LaTeX Thesis Template

Documentation

Version 3.3.0

Matthias Pospiech

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Contributors to the template are welcome. Currently there is no direct input (suggestions, bug fixing, documentation, new features) except from the maintainer himself.

Source

The source code is hosted at
`https://github.com/pospiech/latex/tree/master/latexthesistemplate`.
Downloads on `www.matthiaspospiech.de` contain only the user code including this documentation. The full source is available via the source code repository.

Legal Notes

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CHAPTER 1

Introduction

This chapter gives a general introduction to the usage of this template and enables the user to start with the actual work. In the subsequent chapters and other parts of this documentation you will find a wide variety of further information. However, there is no need to read them all. Instead you might find it useful to look at individual sections later, when you are looking specifically for a solution to a problem.

The changes in the template are can be found in appendix B.

In the second section 1.1 you find a general discussion on the typical user of this template followed by a tutorial (section 1.3) on how to start working with this template. The chapter ends with the introduction of magic comments in section 2.2.

In the next chapter 2 you will find a list of typical questions and answers that are specific for this template followed by a list of known problems in this template (chapter 3). For those who want to change the font in the template there is a short overview on fonts provided in chapter 4.

1.1 Target Users

This template was developed with all sorts of structured documents in mind that require a good citation and reference framework with a customizable layout. It has so far been used for bachelor, master and phd-thesis as well as the thesis of teachers in their practical year. These had all a natural science background, which means that this template is optimized for the needs of people in natural sciences. Nevertheless it should be easily adaptable to topics in humanities, linguistics or even arts.

Since the code is rather complex one might have objections against this template. Here is a list why there is nevertheless a benefit for all sorts of users.

Beginners have the advantage of a ready to use template that covers all major topics. They do not have to load packages therefore and do not need to fiddle with the preamble. This especially saves a lot of time. If the rare case should happen that a modification is necessary the preamble is very well documented. Typical configurations are listed in section 1.3.2.

The other aspect very valuable for beginners is the large list of example codes in part II.

Advanced LaTeX users benefit from all aspects that are listed above for beginners. Furthermore they can make use of all functions and documentation of this template for simple up to extensive modifications. Section 1.2 provides useful information for a start.

Complete different layouts created by significant changes in `preamble/style.tex` and subsequent files could be send to the maintainer of this template for a review and possibly an integration into the template. The same applies for users, who add new functionality to the template that might also be of interest for other users.

Package authors can also benefit from this template. The development has shown that it is a valuable project for finding incompatibilities between different packages and for testing of packages in general in a large and complex, but yet realistic project.

This template and its predecessor has been used under the supervision of the maintainer by very early beginners and also advanced LaTeX users. The experience was that beginners as well as advanced users are more productive with it because 'it just works', while the more advanced users additionally know that they can find all options for later modifications because of the code documentation. And some even find bugs ….

1.2 Features of the template

This section is structured as follows: section 1.2.1 describes the features and advantages of the template in general, whereas section 1.2.2 summarizes the possibilities for the creation of a document. The subsequent sections provide additional information.

1.2.1 Template features

This template provides a great variety of functionality for creating complex and demanding documents for the user, see section 1.2.2. To provide these the template itself is designed with some special respects:

Separation between function and layout

The packages (functions) are loaded separated from the layout. This makes it possible the exchange the layout of the document while keeping all functionality and makes it easier to test problem without customizations in the layout.

This principle is realized by loading all packages in the file `preamble/packages.tex` and all layout modifications in `preamble/style.tex` and its subsequent files. The only exceptions are packages that are necessary for the template itself and packages that should be configured before using the template, see section 1.3.1

Documentation of the code

All code was included with a minimal documentation. Packages are loaded with a short description and important information about package loading orders (if necessary). The code of the style modifications is also documented to some extent. If a certain code segment should be incomprehensible this should be reported as a bug.

Extensive options

Many packages provide a large number of options. This often means that one has to check the documentation several times for all modifications of the package configuration. To simplify this process this template tries to include all options of a package with a minimal description for each option. This itself is somehow a minimal documentation of a package.

Comprehensive documentation

The documentation of this template is very comprehensive. The code itself is documented as much as possible and necessary. Furthermore this documentation document provides an overview of the features and configuration possibilities (part I), a large collection of LaTeX application examples (part II) and a complete printout of the code of the template (part III).

Solving Incompatibilities and fixing bugs

Incompatibilities between packages are take into consideration by putting all packages in the correct loading order and by preventing packages to load if this would raise an error.

This is achieved mainly by using commands like `\IfPackageLoaded`, `\IfPackagesNotLoaded`, `\ExecuteAfterPackage`, `\IfFileExists`, `\IfMultDefined` and others mostly defined by the package `templatetools`.

The goal is to let the whole document compile without the inclusion of `preamble/style.tex` and as much as possible to compile without the loading of any or most packages in file `preamble/packages.tex`.

Furthermore the template tries to fix bugs that do not get solved by the package authors. This requires, however, that the problems and its solutions are known. Anyway, this only applies to bugs that do not get solved. In principle all bugs that are encountered are reported to the package authors. It may happen that a bug fix in this template has become obsolete because it was in the meantime fixed in the package. In that case please inform the template maintainer.

1.2.2 Document features

This template provides all methods (commands, environments, work flows) that are required for a complex scientific document. This is realized by loading a large number of relevant and modern packages of LaTeX. It is difficult to provide a complete list of the resulting features therefore the following lists include only a subset of the most interesting ones.

Fonts

- Font loading and handling (`fontspec`).
- Math Fonts using `unicode-math`.

Math and scientific notations

- Professional math typesetting with a large number of supported symbols and commands using `amsmath`, `mathtools` and others.
- Professional display of scientific notations with automated processing of numbers and units and therefor consistent typesetting (`siunitx`)

Text typesetting

- Multi language support with automatic hyphenation (`babel`)
- Customizable item and enumeration lists (`enumitem`)
- Multiple highlighting possibilities (`ulem`, `soulutf8`)
- Correct and save display of urls and file path (`url`)

References

- Enhanced cross-referencing with automatical determination of the type (equation, section, etc.) (`cleveref`, `varioref`)

Figure, Images, placement and captions

- Image inclusion (`graphicx`)
- Figure positioning (`flafter`, `placeins`)
- Placement of images in inside a paragraph (`wrapfig`)
- Automatic conversion from eps to pdf (`epstopdf`)
- Customizable layout of the captions (`caption`)
- Parallel and stacked layout of multiple images in a single figure with sub-captions (`subcaption`, `floatrow`)

Diagrams and scientific plots

- Vector graphics with all features of a professional vector graphics program (`pgf`, `tikz`)
- High quality vector based function or data plots in normal or logarithmic scaling (`pgfplots`, `pgfplotstable`)

Tables

The recommended class to create tables is the new `tabularray`. This replaces all other packages listed here. Packages like `booktabs` and `tabularx` are only loaded since many code was written using these commands. The package `tabu` is not loaded, because it is unmaintained and fails to compile the document due to bugs in the code.

- Tables with the ability to create them with a professional design (`booktabs`, `tabularray`, `xcolor`),
- Table columns with variable width (so called 'X' columns) and line break support (`tabularx`, `tabularray`),
- Multi page tables (`tabularray`, `ltxtable`),
- Fancy Tables using `tcolorbox`.

Citations and Quotes

- Bibliographies and Citations with highly customizable layout with all settings done in LaTeX code. This bibliography system is not only highly customizable but also programmed for the most advanced demands (`biblatex`).

  Note that all previous packages for bibliographies are incompatible because all their functionality was comprehended in this new package.
- Quotations are typeset in the format of the current language and automatically converted from inline to block quotes. The display of these quotes is customizable (`csquotes`).

Index, Glossary, Acronym list, Symbol list

- The index created with this template can be modified in several ways and the necessary calls to external programs are automatically done. (`imakeidx`).
- Several other lists such as Glossary, Acronym list and a Symbol list can be created and special themes for the display are available and can be modified and extended (`glossaries`).

Code display with syntax highlighting

- Source code can be displayed with word list based syntax highlighting (`listings`).

Layout

- Most aspects of the layout can be modified due the base classes from koma-script.
- The line spacing can be adjusted in one-half, double or custom spacing (`setspace`).
- Head and Foot have automatic generated content which can be customized together with the layout of the header and footer (`scrlayer-scrpage`).
- The Heading can be fully customized. In this template by default the chapter layout is changed with the provided functions of KOMA-script.
- The page size can be calculated automatically (`typearea`) or defined in every tiny detail (`geometry`).
- Many further items can be modified with commands provided by LaTeX itself or any of the packages loaded. All customizations of the layout are done in the file `preamble/style.tex`.

PDF Features

- Inclusion of complete or partial pdf documents as full pages (`pdfpages`).
- hyperlinks for all references and citations with backlinks (`hyperref`).
- Bookmarks in the pdf document (`bookmark`).

1.3 Tutorial - how to start

If you want to use this template for your work you should follow these three steps to configure everything for your needs.

1.3.1 Configure Editor and System Settings

The encoding needs to be configured to ensure that special characters such as: äüößêì are shown correct in the editor and the output pdf-file. The encoding of the editor must be configured in the editor its self or be set up with magic comments, see section 2.2.4. The settings must be `utf8`.

1.3.2 Configure the document

The template is configured by default for language English with double-sided printing and chapters for the highest section level. Suppose you want to configure it instead for German texts with single-sided printing and Sections as the main level:

- The demand of sections as the main level means that neither a book or report like document is intended, but instead an article like document with only few pages that do not require a substantial differentiation with chapters.

  This is realized by changing the document class to `scrartcl` (main file at the `\documentclass` definition). The default class in this template is `scrbook`, which should not be changed for documents such as bachelor, master and phd thesis.
- The language of the text is chosen in the options of the documentclass. The default language is `english`. The setting for new German orthography is `ngerman`. Other language options are documented in the babel documentation: babel.pdf
- The double vs. single side printing is a bit more hidden in the file `preamble/style.tex` under the section *Page Layout Options*. To change to single side printing change the option `twoside` from `true` to `false`.

Other configurations of LaTeX are listed in chapter 2. Section 2.1 lists most of the settings with their according options and locations in the template files. Some are further explained, for example the setting of the line spacing in section 2.10.

1.3.3 Start Writing your content

At the beginning, the documents in the front and the end should be adapted to the documents content. For example the users name, institution, title can be inserted in `content/0-title`. This file comes with other content files before the actual document start with the front pages (*frontmatter*):

- `content/Z-GlossaryEntries.tex`
- `content/0-title`,
- `content/0-Abstract`
- `content/Z-Declaration.tex`.

Next the main files should be renamed according to the chapter organization of the document. The following files are preconfigured for the main content (*mainmatter*).

- `content/0-Introduction`
- `content/1-Theory`
- `content/2-Experiments`
- `content/3-Results`
- `content/4-Summery`

If certain automatic generated lists such as the index, a glossary or others are not needed these should be disabled in the main file. And at the end of the document files are included that belong to the appendix.

- `content/Z-Appendix.tex`
- `content/Z-Publications.tex`
- `content/Z-CV.tex`
- `content/Z-Thanks.tex`

The naming scheme of these files and their loading mechanism is further explained in section 2.17.

From this point on there is not much more to be done, except writing down the content for the project this template is supposed to be used for.

CHAPTER 2

Settings, locations, questions and solutions

This chapter contains all sorts of answers to typical questions, locations of settings and general solutions with LaTeX. Further examples of the possibilities of this template are shown with code and examples in part II.

2.1 Layout and style configuration

This template tries to differentiate clearly between functionality (package loading) and configuration of the layout and the packages. The first is done primarily in file `preamble/packages.tex` the latter mainly in file `preamble/style.tex`. Nevertheless this separation cannot be fully realized because many options must be specified with the loading of the package.

The following tables 2.1 and 2.2 show links to the most important configuration options and their location in the template files.

Most question of the kind 'how do I change the layout of ...' can be solved by locating the relevant settings in these tables and playing with their values.

Table 2.1: Links to locations for configurations of the document layout

Setting	Option/Value	Location
Options in file: `LuaLaTeXTemplate.tex`		
paper size	`paper=a4`	option of `\documentclass`
language	`english`	option of `\documentclass`
font size	`fontsize=11pt`	option of `\documentclass`
color of hyperlinks	`\UseDefinition{Target}{Web}`	Section: Configurations
page layout in the pdf view	`pdfpagelayout`	Section: Configurations
Options in file: `preamble/packages.tex`		
equation position	`fleqn`	Section: PackagesMath
quotation style	`german=quotes`	Section: PackagesQuotes
citation style	`style=alphabetic`	Section: PackagesCitation
bibliography backend	`backend=biber`	Section: PackagesCitation
header and footer	`automark,komastyle`	Section: PackagesHeadFoot
backlinks in the bibliography	`backref=page`	Section: PackagesPDF

Continued on next page ...

Table 2.1: Links to locations for configurations of the document layout (Continued)

Setting	Option/Value	Location
Options in file: preamble/style.tex		
url font	\urlstyle{tt}	Section: StyleText
threshold for \blockquote	\SetBlockThreshold{2}	Section: StyleQuotes
numbering of figures	\numberwithin{figure}	Section: StyleCaptions
paragraph skip or indentation	parskip=false	Section: StyleParagraph
line spacing	\onehalfspacing	Section: StyleLineSpacing
size of text body	DIV=11	Section: StylePageLayout
binding correction	BCOR=10mm	Section: StylePageLayout
single/two side layout	twoside=true	Section: StylePageLayout
separate title page	titlepage=true	Section: StyleTitlepage
sections numbering depth	\setcounter{secnumdepth}{2	Section: StyleHeadings
headings size	headings=small	Section: StyleHeadings
chapter prefix	headings=nochapterprefix	Section: StyleHeadings
heading fonts	\setkomafont{sectioning}	Section: StyleHeadingsFonts
toc numbering depth	\setcounter{tocdepth}{3}	Section: StyleLayoutTOC
bibliography in TOC	bibliography=totoc	Section: StyleLayoutTOC
index in TOC	index=nottotoc	Section: StyleLayoutTOC
LOF in TOC	listof=notoc	Section: StyleLayoutTOC

Table 2.2: Links to files for package configurations

Package / Topic	File
siunitx	preamble/style-siunitx.tex
pgfplots	preamble/style-pgfplots.tex
biblatex	preamble/style-biblatex.tex
biblatex style	preamble/style-biblatex-alpha.tex
caption, subcaption, subfig	preamble/style-caption.tex
floatrow	preamble/style-floatrow.tex
imakeidx	preamble/style-index.tex
glossaries	preamble/style-glossaries.tex
listings	preamble/style-listings.tex
geometry	preamble/style-geometry.tex
scrlayer-scrpage	preamble/style-scrlayer-scrpage.tex

Continued on next page ...

Table 2.2: Links to files for package configurations (Continued)

Package / Topic	File
hyperref	`preamble/style-hyperref.tex`

Some of the options shown in the previous tables are further discussed in the following sections.

2.2 Magic comments

The *magic comments* discussed in this section present a configuration for the editor, which is saved inside the LaTeX file (at the beginning). They allow to define the program (pdflatex), the main file, the encoding (utf8) and the spell checking.

They were originally developed within the editor TexShop and are used by the editors TeXWorks and TeXStudio. The following information on these magic comments is based on these publications:

- texworks magic comments (by Joseph Wright)
- TeXworks manual

All these comments have in common that they have to be put in the beginning of each file and have to begin with '`% !TeX`'.

2.2.1 Root file

```
% !TeX root = manual.tex
```

Defines the main file for typesetting (often called the *master file*). This enables a very basic project management by defining the master file for each file of the project.

2.2.2 Program

```
% !TeX program = lualatex
```

Chooses the engine for compilation. Possible values are `pdflatex`, `LuaLaTeX`, `XeTeX`, `LaTeX` (and possibly others). Note that the engine name inserted is case-insensitive.

Unless your code is set up for a different engine and the selection of packages and fonts loaded is adapted for that engine the default should be kept as `lualatex` for this template.

2.2.3 Spell checking

```
% !TeX spellcheck = en_US
```

Specifies the spell checking language in the editor for that file. The language of course needs to be installed for the editor! Selection of some languages:

- `en_GB` - English (Great Britain)
- `en_US` - English (US)
- `de_DE` - German (Germany)
- `fr_FR` - French (France)

2.2.4 Encoding

```
% !TeX encoding = UTF-8
```

Sets the file encoding for the current file. The default in current editors is UTF-8.

2.2.5 bibliography tool

```
% !BIB = biber
```

The alternative is `bibtex`, which is no longer recommended and with this template not supported!

2.3 Selection of font(s)

The font selection is made in file `fonts/fonts.tex`. The standard font in this template is *Latin Modern*. This selection is done for simplicity. It is the default LaTeX font and should be available in every distribution. If you prefer a different font you have a free choice out of many fonts that are installed on most systems and are available for free. See chapter 4 for a short overview. One should take care that for every roman font that a suitable sans serif font must be chosen as well.

2.4 Change of the page layout

Two packages are supported for the page layout. Package `typearea` is very easy to use and modify and gives well suited results for a thesis document. If however a much customized page layout is demanded the package `geometry` provides the abilities to implement the page layout.

2.4.1 Package typearea

The page layout is by default set up with the package `typearea`, which is loaded automatically. It is configured with the *DIV* parameter, which defines the amount of text on a page (the larger the more space for the text) and the *BCOR* parameter, which defines the binding correction in millimeters. The basics of this layout mechanism is very well described in scrguien.pdf. The parameters are set up in file `preamble/style.tex`, see section 7.2.18.

If the layout must be specified with very detailed parameters such as margin width, top and bottom space or exact amount of line numbers the package `geometry` is providing this functionality.

2.4.2 Package geometry

This package provides 'a flexible and easy interface to page dimensions' as stated in its documentation. One can set up every possible parameter and all unspecified dimensions are automatically determined by the package accordingly.

To enable this package it must be loaded in file `preamble/packages.tex`, see section 7.1.19 and be configured in `preamble/style-geometry.tex`.

2.5 Change color of (hyper)links

The hyperlinks are introduced by package `hyperref`. The colors are configured for the links in `preamble/style-hyperref.tex` and defined in `preamble/style.tex` (see section 7.2.2). This template introduces a simple mechanism to switch between colored and black links (the latter for printing) using the command `\UseDefinition`. This is configured in the main file (see section 6.3.4).

2.6 Generation of tables

See the large list of examples in section 5.8 on using the environments `tabular`, `tabularx`, `tabularray`, `table` and further for printing tabular material in principle and how to print beautiful tables.

2.7 Include, align and position graphics

See the large list of examples on using the `\includegraphics` command, the `figure` environment and further commands in section 5.7.

2.8 Draw graphics, diagrams and plots

This template relies on the packages `pgf`, `tikz` and `pgfplots` for the creation of diagrams and plots, see section 5.16. The `pstricks` is neither supported nor tested with this template. It may or may not work together with this template.

2.9 Print code with line numbers and syntax highlighting

Syntax highlighting within LaTeX is provided by the package `listings`. The syntax highlighting of this package is defined in file `preamble/style-listings.tex`. Several styles are predefined:

`lstStyleBase` basic code format

`lstStyleFramed` basic format with frame

`lstStyleCpp` style for C++ code

`lstStyleLaTeX` style for LaTeX code.

See section 5.14.2 for examples.

2.10 One-half and double spacing

The line spacing is controlled by `setspace`. It is configured in file `preamble/style.tex` in the section *StyleLineSpacing*. The code is shown in section 7.2.17.

2.11 Line numbering

The package required for line numbering is not loaded by default, but it can be enabled in `preamble/packages.tex`, see section 7.1.15. Furthermore the command `\linenumbers` must be executed. This must be enabled in `preamble/makeCommands.tex`.

2.12 Creation of a bibliography and citations styles

This template relies for the creation of a bibliography and the related citations styles entirely on the package `biblatex`. Any historic solution which was popular before `biblatex` came out is incompatible. For all further information refer to the official documentation biblatex.pdf.

2.12.1 Define bibliography (bib) files

The file format is still the well-known BibTeX format (file ending .bib). These files are loading in the preamble before the beginning of the document, see section 6.3.7 with the command `\addbibresource`. The file name must be written without the `.bib` file extension.

2.12.2 Define the citation style

The package is loaded in file `preamble/packages.tex` and the style for the display of the bibliography and the citations is defined as an option of the package. The default style is *alphabetic*. However, several other styles exists, see section 7.1.12, the package documentation and the website biblatex-contrib for a list of further styles.

Furthermore the basic properties of the package are configured in file `preamble/style-biblatex.tex` whereas the style is modified for an *alpha* style in file `preamble/style-biblatex-alpha.tex`.

2.12.3 Ways to insert citations

Citations are inserted basically with the `\cite` command. Further possibilities are shown in section 5.12.1. For a complete list refer to the official documentation of `biblatex`. If the citations are supposed to be placed in the footnotes this is realized with the parameter `autocite` in file `preamble/style-biblatex.tex`.

2.13 Quoting and citing text

The default quotation environments of LaTeX (quote and quotation) are enhanced by the commands `\enquote` and `\blockquote` which are much better suited for very simple to very complex quotations with citations. See section 5.2 for examples of its usage.

2.14 Tables of contents and other tables

The contents and the style of the table of contents are defined in file `preamble/style.tex`, see section 7.2.24.

2.15 Index, glossary and other lists

This template can handle an index and the creation of a glossary, an acronym list and a symbol list which are created using the package `glossaries`.

The style settings for these list are loaded in file `preamble/style-index.tex` and file `preamble/style-glossaries.tex`.

They are printed in the main file, see section 6.4.6.

2.16 Hyphenation

The hyphenation is enabled by default in LaTeX. In order to function correct the language must be specified in the document class, see section 6.2. Additional hyphenation patterns are added to file `content/hyphenation.tex`.

In the text itself hyphenation marks can be added. These are however language specific. For German texts an overview is shown in http://de.wikibooks.org/.

2.17 Document management

The default content files of this template are located in the path `content` and named:

- `content/title`
- `content/0-Abstract`
- `content/0-Introduction`
- `content/1-Theory`
- `content/2-Experiments`
- `content/3-Results`
- `content/4-Summery`
- `content/Z-Appendix.tex`
- `content/Z-Publications.tex`
- `content/Z-CV.tex`
- `content/Z-Thanks.tex`
- `content/Z-Declaration.tex`

The prefix is chosen as numbers for all main content files in the sequence in which the chapters are loaded and with a prefix `Z-` for all minor important files that mostly come after the main content. This naming scheme thus shows the files in the order of their appearance in the resulting document.

To speed up the compile times it is recommended to include only those chapters, on which is currently being worked on, into the compilation. This is realized with LaTeX using the command `\includeonly`. This list contains all files loaded with `\include` that shall be included in the current compilation. All information on those files not included into the compilation, such as labels, is nevertheless included. This only requires that each file was at least once included in the compilation.

2.18 Creation of a minimal working example

This template is complex in terms of its division in different files that makes it rather difficult to track a problem. Due to the deactivatable code section created with the command `\DefineTemplateSection` this can be even easier than in any other large LaTeX project.

In order to ask people for a solution to a problem with LaTeX it is generally expected to provide a minimum working example. That means a single file LaTeX complete document that illustrates the problem. 'Complete' means that it must contain a document class and the document environment and the relevant code inside the document environment. It however must not contain any package or code that does not contribute to the problem.

In order to create a minimum document from this template it is absolutely necessary to copy the whole document code including all sub folders. If these contain too many images these can be left out. The copy is essential, because next most files are going to be modified or deleted.

Now first remove or comment out all chapter files that do not contribute to the error. If it is an error in the preamble, you can as well comment out everything in the document environment.

Next try to reduce the code in you remaining content file to the part that creates the error.

To check if the problem is in `preamble/style.tex` or if this file contributes to the problem comment out `preamble/style.tex`. If the error remains do the same for `preamble/packages.tex`. This could however introduce further errors because functionality gets lost. You can however check each section in this file separately or disable them from bottom to top by changing the section created with `\DefineTemplateSection` to `false`. The same can also be done for `preamble/style.tex`.

If the code section(s) in `preamble/packages.tex` or `preamble/style.tex` that generates the error is identified copy all these parts to the main document and remove the loading of these files. Note, that in cases of incompatible packages it could be more than a single code section that contributes to the error. If still files are included in the main file remove them or copy their code to the main file if necessary. As a result all code should not reside in the main file. From this point it should be able to remove all packages, all options and all remaining content that do not contribute to the problem. As a result the minimum working example is ready.

Typically most self-created errors are already found while processing these procedure to track down the problem. If not a good place to ask for further help is tex.stackexchange.com.

Further reading on how to generate a minimum working example can be found at:

- http://meta.tex.stackexchange.com
- What is a minimal working example?
- Creating a LaTeX Minimal Example
- How to make a minimum example

CHAPTER 3

Known problems

This chapter provides a collection a known warnings and possible errors with an assessment of the problem.

3.1 Warnings

3.1.1 biblatex: No file ⟨*filename*⟩.bbl

If you have not executed `biber` you will get the following warning by `biblatex`. Simply run you bibliography tool to get create bbl file.

```
Package biblatex Info: Trying to load bibliographic data...
Package biblatex Info: ... file '<filename>.bbl' not found.

No file <filename>.bbl.
```

3.1.2 hypennat: You have used the htt option

Package `hypennat` prints out the following warning:

```
Package hyphenat Warning: ******************************
(hyphenat)                * You have used the htt option.
(hyphenat)                * You are likely to get many Font Warning messages.
(hyphenat)                * These can usually be ignored.
(hyphenat)                ******************************.
```

It can be ignored as already stated by the package warning.

3.1.3 unicode-math: Using commands from 'mathtools' package.

```
Package unicode-math Warning: Using \overbracket and \underbracket from
(unicode-math)                `mathtools' package.
(unicode-math)
(unicode-math)                 Use \Uoverbracket and \Uunderbracket for
(unicode-math)                original `unicode-math' definition.
```

These warnings can be ignored.

3.1.4 unicode-math: Overwriting commands from ‘mathtools’ package.

```
Package unicode-math Warning: I'm going to overwrite the following commands
(unicode-math)                from the `mathtools' package:
(unicode-math)
(unicode-math)                     \dblcolon, \coloneqq, \Coloneqq, \eqqcolon.
(unicode-math)
(unicode-math)
(unicode-math)                 Note that since I won't overwrite the other
(unicode-math)                colon-like commands, using them will lead to
(unicode-math)                inconsistencies.
```

These warnings can be ignored.

CHAPTER 4

Short fonts overview

The information given here is only a subset of the whole story. A more complete catalogue on LaTeX fonts can be found at http://www.tug.dk/FontCatalogue/.

The font loading mechanism in LuaLaTeX is described in the manual of `fontspec`. For math fonts the documentation of `unicode-math` is a good starting point. In contrast to the old font mechanism of pdflatex the new mechanism loads only OTF and TTF fonts found in the system standard font location and in the texmf tree.

The default font **Latin Modern** is loaded automatically with package `unicode-math`. For all other fonts the required code is listed here. The Code can be found in the file `fonts\fonts.tex`.

Table 4.1: font overview

Font	Loading command	comment
Latin Modern font family		
Roman	`\setmainfont{Latin Modern Roman}`	
Sans	`\setsansfont{Latin Modern Sans}`	
Mono	`\setmonofont{Latin Modern Mono}`	
Math	`\setmathfont{Latin Modern Math}`	
Roman Fonts		
TeX Gyre Termes	`\setmainfont{TeX Gyre Termes}`	Times like font
TeX Gyre Termes Math	`\setmathfont{TeX Gyre Termes Math}`	math version
TeX Gyre Pagella	`\setmainfont{TeX Gyre Pagella}`	Palatino Like font
TeX Gyre Pagella Math	`\setmathfont{TeX Gyre Pagella Math}`	math version
Charter	`\setmainfont{XCharter}`	
Charter - math version	`\setmathfont{XCharter-Math.otf}`	math version
Garamond	`\usepackage{ebgaramond}`	
Garamond math version	`\setmathfont{Garamond-Math}`	math version
Cambria	`\setmainfont{Cambria}`	
Cambria Math	`\setmathfont{Cambria Math}`	math version
Sans Fonts		

Continued on next page ...

Table 4.1: font overview (Continued)

Font	Loading command	comment
TeX Gyre Heros	`\setsansfont{TeX Gyre Heros}`	Helvetica (Arial) like font
Fira Sans	`\setsansfont{Fira Sans}`	
Cabin	`\setsansfont{Cabin}`	Bera Sans like font
Calibri	`\setsansfont{Calibri}`	
Mono Fonts		
TeX Gyre Cursor	`\setmonofont{TeX Gyre Cursor}`	Courier Like font
Luxi Mono	`\setmonofont{Luxi Mono}`	font must be added to system!
Consolas	`\setmonofont{Consolas}`	
Lucida Console	`\setmonofont{Lucida Console}`	

4.1 Font Gallery

The following table shows how these fonts look like.

Table 4.2: Font examples

Font	Example
Latin Modern Family	
Latin Modern Roman	Sphinx of black quartz, judge my vow.
Latin Modern Sans	Sphinx of black quartz, judge my vow.
Latin Modern Mono	`Sphinx of black quartz, judge my vow.`
Roman Fonts	
TeX Gyre Termes (Times)	Sphinx of black quartz, judge my vow.
TeX Gyre Pagella (Palatino)	Sphinx of black quartz, judge my vow.
TEX Gyre Bonum (URW Bookman)	Sphinx of black quartz, judge my vow.
TEX Gyre Schola (URW Century Schoolbook)	Sphinx of black quartz, judge my vow.
Charter	Sphinx of black quartz, judge my vow.
Garamond	Sphinx of black quartz, judge my vow.
XITS (Times)	Sphinx of black quartz, judge my vow.
Cambria	Sphinx of black quartz, judge my vow.
Sans Fonts	
TeX Gyre Heros (Arial)	Sphinx of black quartz, judge my vow.
Fira Sans	Sphinx of black quartz, judge my vow.

Continued on next page ...

Table 4.2: Font examples (Continued)

Font	Example
Cabin (Bera)	Sphinx of black quartz, judge my vow.
Calibri	Sphinx of black quartz, judge my vow.
Mono Fonts	
TeX Gyre Cursor (Courier)	Sphinx of black quartz, judge my vow.
Luxi Mono	Sphinx of black quartz, judge my vow.
Consolas	Sphinx of black quartz, judge my vow.
Lucida Console	Sphinx of black quartz, judge my vow.
Math Fonts	
Latin Modern Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
TeX Gyre Termes Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
TeX Gyre Pagella Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
TEX Gyre Bonum Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
TEX Gyre Schola Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
Charter Math	$f(u,v) = \iiint \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V$
Garamond Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
Cambria Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
XITS Math	$f(u,v) = \iiint [u\nabla^2 v + (\nabla u, \nabla v)]\, \mathrm{d}^3 V$
Fira Math	$f(u,v) = \iiint \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V$

4.2 Font examples

The following pages show examples of several font combinations that were created with this template code. This selection was done with care on similar x-heights and glyph widths, but since this selection was not done by a font expert the resulting combinations might still be not perfect. Further reading on the topic of typeface combinations can be found here: http://www.smashingmagazine.com/. The clear exception is the combination of Times with Arial and Courier. This is shown because it is widely used but absolutely not recommendable.

