 'figure' the environment to place a graphic is meant. The figure caption is printed where the caption command is placed in the input. Extra vertical space is controlled by the KOMAoption captions (see B.1). Use:  $\begin{figure}[pos] ...\caption{..}\label{fig:x} \end{figure}$ Parameter: pos is a suggestion for placing, it can be ignored by TEX. Possible values are combinations of t (top), h (here), b (bottom), ! (try harder), p (separate page).

Hint: Define a path to the graphic files (no blanks in folder names; no special characters in file names) \qraphicspath{ \ \folder/\{\folder/\}... \ \}

\graphicspath{ {img/} } %subfolder for images; set in preambel \begin{figure}\centering \includegraphics[width=.8\columnwidth]{pic.jpg} \caption[Short title]{Long title}\label{fig:ff} \end{figure}

- → Numbering throughout the whole document (scrbook) with package chngcntr: \counterwithout{figure}{chapter} (same for table)
- → Figure name: \renewcaptionname{\language}{\figurename}{text} \renewcaptionname{language}{\figureautorefname}{text}

typesetted with cmbright, August 18, 2017

### F.2. Subfigures with subcaption

Load: \usepackage{subcaption}

Use:  $\begin{subfigure}[pos]{width}... \end{subfigure}$ 

\begin{figure}[ht] \centering \begin{subfigure}[t]{0.5\textwidth} \centering \includegraphics[height=1.2in]{figure-a} \caption{Subcaption 1}\label{fig:SubFig1}\end{subfigure} \begin{subfigure}[t]{0.5\textwidth} \centering \includegraphics[height=1.2in]{figure-b} \caption{Subcaption 2}\label{fig:SubFig2}\end{subfigure} \caption{Caption of complete figure}\label{fig:Fig1} \end{figure}

# F.3. Tables width aligned material

With 'table' the environment to place aligned material is meant. The table caption is printed where the caption command is placed in the input. For positioning options see F.1.

\KOMAoptions{captions=tableabove} % move to praeambel \begin{table}[htbp] \centering \caption{Table caption}\label{tab:exp} \begin{tabular}{@{}ll@{}} \emph{Name} & \emph{Desc.}\\ \hline tikz2pdf & Python script\\ LaTable & visual table editor \end{tabular}

Use: \begin{tabular}[c b t]{@{} l r c | p{unit}} Column separation: @{\hspace{unit}} or \setlength{\tabcolsep}{unit} Row separation: \\[unit] or \renewcommand{\arraystretch}{unit} Partial lines: \cline{2-3} instead of \hline Additional packages: array, longtable, booktabs, tabu,

xcolor with option table, tabularx, tabulary

# F.4. Colored Table

end{table}

\usepackage[table]{xcolor} % move to praeambel \rowcolors{1}{}{lightblue} % {start row}{odd-row}{even-row} \begin{tabular}{clr} ... \end{tabular}

# F.5. Suppress Floating with float

For a thesis most students want to control the placing of figures and tables themselves. One way is more control with placeins. Another way is to avoid the environments figure and table using \captionof. Quick and dirty is an additional positioning parameter using float: Load: \usepackage{float,scrhack}

# Use: \begin{figure}[H], \begin{table}[H] F.6. Source Code Listings with listings

# Load: \usepackage{listings}

Options: \lstset{ basicstyle=\ttfamily\small, language=Python, numbers=left, keywordstyle=\color{blue}\bfseries } See option literate for Umlauts (literate={ä}{{\"a}}1) Languages: C. C++, Java, Matlab, Python, HTML, XML, ... Use: Environment: \begin{lstlisting} code \end{lstlisting}

In line: \lstinline+code+ (same start- and end char) File: \lstinputlisting{filename}

Resize (graphicx): \scalebox{10}{Giant}

### F.7. Boxes and Rules

Normal: \parbox[pos][height][contentpos]{width}{text} or \begin{minipage}[pos][height][contentpos]{width}text\end{minipage} Lift Text: \raisebox{lift}[height][depth]{text} Framed Box: \fbox{text} or \framebox[width][pos]{text} Colored Box (xcolor): \colorbox{backgroundcolor}{text} Framed colored Box: \fcolorbox{bordercolor}{backgroundcolor}{text}

Lengths: \setlength{\fboxsep}{unit}, \setlength{\fboxrule}{unit}

G. Bibliography with biblatex & External Processor biber

G.1. Entry types

@article @book @inbook @collection @incollection @manual @online @patent @misc @phdthesis @proceedings @neriodical @report @techreport @thesis

G.2. Entry Fields (example see L)

author title iournal vear volume editor publisher institution school series names organization number note key

# G.3. Styles

alphabetic authoryear authortitle numeric mla verbose chem-acs nhvs nature science ieee ana See https://de.sharelatex.com/learn/Biblatex bibliography styles

# G.4. Example

% in preambel \usepackage[autostyle=true]{csquotes} % Load \usepackage[backend=biber,style=nature,language=british] {biblatex} % Load \addbibresource{mybibliographyfile.bib} % Define % anywhere within the document \autocite{citekev} % Use \printbibliography % Print

KOMAoption bibliography (see B.1) generates entry for TOC.

#### G.5. External Processor

IDEs like TEXstudio include the external processor, select biber as bibliography tool for 'build' in preferences, otherwise run biber explicitly.

# H. Math

#### H.1. Math mode (Standard LATEX)

Textstyle:  $(x^2 + 4) \rightarrow x^2 + 4$  as part of the text. Displaystyle: \[ x^2 + 4 \] → separat line, centered Equation: \begin{equation} ... \end{equation} \label{name}

$$\lambda := \lim_{X_1 \to \infty} \int_{X_0}^{X_1} \frac{f\left(\frac{t}{2}\right)}{\sqrt[n]{t^2 + \sin^2(t)}} dt \stackrel{!}{\leq} 1 \tag{1}$$

- → Use \* variant for unnumbered equation (without label).
- Package option for equation position: flegn fixed indent from the left margin instead of centered.
- → Options for positions of equation number: legno or regno.

# H.2. Important Symbols in Math

+	+	_	-	±	\pm	Ŧ	\mp
<	<	$\leq$	\le	«	\11		\cdot
>	>	$\geq$	\ge	>>	\gg	×	\times
=	=	$\neq$	\ne	=	\equiv	$\approx$	\approx
	1	$\perp$	\perp		\mid		\parallel
f′	f'	$\nabla$	\nabla	Δ	\Delta	∂	\partial
$\in$	\in	$\forall$	\forall	∃	\exists	∄	\nexists
$\cap$	\cap	U	\cup	∉	\notin	\	\setminus
l	\ell	_	\angle	0	\circ	Ø	\emptyset
$\vee$	\lor	$\wedge$	\land	$\neg$	\lnot	Ø	\varnothing
Т	\top	$\perp$	\bot	$\infty$	\infty	$\propto$	\propto

#### H.3. Math Functions (upright typeface)

\arccos \arcsin \arctan \arg \cos \cot \cot \csc \deg \det \exp \qcd \hom\inf\ker \lq \lim \liminf \limsup \max \min \Pr \sec \sin \sinh \sup \tan \tanh For other functions use (package amsmath): \operatorname{name}, e.g. \operatorname{arcsinh} (see also J.2).

H.4.	H.4. More Math Functions							
$\sum_{\vec{a}}$	\sum \int \vec{a}	∏ ∫∫ à	\prod \iint \dot{a}	∐ ∬∫ ä	\coprod \iiint \ddot{a}	∮ â	\oint i a i	

H.5. Fonts and Sizes in Math Mode (some from  $A_MSMath$ ) \mathrm{}, \mathit{}, \mathbf{}, \mathsf{}, \mathtt{}, \boldmath{}  $\mathcal{Z}, \mathcal{Z}, \mathcal{Z}, \mathcal{Z}, \mathcal{Z}, \mathcal{Z}$ \displaystyle, \scriptstyle, \scriptscriptstyle, \textstyle \boldsymbol{}

#### H.6. Often used Math Expressions

1	x <sup>n+1</sup>	x^{n+1}	$E_{kin}$	$E_{-}\{\mathbf{mathrm}\{\mathbf{kin}\}\}$
	$\frac{a+b}{2}$	\frac{a+b}{2}	$\sqrt[n]{a^2 + b^2}$	\sqrt[n]{a^2+b^2}
	$x_1, \ldots, x_n$	x_1, \ldots, x_n	$x_1 + \cdots + x_n$	$x_1 + \cdot cdots + x_n$