- Latin Modern Family
- Charter, Cabin, Luxi Mono
- Garamond, Fira Sans, Luxi Mono
- Palantino, Arial, Courier
- Times, Arial, Courier
- Cambria, Calibri, Consolas
- Minion, Myriad and Luxi Mono

Latin Modern Family

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *Latin Modern Family*. The fonts are loaded with

```
% is loaded automatically with \usepackage{unicode-math}
% Manual setting is done by
\setmainfont{Latin Modern Roman}
\setsansfont{Latin Modern Sans}
\setmonofont{Latin Modern Mono}
\setmathfont{Latin Modern Math}
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from http://www.blindtextgenerator.de)

Math formulas

These math formulas are taken from wikipedia.org. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\ j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	**Sans-Font**	**Mono (Typwriter)**
Regular text	Regular text	`Regular text`
Boldface SmallCaps	**Boldface SmallCaps**	`Boldface SmallCaps`
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	`BOLDFACE UPPERCASE`
Boldface	**Boldface**	`Boldface`
SmallCaps	SmallCaps	`SmallCaps`
UPPERCASE	UPPERCASE	`UPPERCASE`

Charter and Cabin and Luxi Mono

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *Charter and Cabin and Luxi Mono* . The fonts are loaded with

```
\setmainfont{XCharter}            % Charter
\setmathfont{XCharter-Math.otf}   % Charter - math version
\setsansfont{Cabin}               % Bera Sans like font
[Scale=MatchLowercase]
\setmonofont{Luxi Mono}           % Luxi Mono
[Scale=MatchLowercase]            % font is not installed by tex!
\linespread{1.05} % for main font
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from http://www.blindtextgenerator.de)

Math formulas

These math formulas are taken from wikipedia.org. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathscr{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathscr{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\ j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	Sans-Font	Mono (Typwriter)
Regular text	Regular text	Regular text
Boldface SmallCaps	**Boldface SmallCaps**	**Boldface SmallCaps**
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	**BOLDFACE UPPERCASE**
Boldface	**Boldface**	**Boldface**
SmallCaps	SmallCaps	SmallCaps
UPPERCASE	UPPERCASE	UPPERCASE

Garamond, Fira Sans and Luxi Mono

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *Garamond, Fira Sans and Luxi Mono*. The fonts are loaded with

```
\usepackage{ebgaramond}          % Garamond
\setmathfont{Garamond-Math}      % Math version
\setsansfont{Fira Sans}          % Fira Sans
[Scale=MatchLowercase]
\setmonofont{Luxi Mono}          % Luxi Mono
[Scale=MatchLowercase]           % font is not installed by tex!
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from `http://www.blindtextgenerator.de`)

Math formulas

These math formulas are taken from `wikipedia.org`. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\ j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	Sans-Font	Mono (Typwriter)
Regular text	Regular text	`Regular text`
Boldface SmallCaps	**Boldface SmallCaps**	**`Boldface SmallCaps`**
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	**`BOLDFACE UPPERCASE`**
Boldface	**Boldface**	**`Boldface`**
SmallCaps	SmallCaps	`SmallCaps`
UPPERCASE	UPPERCASE	`UPPERCASE`

TeX Gyre fonts similar to Palantino, Arial, Courier

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *TeX Gyre fonts similar to Palantino, Arial, Courier*. The fonts are loaded with

```
\setmainfont{TeX Gyre Pagella}          % Palatino Like font
\setmathfont{TeX Gyre Pagella Math}     % Palatino Like font - math
version
\setsansfont{TeX Gyre Heros}            % Helvetica (Arial) Like font
[Scale=MatchLowercase]
\setmonofont{TeX Gyre Cursor}           % Courier Like font
[Scale=MatchLowercase]
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from http://www.blindtextgenerator.de)

Math formulas

These math formulas are taken from wikipedia.org. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\, j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	Sans-Font	Mono (Typwriter)
Regular text	Regular text	Regular text
Boldface SmallCaps	**Boldface SmallCaps**	**Boldface SmallCaps**
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	**BOLDFACE UPPERCASE**
Boldface	**Boldface**	**Boldface**
SmallCaps	SmallCaps	SmallCaps
UPPERCASE	UPPERCASE	UPPERCASE

TeX Gyre fonts similar to Times, Arial, Courier

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *TeX Gyre fonts similar to Times, Arial, Courier*. The fonts are loaded with

```
\setmainfont{TeX Gyre Termes}          % Times like font
\setmathfont{TeX Gyre Termes Math}     % Times Like font - math version
\setsansfont{TeX Gyre Heros}           % Helvetica (Arial) Like font
[Scale=MatchLowercase]
\setmonofont{TeX Gyre Cursor}          % Courier Like font
[Scale=MatchLowercase]
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from http://www.blindtextgenerator.de)

Math formulas

These math formulas are taken from wikipedia.org. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathscr{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathscr{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\, j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	Sans-Font	Mono (Typwriter)
Regular text	Regular text	Regular text
Boldface SmallCaps	**Boldface SmallCaps**	**Boldface SmallCaps**
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	**BOLDFACE UPPERCASE**
Boldface	**Boldface**	**Boldface**
SmallCaps	SmallCaps	SmallCaps
UPPERCASE	UPPERCASE	UPPERCASE

Cambria, Calibri and Consolas

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *Cambria, Calibri and Consolas*. The fonts are loaded with

```
% Serif Font: Microsoft Calibri (TTF)
\setmainfont{Cambria}
\setmathfont{Cambria Math}
% Sans Font: Microsoft Calibri (TTF)
\setsansfont{Calibri}
% Mono Font: Microsoft Consolas (TTF)
\setmonofont{Consolas}[Scale=MatchLowercase]
%\setmonofont{Lucida Console}[Scale=MatchLowercase]
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from `http://www.blindtextgenerator.de`)

Math formulas

These math formulas are taken from `wikipedia.org`. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\ j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	Sans-Font	Mono (Typwriter)
Regular text	Regular text	`Regular text`
Boldface SmallCaps	**BOLDFACE SMALLCAPS**	**`Boldface SmallCaps`**
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	**`BOLDFACE UPPERCASE`**
Boldface	**Boldface**	**`Boldface`**
SMALLCAPS	SMALLCAPS	`SmallCaps`
UPPERCASE	UPPERCASE	`UPPERCASE`

Minion, Myriad and Luxi Mono

The text on these pages demonstrates the appearance of the used fonts for serif, sans serif, math and typewriter fonts. The font(s) used in this document are *Minion, Myriad and Luxi Mono*. The fonts are loaded with

```
% Serif Font: Minion Pro (OTF)
\setmainfont{MinionPro}         % font must be installed by user
% Sans Font: MyriadPro (OTF)
\setsansfont{MyriadPro}         % font must be installed by user
% Math font is missing for Minion Pro (not available for free)
% This is a workaround.
\usepackage[italic]{mathastext}
\MTsetmathskips {f}{3mu}{0mu}
% Mono Font: Luxi Mono
\setmonofont{Luxi Mono}
[Scale=MatchLowercase]          % font is not installed by tex!
```

Plain text

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia live the blind texts. Separated they live in Bookmarksgrove on the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regelialia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth. Even the all-powerful Pointing the blind texts - an almost unorthographic life. One day however a small line of blind text by the name of Lorem Ipsum was to go out into the wide grammar. (text taken from http://www.blindtextgenerator.de)

Math formulas

These math formulas are taken from wikipedia.org. They show well known formulas used in math and physics.

Green's theorem

$$\iiint\limits_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint\limits_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2 A$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \dots, f_m)}{\partial(x_1, \dots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\dots,m;\, j=1,\dots,n}$$

Font-faces

The following tables demonstrates the usable font-faces:

Main-Font	Sans-Font	Mono (Typwriter)
Regular text	Regular text	`Regular text`
Boldface SmallCaps	**Boldface SmallCaps**	**`Boldface SmallCaps`**
BOLDFACE UPPERCASE	**BOLDFACE UPPERCASE**	**`BOLDFACE UPPERCASE`**
Boldface	**Boldface**	**`Boldface`**
SmallCaps	SmallCaps	`SmallCaps`
UPPERCASE	UPPERCASE	`UPPERCASE`

Part II

LaTeX Examples

Contents

CHAPTER 5

Template demonstration

Originally the code of this chapter served only as a test for the template code. It was used to verify that everything is displayed as expected. It was then extended to a presentation of the possibilities of this template.

All examples are presented together with the creation code side by side or on top of each other. The code can be copied directly from the pdf document and inserted in the content files of this template. The basic LaTeX code example may also work in any other LaTeX template. However, most examples require a special package or even some code defined only in this template. Therefore it is only guaranteed that the examples work in this template. If this should not be the case it should be reported as a bug.

All the examples are designed not to raise an error if some functionality is not available, but instead to display why they were not included in the document. These 'error´ messages do not indicate an error of the template. They only inform why an example could not be included.

This document (`content/demo/demo.tex`) could also be used in other templates provided that all depending packages[1] are loaded. In the case of `glossaries` some definitions need to be loaded from an extra file `content/demo/glossariesEntries.tex`. All users and package authors are encouraged to extend and improve the examples as well as use this file for testing of their own commands and packages.

5.1 Text markup

5.1.1 LaTeX standard commands

Code:

```
The standard commands for font attributes:
\textbf{bold}, \textit{italic}, \textsl{slanted},
\textsf{sans serif}, \textsc{small caps} and
\texttt{monospaced typewrite}.
And any combination of them:
\textit{\textbf{bold italic}},
\textsl{\textbf{bold slanted}},
\textsf{\textbf{bold sans serif}},
\textsc{\textbf{bold small caps}}
\textsl{\textsf{sans serif slanted}}.
```

1 `codesection`, `templatetools` and `latexdemo`

Result:

The standard commands for font attributes: **bold**, *italic*, *slanted*, sans serif, SMALL CAPS and `monospaced typewrite`. And any combination of them: ***bold italic***, ***bold slanted***, **bold sans serif**, **bold small caps** *sans serif slanted*.

However, depending on the font not all combinations are possible. In this case the error 'Some font shapes were not available, defaults substituted.' is printed out.

5.1.2 package: soul

Commands of package `soul`:

Code:

```
\so{letterspacing}, \\
\ul{underlining},   \\
\st{overstriking}   \\
and \hl{highlighting}.
```

Result:

l e t t e r s p a c i n g,
underlining,
~~overstriking~~
and highlighting.

5.1.3 package: ulem

Commands of package `ulem`:

Code:

```
\uline{single underlining}, \\
\uuline{double underlining}, \\
\uwave{waved underlining}, \\
\sout{crossed out} and \\
\xout{emphasized crossed out}.
```

Result:

single underlining,
double underlining,
waved underlining,
~~crossed out~~ and
~~*emphasized crossed out*~~.

5.1.4 package: url

The `url` package provides a failsafe way to print urls with characters not allowed by LaTeX.

Code:

```
\url{http://www.dante.de}
```

Result:

http://www.dante.de

The font used for this command can be set up in the preamble.

5.2 Quotes

5.2.1 quote

This standard environment can be used for quotes. Its text is indented from both sides. For quotes with citations the `blockquote` environment of packages `csquotes` is much better suited.

Code:

```
\begin{quote}
```

```
The \LaTeX{} document preparation system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a sophisticated program designed to
produce high-quality typesetting, especially for mathematical text.
\end{quote}
```

Result:

> The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

5.2.2 enquote and blockquote (csquotes)

The `csquotes` package provides advanced facilities for inline (`\inline`) and display quotations (`\blockquote`).

Code:

```
Normal quotes inside a sentence: \enquote{This sentence contains a second
quote \enquote{with different quotation marks}}. The style of
quotations can be set up and is depended on the language setting.
Quotes over several lines can be set as one block: \blockquote[(Lorem Lipsum,
P. 50)]{Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea
commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit
esse cillum dolore eu fugiat nulla pariatur.}
```

Result:

Normal quotes inside a sentence: ‘This sentence contains a second quote “with different quotation marks”’. The style of quotations can be set up and is depended on the language setting. Quotes over several lines can be set as one block:

> Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. (Lorem Lipsum, P. 50)

5.3 References

Code:

```
Some text with a normal reference
to section~\ref{sec:references}.
```

Result:

Some text with a normal reference to section 5.3.

5.3.1 variable references using vref

vref prints out the referenced number together with the page number, if the reference is not on the same page.

Code:

```
Some text with a vref reference
to section~\vref{sec:references}.
```

Result:

Some text with a vref reference to section section 5.3 on the preceding page.

5.3.2 variable references with the cleveref package

Code:

```
Some math formulas to reference:
\begin{equation}
a = b + c \label{eqn:abc}
\end{equation}
and another math formula
\begin{equation}
z = y + x\,. \label{eqn:zyx}
\end{equation}
\Cref{sec:references} contains a reference to a section
whereas the formulars \cref{eqn:abc,eqn:zyx}
reference equations.
```

Result:

Some math formulas to reference:

$$a = b + c \tag{5.1}$$

and another math formula

$$z = y + x\,. \tag{5.2}$$

Section 5.3 contains a reference to a section whereas the formulars eqs. (5.1) and (5.2) reference equations.

5.3.3 references with the reference name

The template provides the commands `\eqnref`, `\figref`, `\tabref`, `\secref` and `\chapref` which print out the name of the object to reference to (similar) to `cleveref` and include this name in the hyperlink.

Code:

```
Some math formulas to reference:
\begin{equation}
q = w + s \label{eqn:qws}
\end{equation}
```

```
%
The \eqnref{eqn:qws} shows how to add variables.
```

Result:

Some math formulas to reference:

$$q = w + s \tag{5.3}$$

The equation (5.3) shows how to add variables.

5.4 Other environments

5.4.1 abstract environment

Error: Environment **abstract** not available

5.4.2 addmargin environment (Koma Script)

The **addmargin**-environment allows to enlarge or shrink the textwidth in both sides of the textbody. It is however recommended to let the wide parts span into the outer margin. The environment **addmargin** has the options [⟨*left*⟩]{⟨*right*⟩}, whereas the starred version **addmargin** differs in a two-sided layout by using the arguments as [⟨*inner*⟩]{⟨*outer*⟩}. For further information refer to the KOMA-script documentation.

Code:

```
\begin{addmargin*}[0cm]{-0.5\marginwidth}
The \LaTeX{} document preparation system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a sophisticated program designed to
produce high-quality typesetting, especially for mathematical text.
\end{addmargin*}
```

Result:

The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

5.5 Paragraph alignment

5.5.1 LaTeX standard alignment

Code:

```
The \LaTeX{} document preparation
system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a
sophisticated program designed to
produce high-quality typesetting,
especially for mathematical text.
```

Result:

The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

If the alignment was not intentionally changed LaTeX prints text as justified and with hyphenation.

5.5.2 centered text

Environment for centering of text. Not to be used with floating environments such as `table` or `figure`!

Code:

```
\begin{center}
The \LaTeX{} document preparation
system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a
sophisticated program designed to
produce high-quality typesetting,
especially for mathematical text.
\end{center}
```

Result:

The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

5.5.3 package: ragged2e

The `ragged2e` improves typesetting of ragged text. Compared with the standard commands (\centering, \raggedleft, and \raggedright) it includes hyphenation. Each environment is also available as a switch. \justifying switches back to justified text after ragged text has been switched on.

FlushLeft

Code:

```
\begin{FlushLeft}
The \LaTeX{} document preparation
system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a
sophisticated program designed to
produce high-quality typesetting,
especially for mathematical text.
\end{FlushLeft}
```

Result:

The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

FlushRight

Code:

```
\begin{FlushRight}
The \LaTeX{} document preparation
system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a
sophisticated program designed to
produce high-quality typesetting,
especially for mathematical text.
\end{FlushRight}
```

Result:

The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

Centering

Code:

```
\begin{Centering}
The \LaTeX{} document preparation
system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a
sophisticated program designed to
produce high-quality typesetting,
especially for mathematical text.
\end{Centering}
```

Result:

The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.

5.5.4 Multiple columns (multicol)

Code:

```
\begin{multicols}{3}[Text with three columns created with package multicol]
Suspendisse ac nibh vitae nunc iaculis accumsan. Vivamus venenatis, orci vitae
interdum tristique, nisl lectus fermentum arcu, sed vehicula pede orci et
nunc. Cras tempus ultrices leo. Nulla at tortor. Morbi nisl tellus, lobortis
nec, nonummy a, vulputate at, felis. In interdum varius sem. Fusce
pellentesque, eros vitae consectetuer dignissim, ipsum urna tincidunt urna,
ut aliquet libero lectus vel purus. In commodo iaculis justo. Sed euismod.
Praesent molestie leo ac erat. Etiam a felis.
Nunc ipsum diam, porta ac, mollis non, mattis a, felis. Etiam nisl sapien,
malesuada eget, rutrum at, dictum non, metus. Aliquam ut nunc in purus rutrum
posuere. Proin id risus. Integer dignissim, lorem sit amet cursus adipiscing,
sapien purus posuere erat, ac porta risus augue non enim. Fusce nunc nunc,
sodales et, vestibulum ut, auctor ac, sem. Vivamus nisi lectus, consectetuer
eget, congue at, feugiat et, elit. Praesent sem. Curabitur interdum placerat
odio.
\end{multicols}
```

Result:

Text with three columns created with package multicol

Suspendisse ac nibh vitae nunc iaculis accumsan. Vivamus venenatis, orci vitae interdum tristique, nisl lectus fermentum arcu, sed vehicula pede orci et nunc. Cras tempus ultrices leo. Nulla at tortor. Morbi nisl tellus, lobortis nec, nonummy a, vulputate at, felis. In interdum varius sem. Fusce pellentesque, eros vitae consectetuer dignissim, ipsum urna tincidunt urna, ut aliquet libero lectus vel purus. In commodo iaculis justo. Sed euismod. Praesent molestie leo ac erat. Etiam a felis. Nunc ipsum diam, porta ac, mollis non, mattis a, felis. Etiam nisl sapien, malesuada eget, rutrum at, dictum non, metus. Aliquam ut nunc in purus rutrum posuere. Proin id risus. Integer dignissim, lorem sit amet cursus adipiscing, sapien purus posuere erat, ac porta risus augue non enim. Fusce nunc nunc, sodales et, vestibulum ut, auctor ac, sem. Vivamus nisi lectus, consectetuer eget, congue at, feugiat et, elit. Praesent sem. Curabitur interdum placerat odio.

5.6 Lists

5.6.1 itemize

This is the standard list of LaTeX. It has a separation between each item, to improve the reading of texts spanning several lines.

Code:

```
\begin{itemize}
   \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
   eiusmod tempor incididunt ut labore et dolore magna aliqua.
%
   \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
   eiusmod tempor incididunt ut labore et dolore magna aliqua.
%
   \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
   eiusmod tempor incididunt ut labore et dolore magna aliqua.
\end{itemize}
```

Result:

- Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
- Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
- Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

These lists can also be nested (list within list)

Code:

```
\begin{itemize}
   \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
```

```
   eiusmod tempor incididunt ut labore et dolore magna aliqua.
   %
   \begin{itemize}
      \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
      eiusmod tempor incididunt ut labore et dolore magna aliqua.
      %
      \begin{itemize}
         \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
         do eiusmod tempor incididunt ut labore et dolore magna aliqua.
         %
         \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
         do eiusmod tempor incididunt ut labore et dolore magna aliqua.
         %
         \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
         do eiusmod tempor incididunt ut labore et dolore magna aliqua.
      \end{itemize}
      %
      \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
      eiusmod tempor incididunt ut labore et dolore magna aliqua.
      %
      \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
      eiusmod tempor incididunt ut labore et dolore magna aliqua.
   \end{itemize}
\end{itemize}
```

Result:

- Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
  - Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
    - Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
    - Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
    - Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
  - Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
  - Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

5.6.2 enumerate

Same as the itemize list, but enumerated.

Code:

```
\begin{enumerate}
   \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod
 tempor incididunt ut labore et dolore magna aliqua.
%
   \begin{enumerate}
      \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
eiusmod tempor incididunt ut labore et dolore magna aliqua.
      %
      \begin{enumerate}
         \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
         do eiusmod tempor incididunt ut labore et dolore magna aliqua.
         %
         \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
         do eiusmod tempor incididunt ut labore et dolore magna aliqua.
         %
         \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
         do eiusmod tempor incididunt ut labore et dolore magna aliqua.
      \end{enumerate}
      %
      \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
      eiusmod tempor incididunt ut labore et dolore magna aliqua.
      %
      \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do
      eiusmod tempor incididunt ut labore et dolore magna aliqua.
   \end{enumerate}
\end{enumerate}
```

Result:

1. Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
   a) Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
      i. Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
      ii. Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
      iii. Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.
   b) Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

c) Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

5.6.3 Compact lists (with enumitem package)

The **enumitem** package provides many options to change the layout of a list. One of these is to create compact lists with the option **noitemsep**.

Code:

```
\begin{itemize}[noitemsep]
  \item This environment
  \item should only be used in the
  \item case of single line items
\end{itemize}
```

Result:

- This environment
- should only be used in the
- case of single line items

5.6.4 Arbitrary labels (enumitem package)

Furthermore labels can be changed using **enumitem**, here for example using the label option.

Code:

```
\begin{enumerate}[label=(\alph{enumi})]
  \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod
tempor incididunt ut labore et dolore magna aliqua.
  %
  \item Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod
tempor incididunt ut labore et dolore magna aliqua.
\end{enumerate}
```

Result:

(a) Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

(b) Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.

5.6.5 `description` environment

The `description` environment is used to describe items.

Code:

```
\begin{description}
  \item[Rivers] Elbe, Rhine
  \item[Seas]  Indian Ocean, Pacific
Ocean, Mediterranean Sea
\end{description}
```

Result:

Rivers Elbe, Rhine

Seas Indian Ocean, Pacific Ocean, Mediterranean Sea

5.6.6 `labeling` environment (Koma Script)

The `labeling` environment is an extension of the description environment. It provided correct alignment using the width of the largest element as a parameter.

Code:

```
\begin{labeling}[ --]{Rivers}
  \item[Rivers] Elbe, Rhine
  \item[Seas]  Indian Ocean, Pacific
Ocean,  Mediterranean Sea
\end{labeling}
```

Result:

Rivers – Elbe, Rhine

Seas – Indian Ocean, Pacific Ocean, Mediterranean Sea

5.7 Figures and captions

5.7.1 figure environment

Code:

```
\begin{figure}[H]
  \centering
  \includegraphics[width=0.3\textwidth]{images/testimage.png}
  \caption[Short figure caption]{Long figure caption displayed
  in the document.}
  \label{fig:figures:1}
\end{figure}
```

Result:

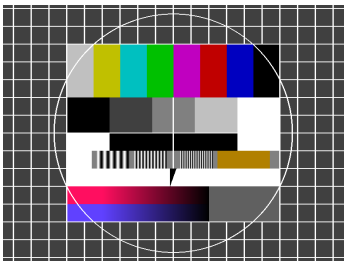


Figure 5.1: Long figure caption displayed in the document.

5.7.2 caption without figure environment using captionof (caption)

Code:

```
\begin{center}
  \includegraphics[width=0.3\textwidth]{images/testimage.png}
  \captionof{figure}{An example for a caption without a figure environment}
\end{center}
```

Result:

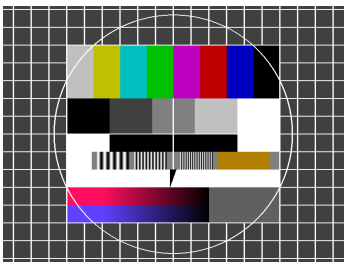


Figure 5.2: An example for a caption without a figure environment

5.7.3 caption without figure environment using captionsetup (caption)

Code:

```
\begin{center}
  \captionsetup{type=figure}
  \includegraphics[width=0.3\textwidth]{images/testimage.png}
  \caption{Another example for a caption without a figure environment}
\end{center}
```

Result:

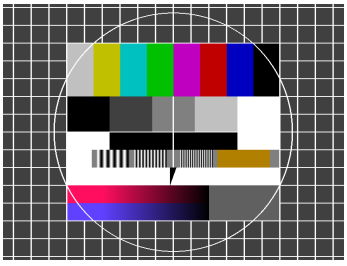


Figure 5.3: Another example for a caption without a figure environment

5.7.4 parallel figures with minipages

The `minipage` environment can be used to display figures in parallel. However if the `floatrow` package is loaded the standard LaTeX behaviour must be restored using `\RawFloats` at the beginning of the figure.

Code:

```
\begin{figure}[H]
  \IfDefined{RawFloats}{\RawFloats} % required if floatrow is loaded
  \begin{minipage}[b]{.5\linewidth}
    \centering
    \includegraphics[width=0.5\linewidth]{images/testimage.png}
    \caption{A figure}
    \label{fig:figures:2}
  \end{minipage}%
  %\hspace{2em}
  \begin{minipage}[b]{.5\linewidth}
    \centering
    \includegraphics[width=0.5\linewidth]{images/testimage.png}
    \caption{Another figure}
    \label{fig:figures:3}
  \end{minipage}
\end{figure}
```

Result:

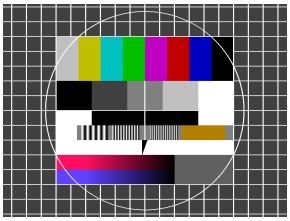


Figure 5.4: A figure

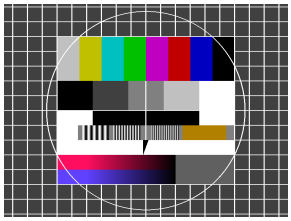


Figure 5.5: Another figure

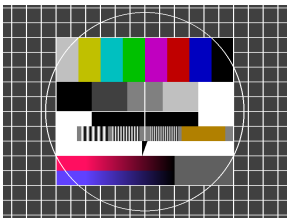
5.7.5 subcaption in minipages (caption)

The `\subcaption` command allows to define subfigure captions independent of the code used to display the pictures.

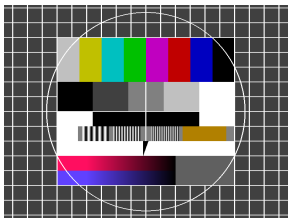
Code:

```
\begin{figure}[H]
  \begin{minipage}[b]{.5\linewidth}
    \centering
    \includegraphics[width=0.5\linewidth]{images/testimage.png}
    \subcaption{A subfigure}\label{fig:1a}
  \end{minipage}%
  \begin{minipage}[b]{.5\linewidth}
    \centering
    \includegraphics[width=0.5\linewidth]{images/testimage.png}
    \subcaption{Another subfigure}\label{fig:1b}
  \end{minipage}
  \caption{A figure}\label{fig:1}
\end{figure}
```

Result:



(a) A subfigure



(b) Another subfigure

Figure 5.6: A figure

5.7.6 parallel figures (floatrow)

The `floatrow` package provides many ways to layout pictures and tables and any other floating content. Here is an example with the `\ffigbox` command inside the `floatrow`

environment using the figure width for the first figure and the remaining width for the second figure.

Code:

```
\begin{figure}[H]
\begin{floatrow}
\ffigbox[\FBwidth]
{\includegraphics[width=0.3\textwidth]{images/testimage.png}}
{\caption{caption spanning the width of the picture}
 \label{fig:floatrow:example:3:a}}
%
\ffigbox[\Xhsize]
{\includegraphics[width=0.3\textwidth]{images/testimage.png}}
{\caption{caption spanning the remaining width of the text width}
 \label{fig:floatrow:example:3:b}}
\end{floatrow}
\end{figure}
```

Result:

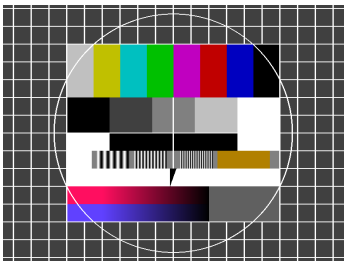


Figure 5.7: caption spanning the width of the picture

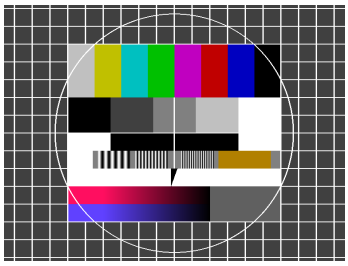


Figure 5.8: caption spanning the remaining width of the text width

5.7.7 parallel figures with vertical alignment (floatrow)

The general `\floatbox` command allows vertical alignment in the third optional parameter. Here [t]op and [b]ottom alignment is demonstrated.

Code:

```
\begin{figure}[H]
\begin{floatrow}
\floatbox{figure}[0.3\textwidth][\FBheight][t]
{\caption{first image positioned at the top}
 \label{fig:floatrow:example:4:a}}
{\includegraphics[width=0.25\textwidth]{images/testimage.png}}
%
\floatbox{figure}[0.3\textwidth][\FBheight][t]
{\caption{second image positioned at the top}
 \label{fig:floatrow:example:4:b}}
```

```
{\includegraphics[width=0.15\textwidth]{images/testimage.png}}
%
\floatbox{figure}[0.3\textwidth][\FBheight][b]
{\caption{third image positioned at the bottom}
 \label{fig:floatrow:example:4:c}}
{\includegraphics[width=0.15\textwidth]{images/testimage.png}}
\end{floatrow}
\end{figure}
```

Result:

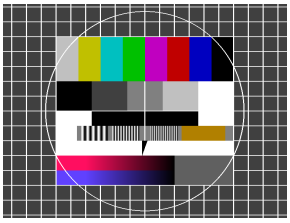


Figure 5.9: first image positioned at the top

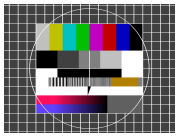


Figure 5.10: second image positioned at the top

Figure 5.11: third image positioned at the bottom

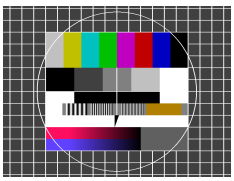
5.7.8 subfigures with subfloatrow environment (floatrow)

The figure placement and layout of `floatrow` can be changed to subfigures by using the `subfloatrow` environment.

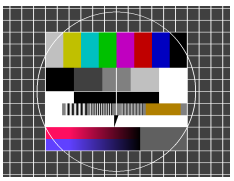
Code:

```
\begin{figure}[H]
\ffigbox[\FBwidth]
{
\begin{subfloatrow}
  \ffigbox[1.5\FBwidth]
  {\includegraphics[width=0.2\textwidth]{images/testimage.png}}
  {\caption{first image}\label{fig:floatrow:example:5:a}}
%
  \ffigbox[1.5\FBwidth]
  {\includegraphics[width=0.2\textwidth]{images/testimage.png}}
  {\caption{second image}\label{fig:floatrow:example:5:b}}
\end{subfloatrow}
}
{\caption{subcaptions using subfloatrow environment}
 \label{fig:floatrow:example:5}}
\end{figure}
```

Result:



(a) first image



(b) second image

Figure 5.12: subcaptions using subfloatrow environment

5.7.9 caption beside the figure (floatrow)

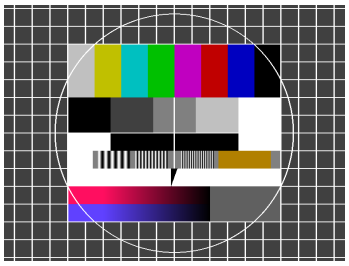
Using the first optional argument of `\floatbox` one can define a caption which is placed beside the figure with `\capbeside`.

Code:

```
\begin{figure}[H]
\floatbox[{\capbeside}]{figure}[\FBwidth]
{\caption[caption beside the figure]{caption beside the figure with some more
text and a bit more text and a little more text to fill space}
 \label{fig:floatrow:example:6:a}}
{\includegraphics[width=0.3\textwidth]{images/testimage.png}}
\end{figure}
```

Result:

Figure 5.13: caption beside the figure with some more text and a bit more text and a little more text to fill space



5.7.10 caption beside the figure with captionbeside (koma script)

If the `floatrow` package is loaded the standard LaTeX behaviour must be restored using `\RawFloats` at the beginning of the figure.

Code:

```
\KOMAoptions{captions=bottombeside} % topbeside
\begin{figure}[H]
\IfDefined{RawFloats}{\RawFloats} % required if floatrow is loaded
\begin{captionbeside}%
  [Example of captionbeside]%
  {Example of captionbeside, with inside caption and with some more
  text and a bit more text and a little more text to fill space.}%
```

```
  [i][0.9\textwidth][2em]
    \includegraphics[width=0.3\textwidth]{images/testimage.png}
\end{captionbeside}
\label{fig:captionbeside:example}
\end{figure}
```

Result:

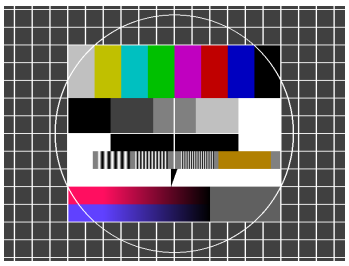


Figure 5.14: Example of captionbeside, with inside caption and with some more text and a bit more text and a little more text to fill space.

5.7.11 figure inside the paragraph (wrapfigure)

Non floating figure inside the paragraph. Note that this can cause wrong placed free space in the text body. If so one must remove this by adding appropiate `\vspace` commands at the top and/or bottom of the figure.

Code:

```
\begin{wrapfigure}{r}{0.3\textwidth}
  \includegraphics[width=0.8\linewidth]{images/testimage.png}
  \caption{A wrapfigure example}
   %\vspace{-2\baselineskip}
\end{wrapfigure}
...
```

Result:

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus.

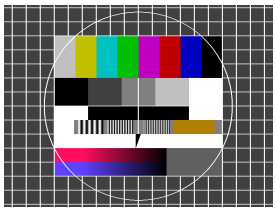


Fig. 5.15: A wrapfigure example

5.7.12 floating figure (or table) inside the paragraph (wrapfigure)

The `wrapfloat` environment in contrast to the `wrapfigure` environment is a floating environment and can be used for not only figures but any floating content.

Code:

```
\begin{wrapfloat}{figure}{r}{0.3\textwidth}
  \includegraphics[width=0.8\linewidth]{images/testimage.png}
  \caption{A wrapfloat example}
   %\vspace{-2\baselineskip}
\end{wrapfloat}
...
```

Result:

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio. Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus.

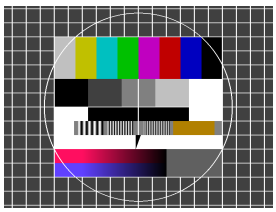


Fig. 5.16: A wrapfloat example

5.7.13 Koma Script: addmargin (default)

In this example the caption is as wide as the figure. The caption however does not span into the margin.

Code:

```
%\captionsetup{parboxrestore=default}

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing
nisi eu metus. Proin viverra odio ac lorem consequat condimentum.
Suspendisse bibendum tellus.

\begin{figure}[H]
\IfDefined{RawFloats}{\RawFloats} % required if floatrow is loaded
\begin{addmargin*}[0pt]{-0.6\marginwidth}%
\centering
\includegraphics[width=0.22\linewidth]{images/testimage} \hfill
\includegraphics[width=0.22\linewidth]{images/testimage} \hfill
\includegraphics[width=0.22\linewidth]{images/testimage} \hfill
\includegraphics[width=0.22\linewidth]{images/testimage}
\caption[pictures extended into the margin]{pictures extended into the margin
-- Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing
nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse
bibendum tellus. }
\label{fig:maincls.addmargin.default}
\end{addmargin*}
\end{figure}
%
Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing
nisi eu metus. Proin viverra odio ac lorem consequat condimentum.
Suspendisse bibendum tellus.
```

Result:

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

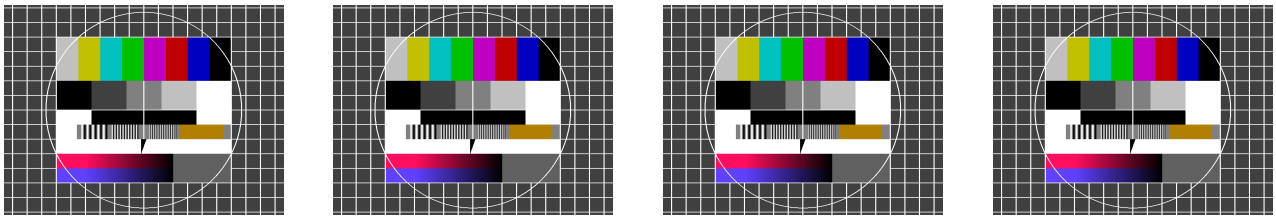


Figure 5.17: pictures extended into the margin – Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

5.7.14 caption inside the margin (mcaption)

Code:

```
Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi
eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse
bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod
adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

\begin{figure}[H]
\IfDefined{RawFloats}{\RawFloats} % required if floatrow is loaded
\begin{margincap}
  \centering
  \includegraphics[width=0.4\textwidth]{images/testimage}
  \caption[short caption text]{long caption text with some more
   text and a bit more text and a little more text to fill space.}
  \label{fig:picmargincap}
\end{margincap}
\end{figure}

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi
eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse
bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod
adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit
```

Result:

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

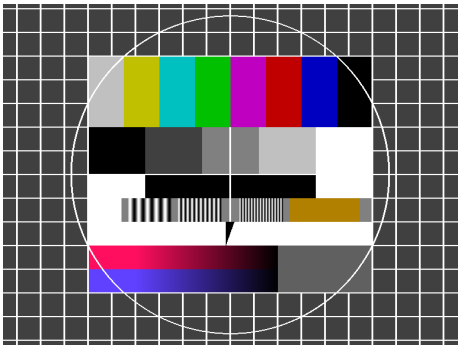


Fig. 5.18: long caption text with some more text and a bit more text and a little more text to fill space.

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

5.7.15 document sizes

This template defines the commands `\doctextwidth` and `\doctextheight` which maintain their size even if the surrounding `\textwidth` changes.

These sizes can be used in figures to specify the width in fixed paper depended sizes.

0.8\textwidth

0.38\doctextwidth | 0.38\doctextwidth

0.38\textwidth | 0.38\textwidth

5.8 Tables

This section about tables is organized as follows:

- In section 5.8.1 different styles to create a table are shown:
  - Basic tables using booktabs line commands (5.8.1 and 5.8.1),
  - with custom commands for the style and the colors (5.8.1),
- Section 5.8.2 is about the alignment of columns in a table, the usage of column specifiers and the alignment of numbers using `siunitx`.
- In section 5.8.3 the usage of `\multicolumn` and `\multirow` commands is shown.
- Section 5.8.5 shows how to correct the indentation for itemize lists.
- Section 5.8.4 and 5.8.5 demonstrates the coloring of rows.
- How to create and present very large tables is introduced in section 5.8.6.

5.8.1 table styles

There a many ways to design a table in terms of its lines (grid), sizes, fonts and colors. Most of these can be regarded as personal taste. However the simplest on, the grid design, is regarded as a style which should be avoided by any means, since it makes it difficult for the eye to read the table. Here some of the most common approaches to style a table are presented.

Booktabs package

Code:

```
\begin{table}[H]
% style
\small\sffamily\renewcommand{\arraystretch}{1.4}
% caption
\captionabove{table in booktabs style}
\begin{tabular}{lll}
\toprule
  header  & header  & header \\
\midrule
  content & content & content \\
  content & content & content \\
  content & content & content \\
\bottomrule
\end{tabular}
\end{table}
```

Result:

Table 5.1: table in booktabs style

header	header	header
content	content	content
content	content	content
content	content	content

Note that here the style of the table was further changed by the commands:

```
\small\sffamily\renewcommand{\arraystretch}{1.4}
```

Cmidrule (booktabs)

Code:

```
\begin{table}[H]
\small\sffamily\renewcommand{\arraystretch}{1.4}
\begin{tabular}{lll}
\toprule
  header  & header  & header \\ \cmidrule(r){1-1}
                                \cmidrule(lr){2-2}
                                \cmidrule(l){3-3}
  content & content & content \\
  content & content & content \\
  content & content & content \\
\bottomrule
\end{tabular}
\end{table}
```

Result:

header	header	header
content	content	content
content	content	content
content	content	content

Custom style with alternating row colors

Here a custom style is applied. Note however that the modern way of package `tabularray` is more recommended.

- `\small` tables are more compact.
- `\renewcommand{\arraystretch}{1.4}` better readibility of rows.
- `\sffamily` tables are better distinguished from the main text.

Code:

```
\begin{table}[H]
% style
\small\sffamily\centering\renewcommand{\arraystretch}{1.4}
% caption
\captionabove{table with style changes and zebra colored rows}
%tabular
\rowcolors{1}{tablebodycolor}{tablerowcolor}
\begin{tabular}{ccc}
\hline
\rowcolor{tableheadcolor}
  \bfseries header  &
  \bfseries header  &
  \bfseries header  \\
\hline
  content & content & content \\
  content & content & content \\
  content & content & content \\
\hline
\end{tabular}
\end{table}
```

Result:

Table 5.2: table with style changes and zebra colored rows

header	header	header
content	content	content
content	content	content
content	content	content

tabularray package

This package can style the whole tabular using a section with style definitions.

Code:

```
\begin{table}[H]
%
\captionabove{table with bold header font using the tabularray package}
\begin{tblr}{
  colspec = {XX},colsep = 4mm,
  row{odd} = {azure8},
  row{1} = {azure2,fg=white,2em, font=\large\bfseries\sffamily},
  row{even} = {gray8},
  hlines = {white}
 }
```

```
 % header = row{1}
 header & header \\
 % Body
 content  & content \\
 content  & content \\
 content  & content \\
 content  & content \\
 content  & content \\
 % sub header
 \SetRow{bg=azure4,fg=white,font=\bfseries\sffamily}
 subhead & subhead \\
 %
 content  & content \\
 content  & content \\
\end{tblr}
\end{table}
```

Result:

Table 5.3: table with bold header font using the tabularray package

header	header
content	content
content	content
content	content
content	content
content	content
subhead	**subhead**
content	content
content	content

5.8.2 Column types and column specifiers

Simple table (only alignment)

Code:

```
\begin{tabular}{lcr}
left  &  center  &  right  \\  % or \tabularnewline
A     &  B       &  C  \\
\end{tabular}
```

Result:

left	center	right
A	B	C

Column types: p

p-columns have a fixed width and align the text as justified.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\begin{tabular}{|l|p{0.1\linewidth}|p{0.2\linewidth}|p{0.4\linewidth}|}
\hline
header l & header p & header p & header p \\ \hline
%
left  &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column
\newline with a line break included \\ \hline
\end{tabular}
\end{center}
```

Result:

header l	header p	header p	header p
left	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column with a line break included

Note, that such a grid should not be applied to a table. It is here only to demonstrate the size of the columns.

Column types: p, m, b

The p,b and m columns all behave the same expect for their vertical alignment:

- p means normal cells, they aligned at the top line
- b means alignment at the bottom, so the baseline is at the bottom line
- m means alignment in the vertical center, i.e. the baseline is in the center.

Therefore b-columns are on top of p-columns because their baselines are aligned.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\begin{tabular}{|p{0.3\linewidth}|m{0.3\linewidth}|b{0.3\linewidth}|}
\hline
\centering header p &
\centering header m &
\centering header b \tabularnewline
\hline
text which is considerably longer than the width of the column  &
text which is considerably longer than the width of the column  &
text which is considerably longer than the width of the column
\\
\hline
\end{tabular}
\end{center}
```

Result:

header p	header m	header b
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column

Note, that such a grid should not be applied to a table. It is here only to demonstrate the alignment.

Column types: X (Tabularray)

The package `Tabularray` allows to define the width of a table and to define a column (X) that takes the remaining space to fill the tabular. Each column is aligned as justified. Note that this is also available with the old package `tabularx` which introduced this type of column.

The X Column can be defined with additional widht specs and alignment such as `X[2,l]X[3,r]`. For further information use the documentation of `Tabularray`.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\small
```

```
\begin{tblr}{width=0.9\textwidth, colspec={llXX}}
\hline
l & l & X & X \\\hline
%
left column & left column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
\hline
\end{tblr}
\end{center}
```

Result:

l	l	X	X
left column	left column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column

Note, that such a grid should not be applied to a table. It is here only to demonstrate the size of the columns.

Columns with large texts using \RaggedLeft

The left an right alignment can be modified using the tblr macros

Code:

```
{% start group

% redefine the alignment macros (here in a group to
% ensure that these commands are not used document-wide)
\RenewDocumentCommand\TblrAlignLeft{}{\RaggedRight}
\RenewDocumentCommand\TblrAlignCenter{}{\Centering}
\RenewDocumentCommand\TblrAlignRight{}{\RaggedLeft}

\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\small
\begin{tblr}{width=0.9\textwidth, colspec={|X[l]|X[c]|X[r]|}}
\hline
variable (left)   &
variable (center) &
variable (right)  \\ \hline
%
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
\hline
```

```
\end{tblr}
\end{center}
}% end group
```

Result:

variable (left)	variable (center)	variable (right)
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column

Note, that such a grid should not be applied to a table. It is here only to demonstrate the size and alignment of the columns.

Usage of special column specifiers (>{...}, !{...})

In this code the `!{...}` specifier is used to replace the cell separation by the equal sign (`!{=}`) and the preceding and following column are specified using `>{$}...<{$}` to define the columns as math mode cells. With this combination an alignment of the properties at the equal sign is achieved.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\begin{tabular}{l>{$}r<{$}!{=}>{$}l<{$}}
\hline
\bfseries  Description  &
\multicolumn{2}{l}{\bfseries  Property} \\
\hline
density         &  \rho          &  \SI{2.2}{g/cm^3} \\
heat capacity   &  c_\mathrm{p}  &  \SI{703}{J/gK}   \\
transmission    &  \multicolumn{2}{c}{185 - 2500\,\si{nm}} \\
\hline
\end{tabular}
\end{center}
```

Result:

Description	**Property**
density	$\rho = 2.2\,\mathrm{g/cm^3}$
heat capacity	$c_\mathrm{p} = 703\,\mathrm{J/gK}$
transmission	185 - 2500 nm

Alignment of numbers (siunitx, S-column)

In this table all numbers are aligned, rounded and zeros added if necessary

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% si setup
\sisetup{%
  table-format = 2.3, % width of numbers
  round-mode=places,  % round numbers
  round-precision=3,  % with 3 decimal digits
  round-integer-to-decimal=true,  % add trailing 0
}
% tabular
\begin{tabular}{|S % center = standard
|S[table-number-alignment = left]
|S[table-number-alignment = right]|}
\hline
{Some Values} & {Some Values} & {Some Values} \\
\hline
 2.34   &  2.34   &  2.34   \\
34.2345 & 34.2345 & 34.2345 \\
56.7834 & 56.7834 & 56.7834 \\
\hline
\end{tabular}
\end{center}
```

Result:

Some Values	Some Values	Some Values
2.340	2.340	2.340
34.235	34.235	34.235
56.783	56.783	56.783

Note, that such a grid should not be applied to a table. It is here only to demonstrate the size and alignment of the columns.

5.8.3 Multicolumn and multirow cells

Multicolumn and multirow (old style)

The standard tables and old environments provide the commands `\multicolumn` and `\multirow` to span multiple cells in one column or row.

Code:

```
\begin{center}
\renewcommand{\arraystretch}{1.4}
\begin{tabular}{|l|c|r|}
\hline
left  &  center  &  right       \\ \
hline
\multicolumn{3}{|c|}{3 columns} \\ \
hline
1     &  2       &  3           \\ \
hline
\multirow{2}{*}{two  cells}
&  b         &  c      \\ \cline{2-3}
&  2         &  3      \\ \hline
\end{tabular}
\end{center}
```

Result:

left	center	right
3 columns		
1	2	3
two cells	b	c
	2	3

tabularray multi column and rows

The new package `tabularray` provides a different and more flexible approach with `\SetCell`.

Code:

```
 \renewcommand{\arraystretch}{1.4}
\begin{tblr}{|l|c|r|}
 \hline
 left  &  center  &  right  \\ \hline
 \SetCell[c=3]{c} 3 columns \\ \hline
 1     &  2       &  3      \\ \hline
 \SetCell[r=2]{c} 2 rows
 &  2         &  3      \\ \cline{2-3}
 &  2         &  3      \\ \hline
 1   & \SetCell[r=2,c=2]{c} 2 rows 2
columns \\ \hline
 1  & 2 & 3 \\ \hline
\end{tblr}
```

Result:

left	center	right
3 columns		
1	2	3
2 rows	2	3
	2	3
1	2 rows 2 columns	
1		

5.8.4 Colors in tables: using rowcolor(s)

The alternating row colors (zebra table style) is created by the `\rowcolors` commmand. A single row is colored with `\tableheadcolor`.

Code:

```
\begin{center}
% Style changes
\small\sffamily\renewcommand{\arraystretch}{1.4}
% tabular
\rowcolors{1}{tablerowcolor}{tablebodycolor}
\begin{tabular}{ccc}
\hline
\rowcolor{tableheadcolor}
head & head & head \\
\hline
content & content & content \\
content & content & content \\
content & content & content \\
\hline
\end{tabular}
\end{center}
```

Result:

head	head	head
content	content	content
content	content	content
content	content	content

5.8.5 Colors in tables: using tabularray

The alternating row colors (zebra table style) and head color is define in the configuration of the table.

Code:

```
\begin{center}
 % Style changes
 \small\sffamily\renewcommand{\arraystretch}{1.4}
 % tabular
 \begin{tblr}{
   colspec = {ccc},
   row{odd} = {tablerowcolor},
   row{1} = {tableheadcolor},
   row{even} = {tablebodycolor},
  }
  \hline
  head & head & head \\
  \hline
  content & content & content \\
  content & content & content \\
  content & content & content \\
  \hline
```

```
  \end{tblr}
 \end{center}
```

Result:

head	head	head
content	content	content
content	content	content
content	content	content

Item lists inside tables

List require a box (using `varwidth`) around the list to be displayed correct and to enable an error free compilation.

Code:

```
 \begin{center}
 % Style changes
 \small\centering\renewcommand{\arraystretch}{1.4}
 % tabular
 \begin{tblr}{width=0.9\textwidth, colspec={|X|X|X|}}
  \hline
  header X &
  header items (X) &
  header enums (X) \\
  \hline
  %
The \LaTeX{} document preparation system is a special version of Donald
Knuth's \TeX{} program. \TeX{} is a sophisticated program designed to
produce high-quality typesetting, especially for mathematical text.

  &
  \begin{varwidth}[t]{\linewidth}
   \begin{itemize}[topsep=0pt, parsep=0pt,leftmargin=8pt]
\item The \LaTeX{} document preparation system is a special version of Donald
Knuth's \TeX{} program.
\item \TeX{} is a sophisticated program designed to produce high-quality
typesetting,
\item especially for mathematical text.
   \end{itemize}
  \end{varwidth}
  &
  \begin{varwidth}[t]{\linewidth}
   \begin{enumerate}[topsep=0pt, parsep=0pt,leftmargin=12pt]
\item The \LaTeX{} document preparation system is a special version of Donald
Knuth's \TeX{} program.
\item \TeX{} is a sophisticated program designed to produce high-quality
typesetting,
```

```
\item especially for mathematical text.
   \end{enumerate}
  \end{varwidth}
  \\ \hline
 \end{tblr}
\end{center}
```

Result:

header X	header items (X)	header enums (X)
The LaTeX document preparation system is a special version of Donald Knuth's TeX program. TeX is a sophisticated program designed to produce high-quality typesetting, especially for mathematical text.	• The LaTeX document preparation system is a special version of Donald Knuth's TeX program. • TeX is a sophisticated program designed to produce high-quality typesetting, • especially for mathematical text.	1. The LaTeX document preparation system is a special version of Donald Knuth's TeX program. 2. TeX is a sophisticated program designed to produce high-quality typesetting, 3. especially for mathematical text.

5.8.6 Large tables

Long tables (longtblr)

This code demonstrates how to create columns which span over more than one page.

Code:

```
\DeclareTblrTemplate{contfoot-text}{templatedoc}{Continued on next page \ldots}
\SetTblrTemplate{contfoot-text}{templatedoc}

\begin{longtblr}[
 caption = {longtable with longtblr},
 label = {tab:doc:longtblr}]
 {
  colspec = {>{\itshape}X[1,l]X[1,l]X[1,l]X[1,l]X[1,l]X[1,l]},
  width = 1.0\textwidth,
  row{odd} = {bg=azure9},
  row{1}   = {bg=azure3, fg=white, font=\sffamily\upshape},
  rowhead = 1,
  rowfoot = 0,
 }
 \hline
 \upshape title &
 title &
 title &
 title &
 title &
```

```
 title \\ \hline
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\
 description   & content & content & content & content & content \\ \hline
\end{longtblr}
```

Result:

Table 5.4: longtable with longtblr

title	title	title	title	title	title
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content

Continued on next page ...

Table 5.4: longtable with longtblr (Continued)

title	title	title	title	title	title
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content
description	content	content	content	content	content

Wide tables (addmargin)

For wide tables one can use the `addmargin` environment to extend the textwidth into the margin. The usage is demonstrate in section 5.4.2 and 5.7.13.

landscape orientated tables (sideways)

The table orientated in landscape created by the environment `sideways` is floating with the caption placed above the table in the direction of the page.

Code:

```
\begin{table}[H]
  \centering\small\renewcommand{\arraystretch}{1.4}\sffamily
  \captionabove{very wide table (sideways)}
  \rowcolors{1}{tablebodycolor}{tablerowcolor}
\begin{sideways}
\begin{tabularx}{0.90\textheight}{*{6}{X}}
\hline
\rowcolor{tableheadcolor}
head & head & head & head & head & head \\
\hline
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
```

```
text which is considerably longer than the width of the column \\
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
\hline
\end{tabularx}
\end{sideways}
\end{table}
```

Result:: Shown on the following page.

Table 5.5: very wide table (sideways)

head	head	head	head	head	head
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column

landscape orientated tables (sidewaystable)

The table orientated in landscape created by the environment `\sidewaystable` is non-floating. The content is displayed on the following page. The caption is rotated as well and thus placed above the table in the orientation of the table.

Code:

```
\begin{sidewaystable}
\begin{center}
  \centering\small\renewcommand{\arraystretch}{1.4}\sffamily
  \captionsetup{type=table}
  \captionabove{very wide table (sidewaystable)}
  \rowcolors{1}{tablebodycolor}{tablerowcolor}
\begin{tabularx}{1.0\textwidth}{*{6}{X}}
\hline
\rowcolor{tableheadcolor}
head & head & head & head & head & head \\
\hline
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column &
text which is considerably longer than the width of the column \\
\hline
\end{tabularx}
\end{center}
\end{sidewaystable}
```

Result:: Shown on the following page.

Table 5.6: very wide table (sidewaystable)

head	head	head	head	head	head
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column
text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column	text which is considerably longer than the width of the column

5.8.7 Fancy tables

tcolorbox Tables

The `tcolorbox` allows fancy tables. Here a simple examples that was posted on stackoverflow.

Code:

```
\tcbset{tab2/.style={enhanced,fonttitle=\bfseries,fontupper=\normalsize\sffamily,
  colback=yellow!10!white,colframe=red!50!black,colbacktitle=Salmon!40!white,
  coltitle=black,center title}}

\newcolumntype{Y}{>{\raggedleft\arraybackslash}X}

\begin{tcolorbox}[tab2,tabularx={X||Y|Y|Y|Y||Y},title=My table,boxrule=0.5pt]
 Group & One      & Two      & Three     & Four      & Sum       \\\hline\hline
 Red   & 1000.00 & 2000.00 &  3000.00 &  4000.00 & 10000.00 \\
 Green & 2000.00 & 3000.00 &  4000.00 &  5000.00 & 14000.00 \\
 Blue  & 3000.00 & 4000.00 &  5000.00 &  6000.00 & 18000.00 \\\hline\hline
 Sum   & 6000.00 & 9000.00 & 12000.00 & 15000.00 & 42000.00
\end{tcolorbox}
```

Result:

My table

Group	One	Two	Three	Four	Sum
Red	1000.00	2000.00	3000.00	4000.00	10000.00
Green	2000.00	3000.00	4000.00	5000.00	14000.00
Blue	3000.00	4000.00	5000.00	6000.00	18000.00
Sum	6000.00	9000.00	12000.00	15000.00	42000.00

5.9 Math

For all math environments and commands the `mathmode.pdf` script by Herbert Voss is a very good reference.

5.9.1 Math formulas

Examples taken from `wikipedia.org`

Code:

```
Green's theorem
\begin{equation}
  \underset{\mathcal{G}\quad}\iiint
  \left[u\nabla^{2}v+\left(\nabla  u,\nabla  v\right)\right]\mathrm{d}^{3}V
  =\underset{\mathcal{S}\quad}\oiint  u\,\frac{\partial v}{\partial n}
  \,\,\mathrm{d}^{2}A
\end{equation}
Jacobian matrix
\begin{equation}
  J_f(a) := \frac{\partial {f}}{\partial {x}}(a)
         := \frac{\partial(f_1,  \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a)
         := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\
             j=1,\ldots,n}
\end{equation}
```

Result:

Green's theorem

$$\underset{\mathcal{G}\quad}{\iiint} \left[u\nabla^{2}v+\left(\nabla u,\nabla v\right)\right]\mathrm{d}^{3}V = \underset{\mathcal{S}\quad}{\oiint} u\,\frac{\partial v}{\partial n}\,\mathrm{d}^{2}A \tag{5.4}$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\ j=1,\ldots,n} \tag{5.5}$$

5.9.2 Multiline equations (align)

Code:

```
\begin{align}
  \dot{q}_i & = \frac{\partial H}{\partial p_i} \\
  \dot{p}_i & = -\frac{\partial H}{\partial q_i}
\end{align}
```

Result:

$$\dot{q}_i = \frac{\partial H}{\partial p_i} \tag{5.6}$$
$$\dot{p}_i = -\frac{\partial H}{\partial q_i} \tag{5.7}$$

5.9.3 Multiline equations with only one number (aligned)

Code:

```
\begin{equation}
\begin{aligned}
  \dot{q}_i & = \frac{\partial H}{\partial p_i} \\
  \dot{p}_i & = -\frac{\partial H}{\partial q_i}
\end{aligned}
\end{equation}
```

Result:

$$\begin{aligned} \dot{q}_i &= \frac{\partial H}{\partial p_i} \\ \dot{p}_i &= -\frac{\partial H}{\partial q_i} \end{aligned} \tag{5.8}$$

5.9.4 Multiline equations with multiple alignments (alignat)

Here the number of alignment specifiers must be declared.

Code:

```
\begin{alignat}{3}
  a & = b + c      && = d - c \\
  m & = n + k + w && = l - f
\end{alignat}
```

Result:

$$a = b + c \qquad = d - c \tag{5.9}$$
$$m = n + k + w = l - f \tag{5.10}$$

5.9.5 special environments: cases

Code:

```
\[
\operatorname{rect}(t) =
```

```
\begin{cases}
  0 &            \text{if } |t| > \frac{1}{2} \\
  \frac{1}{2} & \text{if } |t| = \frac{1}{2} \\
  1 &            \text{if } |t| < \frac{1}{2}
\end{cases}
\]
```

Result:

$$\operatorname{rect}(t) = \begin{cases} 0 & \text{if } |t| > \frac{1}{2} \\ \frac{1}{2} & \text{if } |t| = \frac{1}{2} \\ 1 & \text{if } |t| < \frac{1}{2} \end{cases}$$

5.9.6 special environments: matrices

Code:

```
The determinant of the matrix
\[ A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \]
is written as
\[ \det A  = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad-bc. \]
```

Result:

The determinant of the matrix

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

is written as

$$\det A = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc.$$

5.9.7 special commands: braket

Code:

```
\begin{equation}
   \text{bra:} \Bra{a} \qquad \text{ket:} \Ket{a} \qquad \text{braket:}
   \Braket{a|b} \qquad \Braket{a|A|b}
\end{equation}
```

Result:

$$\text{bra: } \langle a| \qquad \text{ket: } |a\rangle \qquad \text{braket: } \langle a \,|\, b\rangle \qquad \langle a \,|\, A \,|\, b\rangle \tag{5.11}$$

5.9.8 special commands: cancel

Code:

```
\begin{equation}
  f(x) = \frac{\cancel{(a+1)}x}{(x-1)\cancel{(a+1)}}
\end{equation}
```

Result:

$$f(x) = \frac{\cancel{(a+1)}x}{(x-1)\cancel{(a+1)}} \tag{5.12}$$

5.9.9 special commands: empheq

Code:

```
\begin{empheq}[box=\fbox]{align}
  f(x) & = e^{-E/kT}
\end{empheq}
```

Result:

$$\boxed{f(x) = e^{-E/kT}} \tag{5.13}$$

5.9.10 Double stroke math font (mathbb)

Code:

```
\[
\mathbb{N}\subset\mathbb{Z}
          \subset\mathbb{Q}
          \subset\mathbb{R}
          \subset\mathbb{C}
\]
```

Result:

$$\mathbb{N}\subset\mathbb{Z}\subset\mathbb{Q}\subset\mathbb{R}\subset\mathbb{C}$$

5.9.11 Double stroke math font (mathds)

Code:

```
\[
\mathds{N}\subset\mathds{Z}
          \subset\mathds{Q}
          \subset\mathds{R}
          \subset\mathds{C}
\]
```

Result:

$$\mathbb{N}\subset\mathbb{Z}\subset\mathbb{Q}\subset\mathbb{R}\subset\mathbb{C}$$

5.9.12 Euler script symbols in math mode (mathcal)

Code:

```
\[
  \mathcal{A} \quad \mathcal{B} \quad
  \mathcal{C} \quad \mathcal{D} \quad
  \mathcal{E} \quad \mathcal{F}
\]
```

Result:

$$\mathcal{A} \quad \mathcal{B} \quad \mathcal{C} \quad \mathcal{D} \quad \mathcal{E} \quad \mathcal{F}$$

5.9.13 split level fractions

Code:

```
You take \sfrac{1}{2} cup of sugar, \ldots
```

Result:

You take ½ cup of sugar, …

5.9.14 Math and Physics symbols defined in the template

Code:

```
New commands (absolute, norm, trace):
\begin{equation}
\abs{-x} + \Abs{(x-3)^2} + \norm{\vec a - \vec b}
\end{equation}
%
\begin{equation}
\Trace{M} = \Trace{\begin{pmatrix}
     \alpha & \beta\\
     \gamma & \delta
       \end{pmatrix}} = \alpha + \delta
\end{equation}
%
Differentials (partial and total):
\begin{equation}
 \int x y \, \pd x \td y
\end{equation}
%
Abbreviations (real and imaginary)
\begin{equation}
\Re\{\i - 1\} + \Im\{\i - 1\}
\end{equation}
%
Characters for: complex, real, hamiltonian, probability, unity
\begin{equation}
\complex, \real, \Ham, \Prob, \unity
\end{equation}
%
```

```
New operators
\begin{equation}
\rot \vec{a} + \grad \vec{a} + \divf \vec{a} + \rect f(x) + \e^{-\i x} = \const
\end{equation}
%
New Symbols (laplace, dalembert)
\begin{gather}
\laplace f(x,y) = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\
partial y^2} \\
\dalembert = \frac{\partial ^2}{c^2\partial t^2} - \laplace
\end{gather}
%
```

Result:

New commands (absolute, norm, trace):

$$|-x| + \left|(x-3)^2\right| + \left\|\vec{a} - \vec{b}\right\| \tag{5.14}$$

$$\operatorname{Tr}\{\,M\,\} = \operatorname{Tr}\left\{\begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix}\right\} = \alpha + \delta \tag{5.15}$$

Differentials (partial and total):

$$\int xy\,\partial x\,\mathrm{d}y \tag{5.16}$$

Abbreviations (real and imaginary)

$$\Re\{\mathrm{i}-1\} + \Im\{\mathrm{i}-1\} \tag{5.17}$$

Characters for: complex, real, hamiltonian, probability, unity

$$\mathbb{C}, \mathbb{R}, \mathcal{H}, \mathcal{P}, \mathbb{1} \tag{5.18}$$

New operators

$$\operatorname{rot}\vec{a} + \operatorname{grad}\vec{a} + \operatorname{div}\vec{a} + \operatorname{rect} f(x) + \mathrm{e}^{-\mathrm{i}x} = \mathrm{const} \tag{5.19}$$

New Symbols (laplace, dalembert)

$$\Delta f(x,y) = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} \tag{5.20}$$

$$\Box = \frac{\partial^2}{c^2\partial t^2} - \Delta \tag{5.21}$$

5.10 Science

This section is mainly about packages that are useful for special professions, and the use of units in text is demonstrated.

5.10.1 units with siunitx

Code:

```
\begin{tabular}{ll}
Micrometer in text mode:          & 33\,\textmu m \\
and in math mode with units:      & $1,23\,\unit{\micro m/s}$ \\
and with formatting of the number: & $\qty{0,25e-11}{m/s^2}$ \\
and finally with an uncertainty:  & $\qty{1,7(5)e-11}{m/s^2}$ \\
\end{tabular}
```

Result:

Micrometer in text mode:	33 µm
and in math mode with units:	1,23 µm/s
and with formatting of the number:	0.25×10^{-11} m/s^2
and finally with an uncertainty:	$(1.7 \pm 0.5) \times 10^{-11}$ m/s^2

5.11 Symbols

5.11.1 Zapf Dingbats Symbols

Code:

```
\ding{52} \quad \ding{222}
          \quad \ding{237}
```

Result:

✔ ➞ ➪

5.11.2 latexsym Symbols

Code:

```
\mho
\Join
\Box
\Diamond
\sqsubset
\sqsupset
\leadsto
\unlhd
\unrhd
```

Result:

℧ □◇ ⇝⊴⊵

5.12 Bibliographies and Citations

5.12.1 biblatex

The text of this example is taken from the original biblatex examples.

Standard citation examples

Code:

```
\cite{companion}
\cite[59]{companion}
\cite[see][]{companion}
\cite[see][59--63]{companion}
```

Result:

[Goo94] [Goo94, p. 59] [see Goo94] [see Goo94, pp. 59–63]

Examples using \parencite

The \parencite command is similar to \cite at first glance, but the placement of the prenote argument is different.

Code:

```
This is just filler text \parencite{companion}.
This is just filler text \parencite[59]{companion}.
This is just filler text \parencite[see][]{companion}.
This is just filler text \parencite[see][59--63]{companion}.
```

Result:

This is just filler text [Goo94]. This is just filler text [Goo94, p. 59]. This is just filler text [see Goo94]. This is just filler text [see Goo94, pp. 59–63].

Examples using \textcite

Code:

```
\textcite{companion} show that this is just filler text.
\textcite[59]{companion} show that this is just filler text.
\textcite[see][]{companion} show that this is just filler text.
\textcite[see][59--63]{companion} show that this is just filler text.
```

Result:

Goossens et al. [Goo94] show that this is just filler text. Goossens et al. [Goo94, p. 59] show that this is just filler text. Goossens et al. [see Goo94] show that this is just filler text. Goossens et al. [see Goo94, pp. 59–63] show that this is just filler text.

Example using \autocite

By default, the \autocite command works like \parencite.

Code:

```
This is just filler text \autocite{companion}.
```

Result:

This is just filler text [Goo94].

Multiple citations

By default, a list of multiple citations is not sorted. You can enable sorting by setting the 'sortcites' package option.

Code:

```
\cite{companion,augustine,bertram,cotton,hammond,massa,murray}
```

Result:

[Aug95; Ber96; Cot99; Goo94; Ham97; Hos98; Mas04]

Citations details

Code:

```
\cite{companion} \\
\citetitle{companion} \\
\citeyear{companion} \\
\citeauthor{companion} \\
```

Result:

[Goo94]
LaTeX Companion
1994
Goossens et al.

5.13 Index, glossaries, list of symbols, list of acronyms, ...

5.13.1 Index

The result of the index is not displayed here, but is shown in the appendix of the document on page 229.

Code:

```
Lorem\index{example!Lorem} ipsum\index{example!ipsum}
dolor\index{example!dolor} sit amet, consectetuer adipiscing
elit Nam dui ligula, fringilla a, euismod sodales,
sollicitudin vel, wisi.

The resulting index is printed on page~\pageref{sec:Index}.
```

Result:

Lorem ipsum dolor sit amet, consectetuer adipiscing elit Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi.

The resulting index is printed on page 229.

5.13.2 Package glossaries (acronyms, symbols, glossaries)

You need to configure the editor to execute the command `makeglossaries texdocument`, which is a script that executes the necessary makeindex commands.

You can also execute makeindex directly. See the documentation of the glossaries package for further details.

List of acronyms (glossaries)

Code:

```
% place these definitions before \begin{document}
\newacronym{NA}{NA}{numerical Apertur}
\newacronym{DOF}{DOF}{depth of field}
\newacronym{PSF}{PSF}{point spread function}
```

Code:

```
% use the acronyms in a document.
The \gls{NA} of an microscope objective is defined by
$\mathrm{NA} = n \sin(\alpha)$, where and $\alpha$ is the
half-angle of the maximum cone of light that can exit the lens
The $z$-length under which the objective displays the probe with a sharp
picture is named \gls{DOF} and the distribution of a single light point in the
focal area through the whole imaging system is termed \gls{PSF}. Both, the
\gls{DOF} and the \gls{PSF} are dependent on the \gls{NA}.

% print out acronym list (style can be modified)
\printglossary[type=\acronymtype]
```

Result:

The numerical Apertur (NA) of an microscope objective is defined by NA $= n\sin(\alpha)$, where and α is the half-angle of the maximum cone of light that can exit the lens The z-length under which the objective displays the probe with a sharp picture is named depth of field (DOF) and the distribution of a single light point in the focal area through the whole imaging system is termed point spread function (PSF). Both, the DOF and the PSF are dependent on the NA.

Acronyms

Notation	Description
DOF	depth of field
NA	numerical Apertur
PSF	point spread function

List of symbols (glossaries)

Code:

```
% place these definitions before \begin{document}
\newglossaryentry{symb:Pi}{%
  name=$\pi$,%
  description={mathematical constant},%
  sort=symbolpi, type=symbolslist%
}
\newglossaryentry{symb:Phi}{%
  name=$\varphi$,%
  description={arbitrary angle},%
  sort=symbolphi, type=symbolslist%
}
\newglossaryentry{symb:Lambda}{%
  name=$\lambda$,%
  description={wavelength},%
  sort=symbollambda, type=symbolslist%
}
```

Code:

```
% use the symbols in a document.
Calculations with \gls{symb:Pi} always give an inaccurate result,
because \gls{symb:Pi} is an irrational number.

% Add symbols not used in the text
\glsadd{symb:Phi}
\glsadd{symb:Lambda}

% print out symbol list (style can be modified)
```

```
\printglossary[type=symbolslist]
```

Result:

Calculations with π always give an inaccurate result, because π is an irrational number.

List of Symbols

Notation	Description
λ	wavelength
φ	arbitrary angle
π	mathematical constant

Glossary (package glossaries)

Code:

```
% place these definitions before \begin{document}
\newglossaryentry{glos:CD}{name=Compact disc (CD),
  description={The Compact Disc (also known as a CD) is an optical disc used
  to store digital data. It was originally developed to store and playback sound
recordings exclusively, but later expanded to encompass storage of data (Source:
wikipedia)}
}
\newglossaryentry{glos:DVD}{name=DVD,
  description={DVD is an optical disc storage media format, invented and
  developed by Philips, Sony, Toshiba, and Panasonic in 1995. DVDs offer
  higher storage capacity than Compact Discs while having the same dimensions.
  The basis of the DVD name stems from the term \textit{digital versatile disc}.
(Source: wikipedia)}
}
```

Code:

```
% use the symbols in a document.
The \gls{glos:CD} was originally developed to play sound recordings, but later
extended to data storage. Later the \gls{glos:DVD} replaced the CD for the usage
of data storage.