 $\underline{a}^{\top} A^{\dagger} A^{*}$  $\mbox{myvec{a}^{\circ}}^1 A^{\circ} \mbox{dagger} \mbox{boldmath{A}^{*}}$ ! def

\stackrel{!}{<} \stackrel{\mathrm{def}}{=} ahove mid mid \overset{above}{mid} \underset{below}{mid}

1\newcommand{\myvec}[1]{\ensuremath{\underline{\boldsymbol{#1}}}}

### H.7. Math with amsmath (replacing standard Environments)

equation equation\* One line, one equation multline multline\* One unaligned multiple-line equation, one number gather gather\* Several equations without alignment align align\* Several equations with multiple alignments alignat alignat\* Multiple alignments, choose spacing between cols flalign flalign\* Several equations: horizontally spread form of align Alignment for cases cases split A simple alignment within a multiple-line equation aligned A "mini-page" with multiple alignments A "mini-page" with unaligned equations gathered

- → The content is automatically placed in math mode.
- → Use \intertext{text} to set text within an amsmath environment
- → Length parameter to influence vertical spacing within any amsmath environment: \jot (e.g. \addtolength{\jot}{lex})
- → Add singular vertical space for a line via \\[<amount>1 (see A.1)
- → Use the spreadlines environment from the mathtools package
- Length parameters (with standard values) to influence vertical white space around displayed math formulas: \abovedisplayskip=12pt, \belowdisplayskip=12pt, \abovedisplayshortskip=0pt, \belowdisplayshortskip=7pt

# H.7.1. $A_MS$ Math align

\begin{align} v = d(1) v &= d\\ v = cx + dy &= cx+d\nonumber\\ y &= bx^{2}+cx+d \label{eq:key}  $y = hx^2 + cx + d$ \end{align}

\begin{align\*}

z = 1b =3 & z &= 1\\ y(x) &= cx+d & z &= x+1\\ y(x) = cx + dz = x + 1y\_{12} &= bx^2+cx & z &= x^2+x+1  $y_{12} = bx^2 + cx$   $z = x^2 + x + 1$ \end{align\*}

H.7.2. AMSMath alignat

\begin{alignat}{3} % 2x3-1 '&' are neccessary i\_{11} &=0.25 & i\_{12} &=i\_{21} & i\_{13} &=i\_{23}\\  $i_{21} &= \frac{1}{3}i_{11} & i_{22} &= 0.5i_{12} & i_{23} &= i_{31}$ i\_{31} &=0.33i\_{22} \quad & i\_{32} &=0.15i\_{32} \quad & i\_{33} &=i\_{11}

\end{alignat}

$$i_{11} = 0.25$$
  $i_{12} = i_{21}$   $i_{13} = i_{23}$  (1)

$$i_{21} = \frac{1}{3}i_{11}$$
  $i_{22} = 0.5i_{12}$   $i_{23} = i_{31}$  (2)

$$i_{31} = 0.33i_{22}$$
  $i_{32} = 0.15i_{32}$   $i_{33} = i_{11}$  (3)

# H.7.3. AMSMath flalign

\begin{flalign\*}

& i\_{12} & =i\_{21} & i\_{13} & =i\_{23}\\ i\_{11} & =0.25 i\_{21} & =\frac{1}{3}i\_{11} & i\_{22} & =0.5i\_{12} &  $i_{23}$  &  $=i_{31}\cdot dot \cdot qrt_{5}$  $i_{31} \& =0.33i_{22} \& i_{32} \& =0.15i_{32} \& i_{33} \& =i_{11}$ \end{flalign\*}

 $i_{11} = 0.25$ (1)  $i_{12} = i_{21}$  $i_{13} = i_{23}$ 

 $i_{23} = i_{31} \cdot \sqrt{5}$  (2)  $i_{22} = 0.5i_{12}$ 

 $i_{31} = 0.33i_{22}$  $i_{32} = 0.15i_{32}$  $i_{33} = i_{11}$ 

# H.7.4. $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ Math gather

\begin{gather}

 $D(a,r) \neq \sqrt{z \in \mathbb{C} \cdot \mathbb{C}} \cdot \mathbb{Z} \cdot \mathbb{C}$  $\operatorname{seg} (a,r) \neq x \leq x \leq x$  $\colon \mbox{Im } z < \mbox{Im } a, \mbox{$|z-a| < r \}\$ C (E,  $\t$ heta, r)  $\equiv \bigcup_{e\in E} c (e, \t$ heta, r) \end{gather}

$$D(a,r) \equiv \{z \in \mathbb{C} : |z-a| < r\}$$

$$\operatorname{seg}(a,r) \equiv \{z \in \mathbb{C} : \Im z < \Im a, |z-a| < r\}$$
(1)

$$C(E, \theta, r) \equiv \bigcup_{e \in E} c(e, \theta, r)$$
 (2)

# H.7.5. $\mathcal{A}_{\mathcal{M}}\mathcal{S}$ Math matrix

\begin{matrix} a & b \\ c & d \end{matrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{Bmatrix} a & b \\ c & d \end{Bmatrix} \begin{vmatrix} a & b \\ c & d \end{vmatrix} \begin{Vmatrix} a & b \\ c & d \end{Vmatrix}

 $\begin{bmatrix} a & b \end{bmatrix}$  $\begin{pmatrix} c & d \end{pmatrix}$ cd

Dots: \dots or \ldots lower dots, \cdots vertically centered dots, \vdots vertical dots. \ddots diagonal dots. \hdotsfor[cols]{dotspace} multicolumn dots.

# H.8. AMSMath cases

 $f(n) = \left(\frac{s}{n}\right) = \frac{n}{2} \left(\frac{s}{n}\right)$  $-(n+1)/2 \& \quad \text{end{cases}}$ 

$$f(n) = \begin{cases} n/2 & \text{if } n \text{ is ever} \\ -(n+1)/2 & \text{if } n \text{ is odd} \end{cases}$$

# H.9. Arrows

→ \mapsto → \rightarrow ⇒ \Rightarrow → \longrightarrow ⇒ \Longrightarrow ← \leftarrow ← \Leftarrow ← \longleftarrow ← \Longleftarrow ↑ \uparrow \Uparrow \downarrow \Downarrow → \leftrightarrow \Leftrightarrow  $\Leftrightarrow$ 

⇒ \rightrightarrows ≒ \leftrightarrows 

#### H.10. Delimiters (.) (.) [.] [.] \lfloor.\rfloor [.] \lceil.\rceil {.} \{.\} 1.1 |.| \vert.\vert $\langle . \rangle$ \langle.\rangle ||.|| \L.\I

- → Use \left expr \right to stretch delimiters to the height of expr
- → A missing delimiter can be added with ., e.g. \left.
- → For manual sizing use \big, \Big, \bigg, e.g. \Big\| \Big\\ceil

#### H.11. Physical Units with siunitx

Load: \usepackage[sticky-per=true, per-mode=reciprocal]{siunitx} Options: \sisetup{output-decimal-marker={,}, per-mode=symbol} Use:  $\num{number}$ ,  $\si{unit}$ ,  $\si{number}$ ,  $\ang{deg;min;sec}$ 

 $7123456.7 \times 10^{1} \text{ } \text{num} \{7123456.7e1\}$ 4°32′10″ \ang{4;32;10}

 $[q] = m s^{-2}$ [g] = \si{\meter\per\second\squared}  $E = 1.3 \frac{kV}{max}$ E = \SI{1.3}{\kilo\volt\per\milli\meter} SI units like \degreeCelsius, \henry; prefixes like \kilo, \exa.

# I. Typographic Issues

	I.1. Hyphen and Dashes (for Minus see H.2)					
Name	Source	Example	Use			
hyphen	-	X-ray, in- and output	Connecting word			
en-dash		1-5, Paris-Rome	Range or Toward			
en-dash		Paris – except Rome	European dash			
em-dash		Paris—except Rome	American dash			

# I.2. Quotation Marks with csquotes

Load: \usepackage[autostvle=true]{csquotes}

Use: \enguote{text} and \foreignguote{language}{text}

available are all languages loaded with babel, nesting is possible;

variants provide inner nesting style.

Exmp: "Some 'english'." / "Ein Deutscher Text" / « parler français »

#### 13 Font Combinations

Rule: Use serif fonts for long body text and sans-serif for headings. Hint: Load fonts with combined math fonts Example packages: mathptmx (Times), mathpazzo (Palatino), mathpple (Palatino text, Euler math), mathtime (Times text, Belleek math). Hint: Add \KOMAoptions{DIV=last} after loading a font package.