% print out glossary
\printglossary[style=altlist]
```

Result:

The Compact disc (CD) was originally developed to play sound recordings, but later extended to data storage. Later the DVD replaced the CD for the usage of data storage.

Glossary

Compact disc (CD)

The Compact Disc (also known as a CD) is an optical disc used to store digital data. It was originally developed to store and playback sound recordings exclusively, but later expanded to encompass storage of data (Source: wikipedia)

DVD

DVD is an optical disc storage media format, invented and developed by Philips, Sony, Toshiba, and Panasonic in 1995. DVDs offer higher storage capacity than Compact Discs while having the same dimensions. The basis of the DVD name stems from the term *digital versatile disc*. (Source: wikipedia)

Styles of package glossaries

The glossaries packages allows to print out its lists (symbols, acronmys, glossaries) using styles. The package itself defines more than 20 styles. Here only a selections is shown using the symbol list defined before.

Code:

```
\printglossary[type=symbolslist,style=list, title=list]
```

Result:

list

λ wavelength

φ arbitrary angle

π mathematical constant

Code:

```
\printglossary[type=symbolslist,style=altlist, title=altlist]
```

Result:

altlist

λ

wavelength

φ

arbitrary angle

π

mathematical constant

Code:

```
\printglossary[type=symbolslist,style=long, title=long]
```

Result:

long

λ	wavelength
φ	arbitrary angle
π	mathematical constant

Code:

```
\printglossary[type=symbolslist,style=longheader, title=longheader]
```

Result:

longheader

Notation	Description
λ	wavelength
φ	arbitrary angle
π	mathematical constant

This template defines the following styles

Code:

```
\printglossary[type=symbolslist,style=longFancy,title=longFancy]
```

Result:

longFancy

λ	wavelength
φ	arbitrary angle
π	mathematical constant

Code:

```
\printglossary[type=symbolslist,style=longFancyHeader,title=longFancyHeader]
```

Result:

longFancyHeader

Notation	Description
λ	wavelength
φ	arbitrary angle
π	mathematical constant

5.13.1 Todo notes (package todonotes)

The `todonotes` package provides the commands `\todo` and `\missingfigure` to insert todo notes in a LaTeX document. These notes are automatically collected and can be printed out at the end of the document.

Code:

```
The most common usage this package is to insert clearly visible todo notes in
a latex\todo{Should be written as LaTeX} document in the margin or inline
in the text. An example of its usage is the command \emph{todo}, which
renders in the default setting with a orange box in the margin.

The line connecting the note with the place in the text can be disabled
with the option \emph{noline}.\todo[noline]{A note with no line connecting
the note to the placement in the text.}

Furthermore it is possible to place the notes in the main text instead
of placing them in the margin. This is recommended if the text too large for
printing it to the margin. However this also means that the placement of
paragraphs, figures and tables in the the normal text is influenced.
\todo[inline]{A todo note placed in the text}
```

Result:

Should be written as LaTeX

The most common usage this package is to insert clearly visible todo notes in a latex document in the margin or inline in the text. An example of its usage is the command *todo*, which renders in the default setting with a orange box in the margin.

A note with no line connecting the note to the placement in the text.

The line connecting the note with the place in the text can be disabled with the option *noline*.

Furthermore it is possible to place the notes in the main text instead of placing them in the margin. This is recommended if the text too large for printing it to the margin. However this also means that the placement of paragraphs, figures and tables in the the normal text is influenced.

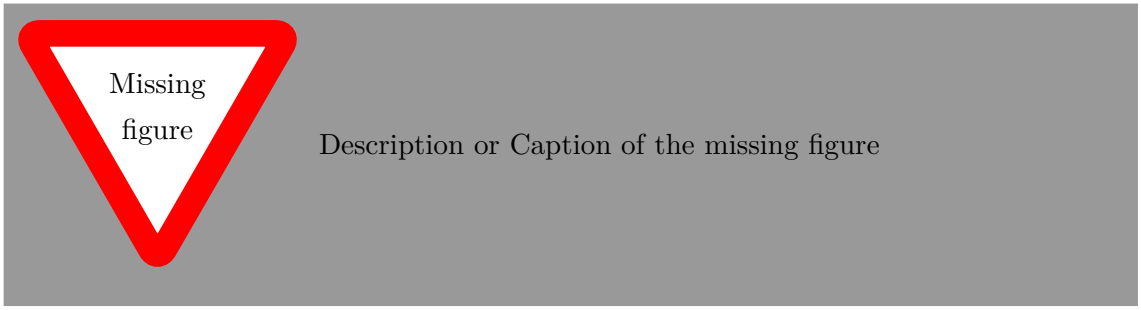
A todo note placed in the text

The `\missingfigure` command is supposed to indicate missing figures. It can be handled as an `\includegraphics` command in any figure environment.

Code:

```
\missingfigure{Description or Caption of the missing figure}
```

Result:



Description or Caption of the missing figure

5.14 Verbatim, Listings

5.14.1 fancyvrb

Different styles of frames and line numbering:

Error: Package `fancyvrb` not loaded.

5.14.2 listings

C++ code example

Code:

```
\begin{lstlisting}[style=lstStyleCpp]
// interface
class Person
{
public:
   Person();  // constructor
   ~Person(); // destructor
   void setName(string name);
   string name();
   void setAge(int age);
   int age();
private:
   string m_name;
   int m_age;
};
\end{lstlisting}
```

Result:

```
// interface
class Person
{
public:
   Person();  // constructor
   ~Person(); // destructor
   void setName(string name);
   string name();
   void setAge(int age);
   int age();
private:
   string m_name;
   int m_age;
};
```

LaTeX code example

This example includes a caption that can be printed in a list at the end of the document with `\lstlistoflistings`.

Code:

```
\begin{lstlisting}[style=lstStyleLaTeX,
   caption={[LaTeX Listings] Lines of code in a typical LaTeX document},
   label=lstLaTeXLinesOfCode]
\documentclass[paper=a4,fontsize=11pt]{scrartcl}
%  preamble: (load packages, setup layout)
%  100 - 1000  lines of code (loc)
\usepackage[utf8]{inputenc}
\usepackage[ngerman]{babel}
...
%  document:  >  2000  loc
\begin{document}
\chapter{Introduction}
Some text ...
\chapter{Theory}
...
\end{document}
\end{lstlisting}
```

Result:

```
\documentclass[paper=a4,fontsize=11pt]{scrartcl}
%  preamble: (load packages, setup layout)
%  100 - 1000  lines of code (loc)
\usepackage[utf8]{inputenc}
\usepackage[ngerman]{babel}
...
%  document:  >  2000  loc
\begin{document}
\chapter{Introduction}
Some text ...
\chapter{Theory}
...
\end{document}
```

Listing 5.1: Lines of code in a typical LaTeX document

5.15 Fancy Packages.

5.15.1 lettrine

Code:

```
\lettrine{A}{} first example shows the default behavior of lettrine.
It will produce an initial two lines, followed by the text between
the curly brackets, which is set in small caps. The following text flows
 around the initial.
```

Result:

A first example shows the default behavior of lettrine. It will produce an initial two lines, followed by the text between the curly brackets, which is set in small caps. The following text flows around the initial.

Code:

```
\lettrine[lines=3]{A}{} second example where the initial is printed across
three lines. Note the indentation of the second and third line. This may be
influenced by the parameter \texttt{nindent}. The indent of the first line is set
 with the parameter \texttt{findent}.
```

Result:

A second example where the initial is printed across three lines. Note the indentation of the second and third line. This may be influenced by the parameter `nindent`. The indent of the first line is set with the parameter `findent`.

Code:

```
\lettrine[lhang=1, nindent=0pt, lines=3]{W}{e} move now in the third example,
the initial in the margin area. This behavior is controlled by the
\texttt{lhang} parameter.
```

Result:

We move now in the third example, the initial in the margin area. This behavior is controlled by the `lhang` parameter.

Code:

```
\lettrine[lines=4, loversize=-.1, lraise=.1]{Q}{uality} has its price. And if
it's just the time to learn how such gimmicks can be achieved. But the
results show that the effort is worthwhile. As you can see, the underscore
of the Q does not protrude into the text.
```

Result:

Quality has its price. And if it's just the time to learn how such gimmicks can be achieved. But the results show that the effort is worthwhile. As you can see, the underscore of the Q does not protrude into the text.

5.15.2 boxedminipage

Code:

```
\begin{boxedminipage}{0.5\textwidth}
Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu
metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum
tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing
lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit
\end{boxedminipage}
```

Result:

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

5.15.3 framed

Framed boxes with text width, which can span over more than one page.

Code:

```
\begin{framed}
Pellentesque mollis nunc sed mauris tempor molestie.
Aliquam adipiscing nisi eu metus. Proin viverra odio ac
lorem consequat condimentum. Suspendisse bibendum tellus.
Duis non diam. Aliquam sodales sapien in mauris. Sed
euismod adipiscing lorem. Pellentesque nulla augue,
nonummy vel, tincidunt at, blandit
\end{framed}
```

Result:

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

5.15.4 mdframed

Framed boxes, which can span over more than one page and where the style can be defined in every detail.

Code:

```
% setup for all frames
\mdfsetup{skipabove=\topskip,skipbelow=\topskip}
% style definition
\global\mdfdefinestyle{exampledefault}{%
  linecolor=red,linewidth=3pt,%
  leftmargin=1cm,rightmargin=1cm}
%
\begin{mdframed}[ style=exampledefault ]
Pellentesque mollis nunc sed mauris tempor molestie.
Aliquam adipiscing nisi eu metus. Proin viverra odio ac
lorem consequat condimentum. Suspendisse bibendum tellus.
Duis non diam. Aliquam sodales sapien in mauris. Sed
euismod adipiscing lorem. Pellentesque nulla augue,
nonummy vel, tincidunt at, blandit
\end{mdframed}
```

Result:

Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

5.16 Diagrams and plots with LaTeX

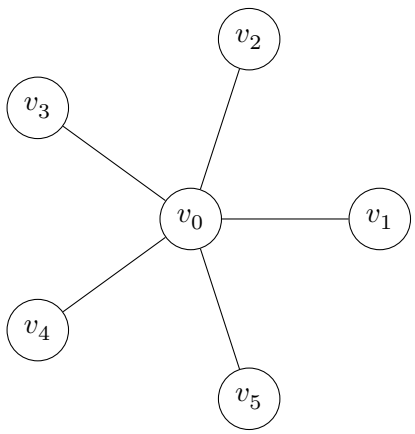
5.16.1 tikz/pgf

basic nodes

Code:

```
\begin{figure}[H]
\centering
\begin{tikzpicture}[scale=2.5]
\tikzstyle{every node}=[draw,shape=circle];
\path (0:0cm)    node (v0) {$v_0$};
\path (0:1cm)    node (v1) {$v_1$};
\path (72:1cm)   node (v2) {$v_2$};
\path (2*72:1cm) node (v3) {$v_3$};
\path (3*72:1cm) node (v4) {$v_4$};
\path (4*72:1cm) node (v5) {$v_5$};
\draw (v0) -- (v1)
      (v0) -- (v2)
      (v0) -- (v3)
      (v0) -- (v4)
      (v0) -- (v5);
\end{tikzpicture}
\end{figure}
```

Result:



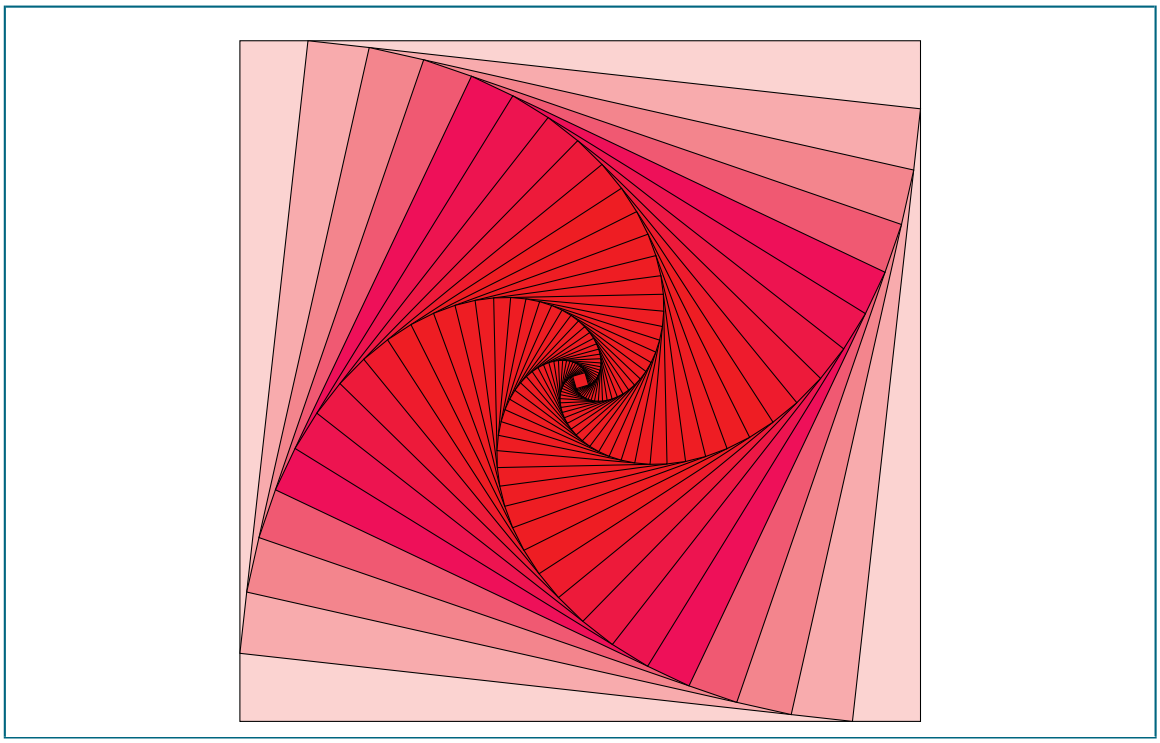
for each example

Code:

```
\begin{figure}[H]
\centering
% code origin:
% http://www.texample.net/tikz/examples/rotated-polygons/
\newcounter{density}
```

```
\setcounter{density}{20}
\begin{tikzpicture}[scale=0.75]
  \def\couleur{OrangeRed}
  \path[coordinate] (0,0)  coordinate(A)
        ++( 90:12cm) coordinate(B)
        ++(  0:12cm) coordinate(C)
        ++(-90:12cm) coordinate(D);
  \draw[fill=\couleur!\thedensity] (A) -- (B) -- (C) --(D) -- cycle;
  \foreach \x in {1,...,40}{%
    \pgfmathsetcounter{density}{\thedensity+20}
    \setcounter{density}{\thedensity}
    \path[coordinate] coordinate(X) at (A){};
    \path[coordinate] (A)
              -- (B) coordinate[pos=.10](A)
              -- (C) coordinate[pos=.10](B)
              -- (D) coordinate[pos=.10](C)
              -- (X) coordinate[pos=.10](D);
    \draw[fill=\couleur!\thedensity] (A)--(B)--(C)-- (D) -- cycle;
  }
\end{tikzpicture}
\end{figure}
```

Result:

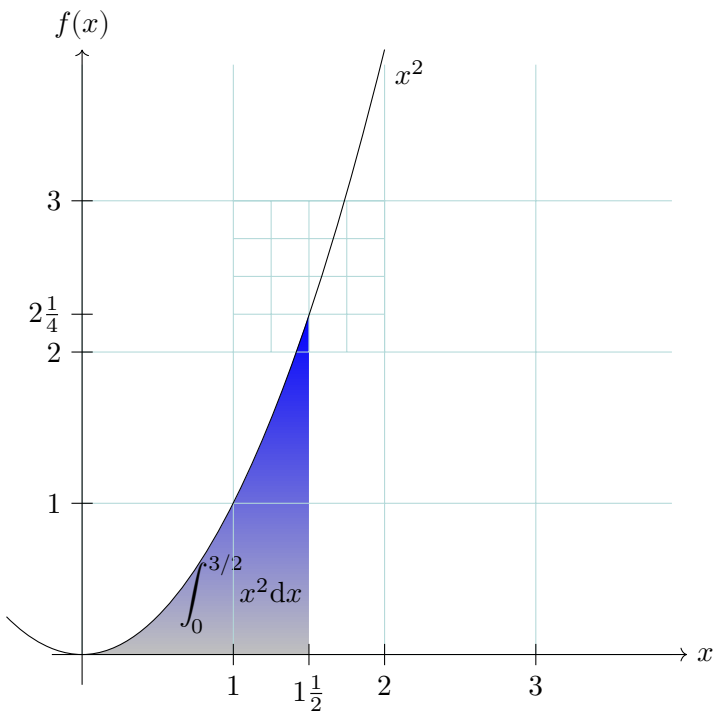


Fancy plot with tikz

Code:

```
\begin{figure}[H]
\centering
% code origin: pgf/tikz manual
\begin{tikzpicture}[scale=2]
  \shade[top color=blue,bottom color=gray!50]
    (0,0) parabola (1.5,2.25) |- (0,0);
  \draw (1.05cm,2pt) node[above]
    {$\displaystyle\int_0^{3/2} \!\!x^2\mathrm{d}x$};
  \draw[help lines]  (0,0) grid (3.9,3.9)
       [step=0.25cm] (1,2) grid +(1,1);
  \draw[->] (-0.2,0) -- (4,0) node[right] {$x$};
  \draw[->] (0,-0.2) -- (0,4) node[above] {$f(x)$};
  \foreach \x/\xtext in {1/1, 1.5/1\frac{1}{2}, 2/2, 3/3}
    \draw[shift={(\x,0)}] (0pt,2pt) -- (0pt,-2pt) node[below] {$\xtext$};
  \foreach \y/\ytext in {1/1, 2/2, 2.25/2\frac{1}{4}, 3/3}
    \draw[shift={(0,\y)}] (2pt,0pt) -- (-2pt,0pt) node[left] {$\ytext$};
  \draw (-.5,.25) parabola bend (0,0) (2,4) node[below right] {$x^2$};
\end{tikzpicture}
\end{figure}
```

Result:



Circuit Libraries

Error: tikz library ‘circuits’ not loaded

Lindenmayer System Drawing Library

Error: tikz library ‘lindenmayer’ not loaded

Mindmap Drawing Library

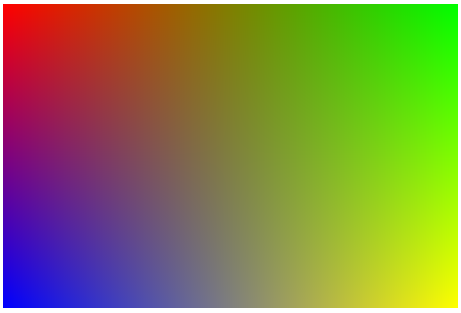
Error: tikz library ‘mindmap’ not loaded

Shadings Library

Code:

```
\begin{figure}[H]
\centering
% code origin: pgf/tikz manual
\begin{tikzpicture}[scale=2]
\shade[upper left=red,upper right=green,
      lower left=blue,lower right=yellow]
  (0,0) rectangle (3,2);
\end{tikzpicture}
\end{figure}
```

Result:



Automata Drawing and To Path Library

Error: tikz library ‘automata’ not loaded

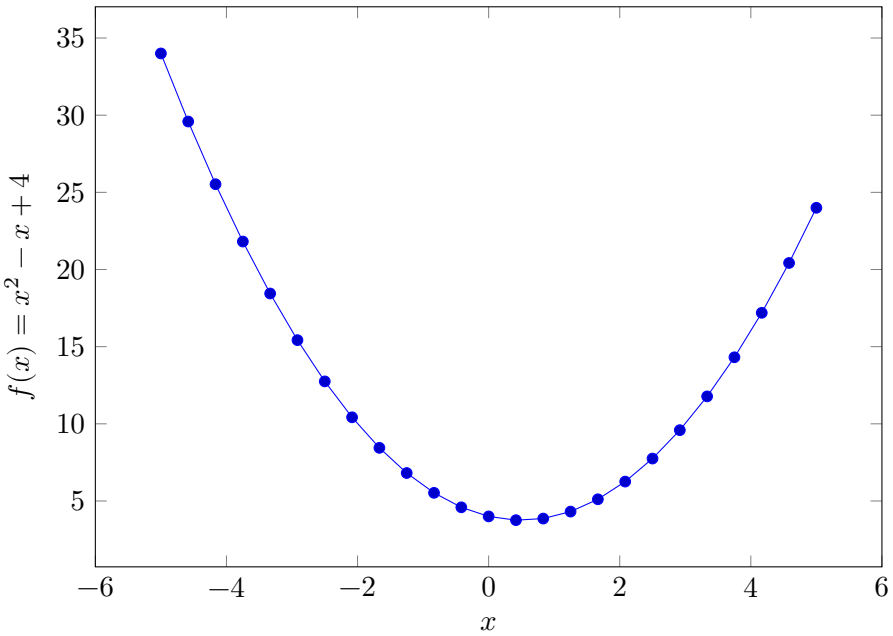
5.16.2 pgfplots

Simple plot with curve (calculated by TeX)

Code:

```
\begin{figure}[H]
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
\centering
\begin{tikzpicture}
\begin{axis}[
  xlabel=$x$,
  ylabel={$f(x) = x^2 - x +4$}
]
% use TeX as calculator:
\addplot {x^2 - x +4};
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:



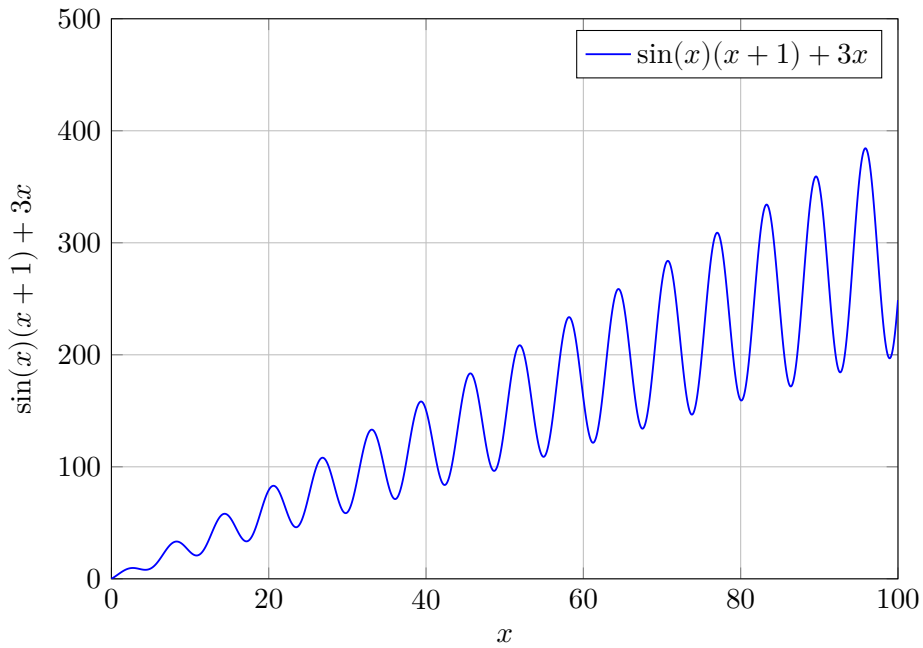
Simple plot with curve (calculated by gnuplot)

Code:

```
\begin{figure}[H]
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
\pgfplotsset{samples=2000}
\centering
```

```
\begin{tikzpicture}
\begin{axis}[
  xlabel=$x$,
  ylabel={$\sin(x) (x+1) + 3x$},
  grid=major,
  /pgfplots/enlargelimits=false,
  ymax=500,
  /pgfplots/xtick={0,20,...,100},
  /pgfplots/ytick={0,100,...,600},
]
%
\addplot[domain=0:100, blue,style={line width=0.7pt}]
  gnuplot{sin(x)*(x+1) + 3*x};
%
\legend{$\sin(x) (x+1) + 3x$}
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:



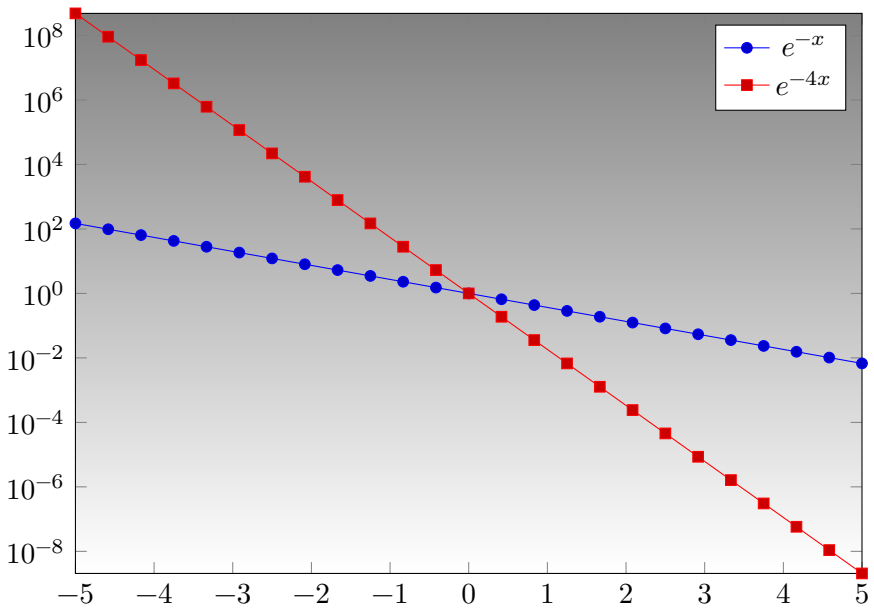
Semilog axis with filled background

Code:

```
\begin{figure}[H]
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
\centering
```

```
\begin{tikzpicture}
  \begin{semilogyaxis}[
    axis background/.style={shade,top color=gray,bottom color=white},
    legend style={fill=white},
    /pgfplots/enlargelimits=false]
    %
    \addplot {exp(-x)};
    \addplot {exp(-4*x)};
    %
    \legend{$e^{-x}$,$e^{-4x}$}
  \end{semilogyaxis}
\end{tikzpicture}
\end{figure}
```

Result:



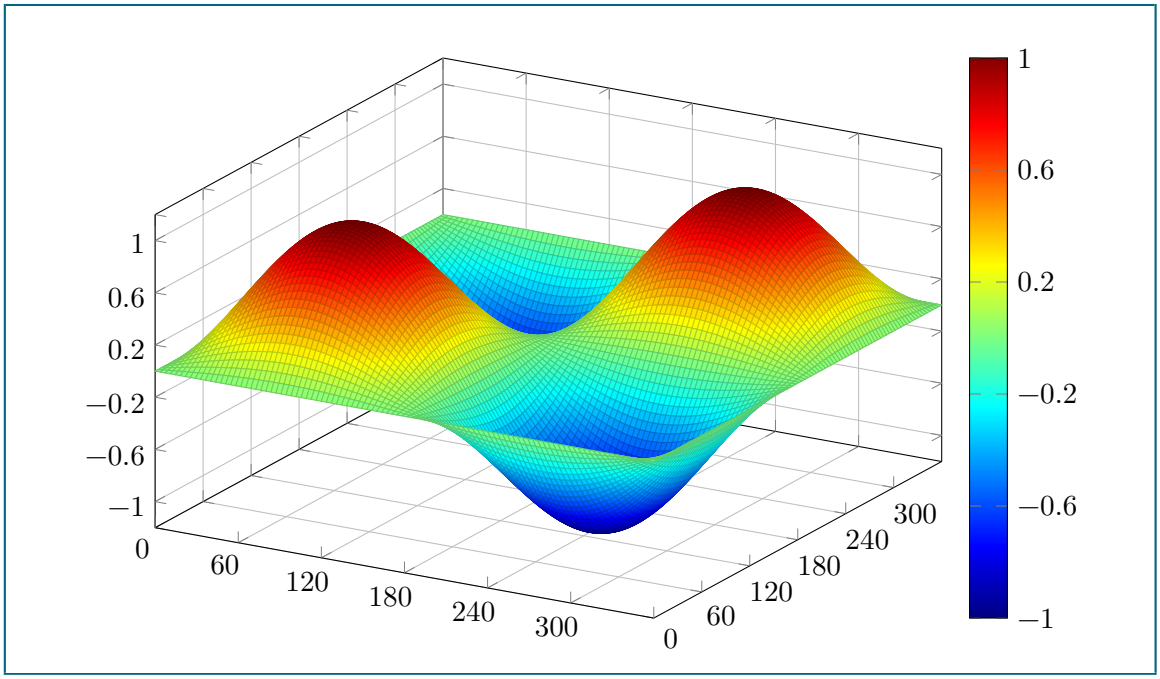
3D plot

Code:

```
\begin{figure}[H]
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
\centering
\begin{tikzpicture}
\begin{axis}[view={30}{30},grid=major,
   /pgfplots/xtick={0,60,...,300},
   /pgfplots/ytick={0,60,...,300},
   /pgfplots/ztick={-1.0,-0.6,...,1.0},
   colorbar,
```

```
   colorbar style={ytick={-1.0,-0.6,...,1.0},
                   ymin=-1,ymax=1},
   colormap/jet
]
\addplot3[surf,domain=0:360,samples=100]
  {sin(x)*sin(y)};
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:

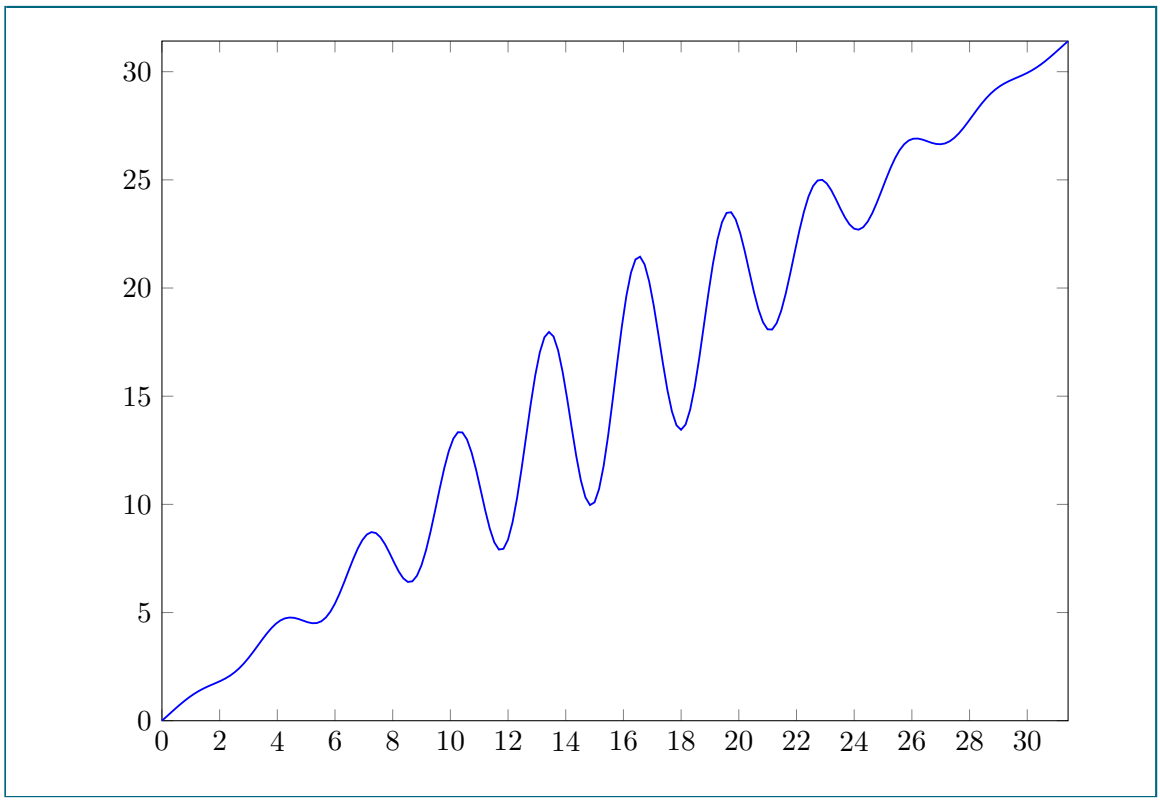


Plotting data from a file

Code:

```
\begin{figure}[H]
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
\centering
\begin{tikzpicture}
\begin{axis}[scale only axis,/pgfplots/enlargelimits=false]
  \addplot[style=solid, color=blue, mark=none,
           style={line width=0.7pt}]
    file{plotdata.txt};
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:



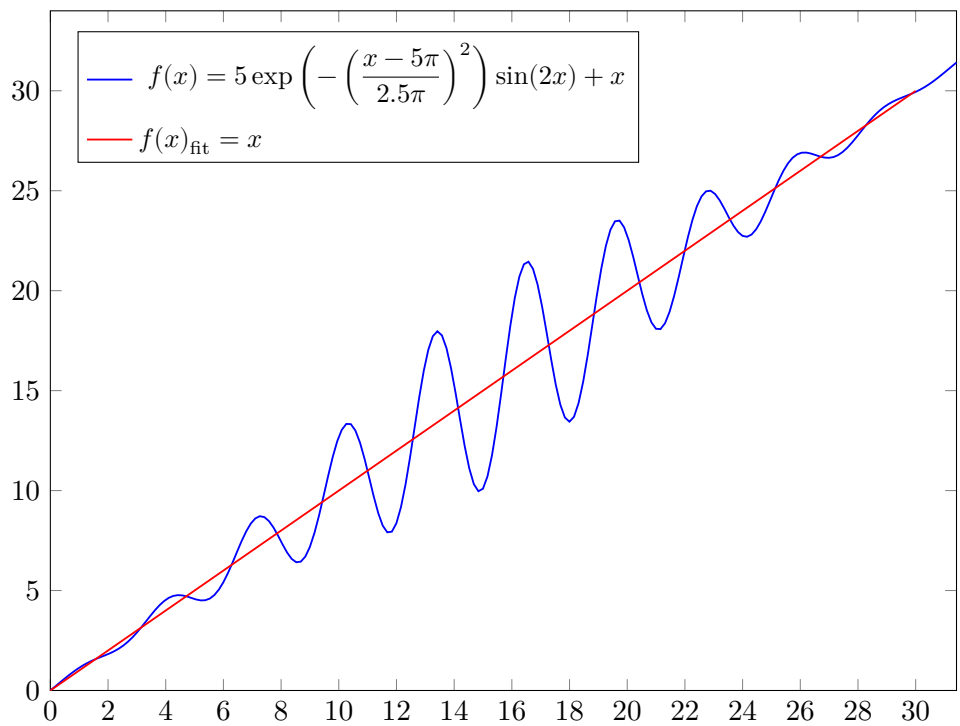
fitting with gnuplot

Code:

```
\begin{figure}[H]
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
\centering
\begin{tikzpicture}
\begin{axis}[scale only axis,
             /pgfplots/enlargelimits=false,
             ymax = 34,
             legend cell align=left,
             legend style={
               cells={anchor=west},
               legend pos=north west,
               font=\small
             }]
  \addplot[style=solid, color=blue, mark=none, style={line width=0.7pt}]
    file {plotdata.txt};
    %
  \addplot [raw gnuplot,
            style=solid, color=red, mark=none, style={line width=0.7pt}]
    gnuplot [id=plotdata] {
```

```
      % define function which should be fitted
      f(x)=a*x;
      % let gnuplot fit using column 1 and 2 of the data file
      fit f(x) 'plotdata.txt' using 1:2 via a;
      % Plot the function with the specified plot range
      plot [x=0:30] f(x);
    };
  %
  \legend{{\raisebox{2.5ex}{
          $f(x) = 5\exp\left(-\left(\dfrac{x-5\pi}{2.5\pi}\right)^2\right)
                  \sin(2x) + x$}},
          $f(x)_\text{fit} = x$}
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:



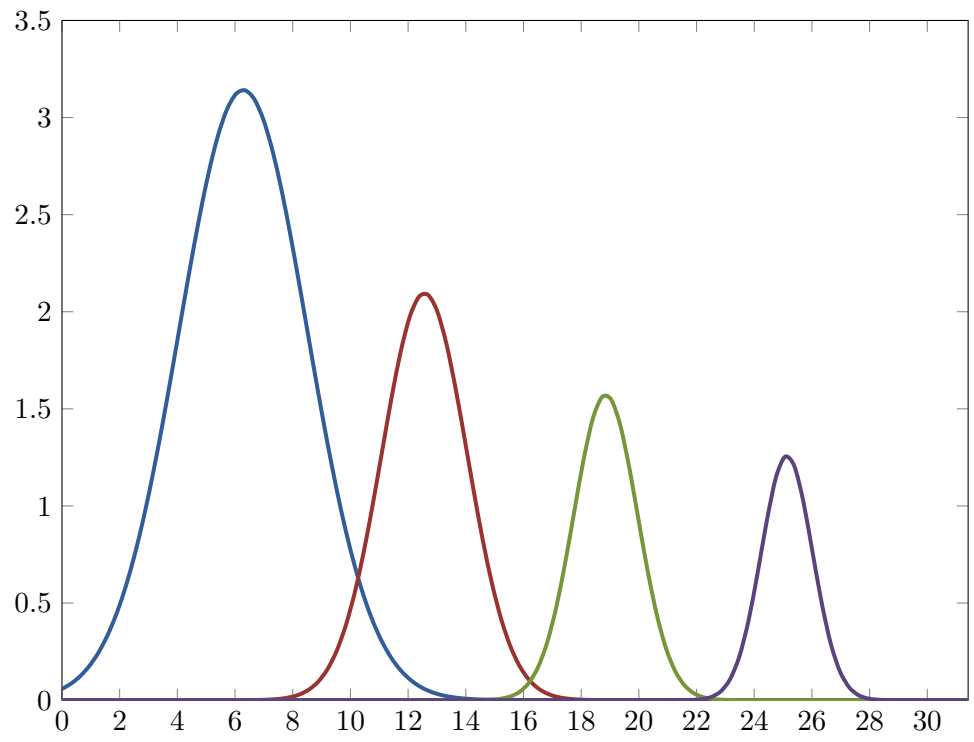
plotting multiple lines from single file

Code:

```
\begin{figure}[H]
\centering
\pgfplotsset{width=0.8\textwidth, height=0.6\textwidth}
```

```
% read data to table
\pgfplotstableread{plotdata.txt}\datatable
%
\begin{tikzpicture}
\begin{axis}[scale only axis,
             every axis plot/.append style={line width=1.5pt},
             mark=none, style=solid,
             enlargelimits=false, ymax = 3.5,
             cycle list name=colorseries-office,
             smooth]
  %  column with header  "y1", "y2", ...
  \addplot+ table[x=x1,y=y1]  from  \datatable;
  \addplot+ table[x=x1,y=y2]  from  \datatable;
  \addplot+ table[x=x1,y=y3]  from  \datatable;
  \addplot+ table[x=x1,y=y4]  from  \datatable;
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:



Part III

Template code documentation

CHAPTER 6

Main file (LuaLaTeXTemplate.tex)

6.1 Code before the documentclass

6.1.1 magic shortcodes

```
% !TeX encoding=utf8
% !TeX program = lualatex
% !TeX spellcheck = en-US
```

6.2 Documentclass

In this template only classes from Koma-Script (Version 3) can be used. Other classes would result in a non compiling template and are not supported therefore.

In the document class options some of the most important settings for the document are configured, such as paper size, font size and language of the document.

```
%% Document Class (Koma Script) ----------------------------------------
%% Doc: scrguien.pdf
\documentclass[%
   %draft=true,     % draft mode (no images, layout errors shown)
   draft=false,     % final mode
%%% --- Paper Settings ---
   paper=a4,% [Todo: add alternatives]
   paper=portrait, % landscape
   pagesize=auto, % driver
%%% --- Base Font Size ---
   fontsize=11pt,%
%%% --- Koma Script Version ---
   version=last, %
%%% --- Global Package Options ---
   english, % language (passed to babel and other packages)
            % (ngerman, english, french, ...)
]{scrbook} % Classes: scrartcl, scrreprt, scrbook
```

6.3 Preamble (packages and settings)

The code after `documentclass` and before the document starts is called preamble. All functionality and layout is loaded and configured there. The following sections show in which order things are loaded and configured.

6.3.1 Packages that come first

The following code loads all packages that must be loaded before anything else. And for all packages that provide control sequences that are used within the template.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Must be loaded first!
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% packages required for the template
\usepackage{atveryend} % must be loaded before etoolbox. (bugfix for pageslts)
\usepackage{codesection}
\usepackage{templatetools}
```

6.3.2 Encoding

Selection of encoding of the LaTeX files and the encoding of the file system. The latter is primarily depended on the operating system.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% encoding
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% lualtex expects utf8 by default
% no package or option required
```

6.3.3 Packages, layout, fonts and custom commands

Selection of fonts, packages (functionality), the style (layout) and custom commands that are required by the template. All defined in the following files:

- `fonts/fonts.tex`
- `preamble/packages.tex`
- `preamble/style.tex`
- `preamble/commands.tex`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% preamble
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

%% load packages
\input{preamble/packages.tex}
%% apply style settings
\input{preamble/style.tex}
%% new commands / definitions (required by the template!)
\input{preamble/commands.tex}
%% select/load fonts
\input{fonts/fonts.tex}


%% Test the page layout
% display the layout
%\IfPackageLoaded{geometry}{\geometry{showframe}}
```

6.3.4 Configuration

All the configuration code shown here is separated from the files `preamble/packages.tex` or `preamble/style.tex` because they are either system or target specific.

Selection of link colors: The links can either be displayed in colors for a pdf document or be displayed in black for a print document.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Configurations
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

%%% Switch between colored links (web) and black links (print)
\IfDefined{UseDefinition}{%
  %\UseDefinition{Target}{Print}
  \UseDefinition{Target}{Web}
}% end of UseDefinition
```

Here possible options are selectable, which configure the way the pdf document is opened.

```
\IfPackageLoaded{hyperref}{%
%%% set layout of PDF pages
\hypersetup{pdfpagelayout=OneColumn}
  % options:
  %  SinglePage     Displays a single page; advancing flips the page
  %  OneColumn      Displays the document in one column; continuous scrolling.
  %  TwoColumnLeft  Displays the document in two columns,
  %                 odd-numbered pages to the left.
  %  TwoColumnRight Displays the document in two columns,
  %                 odd-numbered pages to the right.
  %  TwoPageLeft    Displays two pages, odd-numbered pages to the left
  %  TwoPageRight   Displays two pages, odd-numbered pages to the right
}% (end of hyperref)
```

The backend and encodings for `biblatex` are configured in `preamble/packages.tex` together with the loading of the package, see section 7.1.12.

6.3.5 Custom definitions

With the following files custom macros (`macros/newcommands.tex`) and additional hyphenation patterns `content/hyphenation.tex` are loaded.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% custom definitions
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\input{macros/newcommands.tex}

%%% Hyphenation (Silbentrennung)
\input{content/hyphenation.tex}
```

6.3.6 Execution of commands

Several packages only work if their make-commands are executed. Examples are index, glossaries and such. Here these are grouped in the file `preamble/makeCommands.tex`.

`\listfiles` tells LaTeX to print all files loaded during compilation in a file list at the end of the log-file.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% execute necessary commands
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% (... if the according package is loaded or not)

\input{preamble/makeCommands.tex}

\listfiles % list all loaded files at end of document
```

6.3.7 Bibliography data

With biblatex the bibliography files are loaded before the document starts. They are loaded with the command `\addbibresource` and the file is included without the `.bib` file extension. Multiple files bibliography files are added with multiple `\addbibresource` commands.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% bibliography (now in preamble !)
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

%%% bibtex file(s)
% add multiple files with comma separation
% biblatex requires files before document
\IfPackageLoaded{biblatex}{
  % add all .bib files:
  \addbibresource{bib/BibtexDatabase.bib}
  \addbibresource{bib/publications.bib}
  % \addbibresource{bib/BibtexData-anytopic.bib}
}% end: biblatex
```

6.3.8 Glossary entries

If you want to use acronyms, symbols lists or a glossary you can fill these definitions in the file `content/Z-GlossaryEntries.tex` loaded here:

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Definition of glossaries Entries (before document!)
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% glossary, acronym, symoblist and such
\input{content/Z-GlossaryEntries.tex}
```

6.3.9 Document chapters: includeonly

The chapters which are included in the compilation can be chosen using the `\includeonly` command. If `\includeonly` is not specified in the preamble LaTeX will assume that all

`\include` commands should be evaluated. The advantage of `\includeonly` is that it creates aux files for each `\include` command, so that all references are kept. Note that all files loaded with `\input` are included in the compilation regardless of the `\includeonly` usage.

```
%% document content %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%\includeonly{
% content/0-title,
% content/0-Abstract,
% content/0-Introduction,
% content/1-Theory,
% content/2-Experiments,
% content/3-Results,
% content/4-Summery,
%} % end includeonly
```

6.4 The document (the content)

It start with `\begin{document}` and ends with `\end{document}`. The code in-between includes all the content for the document. Nevertheless the code is filled with necessary style and settings commands.

```
%%% Document Start %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\begin{document}
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

6.4.1 Title page

The page style and the page numbering for the title page is set up with this code

```
% Configure page numbering - required for hyperref (not displayed)
\pagenumbering{alph}\setcounter{page}{1}%
\pagestyle{empty}
```

followed by the title page in file `content/title.tex`.

```
% -- title page --
\include{content/0-title}
\cleardoublepage
```

6.4.2 Abstract

An abstract is common in phd thesis, but unusual in master and bachelor thesis. If you do not require an abstract just comment out the following lines.

```
% -- abstract --
% (only in phd thesis)
\include{content/0-Abstract}
\cleardoublepage
```

6.4.3 Declaration

These lines load the document `content/Z-Declaration.tex` in which you can state that the whole document is based on your ideas and written by only yourself. As far as I know this is required in bachelor and master thesis, but not part of phd-thesis. Comment out this line if you do not require it.

```
% -- declaration --
% (only in bachelor/master thesis)
\input{content/Z-Declaration.tex}
```

6.4.4 Frontmatter

The front pages of a thesis typically contain the table of contents followed by other lists. Here these are the symbol list, an acronym list and a glossary.

These lines only setup the page style and the line numbering for the front pages. The first line sets up as pages with headings defined by `srcheadings` and the line numbering is applied by the command `\frontmatter` in the second line.

```
\frontmatter
\IfPackageLoaded{scrlayer-scrpage}{\pagestyle{scrheadings}}
```

6.4.5 Table of contents

The table of contents is inserted with `\tableofcontents`. Additionally it is added to the pdf bookmarks.

```
% -- table of contents --
%
% add table of contents to pdf bookmarks
\IfPackageLoaded{hyperref}{\pdfbookmark[1]{\contentsname}{toc}}
\tableofcontents
```

6.4.6 Lists: acronym, symbols, glossaries

These are loaded if the package for all these lists is loaded and the standard style, which requires the `longtable` package is loaded. If you do not require all these lists comment those out that you do not want. The make commands required for building these lists were already executed, see section 6.3.6 on page 116. The styles of these lists are defined in file `preamble/style-glossaries.tex`.

```
\IfPackagesLoaded{glossaries,longtable,tabu}{%
  \clearpage
  % print out acronym list
  \IfGlossariesStyleDefined{longtabuFancyHeader}%
   {\printglossary[type=\acronymtype,style=longtabuFancyHeader]}%
  % print out symbol list
  \IfGlossariesStyleDefined{longtabuFancyHeader}%
   {\printglossary[type=symbolslist,style=longtabuFancyHeader]}%
  % print out glossary
  \printglossary[style=altlist]
```

```
} % end of glossaries
```

6.4.7 Main Document

This is the part which contains all the content. It start with `\mainmatter`, which sets up the line numbering and is followed by a list of files loaded with `\include`. The usage of `\include` is important to ensure that `\includeonly` works. See section 6.3.9 for the definition of `\includeonly`.

```
%%% --- Main Document --- --- --- --- --- --- ---
\mainmatter
%
% (files loaded with include must not have the prefix .tex)
%
\include{content/0-Introduction}
\include{content/1-Theory}
\include{content/2-Experiments}
\include{content/3-Results}
\include{content/4-Summery}

%%% -- end of main content
```

6.4.8 Bibliography

The bibliography is placed directly after the main content. It however must not be placed in the appendix. The layout of the bibliography is defined in file `preamble/style-biblatex.tex`.

```
% -- bibliography --
% (must be placed _before_ appendix)
\IfPackageLoaded{biblatex}{
  \cleardoublepage
  \phantomsection\label{sec:bibliography}
  \printbibliography[%
    heading=bibintoc, % (bibintoc, bibnumbered)
  ]
}% end of bibliography
```

6.4.9 Lists of figures, tables, listings

Several lists are automatically created by LaTeX. The most common are the list of figures and list of tables. If one of these lists is not required the responsible line can be commented out.

```
%% -- list of figures and tables --
\cleardoublepage\phantomsection\label{sec:lof}
\listoffigures
\cleardoublepage\phantomsection\label{sec:lot}
\listoftables
```

6.4.10 Lists of listings

The list of listings is one of the additional lists that can be created. It should only be included if code listings with captions are created anyway. If you experience problems with the number of `\write` outputs used it could help to disable this list. For more information see **??**.

```
%% -- List of Listings --
% _Remove_ if no listing with caption is defined
\IfDefined{lstlistoflistings}{\cleardoublepage\lstlistoflistings}
```

6.4.11 Appendix

The appendix contains additional information that do not fit into the main text of the thesis and must contain only information which is *not* necessary for the understanding of the main text. Therefore the appendix is not treated as part of the thesis in the evaluation.

The appendix is started with `\appendix` and manually added to the table of contents. In the last line the file `content/Z-Appendix.tex` is loaded which contains all further chapters and sections of the appendix.

```
% --- Appendix --- --- --- --- --- --- ---
\cleardoublepage\phantomsection
\appendix
% Add `Appendix` to TOC
\addcontentsline{toc}{part}{\appendixname}
% must be _input_, otherwise the TOC entry is at the wrong place
\input{content/Z-Appendix.tex}
```

6.4.12 Publications and Curriculum Vita

The list of publications is loaded with file `content/Z-Publications.tex` and the cv with `content/Z-CV.tex`. These files should only be loaded in case of a phd-thesis. For bachelor and master thesis these lines should be commented out.

```
% -- only in phd thesis --->
\input{content/Z-Publications.tex}
\input{content/Z-CV.tex}
% <------------------------
```

6.4.13 Index

An index is very useful for finding a topic in a large document. It is however also very time consuming to create a good index. If you are not sure that your index content is worth to include it in your thesis you should comment these lines out.

The setup for the index is done in file `preamble/style-index.tex`.

```
%% -- Index --
% _Remove_ Index unless you really want to invest a large amount
% of time and effort to create a good index!
\IfDefined{printindex}{%
  \cleardoublepage\phantomsection\label{sec:index}%
```

```
  \printindex%
}% end of index
```

6.4.14 Thanks

It is common to add a page at the end of the document where the author thanks all people who helped in the creation of the thesis.

```
\input{content/Z-Thanks.tex}
```

6.4.15 Todo

One can add a todo list using the features of the `todonotes`. By default it is disabled and must be removed for the final version of a document anyway. Its usage can be hindered by the *No room for new write* problem, see **??**.

```
% add todo list (remove for final document!)
% \input{content/Z-Todo.tex}
```

6.4.16 End

Finally the main file is closed with

```
%%% Document END %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\end{document}
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

Any content after this line will not be executed.

CHAPTER 7

Preamble files

7.1 preamble/packages.tex

7.1.1 Package sections

This is the file that loads all packages. The packages are grouped together according to there usage. However in many cases the loading order must be different. Therefore the loading order is corrected by commands such as `\ExecuteAfterPackage`. If packages can only be loaded after other packages have been loaded or must not be loaded in a special combination this is recognized and the package either loaded or not in order to prevent the template from not compiling.

All package groups, named within this text *sections*, start with `\BeginTemplateSection` and end with `\EndCodeSection`. If these section are included in the compilation or excludes (not compiled) is defined at the beginning of the file:

```
%% -- package section selections -->
\DefineCodeSection[true]{PackagesBase}
\DefineCodeSection[true]{PackagesBugfixes}
\DefineCodeSection[true]{PackagesFonts}
\DefineCodeSection[true]{PackagesMath}
\DefineCodeSection[true]{PackagesDiagrams}
\DefineCodeSection[true]{PackagesScience}
\DefineCodeSection[true]{PackagesSymbols}
\DefineCodeSection[true]{PackagesTables}
\DefineCodeSection[true]{PackagesText}
\DefineCodeSection[true]{PackagesQuotes}
\DefineCodeSection[true]{PackagesCitation}
\DefineCodeSection[true]{PackagesFigures}
\DefineCodeSection[true]{PackagesCaptions}
\DefineCodeSection[true]{PackagesIndexes}
\DefineCodeSection[true]{PackagesMisc}
\DefineCodeSection[true]{PackagesVerbatim}
\DefineCodeSection[true]{PackagesFancy}
\DefineCodeSection[true]{PackagesLayout}
\DefineCodeSection[true]{PackagesHeadFoot}
\DefineCodeSection[true]{PackagesHeadings}
\DefineCodeSection[true]{PackagesTOC}
\DefineCodeSection[true]{PackagesPDF}
\DefineCodeSection[true]{PackagesAdditional}
%% <--------------------------------
```

If you do not require all sections in your document you can thus change the setting from *true* to *false* in all section definitions you do not want to include in the compilation.

The whole template should compile with any section excluded except section *PackagesBase*. If this is not the case please submit a bug report.

7.1.2 Base packages

The following packages provide basic functionality such as language selections, graphics and colors. Since most other packages require these to be loaded they are loaded here at the beginning.

The application of each package is given with a short description in the source code. The documentation file name and package loading order requirements are also included in the source code.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% These packages must be loaded before all others
% (primarily because they are required by other packages)
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesBase}

% Description: Calculation with LaTeX
% Doc: calc.pdf
\usepackage{calc}

% Description: Multi Language support for LaTeX
% Doc: babel.pdf
\usepackage{babel}

% Description: Color support with color mixing modells
% Doc: xcolor.pdf
\usepackage[
  dvipsnames, % Load a set of predefined colors
  table,      % Load the colortbl package
  % fixpdftex,  % Load the pdfcolmk package (may be problematic)
  fixinclude, % Prevent dvips color reset before .eps file inclusion
]{xcolor}

% Description:
% This package carefully selects and defines 9 colors for 13 hues each.
% All colors with the same suffix number have equal luminance level.
% Also the color black is of level 0, and the color white is of level 10
% Required for colors used in tables in this template
\usepackage{ninecolors}

% Description: Support for graphics in LaTeX
% Doc: grfguide.pdf
\usepackage[%
  %final,
  %draft % do not include images (faster)
]{graphicx}
```

```
% Description: If an eps image is detected, epstopdf is automatically
%              called to convert it to pdf format.
% Requires: graphicx loaded
% Doc: epstopdf.pdf
\IfPackageLoaded{graphicx}{%
  \usepackage{epstopdf}
}

% Description:  environments for setting ragged text
%               which allow hyphenation.
% Provides: \Centering, \RaggedLeft, and \RaggedRight, ...
% Doc: ragged2e.pdf
\usepackage{ragged2e}

% Description: The varwidth environment is superficially similar to minipage,
%              but the specified width is just a maximum value - the box may
%              get a narrower "natural" width
% Required for itemize lists in tables!
\usepackage{varwidth}


\EndCodeSection{PackagesBase}
```

7.1.3 Bug fixing packages

TEX may be bug-free, but LATEX and its packages are certainly not free of bugs. Most packages are updated in short term if bugs are encountered. LATEX however has the philosophy to maintain a document setting stability. Therefore bugs in the base LATEX system are not fixed, even if they are well known. However, some of them are fixed by extension packages. Others are fixed by special packages, which are loaded here.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% LaTeX bug fixing packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesBugfixes}

% Description: marginnote allows a margin note, where \marginpar fails
% Doc: marginnote.pdf
\usepackage{marginnote}

% Description: Redefines implementations of
%              packages float, hyperref and listings
% Doc: scrhack.pdf
\usepackage{scrhack}

%% Description: changes the \marginpar commands, such
%%              that long margin notes work.
%% Doc: marginfix.pdf
```

```
\usepackage{marginfix}

% Description: Used to define commands that don't eat spaces.
% Doc: xspace.pdf
\RequirePackage{xspace}

\EndCodeSection{PackagesBugfixes}
```

7.1.4 Font packages

This section loads the packages for font loading and font modifications. The fonts are loaded in the file `fonts/fonts.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Fonts
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\BeginCodeSection{PackagesFonts}

%% Description: Set the font size relative to the current font size
%% Doc: relsize-doc.pdf
% \usepackage{relsize}

% Make PDF files searchable and copyable
% load before: fontenc (fontenc must not be loaded with lualatex!)
% fontspec loads fontenc - therefore must be loaded before fontspec
\usepackage{cmap}

%% Description: Font selection for LuaLaTeX
%% Doc: fontspec.pdf
% Allows LuaTeX to load OpenType fonts. No special font installation is necessary
,
% fonts only need to be available in the operating system.
% Classic LaTeX font selection is disabled by loading this package!
\usepackage{fontspec}

\EndCodeSection{PackagesFonts}
```

7.1.5 Math packages

The base package for all math in LaTeX is the package `amsmath`. The other packages are not necessary, but some of them provide useful bug fixes and enhancement to the math commands and environments defined by `amsmath`. The package `unicode-math` is essential for loading of math fonts.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Math Packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesMath}
```

```
% Description: basic math package
% Doc: amsldoc.pdf
\usepackage[
   centertags, % (default) center tags vertically
   %tbtags,    % 'Top-or-bottom tags': For a split equation, place equation
               % numbers level with the last (resp. first) line, if numbers
               % are on the right (resp. left).
   sumlimits,  %(default) Place the subscripts and superscripts of summation
               % symbols above and below
   %nosumlimits, % Always place the subscripts and superscripts of
                 % summation-type symbols to the side, even in displayed
                 % equations.
   intlimits,  % Like sumlimits, but for integral symbols.
   %nointlimits, % (default) Opposite of intlimits.
   namelimits, % (default) Like sumlimits, but for certain 'operator names'
               % such as det, inf, lim, max, min, that traditionally have
               % subscripts placed underneath when they occur in a displayed
               % equation.
   %nonamelimits, % Opposite of namelimits.
   %leqno,     % Place equation numbers on the left.
   %reqno,     % Place equation numbers on the right.
   fleqn,      % Position equations at a fixed indent from the left margin
               % rather than centered in the text column.
]{amsmath} %

\IfPackageLoaded{amsmath}{

  % Description: The mathtools package is an extension package to amsmath.
  %              Furthermore it corrects various bugs
  % Doc: mathtools.pdf
  % mathtools must be loaded before unicode-math
  \usepackage[fixamsmath,disallowspaces]{mathtools}

  % Description: Inhibits the usage of plain TeX and
  %              of standard LaTeX math environments
  % Doc: onlyamsmath.pdf
  \usepackage[
    all,
    % warning
    error
  ]{onlyamsmath}
  % Note that many other packages have problems with the change of the
  % catcode of the $-char. Therefore workarounds/fixes for tikz and tabu
  % are provided (loaded in style.tex)

} % end: IfPackageLoaded{amsmath}

% Description: Macros for Dirac bra-ket notation and sets.
```

```
% Doc: braket.pdf
\usepackage{braket}

% Description: strike out arguments in math mode
% Doc: cancel.sty
\usepackage{cancel}

%% Description: Emphasize equations
%% Doc: empheq.pdf
\usepackage{empheq}

% Description: scales math mode output in all environments correct
% Doc: Mathmode.pdf
\IfPackagesNotLoaded{MnSymbol,fourier}{
   \usepackage{exscale}
}


% Description: Enables the correct use of the comma as
%              a decimal separator in math mode
% Doc: icomma.pdf
% must be loaded after uncode-math, since both define \mathcomma, see
% https://tex.stackexchange.com/questions/653983/lualatex-fails-with-package-
icomma-and-font-tex-gyre-termes-math#653983
\ExecuteAfterPackage{unicode-math}{\usepackage{icomma}}

% Description: LaTeX 3 Package for nice inline fractions
% Provides: \sfrac{1}{2}
% Replaces: nicefrac
% Doc: xfrac.pdf
\usepackage{xfrac}

% Description: implementation of Unicode maths for LATEX using LuaTEX typesetting
 engines
% - It should be loaded after any other maths or font-related package
%   in case it needs to overwrite their definitions.
% -  Once the package is loaded, traditional TFM-based maths fonts are no longer
%    supported; you can only switch to a different OpenType maths font using the
%    \setmathfont command.
% - amsmath should be loaded before unicode-math to avoid conflicts
\usepackage{unicode-math}


\EndCodeSection{PackagesMath}
```

7.1.6 Diagram and vector graphics packages

Several approaches are possible to include vector graphics in a LaTeX document with LaTeX-code. In this template the packages `tikz`/`pgf` were chosen for this application.

Since `tikz` and `pgf` come with many options and extension package they are loaded in an extra file `preamble/packages-tikzpgf.tex`. The package `pgfplots` provides an extension for scientific plots.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% diagrams
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesDiagrams}

% tikz and pgf
% consumes at least one \write (more if external is used)
\input{preamble/packages-tikzpgf.tex}

% pgfplots
\usepackage{pgfplots}
\usepackage{pgfplotstable}
\usetikzlibrary{pgfplots.patchplots}
\usetikzlibrary{pgfplots.dateplot}
\usetikzlibrary{pgfplots.colormaps}
\usetikzlibrary{pgfplots.groupplots}
\usetikzlibrary{pgfplots.polar}
\usetikzlibrary{pgfplots.units}

\EndCodeSection{PackagesDiagrams}
```

preamble/packages-tikzpgf.tex

```
\usepackage{pgf}
\usepackage{tikz}
\IfPackageLoaded{pgf}{%
% \usepgflibrary{arrows}
}

\IfPackageLoaded{tikz}{%
%%% Chapter numbers according to
%%% package version 2.10
%
%%% 12. Package, Environments, Scopes, and Styles
\usetikzlibrary{scopes}         % Shorthand for Scope Environments
\usetikzlibrary{intersections}  % Intersections of Arbitrary Paths
%%% 13. Specifying Coordinate
\usetikzlibrary{calc}           % Coordinate Calculations
%%% 14. Syntax for Path Specifications
%%% 15. Actions on Path
%%% 16. Nodes and Edge
\usetikzlibrary{positioning}    % Advanced Placement Options
%%% 17. Matrices and Alignment
%%% 18. Making Trees Grow
%%% 19. Plots of Function
%%% 20. Transparency
```

```
%%% 21. Decorated Path
% \usetikzlibrary{decorations}
%%% 22. Transformation
%%% 23. Arrow Tip Library
\usetikzlibrary{arrows}
%%% 24. Automata Drawing Library
% \usetikzlibrary{automata}
%%% 25. Background Library
\usetikzlibrary{backgrounds}
%%% 26. Calc Library -> see 13.
%%% 27. Calendar Library
%\usetikzlibrary{calendar}
%%% 28. Chains
% \usetikzlibrary{chains}
%%% 29. Circuit Libraries
%\usetikzlibrary{circuits}
%\usetikzlibrary{circuits.logic.IEC}
%\usetikzlibrary{circuits.ee.IEC}
%\usetikzlibrary{circuits.logic.US}
%%% 30. Decoration Library -> see 21.
%%% 31. Entity-Relationship Diagram Drawing Library
% \usetikzlibrary{er}
%%% 32. Externalization Library
% \usetikzlibrary{external} % uses \write, may fail
% \tikzexternalize % activate externalize!
%%% 33. Fading Library
% \usetikzlibrary{fadings}
%%% 34. Fitting Library
\usetikzlibrary{fit}
%%% 35. Fixed Point Arithmetic Library
\usetikzlibrary{fixedpointarithmetic}
%%% 36. Floating Point Unit Library
\usetikzlibrary{fpu}
%%% 37. Lindenmayer System Drawing Library
%\usetikzlibrary{lindenmayersystems}
%%% 38. Matrix Library
\usetikzlibrary{matrix} % used for tables
%%% 39. Mindmap Drawing Library
%\usetikzlibrary{mindmap}
%%% 40. Paper Folding Diagrams Library
%\usetikzlibrary{folding}
%%% 41. Pattern Library
\usetikzlibrary{patterns}
%%% 42. Petri-Net Drawing Library
%\usetikzlibrary{petri}
%%% 43. Plot Handler Library (loaded autom.)
\usetikzlibrary{plothandlers}
%%% 44. Plot Mark Library
\usetikzlibrary{plotmarks}
```

```
%%% 45. Profiler Library
%%% 46. Shadings Library
\usetikzlibrary{shadings}
%%% 47. Shadow Library
% \usetikzlibrary{shadows}
%%% 48. Shape Library
% \usetikzlibrary{shapes.geometric}
% \usetikzlibrary{shapes.symbols}
% \usetikzlibrary{shapes.multipart}
% \usetikzlibrary{shapes.callouts}
% \usetikzlibrary{shapes.misc}
%%% 49. Spy Library: Magnifying Parts of Pictures
% \usetikzlibrary{spy}
%%% 50. SVG-Path Library
% \usetikzlibrary{svg.path}
%%% 51. To Path Library (loaded autom.)
\usetikzlibrary{topaths}
%%% 52. Through Library
% \usetikzlibrary{through}
%%% 53 Tree Library
% \usetikzlibrary{trees}
%%% 54 Turtle Graphics Library
% \usetikzlibrary{turtle}
}
%% added upon request of user
\usepackage{tkz-base}
\usepackage{tkz-fct}
\usepackage{tkz-euclide}

%%
```

7.1.7 Science packages

Here packages are included which help to typeset numbers and units correctly. The recommended package is `siunitx`. The other packages are not activated by default because they are incompatible with `siunitx` or not necessary with the default fonts.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% science packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesScience}

% Description: siunitx aims to provide a unified method to
%              typeset numbers and units correctly and easily.
% Incompatible: gensymb, units
\IfPackagesNotLoaded{gensymb, units}{
  \usepackage{siunitx}
}

\EndCodeSection{PackagesScience}
```

7.1.8 Symbol packages

There are many packages that provide additional symbols to LaTeX. Since these are font depended they are also incompatible if special font packages are loaded. Here only a selection of symbol packages is documented and loaded.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Symbols
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesSymbols}
%%% General Doc: symbols-a4.pdf
%
%%% Math symbols
\IfPackagesNotLoaded{mathdesign}{
   \usepackage{dsfont}   %% Double Stroke Fonts
   % \usepackage{amssymb} - must not be loaded together with unicode-math which
must be loaded
}{}

%% Futher Math symbols and script fonts

% Description: generate missing integrals
% Load after: amslatex
\usepackage{esint}

%% The European Currency Symbol
\usepackage[gen]{eurosym}

%% Common Symbols
\usepackage{pifont}   %% ZapfDingbats

%% Old Package for symbols, required in the documentation for \Box
\usepackage{latexsym}

\EndCodeSection{PackagesSymbols}
```

7.1.9 Table packages

Standard LaTeX tables are just ugly. In order to create good looking or even fancy tables further packages are necessary. The most recommend package is `tabularray`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Tables (Tabular)
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesTables}

% Description:  some additional commands to enhance
%               the quality of tables
% Provides:     \toprule, \midrule, \bottomrule, \cmidrule
% Doc: booktabs.pdf
\usepackage{booktabs}
```

```
% Description: extends the standard tabular environment with cells
%              spanning over multiple rows.
% Doc: multirow.pdf
\usepackage{multirow, bigstrut}

% Description: Table spanning over many pages (from longtable package)
%              and with strechable columns (from tabularx package)
% Doc: ltxtable.pdf
% -> load afer hyperref
\ExecuteAfterPackage{hyperref}{\usepackage{ltxtable}}

% Description: defines a single environment tabu to make all kinds of tabulars
%              It is more flexible than tabular, tabular*, tabularx and array
%              and extends the possibilities.
% Doc: tabu.pdf
% The package has not been updated for years and bugs have not been fixed.
% The auther can not be contacted and does not respond.
% It is thus NOT RECOMMENDED to use this package.
% \usepackage{tabu}

% Under the premise of being compatible with the basic syntax of LATEX2 tables,
% this macro package will completely separate the content and style of the table,
% and the style of the table can be completely set in keyval way.
% Recommended Package!
\usepackage{tabularray}

% Description: tcolorbox provides an environment for colored
%              and framed text boxes with a heading line.
\usepackage{tcolorbox}

\EndCodeSection{PackagesTables}
```

7.1.10 Text related packages

This code is divided into bug fixing packages and packages for text-decoration, footnotes, references and lists.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% text related packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\BeginCodeSection{PackagesText}

%%% bug fixing ==========================================
% description: fixes bug in ellipsis (...)
% Doc: ellipsis.pdf
% -> load after babel
\usepackage[xspace]{ellipsis}
```

```latex
%%% Text-decoration ======================================
%
% Description: commands for underlining for emphasis
% Provides: \ulin, \uuline, \sout, \xout, ...
% Doc: ulem.pdf
\usepackage[normalem]{ulem}

% Description: commands for for emphasis
% Provides: \so, \ul, \st, ...
\usepackage{soul}

% Description: enable linebreaks for URLs
% Provides: \url{}
% Doc: url.pdf
\usepackage{url}

%%% footnotes============================================

% Description: The footmisc package provides several different
%              customisations of the way foonotes are represented.
%              Fixes a LaTeX bug with option 'bottom'
%
% Doc: footmisc.pdf
% Load after: setspace
% Load before: hyperref
\ExecuteAfterPackage{setspace}{%
%
\usepackage[%
   bottom,      % Footnotes appear always on bottom. This is necessary
                % especially when floats are used
   stable,      % Make footnotes stable in section titles
   perpage,     % Reset on each page
   %para,       % Place footnotes side by side of in one paragraph.
   %side,       % Place footnotes in the margin
   ragged,      % Use RaggedRight
   %norule,     % suppress rule above footnotes
   multiple,    % rearrange multiple footnotes intelligent in the text.
   %symbol,     % use symbols instead of numbers
]{footmisc}}

%% Description: footnotes are normally reset at each page.
%%              With this package they can be reset only at
%%              defined headings, such as chapters.
%% Doc: chngcntr.pdf
% \usepackage{chngcntr}
% \counterwithout{footnote}{chapter}

%%% References ===========================================
%
```

```
% Description:  provides \vref, which is similar to \ref but
%               adds an additional page reference, like
%               'on the facing page' or 'on page 27'
% Doc: varioref.pdf
\usepackage{varioref}

% Description:  enhances  the cross-referencing  features,
%               allowing the format of cross-references to be determined
%               automatically according to the "type" of cross-reference
% Doc: cleveref.pdf
% loading: must be loaded after hyperref and after varioref
\ExecuteAfterPackage{hyperref}{
% caption and cleveref incompatible in Versions before 2011/12/24
  \usepackage{cleveref}[2011/12/24]
}

% Description: Extension of the xr package for
%              cross references, with hyperref support
% Doc: xr.pdf
% load: before hyperref
\usepackage{xr-hyper}

%%% Lists ================================================
%
% Description: Allows the custom lists of type item, enum
%              and description. It thereby replaces the packages
%              paralist, enumerate, mdwlist.
% Incompatible: enumerate.
% Doc: enumitem.pdf
\IfPackageNotLoaded{enumerate}{
  \usepackage{enumitem}
}
%
%%% Other Environments ================================================
%
% Description: The abstract package provides control over the typesetting of
%              the abstract environment.
% Doc: abstract.pdf
\IfDefined{endabstract}{%
  \usepackage{abstract}
}

\EndCodeSection{PackagesText}
```

7.1.11 Quotes

The package `csquotes` is a very powerful package that makes quotes language specific and in general easier.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

```
% Quotes
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesQuotes}
%
% Description: Advanced features for clever quotations
% Doc: csquotes.pdf
\usepackage[%
   autostyle,        % the style of all quotation marks will be adapted
                     % to the document language as chosen by 'babel' or '
polyglossia'
   german=quotes,    % Styles of quotes in each language
   english=british,
   french=guillemets
]{csquotes}

\EndCodeSection{PackagesQuotes}
```

7.1.12 Citation/bibliography packages

There are many packages for citations and creation or modification or the bibliography. However almost all of them are nowadays replaced by the package `biblatex` which provides the functionality of all previous package and beyond them. The enable the full functionality of `biblatex` it is necessary to also replace `bibtex` by the program `biber`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Citations
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesCitation}

% Description: Modern Bibliographie package with full customizability
% Doc:  biblatex.pdf
% Incompatible: ucs and every previous bibtex package
\usepackage[
  style=alphabetic, % Loads the bibliography and the citation style
  % bibstyle=alphabetic, % load a bibliography style
  % citestyle=alphabetic, % load a citatio style
  natbib=true, % define natbib compatible cite commands
%%--- Backend --- --- ---
  backend=biber,   % (bibtex, biber)
  bibwarn=true,     %
  texencoding=auto, % auto-detect the input encoding
  bibencoding=auto, % (auto (equal to tex), <encoding>)
]{biblatex}
% Other options:
%  style=numeric, %
%  style=numeric-comp,    % [1-3, 7, 8]
%  style=numeric-verb,    % [2]; [5]; [6]
%  style=alphabetic,      % [Doe92; Doe95; Jon98]
%  style=alphabetic-verb, % [Doe92]; [Doe95]; [Jon98]
%  style=authoryear,      % Doe 1995a; Doe 1995b; Jones 1998
```

```
%  style=authoryear-comp, % Doe 1992, 1995a,b; Jones 1998
%  style=authoryear-ibid,
%  style=authoryear-icomp,
%  style=authortitle,
%  style=authortitle-comp,
%  style=authortitle-ibid,
%  style=authortitle-icomp,
%  style=authortitle-terse,
%  style=authortitle-tcomp,
%  style=authortitle-ticomp,

%% APA Style
%  style=apa
%
% if apa style is loaded
%\DeclareLanguageMapping{german}{german-apa}
\DeclareLanguageMapping{british}{british-apa}

\EndCodeSection{PackagesCitation}
```

7.1.13 Packages for figures, placement and floats

The basic package `graphicx` for figures is already loaded at the beginning as shown in section 7.1.2. Here further packages are loaded that extent the placement and floating possibilities.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% figures, placement, floats and captions
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesFigures}


%% Description: provides new floats and enables H float modifier option
%%              (in future incompatible with Koma Script)
%% Doc: float.pdf
%% ---> replaced by floatrow package!

% Description: enables typesetting a narrow float at the edge of the text,
%              and making the text wrap around it.
% load after: float
% load before: caption
% Provides: wrapfigure and wrapfloat
% Doc: wrapfig-doc.pdf
\usepackage{wrapfig}

% Description: place floats after the reference
% Doc: no documentation
\usepackage{flafter}

% Description: Defines a \FloatBarrier command, beyond which floats may not
```

```
%               pass; useful, for example, to ensure all floats for a section
%               appear before the next \section command.
% Doc: placeins-doc.pdf
\usepackage[
  section    % "\section" command will be redefined with "\FloatBarrier"
]{placeins}
%

\EndCodeSection{PackagesFigures}
```

7.1.14 Caption packages

The fundamental package for captions is the package `caption`. Its possibilities in terms of figure placement is enhanced by package `floatrow` and for subfigures package `subcaption`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% caption packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesCaptions}

% Description: extents the float mechanism of LaTeX and
%              provides macros for precise placement of
%              figures, tables and captions.
%              works well together with the caption pack.
% load before: caption
% Doc: floatrow.pdf
\usepackage{floatrow, fr-fancy}

% Description: The caption package offers customization
%              of captions in floating environments such
%              figure and table and cooperates with many
%              other packages.
% Doc: caption.pdf (Required v3.2 or newer)
\usepackage{caption}

%% subfig ist NOT recommended, use subcaption instead

% Description: subcaption supports typesetting of sub-captions
%             (by using the the sub-caption feature of the caption package).
% incompatible: subfig
% Doc: subcaption.pdf
\IfPackageNotLoaded{subfig}{
  % load after caption package
  \usepackage{subcaption}[2011/08/17]
}

% Description: provides a margincap environment for putting
%              captions into the outer document margin with
%              either a top or bottom alignment.
% Doc: mcaption.pdf
```

```
\usepackage[
  top, %  vertical caption alignment (top, bottom)
]{mcaption}

% Description: provides two new environments, sidewaystable and sidewaysfigure,
%              and further commands to rotate content.
% Doc: rotating.pdf
\usepackage[figuresright]{rotating}

\EndCodeSection{PackagesCaptions}
```

7.1.15 Misc packages

This section contains mainly packages that should be loaded before `hyperref` and do not fit into the other sections. Currently it contains only the package `lineno` for numbering lines in the document. It is not loaded by default, but can be activated by removing the comment chars.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% misc packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesMisc}

% Description: adds line numbers to the main text
% Doc: ulineno
%\usepackage[
%  ,left     %  margin placment (left, right, switch, switch*)
%  ,pagewise %  Number the lines from 1 on each page (pagewise, running)
%  ,modulo   %  Print line numbers only if they are multiples of five.
%]{lineno}

\EndCodeSection{PackagesMisc}
```

7.1.16 Packages for index and other lists

For the index package `imakeidx` is loaded and for almost anything else `glossaries` provides a solution.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Index and other lists
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesIndexes}

%% Description: print text of \index{entry} to the margin
%% Doc: makeidx.pdf
%% --> load only in draft mode
%% load before: imakeidx
\IfDraft{
  \usepackage{showidx}
}
```

```
%% Description makeindex package with shell-escape makeindex call
%% Doc: imakeidx.pdf
% consumes \write
\usepackage{imakeidx}

%% Description: Package for glossaries, nomenclatures and acronym lists
%% replaces: nomencl, acronym
%% load after: hyperref!, inputenc, babel and ngerman.
% consumes \write (1 in general, 2 if entries are defined inside the document)
\ExecuteAfterPackage{hyperref}{%
\usepackage[
%%% General Options
  % nomain, % This suppresses the creation of the main glossary and associated
          % .glo file, if unrequired. Note that if you use this option,
          % you must create another glossary in which to put all your
          % entries (either via the acronym (or acronyms) package option
  % sanitizesort, % This is a boolean option that determines whether or not
                % to sanitize the sort value when writing to the external
glossary
                % file.
  savewrites, % This is a boolean option to minimise the number of
              % write registers used by the glossaries package.
              % (Default is savewrites=false.)
              % savewrites
        % Note!: This option can significantly slow document compilation.
        % As an alternative, you can use the scrwfile package and not use this
option.
        % -> scrwfile disabled because of incompatibility with titletoc.
  translate=true, % If babel has been loaded and the translator package
                  % is installed, translator will be loaded and the translations
                  % will be provided by the translator package interface.
  hyperfirst=true, % options: (*true*, false)
                  % This is a boolean option that specifies whether each term
                  %  has a hyperlink on first use.
%
%%% Sectioning, Headings and TOC Options
  % toc,          % Add the glossaries to the table of contents.
  numberline,     % When used with toc, this will add \numberline{} in
                  % the final argument of \addcontentsline. This will align the
                  % table of contents entry with the numbered section titles.
  section=section, % Its value should be the name of a sectional unit (e.g.
chapter).
                  % This will make the glossaries appear in the named sectional
unit,
                  % otherwise each glossary will appear in a chapter,
                  % if chapters exist, otherwise in a section.
  numberedsection = false,%
```

```
    % The glossaries are placed in unnumbered sectional
    % units by default, but this can be changed using numberedsection.
    % options
    % - false: no number, i.e. use starred form of sectioning command
    % - nolabel: use a numbered section, but the section not labelled
    % - autolabel: numbered with automatic labelling.
%
%%%  Glossary Appearance Options
  % entrycounter=false % (true, *false*)
                       % If set, each main (level 0) glossary entry will
                       % be numbered when using the standard glossary styles.
  % counterwithin=0 % if set will reset the glossaryentry counter every
                    % time the defined level is reset.
  % nolong,  % prevents loading of glossary-long and thus the longtable package
  % nosuper, % prevents loading of glossary-super and thus the supertabular
package
  % nolist,  % prevents loading of glossary-list
  % notree,  % prevents loading of glossary-tree
  nonumberlist, %  This option will suppress the
                % associated number lists in the glossaries
  counter=page, % The value should be the name of the default counter
                % to use in the number lists ).
%%% Sorting Options
  sort=standard,%
    % options
    % - standard : entries are sorted according to the value of the
    %              sort key used in \newglossaryentry (if present)
    %              or the name key (if sort key is missing);
    % - def : entries are sorted in the order in which they were defined
    % - use : entries are sorted according to the order in which they
    %         are used in the document
%%% Acronym Options
  acronym,    % Creates a separate acronym list
  shortcuts,  % define shortcuts (\ac for acronym)
]{glossaries}
% further styles
\usepackage{glossary-longragged}
% Create a new list of symbols
\newglossary[slg]{symbolslist}{syi}{syg}{List of Symbols}
% Simplest and easiest sorting method, but it's
% inefficient and the sorting is done according to the English alphabet. To
% use this method, add \makenoidxglossaries to the preamble and put
% \printnoidxglossaries at the place where you want your glossary
%\makenoidxglossaries
}

\EndCodeSection{PackagesIndexes}
```

7.1.17 Verbatim packages

Verbatim environments are used to display text in monospaced fonts. The typical usage is to display programming code. `verbatim` and `fancyvrb` are intended to be used for small (and fancy) code sections, whereas `listings` is optimal for large code section with syntax highlighting.

The style of `listings` is defined in file `preamble/style-listings.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% verbatim packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesVerbatim}
%%% Doc: upquote.sty
\usepackage{upquote} % print correct quotes in verbatim-environments

% Description: Reimplementation of the original verbatim enironment
% Doc: verbatim.pdf
\usepackage{verbatim} %

% Description: This package provides many facilities for reading, writing and
%              changing the output style of verbatim code
% Doc: fancyvrb.pdf
% consumes \write
% \usepackage{fancyvrb}

% Description: The listings package is a source code printer for LaTeX.
%              You can typeset stand alone files as well as listings with an
%              environment.
%              If the Syntax Highlighting of the preferred  programming
%              language is not already supported, you can make your own
%              definition.
% Doc: listings.pdf
% consumes \write
\usepackage{listings}

\EndCodeSection{PackagesVerbatim}
```

7.1.18 Fancy packages

Two different types of fancy packages are loaded. `lettrine` for dropping capitals and other packages for fancy framed texts: `boxedminipage`, `fancybox`, `framed` and `mdframed`. Not however that `mdframed` is a modern package that can replace the other three.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% fancy packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesFancy}

% Description: Dropping capitals
% Doc: lettrine.pdf
```

```
\usepackage{lettrine}

% Doc: boxedminipage.pdf
\usepackage{boxedminipage}

% Description: Create framed, shaded, or differently highlighted
%              regions that can break across pages.
% Doc: framed.pdf
% --> replaced by mdframed  or tcolorbox
% \usepackage{framed}

% Description: defines new environments where the user may choose
%              between several individual designs.
% Doc: mdframed-doc-en.pdf
\usepackage{mdframed}

\EndCodeSection{PackagesFancy}
```

7.1.19 Layout packages

The indentation of the first paragraph can be modified using `indentation`. The text can be printed in multiple columns with package `multicol`. The line spacing can be modified using package `setspace`. And the page layout can be modified with the packages `geometry` or alternatively `typearea`. The latter is automatically loaded with the koma script class. `changepage` can be used to detect odd/even pages.

The configuration of most packages is in file `preamble/style.tex` and for package `geometry` in file `preamble/style-geometry.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% layout packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesLayout}

%%% indentation ========================================

% Description: Indent first paragraph after section header
% Doc: indentfirst.pdf
% \usepackage{indentfirst}

%%% columns ============================================

% Description: Environment for multicolumn text
% Doc: multicol.pdf
\usepackage{multicol}


%% line spacing ========================================
%
% Description: configure line spacing
```

```
% Provides: \onehalfspacing, \doublespacing
% Doc: setspace.sty
\usepackage{setspace}

%% page layout ========================================

%% Test the page layout
%% Doc: layman.pdf
%\usepackage{layouts}

% Layout with 'geometry'
% Doc: geometry.pdf
% load after: hyperref
% ---> remove all comments to load geometry
%\ExecuteAfterPackage{hyperref}{\usepackage{geometry}}
% % make sure geometry is loaded before settings to typearea are set.
%\ExecuteAfterPackage{lastpackage}
%  {\IfPackageNotLoaded{geometry}{\usepackage{geometry}}}
% <---

% Layout with 'typearea'
% -> loaded automatically if geometry not loaded
% Doc: scrguide.pdf

% Description: Margin adjustment and detection of odd/even pages.
% Doc: changepage.pdf
% \usepackage[strict]{changepage}

\EndCodeSection{PackagesLayout}
```

7.1.20 Packages for header and footer

The content in the header and footer of a page is defined with package `scrlayer-scrpage`, with the settings defined in file `preamble/style-scrlayer-scrpage.tex`.

The total number of page is provided by package `pageslts`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% head and foot lines
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesHeadFoot}

%%% Doc: scrguide.pdf
\usepackage[%
%% column titles (content, style)
automark,
autooneside,% ignore optional argument in automark at oneside
pagestyleset=KOMA-Script, % default, used with koma-script
% other options
% - standard : style as defined by standard classes
markcase=ignoreuppercase,
```

```
% other options
% - lower % redefines \MakeMarkcase to convert the automatic running heads into
lower-case
%         % letters using \MakeLowercase (lower case typesetting).
% - upper % redefines \MakeMarkcase to convert the automatic running heads into
upper-case
%         % letters using \MakeUppercase (upper case typesetting).
% - used  % redefines \MakeMarkcase to use automatic running heads without any
case changes.
% - ignoreuppercase % redefines not only \MakeMarkcase but also \MakeUppercase
and \uppercase locally
%         % to the running heads to leave the automatic running heads unchanged.
]{scrlayer-scrpage}


% Description: provides total number of pages (ie. page 7 of 19)
% Provides: \lastpageref{LastPage}
% load after: hyperref
% Doc: pageslts.pdf
\ExecuteAfterPackage{hyperref}{\usepackage{pageslts}}
% The Warning can be ignored:
% Package pageslts Warning: Package pdfpages detected
% see: https://tex.stackexchange.com/questions/73767/warning-about-pdfpages-with-
hyperref

\EndCodeSection{PackagesHeadFoot}
```

7.1.21 Layout of headings

All headings can be redefined using package `titlesec`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% layout of headings
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\BeginCodeSection{PackagesHeadings}

% Description: The titlesec package is essentially a replacement - partial or
%              total-for the LaTeX macros related with sections - namely
%              titles, headers and contents.
% incompatible: with KOMA script, NOT Recommended!
%%% Doc: titlesec.pdf

\EndCodeSection{PackagesHeadings}
```

7.1.22 Layout of table of contents

The `titletoc` package is a companion to the `titlesec` package and it handles toc entries. It provides new commands with which one can format the toc entries in a generic way. It is used to define the layout of the part-pages.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% settings and layout of TOC
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\BeginCodeSection{PackagesTOC}

% Description: The philosophy of this package is to use new commands which you
%              can format the toc entries with in a generic way.
% Doc: titlesec.pdf
% load before: hyperref
% consumes \write
% usage: % Define partial toc for part pages \PartialToc
\IfDefined{chapter}{\usepackage{titletoc}}

% Description: The appendix package provides some facilities for
%              modifying the typesetting of appendix titles.
% Doc: appendix.pdf
%\usepackage[
% ,toc   % Put a header (e.g., 'Appendices') into the Table of Contents
% %,page  % Puts a title  (e.g.,  'Appendices') into the document at the
%        % beginning of the appendices environment
% %,title % Adds a name (e.g., 'Appendix') before each appendix title in
%        % the body of the document.
% %,titletoc % Adds a name (e.g., 'Appendix') before each appendix listed
%        % in the ToC
% %,header% Adds a name (e.g., 'Appendix') before each appendix in page headers.
%]{appendix}
%\renewcommand{\appendixtocname}{\appendixname}


\EndCodeSection{PackagesTOC}
```

7.1.23 PDF packages (including hyperref)

`pdfpages` is a package for the inclusion of pages from external pdf documents, `pdflscape` for changing the page orientation, `microtype` for improving the textformating, `hyperref` for almost everything else that is related to PDF especially its hyperlinks and `bookmark` for bookmarks in a PDF document.

Note that `hyperref` must be loaded after almost all packages!

The settings of hyperref are defined in file `preamble/style-hyperref.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% pdf packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\BeginCodeSection{PackagesPDF}

% Description: Include pages from external PDF documents in LaTeX documents
% Doc: pdfpages.pdf
```

```latex
\usepackage{pdfpages}

% Description: landscape orientation in PDF Format
% Doc: pdflscape.pdf
% load after: footmisc (correct ?)
%\usepackage{pdflscape}

% Description: The microtype package provides a LaTeX interface to the
%              micro-typographic extensions of pdfTEX: most prominently,
%              character protrusion and font expansion, furthermore
%              the adjustment of interword spacing and additional kerning.
% Provides:    Much better textformating and better typography,
%              but at the cost of a much larger PDF file.
% Doc: microtype.pdf
\ifpdf
\usepackage{microtype}
\fi

% Description: add hyperlink support to LaTeX
% load: after almost every package!
% Doc: manual.pdf
\usepackage[
%%% Extension options
  ,backref=page       % Adds backlink text to the end of each item in the
                      % bibliography, as a list of section numbers.
                      % (section, slide, page, none)
  ,pagebackref=false  % Adds backlink text to the end of each item in the
                      % bibliography, as a list of page numbers.
  ,hyperindex=true    % Makes the page numbers of index entries into
                      % hyperlinks.
  ,hyperfootnotes=false % Makes the footnote marks into hyperlinks to the
                        % footnote text (must be false if footmisc is loaded).
%%% PDF-specific display options
  ,bookmarks=true
%%% PDF display and information options
  ,pdfpagelabels=true % set PDF page labels
]{hyperref}

% Description: This package implements a new bookmark (outline) organization
%              for package  hyperref. In contrast to hyperref here only one
%              LaTeX run is required.
% load: after hyperref
% Doc: bookmark.pdf
\IfNotDraft{%
  \usepackage{bookmark}
}

\EndCodeSection{PackagesPDF}
```

7.1.24 Additional packages (explicitly after package hyperref)

These packages here have nothing in common except that they can be loaded after `hyperref`. Other additional package that must be loaded before must be put into the section `Misc Packages`, see section section 7.1.15.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% additional packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% All packages added here MUST be loadeable after hyperref!
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

\BeginCodeSection{PackagesAdditional}

% Description: enable hyphenation of typewriter text word (\texttt)
% Doc:  hyphenat.pdf
% Note: According to documentation the font warnings can be ignored
\usepackage[htt]{hyphenat}

\usepackage[%
  % disable,
]{todonotes}

\usepackage[NoDate]{currvita}

\usepackage{nicefilelist}

\EndCodeSection{PackagesAdditional}
```

7.1.25 Last Package

This package indicates the point after which no other package is loaded. It is required by this template.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% last package
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% This package only indicates the last package loaded.
% It provides no functionality, it is just used by the command
% \ExecuteAfterPackage{lastpackage} to execute code before
% parameters of packages are set.
\usepackage{lastpackage}
```

7.2 preamble/style.tex

7.2.1 Package sections

This is the file that defines all settings for the package including the page layout. The settings are grouped together according to there usage. These section defined at the beginning of the file:

```
%% -- style section selections -->
```

```
\DefineCodeSection[true]{StyleColors}
\DefineCodeSection[true]{StyleMath}
\DefineCodeSection[true]{StyleDiagrams}
\DefineCodeSection[true]{StyleScience}
\DefineCodeSection[true]{StyleText}
\DefineCodeSection[true]{StyleFootnote}
\DefineCodeSection[true]{StyleQuotes}
\DefineCodeSection[true]{StyleCiteBib}
\DefineCodeSection[true]{StyleFigures}
\DefineCodeSection[true]{StyleCaptions}
\DefineCodeSection[true]{StyleTables}
\DefineCodeSection[true]{StyleIndexes}
\DefineCodeSection[true]{StyleVerbatim}
\DefineCodeSection[true]{StyleFancy}
\DefineCodeSection[true]{StyleParagraph}
\DefineCodeSection[true]{StyleLineSpacing}
\DefineCodeSection[true]{StylePageLayout}
\DefineCodeSection[true]{StyleTitlepage}
\DefineCodeSection[true]{StyleHeadFoot}
\DefineCodeSection[true]{StyleHeadings}
\DefineCodeSection[true]{StyleHeadingsFonts}
\DefineCodeSection[true]{StyleHeadingsLayout}
\DefineCodeSection[true]{StyleLayoutTOC}
\DefineCodeSection[true]{StylePdf}
\DefineCodeSection[true]{StyleFixProblems}
%% <--------------------------------
```

If you do not require all sections in your document you can change the setting from *true* to *false* in all section definitions you do not want to include in the compilation.

7.2.2 Colors

If package `xcolor` is loaded then colors for the sections, the tables and pdf links are defined with `\definecolor` and `\colorlet`. Note that `\SetTemplateDefinition` is used here to define switchable colors for different document targets (web/print).

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Colors
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleColors}
\IfMultDefined{definecolor,colorlet}{%

% color of headings
%\definecolor{sectioncolor}{RGB}{0, 51, 153} % blue
%\definecolor{sectioncolor}{RGB}{0, 25, 152} % darker blue
\definecolor{sectioncolor}{RGB}{0, 0, 0}     % black
%
% Farbe fuer grau hinterlegte Boxen (fuer Paket framed.sty)
\definecolor{frameshadecolor}{gray}{0.90}

\definecolor{pdfanchorcolor}{named}{black}
```

```
\definecolor{pdfmenucolor}{named}{red}
\definecolor{pdfruncolor}{named}{cyan}

\SetTemplateDefinition{Target}{Web}{%
  \IfDefined{definecolor}{
    \definecolor{pdfurlcolor}{rgb}{0,0,0.6}
    \definecolor{pdffilecolor}{rgb}{0.7,0,0}
    \definecolor{pdflinkcolor}{rgb}{0,0,0.6}
    \definecolor{pdfcitecolor}{rgb}{0,0,0.6}
  }
}%
\SetTemplateDefinition{Target}{Print}{%
  \IfDefined{definecolor}{
    \definecolor{pdfurlcolor}{rgb}{0,0,0}
    \definecolor{pdffilecolor}{rgb}{0,0,0}
    \definecolor{pdflinkcolor}{rgb}{0,0,0}
    \definecolor{pdfcitecolor}{rgb}{0,0,0}
  }
}%

% Execute color definition defined by Target->Web
\UseDefinition{Target}{Web}

% table colors
\colorlet{tablebodycolor}{white!100}
\colorlet{tablerowcolor}{gray!10}
\colorlet{tablesubheadcolor}{azure3!30}
\colorlet{tableheadcolor}{gray!25}

}{} % End: \IfMultDefined{definecolor}
\EndCodeSection{StyleColors}
```

7.2.3 Math

This code shows how to exchange the vector symbol arrow with a bold font and how to exchange various greek symbols by there *var* variant.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Math Settings
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleMath}

%%% print vector in bold
%\let\oldvec\vec
%\def\vec#1{{\boldsymbol{#1}}} % bold vector
%\newcommand{\ve}{\vec} %

%%% exchange greek symbols
\let\ORGvarepsilon=\varepsilon
\let\varepsilon=\epsilon
```

```
\let\epsilon=\ORGvarepsilon
%
% \let\ORGvarrho=\varrho
% \let\varrho=\rho
% \let\rho=\ORGvarrho
%
% \let\ORGvartheta=\vartheta
% \let\vartheta=\theta
% \let\theta=\ORGvartheta
%
% \let\ORGvarphi=\varphi
% \let\varphi=\phi
% \let\phi=\ORGvarphi
\EndCodeSection{StyleMath}
```

7.2.4 Science

Loading of `preamble/style-siunitx.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Science Settings
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleScience}

% style setup of siunitx
\input{preamble/style-siunitx.tex}

\EndCodeSection{StyleScience}
```

preamble/style-siunitx.tex

`siunitx` is setup for the detection of all font changes and in mode *math*. For german text several changes are applied to ensure the correct setting of math in that language.

Additionally the commands `\nicefrac`, `\unitfrac` and `\unit` are defined in order to emulate the commands from the package `units`.

```
\IfDefined{sisetup}{%

\sisetup{%
  mode = math, % text is printed using a math font
  mode = match,
  propagate-math-font = true,
  reset-math-version = false,
  reset-text-family = false,
  reset-text-series = false,
  reset-text-shape = false,
  text-family-to-math = true,
  text-series-to-math = true,
  uncertainty-mode = separate
}
```

```
\IfDefined{iflanguage}{%
  \iflanguage{ngerman}{%
    \sisetup{%
      exponent-product = \cdot,
      number-unit-separator=\text{\,},
      output-decimal-marker={\text{,}},
    }
  }
}

} % end: \IfDefined
```

7.2.5 Diagrams

Setup of default plot size for `tikz/pgfplots` and in case of german text the decimal separator is set up as a comma.

Further settings for `pgfplots` are in a separate file: `preamble/style-pgfplots.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% diagrams
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleDiagrams}

% setup of package pgfplots
\input{preamble/style-pgfplots.tex}

\EndCodeSection{StyleDiagrams}
```

preamble/style-pgfplots.tex

Color series for pgfplots are defined in this file.

```
\IfPackagesLoaded{tikz,pgfplots}{%

% tikz/pgf
\pgfplotsset{width=0.8\textwidth,compat=newest}
%% See pgfplotstable documentation (4.12.1) for further options
% set decimal point to comma for german text
\IfDefined{iflanguage}{
  \iflanguage{ngerman}{%
    \pgfplotsset{%
      every tick label/.append style={/pgf/number format/use comma}
%      x tick label style={/pgf/number format/use comma},%
%      y tick label style={/pgf/number format/use comma},%
%      z tick label style={/pgf/number format/use comma}%
    }%
  }{} % end of \iflanguage
  % for all languages
```

```
  \pgfplotsset{%
    every tick label/.append style={/pgf/number format/set thousands separator
={\,}},
    every node near coord/.append style={/pgf/number format/set thousands
separator={\,}}
  }%
}{} % end of \IfDefined



\definecolor{colorseriesRGB1}{RGB}{0,     0, 192}
\definecolor{colorseriesRGB2}{RGB}{192,   0,   0}
\definecolor{colorseriesRGB3}{RGB}{0  , 128,   0}
\definecolor{colorseriesRGB4}{RGB}{192,   0, 192}

\pgfplotscreateplotcyclelist{colorseries-rgb}{
  {colorseriesRGB1},
  {colorseriesRGB2},
  {colorseriesRGB3},
  {colorseriesRGB4},
}


\definecolor{colorseriesOffice1}{RGB}{ 49,  93, 152}
\definecolor{colorseriesOffice2}{RGB}{154,  50,  47}
\definecolor{colorseriesOffice3}{RGB}{117, 150,  57}
\definecolor{colorseriesOffice4}{RGB}{ 92,  67, 125}
\definecolor{colorseriesOffice5}{RGB}{211, 112,  40}
\definecolor{colorseriesOffice6}{RGB}{ 45, 134, 161}

\pgfplotscreateplotcyclelist{colorseries-office}{%
  {colorseriesOffice1},%
  {colorseriesOffice2},%
  {colorseriesOffice3},%
  {colorseriesOffice4},%
  {colorseriesOffice5},%
  {colorseriesOffice6},%
}

% color cycle list for bar plots
\pgfplotsset{
  /pgfplots/bar cycle list/.style={/pgfplots/cycle list={%
    {colorseriesOffice1!20!black,fill=colorseriesOffice1!80!white,mark=none},%
    {colorseriesOffice2!20!black,fill=colorseriesOffice2!80!white,mark=none},%
    {colorseriesOffice3!20!black,fill=colorseriesOffice3!80!white,mark=none},%
    {colorseriesOffice4!20!black,fill=colorseriesOffice4!80!white,mark=none},%
    {colorseriesOffice5!20!black,fill=colorseriesOffice5!80!white,mark=none},%
    {colorseriesOffice6!20!black,fill=colorseriesOffice6!80!white,mark=none},%
    }
```

```
  },
}

}{}% end if pgfplots
```

7.2.6 Text

Here the font for urls (package `url`) and the font in margins used by package `marginnote` is defined.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% text related
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleText}

%% style of URL
\IfDefined{urlstyle}{
  \urlstyle{tt} %sf
}

% font used in margins by package marginnote
\IfDefined{marginfont}{
  \IfDefined{color}{
    \renewcommand*{\marginfont}{\color{red}\sffamily}
  }
}

% Options of enumitem
\IfDefined{setlist}{%
  \setlist{itemsep=0pt}
}%

\EndCodeSection{StyleText}
```

7.2.7 Footnotes

Several definitions to solve common problems with footnotes and example code for the redefinition of the footnote layout.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Footnotes
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleFootnote}

% separation text to footnote
\addtolength{\skip\footins}{\baselineskip}

% printed text between multible footnotes
\renewcommand*{\multfootsep}{,\nobreakspace}
```

```
% standard superscript numbers in footnotes
%\deffootnote%
%   [1em]% width of marker
%   {1.5em}% indentation (general)
%   {1em}% indentation (par)
%   {\textsubscript{\thefootnotemark}}%

% remove superscript numbers in footnotes
\deffootnote
  {1.5em}% indentation (general)
  {1em}% indentation (par)
  {\makebox[1.5em][l]{\thefootnotemark}}

%% Change intendation of footnote
%\setlength\footnotemargin{10pt}

% Limit space of footnotes to 10 lines
\setlength{\dimen\footins}{10\baselineskip}

% prevent continuation of footnotes
% at facing page
\interfootnotelinepenalty=10000

\EndCodeSection{StyleFootnote}
```

7.2.8 Quotes

Settings for package `csquotes`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Quotes
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleQuotes}
\IfPackageLoaded{csquotes}{

% All facilities which take a 'cite' argument will not insert
% it directly. They pass it to an auxiliary command called \mkcitation
% which  may be redefined to format the citation.
\renewcommand*{\mkcitation}[1]{{\,}#1}
\renewcommand*{\mkccitation}[1]{ #1}

\SetBlockThreshold{2} % Number of Lines at which a blockquote is separated
                      % from the text.