#### L4 Numbers and Dates

Numbers Style Use old-style 1234567890 text, dates 1234567890 math lining

British American European 27/06/17 06/27/17 27.6.2017 27 June, 2017 June 27, 2017 27. Juni 2017

International notation (ISO 8601): yyyy-mm-dd: 2017-06-27

#### I.5. Spacing horizontally

Avoid spacing with fixed units like \hspace{0.5cm} use \quad or \qquad instead (see also A.1). Spacing in math is almost always right!

М	ath	Math	/Text	Math/Text	Math/T	ext
a b	ab	a\!b ≀	ab ab	a\;b <i>a b</i> a b	a b	a b
a\>b	a b	a∖,b	ab ab	a\ b <i>a b</i> a b	a\qquad b	a b

\hspace{length}; \* variant \hspace\*{length} space even at line start Use with care: \hphantom{text}

#### I.6. Spacing vertically

- → Vertical space is only effective between paragraphs (see E.1).
- → Avoid spacing with fixed units like \vspace{0.5cm} use rubber length like \smallskip, \medskip or \bigskip instead (see also A.1)
- → \vspace{|ength}: \* variant \vspace\*{|ength} space even at page start
- → \\[unit] (see A.1)
- → Use with care: \vphantom{text}

#### 1.7. Preventing Breaks

- → Protected space between words: ~
- → Prevent line breaking within text: \mbox{text}
- → Prevent page breaks: \nopagebreak[num], num between 1 and 4
- → Cheat a bit on page size: \enlargethispage{unit} (see A.1)

# I.8. Penalties

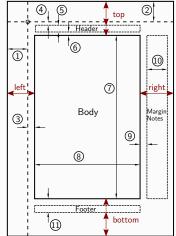
Penalties are the main values that TFX tries to minimise when line or page breaks are calculated

acceptable badness of lines after hyphenation

\linepenalty=10 page break within a paragraph line break at an automatic hyphen \hvphenpenaltv=50 \binoppenalty=700 line break at a binary operator \relpenalty=500 line break at a relation

\clubpenalty=150 page break after first line of paragraph page break before last line of paragraph \widowpenalty=150 \brokenpenalty=100 page break after a hyphenated line

\tolerance=200 I.9. Page Layout



- ① lin + \hoffset ② lin + \voffset ③ \oddsidemargin
- ♠ \topmargin ⑤ \headheight ⑥ \headsen ⑦ \textheight \textwidth 9 \marginparwidth
- (0) \marginparwidth (1) \footskip

Hint: This image with the current values of the specific document can be generated by loading the package layout and the command \layout.

# J. Own Commands and Environments

#### 11 Own Commands in General

- → \newcommand doesn't work if the command is already defined: so it's a completely new definition
- → \renewcommand works only if the command is already defined: it's a
- → \providecommand works like \newcommand, but if the command is
- already defined, the (re)definition is ignored.
- → \AtBeginDocument{commands} can be helpful.

#### 12 Own Commands

Define: \newcommand{\cmdname}{commands}

Exmp: \newcommand{\mytext}{Some text which I need very often.} Exmp: \newcommand{\diff}{\mathop{}\!\mathrm{\vphantom( d}} Params: #1 . . . #9

Define: \newcommand[paramsquantity]{\cmdname}{cmds #1 ...} Redefine: \renewcommand[paramsquantity]{\cmdname}{commands}

Copy: with letltxmacro: \LetLtxMacro{\cmdcpyname}{\cmdname}

Define: \DeclareMathOperator{name}{commands} Exmp: \DeclareMathOperator{\dirac}{\ensuremath{\delta}}

Exmp: \DeclareMathOperator{\acrsinh}{arcsinh}

#### J.3. Own Environments

Define: \newenvironment{envname}{cmds begin}{cmds end}

Params: #1 ... #9

Define: \newenvironment{envname}[paramsquantity]{cmds begin #1

...}{ cmds end #2 ...}

\newenvironment{colorpar}[1]{\color{#1}}{\normalcolor} Fxmp: \begin{colorpar}{violet} text \end{colorpar}

#### J.4. Some important Variables

Counters: page, section, figure, equation; to get the formatted content of a counter add \the, e.g. \thepage

Lengths: \textwidth, \linewidth, \columnwidth, \parindent, \parskip

Change: \setlength, \addtolength

#### J.5. Helpfull other Commands for defining own Commands

- → \ensuremath, e.g. \$\tx=...\$ defines \tx. by  $\mbox{\newcommand} \operatorname{\xi}_{\newcommand} \$ → Look for \Declare... in package documentations.
- → Packages: etoolbox, xparse, xkeyval, calc; see also tocbasic.

# K. Useful Weblinks and Summary of Packages

Forum http://latex.org Forum (German) http://golatex.de http://texwelt.de FAQ (German) https://texfragen.de PhD Thesis https://www.dickimaw-books.com/latex/thesis https://meta.wikimedia.org/wiki/Help:Displaying a formula Math Fonts http://www.tug.dk/FontCatalogue Symbols https://ctan.org/pkg/comprehensive Download (Software) https://tug.org/texlive CTAN (Packages) https://ctan.org IDEs TEXStudio (recommended) https://texstudio.sourceforge.net TEXshop, TEXworks, Kile, Lyx, ... TU Dresden CD https://github.com/tud-cd/tudscr Using LATEX Online https://de.sharelatex.com

https://www.overleaf.com

https://www.dante.de

For all packages a documentation can be found with: texdoc package name (or in the Help menu in IDEs) The documentation for KOMA-Script can be found with texdoc scguien or texdoc scrguide (German)

acro Acronyms, Glossary

DANTE e.V.

amsmath,amssymb Math extended, Math symbols extended

babel Language depend issues hiblatex Bibliography

Rules in tabular booktabs csquotes Quotations esp. in bibliography

enumitem Lists extended

float Suppress floating, needs scrhack

fontenc,inputenc Font encoding, input encoding Page layout, e.g. size geometry

Graphics graphicx Hyperlinks hyperref

listings Source code listings, needs scrhack sometimes

longtable Tables longer than a page microtype Optical margin alignment multicols Multiple columns extended pdfpages Including PDF pages

scrlayer-scrpage Page layout, e.g. headings, watermarking setspace Control line spread, needs scrhack sometimes scrhack Avoid warnings from float, listings, setspace

subcaption Multiple figures with multiple captions textcomp Text symbols extended

tabularx | tabulary Tabular extended upgreek Upright greek symbols wrapfig | floatflt Graphic surrounded by text

xcolor Color

# L. A Sample Document (output on next page)

```
% thesis.tex
\documentclass[fontsize=12pt,paper=a4,open=any,parskip=half,
 twoside=false,toc=listof,toc=bibliography,fleqn,leqno,
  captions=nooneline,captions=tableabove,british]{scrbook}
\usepackage[utf8]{inputenc} % load early
\usepackage[T1]{fontenc} % load early
\usepackage[ngerman,main=british]{babel}
\usepackage[autostyle=true]{csquotes}
\usepackage{graphicx, booktabs, float, scrhack}
\usepackage{amsmath,amssymb}
\usepackage[automark]{scrlayer-scrpage}
\usepackage[backend=biber.stvle=verbose.sortcase=false.
 language=british]{biblatex}
\addbibresource{thesis.bib}
\PassOptionsToPackage{hyphens}{url}
\usepackage[hidelinks]{hyperref} % load late
\setkomafont{disposition}{\sffamily\color{gray!70}}
\begin{document}
\frontmatter % only if you need page numbering roman
\titlehead{\hfill\includegraphics[width=2cm]{logo}}
\title{My Title} \subtitle{My Subtitle} \author{N.\,N.} \date{}
\maketitle
\tableofcontents \listoffigures \listoftables
```

\mainmatter % page numbering arabic, starting by 1 again \chapter[Intro]{Introduction}\label{sec:intro} \section{Technical introduction}\label{sec:tecintro} \subsection\*{Heading without number} Some text in \textbf{bold}, some more text. Some text in \emph{emph}. more text. And now some text in German language \foreignlanguage{ngerman}{Hier kommt eine Formel:} \(2+2=5\)

A new paragraph, viz. a new idea, a new thought.