\newenvironment{myquote}%
  {\begin{quote}\small}%
  {\end{quote}}%
\SetBlockEnvironment{myquote}
%\SetCiteCommand{} % Changes citation command
```

```
} %end: \IfPackageLoaded{csquotes}
\EndCodeSection{StyleQuotes}
```

7.2.9 Citations / Style of Bibliography

Loading of the settings file `preamble/style-biblatex.tex` for package `biblatex` and modification of the layout of the bibliography items in file `preamble/style-biblatex-alpha.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Citations / Style of Bibliography
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleCiteBib}

% biblatex bibliography options
\input{preamble/style-biblatex.tex}
% modifications for an alpha style
\input{preamble/style-biblatex-alpha.tex}

% Other styles that can be loaded instead of the custom 'biblatex-alpha'
\IfPackageNotLoaded{biblatex}{%
  %%% Bibliography styles with natbib support
  %\bibliographystyle{plainnat} % Numeric Labels, alphabatical order
  %\bibliographystyle{abbrvnat} % same as plain, but shorter names
  %\bibliographystyle{unsrtnat} % same as plain, but appeariance in order of
citation
  %\bibliographystyle{alpha}    % labels are formed by author and year

  %%% Bibliography styles according to DIN
  %%% get from: http://www.ctan.org/tex-archive/biblio/bibtex/contrib/german/din
1505/
  %\bibliographystyle{alphadin}
  %\bibliographystyle{abbrvdin}
  %\bibliographystyle{plaindin}
  %\bibliographystyle{unsrtdin}

  %%% Bibliography styles created with custombib
  %%% Doc: ftp://tug.ctan.org/pub/tex-archive/macros/latex/contrib/custom-bib/
makebst.pdf
  % \bibliographystyle{...}

}% end: \IfPackageNotLoaded{biblatex}

% other BibTeX styles: http://www.cs.stir.ac.uk/~kjt/software/latex/showbst.html

\KOMAoptions{%
   % bibliography=oldstyle%
   bibliography=openstyle%
}%
\EndCodeSection{StyleCiteBib}
```

preamble/style-biblatex.tex

Setting of bibliography options.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

\IfPackageLoaded{biblatex}{%
  \ExecuteBibliographyOptions{%
%--- Sorting --- --- ---
  sorting=nty, % Sort by name, title, year.
  % other options:
  % nty        Sort by name, title, year.
  % nyt        Sort by name, year, title.
  % nyvt       Sort by name, year, volume, title.
  % anyt       Sort by alphabetic label, name, year, title.
  % anyvt      Sort by alphabetic label, name, year, volume, title.
  % ynt        Sort by year, name, title.
  % ydnt       Sort by year (descending), name, title.
  % none       Do not sort at all. All entries are processed in citation order.
  % debug      Sort by entry key. This is intended for debugging only.
  %
  sortcase=true,
  sortcites=true, % do/do not sort citations according to bib
%--- Dates --- --- ---
  date=comp,  % (short, long, terse, comp, iso8601)
% origdate=
% eventdate=
% urldate=
% alldates=
  datezeros=true, %
  dateabbrev=true, %
%--- General Options --- --- ---
% maxnames=1,
% minnames=1,
  maxbibnames=15,%
  maxcitenames=1,%
  uniquename=true,% (biber only)
  maxalphanames=1,% (biber only)
% autocite= % (plain, inline, footnote, superscript)
  autopunct=true,
  language=auto,
  block=none, % (none, space, par, nbpar, ragged)
  notetype=foot+end, % (foot+end, footonly, endonly)
  hyperref=true, % (true, false, auto)
  backref=true,
  backrefstyle=three, % (none, three, two, two+, three+, all+)
  backrefsetstyle=setonly, %
  indexing=false, %
  % options:
  % true       Enable indexing globally.
```

```
  % false      Disable indexing globally.
  % cite       Enable indexing in citations only.
  % bib        Enable indexing in the bibliography only.
  refsection=none, % (part, chapter, section, subsection)
  refsegment=none, % (none, part, chapter, section, subsection)
  abbreviate=true, % (true, false)
  defernumbers=true, %
  punctfont=false, %
  arxiv=abs, % (ps, pdf, format)
%--- Style Options --- --- ---
% The following options are provided by the standard styles
  isbn=false,%
  url=false,%
  doi=false,%
  eprint=false,%
  }%
}% \IfPackageLoaded{biblatex}
```

preamble/style-biblatex-alpha.tex

Redefinitions of bib-macros for an alpha style.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

\makeatletter % for some reason required to make the bold author names possible
... ?
% no idea why it needs to be in front of \IfPackageLoaded
% is connected with the @ in the newbibmacro definition in line 92

\IfPackageLoaded{biblatex}{%
  % the number is not used in the bibliography, nor
  % the citations, but for the list of publications
  % we want numbers to be available.
  \ExecuteBibliographyOptions{labelnumber}

  % change alpha label to be without +
  \renewcommand*{\labelalphaothers}{}

  % change 'In: <magazine>" to "<magazine>"
  \renewcommand*{\intitlepunct}{}
  \DefineBibliographyStrings{german}{in={}}
  \DefineBibliographyStrings{english}{in={}}

  % make names capitalized \textsc{}
  \renewcommand{\mkbibnamegiven}{\textsc}
  \renewcommand{\mkbibnamefamily}{\textsc}

  % make volume and number look like
  % 'Bd. 33(14): '
```

```
\renewbibmacro*{volume+number+eid}{%
  \setunit{\addcomma\space}%
  \bibstring{volume}%
  \setunit{\addspace}%
  \printfield{volume}%
  \iffieldundef{number}{}{%
    \printtext[parens]{%
      \printfield{number}%
    }%
  }%
  \setunit{\addcomma\space}%
  \printfield{eid}
  %\setunit{\addcolon\space}%
}

% <authors>: <title>
\renewcommand*{\labelnamepunct}{\addcolon\space}
% make ': ' before pages
\renewcommand*{\bibpagespunct}{\addcolon\space}
% names delimiter ';' instead of ','
%\renewcommand*{\multinamedelim}{\addsemicolon\space}

% move date before issue
\renewbibmacro*{journal+issuetitle}{%
  \usebibmacro{journal}%
  \setunit*{\addspace}%
  \iffieldundef{series}
  {}
  {\newunit
    \printfield{series}%
    \setunit{\addspace}}%
  %
  \usebibmacro{issue+date}%
  \setunit{\addcolon\space}%
  \usebibmacro{issue}%
  \setunit{\addspace}%
  \usebibmacro{volume+number+eid}%
  \newunit}

% print all names, even if maxnames = 1
\DeclareCiteCommand{\citeauthors}
{
  \defcounter{maxnames}{1000}
  \boolfalse{citetracker}%
  \boolfalse{pagetracker}%
  \usebibmacro{prenote}}
{\ifciteindex
  {\indexnames{labelname}}
  {}%
```

```
    \printnames{labelname}}
  {\multicitedelim}
  {\usebibmacro{postnote}}

  %% create a new style for an enumerated publication list
  %% this code is taken from http://tex.stackexchange.com/questions/187181/
independent-publication-list-with-numbered-list-using-biblatex-and-refsection

  %% Emphasize own name in References with boldface

  % Doc: xpatch.pdf
  \usepackage{xpatch}%

  % \bibboldnames: etoolbox-list of names to typeset bold in \printbibliography
  \newcommand*{\bibboldnames}{}

  \makeatletter
  %% updated with respect to https://tex.stackexchange.com/questions/73136/make-
specific-author-bold-using-biblatex?lq=1
  \newbibmacro*{name:bold}[2]{%
    \edef\blx@tmp@name{\expandonce#1, \expandonce#2}%
    \def\do##1{\ifdefstring{\blx@tmp@name}{##1}{\bfseries\listbreak}{}}%
    \dolistloop{\bibboldnames}}%

  \makeatother % required to make it work!!! is connected with the @ in the above
 macro definition

  %% # can not be used in patch command because the command is wrapped in another
 macro.
  %% Therefore we must play around with cat codes.
  %%   see http://tex.stackexchange.com/questions/188188/loop-macro-fails-if-
wrapped-in-conditional
  %%   for a better explaination.
  \begingroup\lccode`?=`#\lowercase{\endgroup
    \xpretobibmacro{name:family}{\begingroup\usebibmacro{name:bold}{?1}{?2}}{}{}
% with biblatex 3.3 'last' was changed to 'family'
    \xpretobibmacro{name:given-family}{\begingroup\usebibmacro{name:bold
}{?1}{?2}}{}{} % with biblatex 3.3 'first' was changed to 'given'
    \xpretobibmacro{name:family-given}{\begingroup\usebibmacro{name:bold
}{?1}{?2}}{}{}
  }%
  \xpretobibmacro{name:delim}{\begingroup\normalfont}{}{}
  \xapptobibmacro{name:family}{\endgroup}{}{}
  \xapptobibmacro{name:given-family}{\endgroup}{}{}
  \xapptobibmacro{name:family-given}{\endgroup}{}{}
  \xapptobibmacro{name:delim}{\endgroup}{}{}

  \DeclareNameAlias{default}{family-given/given-family}
```

```
  % Define an new 'defbibenvironment'
  % that includes numbers for use in extra refsections
  \DeclareFieldFormat{labelnumberwidth}{#1\adddot}
  \newlength{\periodwidth}
  \settowidth{\periodwidth}{.}

  \defbibenvironment{numbered+bold}
  {\list
    {\printtext[labelnumberwidth]{%
        \printfield{prefixnumber}%
        \printfield{labelnumber}%
      }%
    }%
    {
      \setlength{\labelwidth}{\labelnumberwidth}%
      \setlength{\leftmargin}{\labelwidth}%
      \setlength{\labelsep}{\biblabelsep}%
      \addtolength{\labelsep}{1em}
      \addtolength{\leftmargin}{\labelsep}%
      \setlength{\itemsep}{\bibitemsep}%
      \setlength{\parsep}{\bibparsep}}%
    \renewcommand*{\makelabel}[1]{\hss##1}%
  }
  {\endlist}
  {\item}%\hskip-\periodwidth

}% \IfPackageLoaded{biblatex}
```

7.2.10 Figures, placement and floats

Configuration of variable for package `wrapfig` (if loaded) and general modifications of float placement variables to make the placement of many floating figures easier.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% figures, placement and floats
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleFigures}
\IfPackageLoaded{float} {
% \floatplacement{figure}{H} % default placement
}

\IfPackageLoaded{wrapfig} {
%\setlength{\wrapoverhang}{\marginparwidth}
%\addtolength{\wrapoverhang}{\marginparsep}
\setlength{\intextsep}{0.5\baselineskip} % space above and below the image
% \intextsep ignored with draft ???
%\setlength{\columnsep}{1em} % separation to the text
}
```

```
% Make float placement easier
\renewcommand{\floatpagefraction}{.75} % previous: .5
\renewcommand{\textfraction}{.1}       % previous: .2
\renewcommand{\topfraction}{.8}        % previous: .7
\renewcommand{\bottomfraction}{.5}     % previous: .3
\setcounter{topnumber}{3}        % previous: 2
\setcounter{bottomnumber}{2}     % previous: 1
\setcounter{totalnumber}{5}      % previous: 3

\EndCodeSection{StyleFigures}
```

7.2.11 Captions

In this section the visual appearance and numbering of captions is configured for the packages `caption`, `subcaption`, `subfig` (in `preamble/style-caption.tex`) and `floatrow` (in `preamble/style-floatrow.tex`). The package `subfig` however is not recommended and can only be used without `subcaption`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Captions
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleCaptions}

\IfPackageLoaded{amsmath}{
% Numbering of figures and table in each chapter
% \numberwithin{figure}{chapter}
% \numberwithin{table}{chapter}
}

% Style of captions and subcaptions (and subfig)
\input{preamble/style-caption.tex}

% Style of figure placement with floatrow
\input{preamble/style-floatrow.tex}

\EndCodeSection{StyleCaptions}
```

preamble/style-caption.tex

In this file the standard caption style with name *captionStyleTemplateDefault* is defined and applied via `\captionsetup`. Furthermore a version for short captions is defined with the name *captionStyleTemplateShortDefault*, which is then applied for all wrap style and margin figures.

Additionally caption styles are defined for `subcaption` type captions and for `subfig` captions (not recommended) in the case that `subfig` is loaded instead of `subcaption`.

```
\IfPackageLoaded{caption}{%
% Style of captions
\DeclareCaptionStyle{captionStyleTemplateDefault}
```

```
[ % single line captions
  justification = centering
]
{ % multiline captions
% -- Formatting
  format    = plain,  % plain, hang
  indention  = 0em,   % indention of text
  labelformat = default,% default, empty, simple, brace, parens
  labelsep   = colon,  % none, colon, period, space, quad, newline, endash
  textformat  = simple, % simple, period
% -- Justification
  justification = justified, %RaggedRight, justified, centering
  singlelinecheck = true, % false (true=ignore justification setting in
%single line)
% -- Fonts
  labelfont  = {small,bf},
  textfont   = {small,rm},
% valid values:
% scriptsize, footnotesize, small, normalsize, large, Large
% normalfont, ip, it, sl, sc, md, bf, rm, sf, tt
% singlespacing, onehalfspacing, doublespacing
% normalcolor, color=<...>
%
% -- Margins and further paragraph options
  margin = 10pt, %.1\textwidth,
  % width=.8\linewidth,
% -- Skips
  skip    = 10pt, % vertical space between the caption and the figure
  position = auto, % top, auto, bottom
% -- Lists
  % list=no, % suppress any entry to list of figure
  listformat = subsimple, % empty, simple, parens, subsimple, subparens
% -- Names & Numbering
  % figurename = Abb. %
  % tablename  = Tab. %
  % listfigurename=
  % listtablename=
  % figurewithin=chapter
  % tablewithin=chapter
%-- hyperref related options
  hypcap=true, % (true, false)
  % true=all hyperlink anchors are placed at the
  % beginning of the (floating) environment
  %
  hypcapspace=0.5\baselineskip
}

% apply caption style
\captionsetup{
```

```
  style = captionStyleTemplateDefault % base
}

% Predefinded skip setup for different floats
\captionsetup[table]{position=top}
\captionsetup[figure]{position=bottom}

\newcommand\FigureAbbrevition{Fig.}
\IfDefined{iflanguage}{%
  \iflanguage{ngerman}{%
    \renewcommand\FigureAbbrevition{Abb.}
  }{}
}

\DeclareCaptionStyle{captionStyleTemplateShortDefault}{%
  style=captionStyleTemplateDefault,
  name=\FigureAbbrevition,
  indention=0pt,
  justification=RaggedRight
}

% Short Names
\IfDefined{wrapfigure}{%
  \captionsetup[wrapfigure]{style=captionStyleTemplateShortDefault}}
\IfDefined{wrapfloat}{%
  \captionsetup[wrapfloat]{style=captionStyleTemplateShortDefault}}
\IfDefined{floatingfigure}{%
  \captionsetup[floatingfigure]{style=captionStyleTemplateShortDefault}}
\IfDefined{margincap}{%
  \IfDefined{preto}{\preto\margincap{
  \captionsetup{style=captionStyleTemplateShortDefault}}}}
  % see http://tex.stackexchange.com/questions/37721/captionsetup-for-margin-
caption
  % for an explanation of the extra code.
  %
} % end \IfPackageLoaded{caption}

% options for subcaptions
\IfPackageLoaded{subcaption}{
  \captionsetup[sub]{ %
    style = captionStyleTemplateDefault, % base
    labelfont  = {footnotesize,bf},
    textfont   = {footnotesize,rm},
    justification = RaggedRight, %RaggedRight, justified, centering
    skip=6pt,
    margin=5pt,
    labelformat = simple,% default, empty, simple, brace, parens
    labelsep    = space,
    list=false,
```

```
    hypcap=false
  }
  % make subcaptions be referenced as 5.3(b)
  \renewcommand\thesubfigure{(\alph{subfigure})}
}

% style options for subfig
\IfPackageLoaded{caption}{%
 \IfPackageLoaded{subfig}{%
  \captionsetup[subfloat]{%
   style = captionStyleTemplateDefault, % base
   skip=6pt,
   margin=5pt,
   labelformat = parens,% default, empty, simple, brace
   labelsep    = space,
   list=false,
   hypcap=false
  }
 } % end \IfPackageLoaded{subfig}
} % end \IfPackageLoaded{caption}
```

preamble/style-floatrow.tex

Several settings of package `floatrow` are set up and float styles are defined with `\floatsetup`.

```
\IfPackageLoaded{floatrow}{%

\floatsetup[table]{style=plaintop}

\DeclareFloatStyle{TemplateFloatStyleBoxed}%
   {style=Boxed,frameset={\fboxrule1pt\fboxsep12pt}}

\DeclareFloatVCode{grayruleabove}%
   {{\color{gray}\par\rule\hsize{2.8pt}\vskip4pt\par}}

\DeclareFloatVCode{grayrulebelow}%
   {{\color{gray}\par\vskip4pt\rule\hsize{2.8pt}}}

\DeclareColorBox{TemplateFloatColorBoxStyle}%
   {\fcolorbox{gray}{white}}

\DeclareObjectSet{centering}{\centering}

\DeclareMarginSet{center}%
   {\setfloatmargins{\hfil}{\hfil}}

\DeclareMarginSet{hangleft}%
   {\setfloatmargins{\hskip-\marginparwidth\hskip-\marginparsep}{\hfil}}

\DeclareFloatSeparators{marginparsep}%
```

```
   {\hskip\marginparsep}

\floatsetup{%
   %% style
   style={%
      plain % Standard LaTeX
      % plaintop % puts captions above float object's contents
      % Plaintop % Capitalized form of plaintop
      % ruled
      % Ruled
      % boxed
      % Boxed
      % BOXED
      % shadowbox
      % Shadowbox
      % SHADOWBOX
      % Doublebox
      % DOUBLEBOX
      % wshadowbox
      % Wshadowbox
      % WSHADOWBOX
   },%
   %%% --- Font --
   % uses caption-package formats
   % font=
   % footfont=
   %%% --- Position of Caption ---
%   capposition=top, % caption above object
%   %% caption above object and also aligned by top line in float row.
%   capposition=TOP,
%   capposition=bottom, % caption below object
%   capposition=beside, % caption beside object.
%   %
%   %%% --- Position of Beside Caption ---
%   %% caption is printed to the left side of object
%   capbesideposition=left,
%   %% caption is printed to the right side of object;
%   capbesideposition=right,
%   % caption is printed in binding side of page if
%   % twoside option switched on in document class and key
%   % facing=yes is used; in oneside option of document
%   % (or key facing=no is used), caption is printed at the left side;
%   capbesideposition=inside,
%   capbesideposition=outside,
%   % least popular option: caption printed in outer side of page
%   % if twoside option switched on in document class and key
%   % facing=yes is used; in oneside option of document
%   % (or key facing=no is used), caption is printed at the right side.
%   capbesideposition=top, % caption aligned to the top of object;
```

```
%   capbesideposition=bottom, % caption aligned to the bottom of object;
%   capbesideposition=center, % caption aligned to the center of object.
%   %
%   capbesidewidth=4cm, % Defines width of beside caption.
%   floatwidth=7cm, % Defines width of objects
%   capbesideframe=no, % Align Caption at frame, not text
   %
   footposition=default, % if caption above float object foot material is placed
                         % below float object, otherwise below caption;
%   footposition=caption, % always placed below caption;
%   footposition=bottom,  % always placed at the bottom of float box.
   %
   %%% --- Vertical Alignment of Float Elements ---
   %% - heightadjust ----
   heightadjust={%
      %all, % adjust both caption and object heights
                      % (e.g. for styles ruled, Ruled and BOXED);
      % caption, % adjust caption heights (e.g. for Plaintop style);
      object, % adjust object heights (e.g. for Boxed style);
      % none, % nothing to be adjusted (the plain style);
      % nocaption, % no adjusting for captions;
      % noobject, % no adjusting for objects;
   },%
   %
   %% - valign ---
   % valign=t, % aligns objects by top line;
   % valign=c, % aligns objects by center line
   valign=b, % aligns objects by bottom line;
   % valign=s, % stretches objects by full height (if it is possible).
   %%% --- Facing Layout ---
   facing=yes, % different layout for even and odd pages in if twoside is on
   %%% --- Object Settings ---
   %% - objectset: Defines justification of float object (float contents).
   % objectset=justified,    %
   objectset=centering,    %
   % objectset=raggedright,  %
   % objectset=RaggedRight,  %
   %%% --- Defining Float Margins ---
   %% - margins: ????
   margins=centering,   %
   % margins=raggedright, %
   % margins=raggedleft,  %
   %%% --- Defining Float Separators ---
   % horizontal skip = \columnsep (default for both keys);
    floatrowsep=columnsep,
   % floatrowsep=quad,  % horizontal skip = 1 em;
   % floatrowsep=qquad, % horizontal skip = 2 em;
   % floatrowsep=hfil,  % like \hfil
   % floatrowsep=hfill, % like \hfill
```

```
% floatrowsep=none,  % empty separator
%
% horizontal skip = \columnsep (default for both keys);
capbesidesep=columnsep,
% capbesidesep=quad,  % horizontal skip = 1 em;
% capbesidesep=qquad, % horizontal skip = 2 em;
% capbesidesep=hfil,  % like \hfil
% capbesidesep=hfill, % like \hfill
% capbesidesep=none,  % empty separator
%%% --- Defining Float Rules/Skips ---
%% - precode:     above float box
precode={
   none %
   % thickrule %
   % rule %
   % lowrule %
   % captionskip
},%
%% - rowprecode:  above alone float box
rowprecode={
   none %
   % thickrule %
   % rule %
   % lowrule %
   % captionskip
},%
%% - midcode:     between caption above/below and float object.
midcode={%
   %none %
   % thickrule %
   % rule %
   % lowrule %
   captionskip
},%
%% - postcode:    below float box
postcode={%
   none %
   % thickrule %
   % rule %
   % lowrule %
   % captionskip
},%
%% - rowpostcode: below alone float box
rowpostcode={%
   none %
   % thickrule %
   % rule %
   % lowrule %
   % captionskip
```

```
   },%
   %%% --- Defining Float Frames ---
%   framestyle={%
%      % fbox %
%      colorbox %
%      % doublebox %
%      % shadowbox %
%      % wshadowbox %
%   },
   %% - frameset: The parameters for chosen frame
   % frameset={\fboxrule1pt\fboxsep12pt},
%   framearound={%
%      object % float object contents
%      % all % full float box
%   },
   framefit=yes, % fit frame to whatever is set
   %%% --- Settings for Colored Frames ---
   % Predefinded ColorBox (\DeclareColorBox)
%   colorframeset=TemplateFloatColorBoxStyle,
   %%% --- Defining Float Skips ---
   captionskip=5pt,
   footskip=\skip\footins,
   %%% --- Defining Float Footnote Rule's Style ---
   % Defines type of footnote rule for footnotes inside floating environment.
   footnoterule={
      normal   % standard LaTeX definition
      % limited  % standard LaTeX definition, max width of footnote \frulemax
      % fullsize % rule to full current text width.
      % none     % Absent rule.
   },
   %%% --- Managing Floats with [H] Placement Option ---
   % doublefloataswide=true, % ???
   % floatHaslist=false, % only true for backward compatibility
}


\floatsetup[FloatStyleCaptionMargin]{
  margins=hangleft,
  floatwidth=\textwidth,
  capposition=beside,
  capbesideposition=left,
  capbesideframe=no,
  capbesidewidth=\marginparwidth,
  capbesidesep=marginparsep,
  framestyle=framefit=yes,
}

%%% Replacement of <float> Package
%\DeclareNewFloatType{%
```

```
%   placement={%
%      tbh % any of t,b,h,p
%   },%
%   name={
%      % Defines the name of environment in the caption label.
%   },%
%   fileext={
%       % Defines extension of the file in which gathered list of floats.
%   }
%   within={% Reset caption within...
%      % nothing = do not reset ever
%      section % also section/chapter/part
%   },%
%   relatedcapstyle=yes % yes/no, related to \captionsetup
%}%

}% end if
```

7.2.12 Tables

Here new column types are defined if they are not yet defined.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% table packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleTables}

% Define new column types only if they are not yet defined
\IfDefined{RaggedLeft}{
  %% centered (Z):
  \IfColumntypeDefined{Z}{}
    {\newcolumntype{Z}{>{\Centering\arraybackslash\hspace{0pt}}X}}
  %% right (X):
  \IfColumntypeDefined{Y}{}
    {\newcolumntype{Y}{>{\RaggedLeft\arraybackslash\hspace{0pt}}X}}
  %% left (X):
  \IfColumntypeDefined{W}{}
    {\newcolumntype{W}{>{\RaggedRight\arraybackslash\hspace{0pt}}X}}
  %% left (p):
  \IfColumntypeDefined{L}{}
    {\newcolumntype{L}[1]{>{\RaggedRight\arraybackslash\hspace{0pt}}p{#1}}}
  %% right (p):
  \IfColumntypeDefined{R}{}
    {\newcolumntype{R}[1]{>{\RaggedLeft\arraybackslash\hspace{0pt}}p{#1}}}
  %% centered (p):
  \IfColumntypeDefined{C}{}
    {\newcolumntype{C}[1]{>{\Centering\arraybackslash\hspace{0pt}}p{#1}}}
}

% tcolobox library
```

```
\IfDefined{tcbuselibrary}{
  \tcbuselibrary{skins}
}

\EndCodeSection{StyleTables}
```

7.2.13 Index and glossaries and other lists

The index settings are defined in file `preamble/style-index.tex` and all settings for package `glossaries` are defined in file `preamble/style-glossaries.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Index and other lists
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleIndexes}

\input{preamble/style-index.tex}
\input{preamble/style-glossaries.tex}

\EndCodeSection{StyleIndexes}
```

preamble/style-index.tex

Setup for package `imakeidx`.

```
\IfPackageLoaded{imakeidx}{%

\indexsetup{%
  ,level=\chapter*%
  ,toclevel=chapter % indicate the level at which the indices appear in TOC
  ,noclearpage=false%
  ,firstpagestyle=plain%
  ,headers={\indexname}{\indexname}%
  ,othercode={\label{sec:Index}}% will be executed at the beginning of index
entries typesetting
}%

}% end if \IfPackageLoaded
```

preamble/style-glossaries.tex

Configuration for package `glossaries`. New styles are defined with `\newglossarystyle` and with the use of package `translator` the headings are translated for the german language.

```
\IfPackageLoaded{glossaries}{%

% disable hyperref links for glossaries
\glsdisablehyper

% disable point at the end of each description
```

```
\renewcommand*{\glspostdescription}{}

\newglossarystyle{longFancy}{%
  \setglossarystyle{long}%
  \renewenvironment{theglossary}%
     {%
        \vspace*{-1\baselineskip}
        \renewcommand{\arraystretch}{1.6}%
        \normalfont\normalsize%
        \centering%
        \rowcolors{1}{tablerowcolor}{tablebodycolor}
        \begin{longtable}{l>{\RaggedRight}p{\glsdescwidth}}%
     }%
     {\end{longtable}}%
  \renewcommand*{\glsgroupskip}{}%
  \renewcommand*{\glossaryheader}{%
    \hline\endhead%
    \hline\endfoot%
  }%
}

\setlength{\glsdescwidth}{0.75\textwidth}

\newglossarystyle{longFancyHeader}{%
  \setglossarystyle{longFancy}%
  \renewcommand*{\glossaryheader}{%
    \hline\rowcolor{tableheadcolor}
      \bfseries \entryname &
      \bfseries \descriptionname \tabularnewline
    \hline\endhead%
    \hline\endfoot%
    }%
}

\setglossarystyle{longFancyHeader}

\IfPackageLoaded{tabu}{%
  \newglossarystyle{longtabuFancy}{%
    \setglossarystyle{long}%
    \renewenvironment{theglossary}%
       {%
          \vspace*{-1\baselineskip}
          \renewcommand{\arraystretch}{1.6}%
          \normalfont\normalsize%
          \centering%
          \rowcolors{1}{tablerowcolor}{tablebodycolor}
            \begin{longtabu} to 0.95\textwidth{lX[L]}
       }%
       {\end{longtabu}}%
```

```
    \renewcommand*{\glsgroupskip}{}%
    \renewcommand*{\glossaryheader}{%
      \hline\endhead%
      \hline\endfoot%
    }%
  } % end of newglossarystyle

  \newglossarystyle{longtabuFancyHeader}{%
    \setglossarystyle{longtabuFancy}%
    \renewcommand*{\glossaryheader}{%
      \hline\rowcolor{tableheadcolor}
        \bfseries \entryname &
        \bfseries \descriptionname \tabularnewline
      \hline\endhead%
      \hline\endfoot%
      }%
  }
  \setglossarystyle{longtabuFancyHeader}
} % end of IfPackage


\IfPackageLoaded{translator}{%
   \deftranslation[to=German]{Acronyms}{Abkürzungsverzeichnis}%
   \deftranslation[to=German]{List of Symbols}{Symbolverzeichnis}%
   \deftranslation[to=German]{Glossary}{Glossar}%
}%

}% end if
```

7.2.14 Verbatim and listings packages

The code for `listings` is defined in a separate file: `preamble/style-listings.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% verbatim packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleVerbatim}

\input{preamble/style-listings.tex}

\EndCodeSection{StyleVerbatim}
```

preamble/style-listings.tex

First a new basic style with name *lstStyleBase* is defined using `\lstdefinestyle`. Then Programming dependent styles are loaded in subfiles and in the end activated with `\lstloadlanguages`.

preamble/listings-latex.tex

Style definitions for language *LaTeX* saved as *lstStyleLaTeX*.

```
\colorlet{lstcolorStringLatex}{green!40!black!100}
\colorlet{lstcolorCommentLatex}{green!50!black!100}
\definecolor{lstcolorKeywordLatex}{rgb}{0,0.47,0.80}

% define useless command for checking the
% existens of this style
\newcommand{\lstStyleLaTeX}{\relax}
% define style
\lstdefinestyle{lstStyleLaTeX}{%
   ,style=lstStyleBase
%%% colors
   ,stringstyle=\color{lstcolorStringLatex}%
   ,keywordstyle=\color{lstcolorKeywordLatex}%
   ,commentstyle=\color{lstcolorCommentLatex}%
   ,% backgroundcolor=\color{codebackcolor}%
%%% Frames
   ,frame=single%
   ,%frameround=tttt%
   ,%framesep = 10pt%
   ,%framerule = 0pt%
   ,rulecolor = \color{black}%
%%% language
   ,language = [LaTeX]TeX%
%%% commands
% moved to: listings-latex-texcs.tex
}

\input{preamble/listings-latex-texcs.tex}

\lstloadlanguages{[LaTeX]TeX}
```

preamble/listings-cpp.tex

Style definitions for language *C++* saved as *lstStyleCpp*.

```
%\colorlet{colorlstStringCpp}{green!40!black!100}
\colorlet{colorlstCommentCpp}{green!50!black!100}
\colorlet{colorlstBackgroundCpp}{white!100}
\definecolor{colorlstStringCpp}{rgb}{0,0.47,0.80}

%% \colorlet{colorlstStringCpp}{green!100!black!100}
%% \colorlet{commencolor}{green!100!red!50!black!100}
%\definecolor{commencolor}{rgb}{0.0,0.5,0.0}
\definecolor{colorlstKeywordCpp}{rgb}{0.4,0.4,0.0}

% define useless command for checking the
% existens of this style
\newcommand{\lstStyleCpp}{\relax}
% define style
```

```
 \lstdefinestyle{lstStyleCpp}{%
    ,style=lstStyleBase
%%% Numbers
    ,,stepnumber=1%
%%% colors
    ,keywordstyle=\textbf\ttfamily\color{colorlstKeywordCpp}%
    ,identifierstyle=\ttfamily%
    ,commentstyle=\color{colorlstCommentCpp}%
    ,stringstyle=\ttfamily\color{colorlstStringCpp} %\color[rgb]{0,0.5,0},
    ,backgroundcolor=\color{colorlstBackgroundCpp}%
%%% Frames
    ,frame=single%
    ,%frameround=tttt
    ,%framesep = 10pt
    ,%framerule = 0pt
%%% language
    ,language = C++%
    ,otherkeywords={string},
%%% Comments
    ,morecomment=[l][\color{colorlstCommentCpp}]{//},%
    ,morecomment=[s][\color{colorlstCommentCpp}]{/*}{*/}%
}

\lstloadlanguages{
    ,C++
    ,[Visual]C++
    ,[ISO]C++
}
```

7.2.15 Fancy packages

Configuration for package `lettrine` and package `framed`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% fancy packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleFancy}
\IfPackageLoaded{lettrine}{
  \setcounter{DefaultLines}{2}
  \renewcommand{\DefaultLoversize}{0}
  \renewcommand{\DefaultLraise}{0}
  \renewcommand{\DefaultLhang}{0}
  \LettrineImagefalse
  \setlength{\DefaultFindent}{0pt}
  \setlength{\DefaultNindent}{0.5em}
  \setlength{\DefaultSlope}{0pt}
}

\IfPackageLoaded{framed}{
  \renewcommand\FrameCommand{\fcolorbox{black}{frameshadecolor}}
```

```
}
\EndCodeSection{StyleFancy}
```

7.2.16 Layout: paragraph

Definition of *parskip*.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% layout:  Paragraph
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleParagraph}
%\nonfrenchspacing     % provides extra space after sentence endings
                       % Must be switched of for german and english text!