\subsection{Heading lower level}\label{sec:headingLL} More text \emph{emphasized} text.\autocite{WC:2017} \begin{table}[htpl

\caption{Table caption}\label{tab:table} \begin{tabular}{l@{\qquad}cr} \toprule Head & Head & Head \\ \midrule

Data & first & Row \\ Data & second & Row \\ \bottomrule

\end{tabular} \end{table}

\chapter{Method}\label{sec:ana} Some text, see \autoref{tab:table} for aligned material.

L'Hôpital's rule: \begin{equation}  $\lim_{x\to 0}{\frac{e^x-1}{2x}}$ 

\overset{\left[\frac{0}{0}\right]}{\underset{\mathrm{H}}{=}}

 $\lim_{x\to 0}{\frac{e^x}{2}}={\frac{1}{2}}$ \end{equation}\label{eq:lhopital}

\newnage More text. A \enquote\*{quote} and a \foreignquote{ngerman}{Zitat}.

\appendix % headings numbered with letters \chapter{Appendix}\label{sec:app} \begin{figure}[H] \KOMAoptions{captions=centeredbeside}

\hegin{captionheside}% [Example of a caption centeredbeside]%

{Example of a caption beside the figure} [o] % position left/right/inner/outer [\linewidth] % width of figure+caption % offset from left side

 $\framebox{\begin{minipage}[t][3cm][c]{0.5}\textwidth}$ {\begin{center} A BOX\end{center}}\end{minipage}} \end{captionbeside}\label{fig:cbeside}\end{figure}

\printbibliography \end{document}

# thesis.bib @misc{ WC:2017, author = {Wikipedia}, title = {\TeX{}---Wikipedia{,} The Free Encyclopedia}, note = {\url{https://en.wikipedia.org/wiki/TeX}, last referenced 24-June-2017}

My Title My Subtitle N. N.	Contents	List of Figures  A.1. Example of a caption centeredheside	List of Tables  1.1. Table caption	1. Introduction  1.1. Technical introduction  Heading without number  Some text in bodd, some more text. Some text in emph, more text. And now some text in German language filter locomate cine Formet: 2 + 2 = 5  A new paragraph, viz. a new idea, a new thought.  1.1.1. Heading lower level  More text emphasized text.  Table 1.1. Table caption  Head Head Head  Head Some level  Data first flow  Data second flow
	и	si	iv	*Wikpedia. DS. Wikpedia. The Proc Recyclopedia. https://ww.vikkpedia.org/wkk/fwl. last referenced 24-3me-2017. 1
2. Method  Some text, see Table 1.1 for aligned material.  1. Höpital's rule:  (2.1) $\lim_{x\to 0} \frac{x'-1}{2x} \left[\frac{ x }{n} \lim_{x\to 0} \frac{x'}{2} = \frac{1}{2}\right]$	2. Method  More text. A "quote" and a Zinat".	A. Appendix  A BOX  Figure A.1.: Example of a caption beside the figure	Bibliography  Wikipedia. Tpt.—Wikipedia. The Free Encyclopedia. https://en.wikipedia.org/wiki/TeX, lest referenced 24-June-2017.	License  Rederense Sheet, Version 1.2. August 2017  The Cheat Sheet is free under the terms and conditions of the BFIgX Project Public License Version 1.2.  Authors: Marion Lammarch, University of Heidelberg, and Ellie Schubert, Statensee Credit for the layout and content ideas goes to  (a) Emanuel Regnath, "Flay Cheat Sheet" SHIPAHI, 2013  http://www.hatesdei.de/domloads/laTel_CheatSheet.pdf  (b) Tammo Schwind, DHIW Moshods, "LaTel, Sheet German; Ed. 2014  http://mirror.tam.org/pts-s-chive/info/lateschosal/lateschat-tde/  http://mirror.tam.org/pts-s-chive/info/lateschosal/lateschat-tde/  The logs with the TSK ion is detected by Dame Bibly, https://mirror.tam.org/  lion/Tiles; the graphic of a bender of a page in from the KOMA-Script Commentation, file schirey-scripage-test, the gase planoit image is done by using the page-layout and the command 'Layout and the red lines and red test added with a graphes program.  Acknowledgements  We would like to thank Markus Kohm, Ulrike Fischer, Martin Sievers, and Herbert Vok for their media hints and suggestions.  Not naming all the benale and male students which with their intrigued questions beliped to improve this reference sheet.
2	3	4	5	