%% Paragraph Separation ================================
\KOMAoptions{%
   % parskip=relative, % _not_ compatible with tikz! othwise recommanded
   parskip=absolute, % do not change indentation according to fontsize
   parskip=false    % indentation of 1em
   % parskip=true   % parksip of 1 line - with free space in last line of 1em
   % parskip=full-  % parksip of 1 line - no adjustment
   % parskip=full+  % parksip of 1 line - with free space in last line of 1/4
   % parskip=full*  % parksip of 1 line - with free space in last line of 1/3
   % parskip=half   % parksip of 1/2 line - with free space in last line of 1em
   % parskip=half-  % parksip of 1/2 line - no adjustment
   % parskip=half+  % parksip of 1/2 line - with free space in last line of 1/3
   % parskip=half*  % parksip of 1/2 line - with free space in last line of 1em
}%
\EndCodeSection{StyleParagraph}
```

7.2.17 Layout: line spacing

Configuration of line spacing with package `setspace`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% layout:  line spacing
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
%
\BeginCodeSection{StyleLineSpacing}
\IfPackageLoaded{setspace}{
  %\onehalfspacing    % 1,5-times spacing
  %\doublespacing     % 2-times spacing
}
\EndCodeSection{StyleLineSpacing}
```

7.2.18 Layout: page layout

Configuration of package `geometry` or package `typearea`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% layout:  page layout
```

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
%
\BeginCodeSection{StylePageLayout}

\raggedbottom     % allow variable (ragged) site heights

% Layout with 'geometry'
\IfPackageLoaded{geometry}{%
  \input{preamble/style-geometry.tex}
} % Endif


%%% === Page Layout Options ===
\KOMAoptions{%
   %
   headlines=2.1,%
   % headheight=2em,%
   cleardoublepage=empty %plain, headings
}%

% Layout with 'typearea'
%%% Doc: scrguide.pdf
\IfPackageLoaded{typearea}{% If typearea is loaded
   \IfPackageNotLoaded{geometry}{% and geometry is not loaded
     % Koma Script text area layout
     \KOMAoptions{%
        DIV=12,% (Size of Text Body, higher values = greater textbody)
        % DIV=calc % (also areaset/classic/current/default/last)
        % -> after setting of spacing necessary!
        BCOR=10mm% (binding correction)
     }%

     \KOMAoptions{% (most options are for package typearea)
       twoside=true, % two side layout (alternating margins, standard in books)
       % twoside=false, % single side layout
       % twoside=semi,  % two side layout (non alternating margins!)
       %
       twocolumn=false, % (true)
       %
       headinclude=false,%
       footinclude=false,%
       mpinclude=false,%
       headsepline=true,%
       footsepline=false,%
     }%
     % reloading of typearea, necessary if setting of spacing changed
     \typearea[current]{last}
%
% BCOR
```

```
%    current  % Recalculate type-area with the currently valid BCOR value.
%
% DIV
%    areaset  % Recalculate page layout.
%
%    calc     % Recalculate type-area including choice of appropriate DIV
%             % value.
%
%    classic  % Recalculate type-area using Middle Age book design canon
%             % (circle-based calculation).
%
%    current  % Recalculate type-area using current DIV value.
%
%    default  % Recalculate type-area using the standard value for the current
%             % page format and current font size. If no standard value
%             % exists, calc is used.
%
%    last     % Recalculate type-area using the same DIV argument as was used
%             % in the last call.
%
   } % \IfPackageNotLoaded{geometry}
} % \IfPackageLoaded{typearea}
\EndCodeSection{StylePageLayout}
```

preamble/style-geometry.tex

Configuration of page layout by package `geometry`.

```
\geometry{%
%%% Paper Groesse
   a4paper, % Andere a0paper, a1paper, a2paper, a3paper, , a5paper, a6paper,
            % b0paper, b1paper, b2paper, b3paper, b4paper, b5paper, b6paper
            % letterpaper, executivepaper, legalpaper
   %screen,  % a special paper size with (W,H) = (225mm,180mm)
   %paperwidth=,
   %paperheight=,
   %papersize=, %{ width , height }
   %landscape,  % Querformat
   portrait,    % Hochformat
%%% Koerper Groesse
   %hscale=,      % ratio of width of total body to \paperwidth
                  % hscale=0.8 is equivalent to width=0.8\paperwidth. (0.7 by
default)
   %vscale=,      % ratio of height of total body to \paperheight
                  % vscale=0.9 is equivalent to height=0.9\paperheight.
   %scale=,       % ratio of total body to the paper. scale={ h-scale , v-scale }
   %totalwidth=,    % width of total body % (Generally, width >= textwidth)
   %totalheight=,   % height of total body, excluding header and footer by
default
   %total=,        % total={ width , height }
```

```
   % value similar to koma script with DIV=12
   textwidth=426.8pt,    % modifies \textwidth, the width of body
   textheight=595.8pt,   % modifies \textheight, the height of body
   %body=,        % { width , height } sets both \textwidth and \textheight of
the body of page.
   %lines=45,       % enables users to specify \textheight by the number of lines
.
   %includehead,  % includes the head of the page, \headheight and \headsep, into
 total body.
   %includefoot,  % includes the foot of the page, \footskip, into body.
   %includeheadfoot, % sets both includehead and includefoot to true
   %includemp,    % includes the margin notes, \marginparwidth and \marginparsep,
 into body
   %includeall,   % sets both includeheadfoot and includemp to true.
   %ignorehead,   % disregards the head of the page, headheight and headsep in
determining vertical layout
   %ignorefoot,   % disregards the foot of page, footskip, in determining
vertical layout
   %ignoreheadfoot, % sets both ignorehead and ignorefoot to true.
   %ignoremp,     % disregards the marginal notes in determining the horizontal
margins
   %ignoreall,     % sets both ignoreheadfoot and ignoremp to true
   heightrounded, % This option rounds \textheight to n-times (n: an integer) of
\baselineskip
   %hdivide=,     % { left margin , width , right margin }
                  % Note that you should not specify all of the three parameters
   %vdivide=,     % { top margin , height , bottom margin }
   %divide=,      % ={A,B,C} %  is interpreted as hdivide={A,B,C} and vdivide={A,
B,C}.
%%% Margin
   %left=,        % left margin (for oneside) or inner margin (for twoside) of
total body
                  % alias: lmargin, inner
   %right=,       % right or outer margin of total body
                  % alias: rmargin outer
   % set \oddsidemargin to 3.6pt
   %  can not be set directly, must be calculated:
   %  inner = 1inch - bindingoffset + oddsidemargin
   inner=\dimexpr1in-10mm+3.6pt\relax,
   % set top (sets multiple values, for example \topmargin)
   %  such that it matches typearea with DIV 12 approx.
   top = 120pt,
   %top=,         % top margin of the page.
                  % Alias : tmargin
   %bottom=,      % bottom margin of the page
                  % Alias : bmargin
   %hmargin=,     % left and right margin. hmargin={ left margin , right margin }
   %vmargin=,     % top and bottom margin. vmargin={ top margin , bottom margin }
   %margin=,      % margin={A,B} is equivalent to hmargin={A,B} and vmargin={A,B}
```

```
   %hmarginratio, % horizontal margin ratio of left (inner) to right (outer).
   %vmarginratio, % vertical margin ratio of top to bottom.
   %marginratio,  % marginratio={ horizontal ratio , vertical ratio }
   %hcentering,   % sets auto-centering horizontally and is equivalent to
hmarginratio=1:1
   %vcentering,   % sets auto-centering vertically and is equivalent to
vmarginratio=1:1
   %centering,    % sets auto-centering and is equivalent to marginratio=1:1
   twoside,       % switches on twoside mode with left and right margins swapped
on verso pages.
   %asymmetric,   % implements a twosided layout in which margins are not swapped
 on alternate pages
                  % and in which the marginal notes stay always on the same side.
   bindingoffset=10mm,  % removes a specified space for binding
%%% Dimensionen
   headheight=28.5pt,  % Alias:  head
   %headsep=,     % separation between header and text
   %footskip=,    % distance separation between baseline of last line of text and
 baseline of footer
                  % Alias: foot
   %nohead,       % eliminates spaces for the head of the page
                  % equivalent to both \headheight=0pt and \headsep=0pt.
   %nofoot,       % eliminates spaces for the foot of the page
                  % equivalent to \footskip=0pt.
   %noheadfoot,   % equivalent to nohead and nofoot.
   %footnotesep=, % changes the dimension \skip\footins,.
                  % separation between the bottom of text body and the top of
footnote text
   %marginparwidth=22pt, % width of the marginal notes
                  % Alias: marginpar
   %marginparsep=,% separation between body and marginal notes.
   %nomarginpar,  % shrinks spaces for marginal notes to 0pt
   %columnsep=,   % the separation between two columns in twocolumn mode.
   %hoffset=,
   %voffset=,
   %offset=,      % horizontal and vertical offset.
                  % offset={ hoffset , voffset }
   %twocolumn,    % twocolumn=false denotes onecolumn
   twoside,
   %reversemp,    % makes the marginal notes appear in the left (inner) margin
                  % Alias: reversemarginpar
}
```

7.2.19 Titlepage

Configuration for the title page.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Titlepage
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

```
\BeginCodeSection{StyleTitlepage}
\KOMAoptions{%
   titlepage=true % % separate page for title
   %titlepage=false %
}%
\EndCodeSection{StyleTitlepage}
```

7.2.20 Header and footer lines

Configuration of the (automatic) content in header and footer for `scrlayer-scrpage` defined in file `preamble/style-scrlayer-scrpage.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% head and foot lines
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleHeadFoot}

\input{preamble/style-scrlayer-scrpage.tex}

\EndCodeSection{StyleHeadFoot}
```

preamble/style-scrlayer-scrpage.tex

Configuration of header and footer defined by package `scrlayer-scrpage`.

```
\IfPackageLoaded{scrlayer-scrpage}{%

\IfElseDefined{chapter}{%
   \pagestyle{scrheadings} % pages with header
}{
   \pagestyle{scrplain} % pages without header but page numbers
}
%\pagestyle{empty} % empty pages
%
% delete predefined styles
\clearmainofpairofpagestyles
\clearplainofpairofpagestyles
%
% What is printed where ...
\IfElseDefined{chapter}{
   \ohead{\pagemark} % header outside: page number
   \ihead{\headmark} % header inside: chapter and section titles
   \ofoot[\pagemark]{} % footer outside: page numbers on plain pages
}{
   \cfoot[\pagemark]{\pagemark} % Mitte unten: Seitenzahlen bei plain
}
% Complete list of possible positions
%\lehead[scrplain-left-even   ]{scrheadings-left-even }
%\cehead[scrplain-center-even ]{scrheadings-center-even }
%\rehead[scrplain-right-even  ]{scrheadings-right-even }
%\lefoot[scrplain-left-even   ]{scrheadings-left-even }
```

```
%\cefoot[scrplain-center-even ]{scrheadings-center-even }
%\refoot[scrplain-right-even  ]{scrheadings-right-even }
%\lohead[scrplain-left-odd    ]{scrheadings-left-odd }
%\cohead[scrplain-center-odd  ]{scrheadings-center-odd }
%\rohead[scrplain-right-odd   ]{scrheadings-right-odd }
%\lofoot[scrplain-left-odd    ]{scrheadings-left-odd }
%\cofoot[scrplain-center-odd  ]{scrheadings-center-odd }
%\rofoot[scrplain-right-odd   ]{scrheadings-right-odd }
%\ihead[scrplain-inside       ]{scrheadings-inside }
%\chead[scrplain-centered     ]{scrheadings-centered }
%\ohead[scrplain-outside      ]{scrheadings-outside }
%\ifoot[scrplain-inside       ]{scrheadings-inside }
%\cfoot[scrplain-centered     ]{scrheadings-centered }
%\ofoot[scrplain-outside      ]{scrheadings-outside }

% Shown sections in the header
\IfElseDefined{chapter}{
   \automark[section]{chapter} %[right]{left}
}{
   \automark[subsection]{section} %[right]{left}
}
%
%% -- Lines --
% list of all lines
% - headtopline,
% - plainheadtopline,
% - headsepline,
% - plainheadsepline,
% - footsepline,
% - plainfootsepline,
% - footbotline,
% - plainfootbotline,
% - ilines,
% - clines,
% - olines,
% set as \KOMAoptions{footsepline = true}, or with thickness
% as set here:
\IfDefined{chapter}{%
  % width of head, thickness 0.4pt (true = default thickness)
  \KOMAoptions{headsepline=.4pt}
  % change color of line
  \addtokomafont{headsepline}{\color{black}}
}

%% width of head and foot
% option definition: width:offset:offset
\KOMAoptions{headwidth=text:0pt:0pt} %
\KOMAoptions{footwidth=text:0pt:0pt} %
%   paper % width of paper
```

```
%   page  % width of page (paper - BCOR)
%   text  % \textwidth
%   textwithmarginpar % width of text plus margin
%   head  % current width of head
%   foot  % current width of foot

% set chapter pages with heading (or other) style
% \renewcommand*{\chapterpagestyle}{scrheadings}

%\renewcommand*{\partpagestyle}{empty}
%\renewcommand*{\titlepagestyle}{empty}
%\renewcommand*{\indexpagestyle}{empty}

} % end: \IfPackageLoaded{scrlayer-scrpage}
```

7.2.21 Headings: numbering, sizes and page opening

Configuration of heading numbering, sizes and page openings.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% headings / page opening
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleHeadings}

% depth of sections numbering
\setcounter{secnumdepth}{2}
% 0 - chapter
% 1 - section
% 2 - subsection and so on ...

\KOMAoptions{%
%%%% headings
   headings=small  % Small Font Size, thin spacing above and below
   % headings=normal % Medium Font Size, medium spacing above and below
   % headings=big % Big Font Size, large spacing above and below
   %
%%% Add/Dont/Auto Dot behind section numbers
%%% (see DUDEN as reference)
   % ,numbers=autoenddot
   % ,numbers=enddot
   ,numbers=noenddot
}%

\IfDefined{chapter}{
   \KOMAoptions{%
      headings=noappendixprefix % chapter in appendix as in body text
      % ,headings=nochapterprefix  % no prefix at chapters
      % ,headings=appendixprefix   % inverse of 'noappendixprefix'
      ,headings=chapterprefix    % inverse of 'nochapterprefix'
      % ,headings=openany   % Chapters start at any side
```

```
      % ,headings=openleft  % Chapters start at left side
      ,headings=openright % Chapters start at right side
   }%
}%

% headings left aligned and ragged
\renewcommand*{\raggedsection}{\raggedright}

\EndCodeSection{StyleHeadings}
```

7.2.22 Headings: fonts

Configuration of heading fonts.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% fonts of headings
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleHeadingsFonts}


% Default font for sections
\newcommand\SectionFontStyle{\sffamily}

\IfDefined{chapter}{%
   \setkomafont{chapter}{\Large\SectionFontStyle}    % Chapter
}

\setkomafont{sectioning}{\SectionFontStyle}
%\setkomafont{section}{\usekomafont{sectioning}}
%\setkomafont{subsection}{\usekomafont{sectioning}}
%\setkomafont{subsubsection}{\usekomafont{sectioning}}
\setkomafont{paragraph}{\rmfamily\itshape}
\setkomafont{subparagraph}{\rmfamily}

\setkomafont{descriptionlabel}{\itshape}

%\setkomafont{dictum}{}
%\setkomafont{dictumauthor}{}
%\setkomafont{dictumtext}{}
%\setkomafont{disposition}{}
%\setkomafont{footnote}{}
%\setkomafont{footnotelabel}{}
%\setkomafont{footnotereference}{}
%\setkomafont{minisec}{}

\setkomafont{part}{\usekomafont{sectioning}\LARGE}
\setkomafont{partnumber}{\usekomafont{sectioning}\Huge}

\setkomafont{pageheadfoot}{\normalfont\normalcolor\small\sffamily}
% \setkomafont{pagenumber}{\bfseries\usekomafont{sectioning}}
```

```
\setkomafont{pagenumber}{\normalfont\sffamily\fontshape{b}\selectfont}

%%% --- Titlepage ---
%\setkomafont{subject}{}
%\setkomafont{subtitle}{}
%\setkomafont{title}{}

% colors of headings
\IfDefined{color}{%
  \IfColorDefined{sectioncolor}{%
    \addtokomafont{sectioning}{\color{sectioncolor}}%
    \IfDefined{chapter}{%
      \addtokomafont{chapter}{\color{sectioncolor}}%
    }%
  }{}%
}

\EndCodeSection{StyleHeadingsFonts}
```

7.2.23 Headings: custom layout

Custom layouts for headings are defined using standard LaTeXand KOMA-script commands .

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% layout of headings
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleHeadingsLayout}
%%% Remove Space above Chapter.
%%% (NOT recommanded!)
%% Space above Chapter Title
% \renewcommand*{\chapterheadstartvskip}{\vspace{1\baselineskip}}%
%% Space below Chapter Title
% \renewcommand*{\chapterheadendvskip}{\vspace{0.5\baselineskip}}%

%% code taken from
%% http://tex.stackexchange.com/questions/307522/convert-titlesec-code-to-
something-koma-script-like
%% by user >esdd<

% part and chapter
\RedeclareSectionCommand[
  style=chapter,
  beforeskip=-1sp,
  afterskip=1sp,
  innerskip=0pt,
  font=\mdseries\Large,
  prefixfont=\LARGE,
]{part}
```

```
\RedeclareSectionCommand[
  innerskip=1pt,
  font=\mdseries\Large,
  prefixfont=\LARGE,
]{chapter}

\renewcommand*{\partformat}{%
  \raisebox{-.5\dp\strutbox}{%
    \makebox[0pt]{%
      \setlength\fboxsep{.5em}%
      \colorbox{white}{%
        \partname\nobreakspace{\Huge\thepart\autodot}%
}}}}

\renewcommand*{\chapterformat}{%
  \mbox{\MakeUppercase{%
    \chapappifchapterprefix{\nobreakspace}}{\Huge\thechapter\autodot}%
    \IfUsePrefixLine{}{\enskip}}%
}

\renewcommand\chapterlineswithprefixformat[3]{%
  \Ifstr{#1}{chapter}{%
    #2\nobreak%
    \vspace*{\dimexpr-\ht\strutbox}%
    \rule[-\dp\strutbox]{\textwidth}{.4pt}\\*[.9pc]%
    {\IfColorDefined{sectioncolor}{\color{sectioncolor}}{}#3}%
    \vspace*{\dimexpr-\ht\strutbox-\dp\strutbox+.9pc}\nobreak%
    \rule[-\dp\strutbox]{\textwidth}{.4pt}%
    \par\nobreak%
  }{%
    \Ifstr{#1}{part}{%
      \null\vfil
      \fbox{%
        \parbox[t][\dimexpr\height+3\normalbaselineskip][c]
          {\dimexpr\textwidth-2\fboxsep-2\fboxrule\relax}
          {\centering \IfColorDefined{sectioncolor}{\color{sectioncolor}}{}#3}%
      }\nolinebreak%
      \Ifnumbered{part}{\hspace*{-.5\textwidth}#2}{}%
      \vfil\newpage\partheademptypage
    }{%
      #2#3%
    }%
  }%
}

% other section levels
\RedeclareSectionCommand[
  beforeskip=-2ex plus -.6ex minus -0.12ex,
  afterskip=.5ex plus .05ex
```

```
]{section}

\RedeclareSectionCommands[
  beforeskip=-1.5ex plus -.45ex minus -0.09ex,
  afterskip=.5ex plus .05ex
]{subsection,subsubsection}


\EndCodeSection{StyleHeadingsLayout}
```

7.2.24 Settings and layout of table of contents and other lists

Configuration of counter *tocdepth*, options of koma-script, package `tocstyle` and koma-script specific fonts and general options for lists.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% settings and layout of TOC, LOF
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleLayoutTOC}
%%% === Table of Contents ==============================

\setcounter{tocdepth}{3} % Depth of TOC Display

\KOMAoptions{%
   %%% Setting of 'Style' and 'Content' of TOC
   % toc=left, %
   toc=indented,%
}%

% setup of package titletoc
\input{preamble/style-titletoc.tex}

% \newcommand{\fontTOC}{\sffamily}
\newcommand{\fontTOC}{\rmfamily}


\IfPackageNotLoaded{tocloft}{ % inkompatible
   % apply style of TOC using koma script
   \setkomafont{partentry}{\fontTOC\bfseries\large}
   \setkomafont{partentrypagenumber}{\fontTOC\bfseries}
   \IfElseDefined{chapter}{%
      \setkomafont{chapterentry}{\bfseries\fontTOC}
      \setkomafont{chapterentrypagenumber}{\bfseries\fontTOC}
   }{%
      \setkomafont{sectionentry}{\bfseries\fontTOC}
      \setkomafont{sectionentrypagenumber}{\bfseries\fontTOC}
   }
}
```

```
%%% === Appereance of Lists of figures, tables etc.  ===
\KOMAoptions{%
   %%% Setting of 'Style' and 'Content' of Lists
   %%% (figures, tables etc)
   % --- General List Style ---
   % listof=left, % tabular styles
   listof=indented, % hierarchical style
   % --- Appearance of Lists in TOC
   listof=notoc, % Lists are not part of the TOC
   % listof=totoc, % add Lists to TOC without number
   % listof=totocnumbered, % add Lists to TOC with number
%%% index in toc
   index=nottotoc, % index is not part of the TOC
   % index=totoc, % add index to TOC without number
%%% bib in toc
   % bibliography=nottotoc, % Bibliography is not part of the TOC
   % bibliography=totocnumbered, % add Bibliography to TOC with number
   bibliography=totoc % add Bibliography to TOC without number
}%

%\IfDefined{chapter}{%
% \KOMAoptions{%
%   % --- chapter highlighting ---
%   % listof=chapterentry, % ??? Chapter starts are marked in figure/table
%   % listof=chaptergapline, % New chapter starts are marked by a gap
%                            % of a single line
%   listof=chaptergapsmall, % New chapter starts are marked by a gap
%                            % of a smallsingle line
%   % listof=nochaptergap, % No Gap between chapters
%   %
%   % listof=leveldown, % lists are moved one level down ???
% }
%}

% Subfigures text in List of Figures
\IfPackageLoaded{subfig}{
   \setcounter{lofdepth}{1}  %1 = only figures, 2 = figures and subfigures
}


% usage of functions from tocbasic (from koma-script)
% Is loaded by koma-script automatically.
% see:
%https://tex.stackexchange.com/questions/557571/what-should-i-use-instead-of-
tocstyle
%https://tex.stackexchange.com/questions/653373/move-from-tocstyle-to-tocbasic

% Declare common style
\DeclareTOCStyleEntries[
```

```
raggedentrytext,
linefill=\hfill,
numwidth=0pt,
numsep=1ex,
dynnumwidth
]{tocline}{chapter,section,subsection,subsubsection,paragraph,subparagraph}

% declare different style for everthing except chapter
\DeclareTOCStyleEntries[
linefill=\TOCLineLeaderFill,
indent=0pt,
dynindent
]{tocline}{section,subsection,subsubsection,paragraph,subparagraph}
% set Chapter font to bold
\setkomafont{chapterentry}{\bfseries}



\EndCodeSection{StyleLayoutTOC}
```

7.2.25 Settings and layout of pdf packages

Configuration of packages `hyperref` in file `preamble/style-hyperref.tex`, `bookmark` and the creation of `hyperref` depended reference commands in file `preamble/style-references.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% pdf packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StylePdf}

\input{preamble/style-hyperref.tex}

\IfPackageLoaded{bookmark}{
   \bookmarksetup{%
   %%% Action options
      ,page=1    %
      %,view     %
      ,open=true %
      ,openlevel=2 % level to which bookmarks are open
      ,depth=4   % level to which bookmarks are generated
      ,numbered=true
   }%
}

%% disable compression of images in pdf
% \ifpdf
%    \pdfcompresslevel=0
% \fi
```

```
% Make figure and not only the number to a link
\input{preamble/style-references.tex}

\EndCodeSection{StylePdf}
```

preamble/style-hyperref.tex

Configuration of package `hyperref`. The option *pdfpagelayout* is not included here because it should be set up by the user of the template. It is therefore in file `LuaLaTeXTemplate.tex`, see section section 6.3.4 on page 115.

```
\IfPackageLoaded{hyperref}{

\hypersetup{
%%% General options
  ,draft=false, % all hypertext options are turned off
  ,final=true   % all hypertext options are turned on
  ,debug=false  % extra diagnostic messages are printed in the log file
  ,hypertexnames=true % use guessable names for links
  ,naturalnames=false % use LaTeX-computed names for links
  ,setpagesize=true   % sets page size by special driver commands
%%% Configuration options
  ,raiselinks=true    % forces commands to reflect the
                      % real height of the link
  ,breaklinks=true    % Allows link text to break across lines
  ,pageanchor=true    % Determines whether every page is given an implicit
                      % anchor at the top left corner.
  ,plainpages=false   % Forces page anchors to be named by the arabic
                      % form of the page number, rather than the formatted form.
%%% Extension options
  ,linktocpage=true   % make page number, not text, be link on TOC, LOF and LOT
  ,colorlinks=true    % Colors the text of links and anchors.
}%
\IfColorDefined{pdflinkcolor}{\hypersetup{%
%%% Colors for links
  ,linkcolor  =pdflinkcolor   % Color for normal internal links.
  ,anchorcolor=pdfanchorcolor % Color for anchor text.
  ,citecolor  =pdfcitecolor   % Color for bibliographical citations in text.
  ,filecolor  =pdffilecolor   % Color for URLs which open local files.
  ,menucolor  =pdfmenucolor   % Color for Acrobat menu items.
  ,runcolor   =pdfruncolor    % Color for run links (launch annotations).
  ,urlcolor   =pdfurlcolor    % color magenta Color for linked URLs.
}}{}
\hypersetup{%
%%% PDF-specific display options
  ,bookmarksopen=true     % If Acrobat bookmarks are requested, show them
                          % with all the subtrees expanded.
  ,bookmarksopenlevel=2   % level (\maxdimen) to which bookmarks are open
  ,bookmarksnumbered=true %
  ,bookmarkstype=toc      %
```

```
%%% PDF display and information options
  ,pdfpagemode=UseOutlines % Determines how the file is opening in Acrobat:
                           %  UseNone, UseThumbs (show thumbnails),
                           %  UseOutlines (show bookmarks), FullScreen,
                           %  UseOC (PDF 1.5), and UseAttachments (PDF 1.6).
                           %
  ,pdfstartpage=1          % Determines on which page the PDF file is opened.
  ,pdfstartview=FitV       % Set the startup page view
  % options: (same for pdfview, pdfremotestartview)
  %  Fit   Fits the page to the window.
  %  FitH  Fits the width of the page to the window.
  %  FitV  Fits the height of the page to the window.
  %  FitB  Fits the page bounding box to the window.
  %  FitBH Fits the width of the page bounding box to  the window.
  %  FitBV Fits the height of the page bounding box to the window.
  ,pdfremotestartview=Fit % Set the startup page view of remote PDF files
  ,pdfcenterwindow=false  %
  ,pdffitwindow=false     % resize document window to fit document size
  ,pdfnewwindow=false     % make links that open another PDF file
                          % start a new window
  % options:
  %  SinglePage     Displays a single page; advancing flips the page
  %  OneColumn      Displays the document in one column; continuous scrolling.
  %  TwoColumnLeft  Displays the document in two columns,
  %                 odd-numbered pages to the left.
  %  TwoColumnRight Displays the document in two columns,
  %                 odd-numbered pages to the right.
  %  TwoPageLeft    Displays two pages, odd-numbered pages to the left
  %  TwoPageRight   Displays two pages, odd-numbered pages to the right
  %
  ,pdfdisplaydoctitle=true  % display document title instead of file name
} % end: hypersetup

} % end: IfPackageLoaded{hyperref}
```

preamble/style-references.tex

Provides the commands `\eqnref`, `\figref`, `\tabref`, `\secref` and `\chapref`, which behave like `\ref` but also include the name of the thing to reference in the hyperlink.

Something similar and is achieved by the package `cleveref` which does the same thing in a more clever way.

```
\IfPackageLoaded{babel}{
  % if babel loaded not necessary
  %\providecommand*{\figurename}{Abbildung}
  %\providecommand*{\tablename}{Tabelle}
  %\providecommand*{\chaptername}{Kapitel}
  % not defined by babel
  \iflanguage{ngerman}{%
    \providecommand*{\secrefname}{Abschnitt}%
```

```
    \providecommand*{\eqnrefname}{Gleichung}%
  }{}%
  \iflanguage{english}{%
    \providecommand*{\secrefname}{section}%
    \providecommand*{\eqnrefname}{equation}%
  }{}%
  %
  \IfElsePackageLoaded{hyperref}{
    \newcommand*{\eqnref}[1]{%
        \hyperref[{#1}]{\eqnrefname~(\ref*{#1}})%
    }%
    \newcommand*{\figref}[1]{%
      \hyperref[{#1}]{\figurename~\ref*{#1}}%
    }%
    \newcommand*{\tabref}[1]{%
      \hyperref[{#1}]{\tablename~\ref*{#1}}%
    }%
    \newcommand*{\secref}[1]{%
      \hyperref[{#1}]{\secrefname~\ref*{#1}}%
    }%
    \newcommand*{\chapref}[1]{%
      \hyperref[{#1}]{\chaptername~\ref*{#1}}%
    }%
  }{% hyperref not loaded
    \newcommand*{\eqnref}[1]{%
      \eqnrefname~(\ref*{#1})%
    }%
    \newcommand*{\figref}[1]{%
      \figurename~\ref*{#1}%
    }%
    \newcommand*{\tabref}[1]{%
      \tablename~\ref*{#1}%
    }%
    \newcommand*{\secref}[1]{%
      \secrefname~\ref*{#1}%
    }%
    \newcommand*{\chapref}[1]{%
      \chaptername~\ref*{#1}%
    }%
  }% end: hyperref not loaded
}% \IfPackageLoaded{babel}
```

7.2.26 Fix remaining problems

Several packages cause problems if they are loaded together or can cause problems in this template if the package is not loaded or a special command is not available. These things are fixed here.

The commands `\frontmatter`, `\mainmatter` and `\backmatter` are defined if they are not defined. This happens for example if the class *scrartcl* is loaded.

The package `tabu` has a problem with the $-char if it was redefined by package `onlyamsmath`. Here the original definition is restored for every tabu tabular to solve the problem.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% fix remaining problems
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleFixProblems}
% ------------------------------------------------------------------
% Define frontmatter, mainmatter and backmatter if not defined
% because this template shall compile in any koma script class
\makeatletter
\@ifundefined{frontmatter}{%
   \newcommand{\frontmatter}{%
      % (i, ii, iii)
      \pagenumbering{roman}
   }
}{}
\@ifundefined{mainmatter}{%
   % scrpage2 benoetigt den folgenden switch
   % wenn \mainmatter definiert ist.
   \newif\if@mainmatter\@mainmattertrue
   \newcommand{\mainmatter}{%
      %  (1,2,3)
      \pagenumbering{arabic}%
      \setcounter{page}{1}%
   }
}{}
\@ifundefined{backmatter}{%
   \newcommand{\backmatter}{
      % (i, ii, iii)
      \pagenumbering{roman}
   }
}{}
\makeatother

% fix Problem with onlyamsmath active $ char
% together with the tabu package
% -> switches $ back to its original definition
\IfPackagesLoaded{onlyamsmath,tabu}{%
  \RequirePackage{etoolbox}
  \AtBeginEnvironment{tabu}{\catcode`$=3 }
}{}
% thanks to egreg for providing this fix.
% The discussion on why this is necessary can be read at
% http://tex.stackexchange.com/questions/35139/restore-original-definition-of

% fix Problem with onlyamsmath active $ char
% together with the tikz package
% fix incompatibilty problems with tikz and onlyamsmath
```

```
\IfPackagesLoaded{onlyamsmath,tikz}{%
  \AtBeginDocument{\catcode`\$=3}
}{}
% thanks to Peter Grill and Christian Feuersänger for providing this fix.
% The discussion on why this is necessary can be read at
% http://tex.stackexchange.com/questions/31860/conflict-onlyamsmath-and-tikz
% http://tex.stackexchange.com/questions/99526/bug-in-pgfplots-or-other-packages

% ----------------------------------------------------------------
\EndCodeSection{StyleFixProblems}
```

7.3 preamble/commands.tex

This file defines new commands which are required by the template. User commands should instead be inserted to `macros/newcommands.tex`.

- `\marginwidth` defines the margin width
- `\doctextwidth` and `\doctextheight` define the width and height of the document text area.

```
% --| conditional |-----------------------------------------------

\newcommand{\IfDefinedBibEnvironment}[1]{\ifcsdef{blx@env@#1}}
\IfUndefined{phantomsection}{\providecommand\phantomsection{}}


% --| Index |-------------------------------------------------------

% prints 1st argument emphasized and indexes it
\newcommand{\emphidx}[1]{\emph{#1}\index{#1}}

% prints and indexes 1st argument
\newcommand{\idx}[1]{#1\index{#1}}

% --| Length |------------------------------------------------------

% define margin width variable
\newlength{\marginwidth}
\setlength{\marginwidth}{\marginparwidth}
\addtolength{\marginwidth}{\marginparsep}

% define text width and height
\newlength{\doctextwidth}
\setlength{\doctextwidth}{\textwidth}
\newlength{\doctextheight}
\setlength{\doctextheight}{\textheight}
```

7.4 fonts/fonts.tex

This file provides examples for loading fonts. The default font is *Latin Modern*, loaded with package `unicode-math`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Fonts Fonts Fonts
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

%% Define Math Font Versions:
% This makes it easier to switch the Font in the document
% using the code \mathversion{LM}
\setmathfont{Latin Modern Math}[version=LM]
%\setmathfont{TeX Gyre Termes Math}[version=Termes]
%\setmathfont{TeX Gyre Pagella Math}[version=Pagella]
%\setmathfont{XCharter-Math.otf}[version=XCharter]
%\setmathfont{Garamond-Math}[version=Garamond]
%\setmathfont{Cambria Math}[version=Cambria]
%\setmathfont{TEX Gyre Bonum Math}[version=Bonum]
%\setmathfont{TEX Gyre Schola Math}[version=Schola]
%\setmathfont{XITS Math}[version=XITS]
%\setmathfont{Libertinus Math}[version=Libertinus]
%\setmathfont{Fira Math}[version=Fira]
% select math font
\mathversion{LM}

%% ==== Font Families / Font Combinations  (Sans + Serif) ================

% -> Latin Modern (LaTeX Standard)
% is loaded automatically with \usepackage{unicode-math}
% Manual setting is done by
%\setmainfont{Latin Modern Roman}
%\setsansfont{Latin Modern Sans}
%\setmonofont{Latin Modern Mono}
%\setmathfont{Latin Modern Math}

%% -> Times, Helvetica, Courier (Old Word Standard...)
%\setmainfont{TeX Gyre Termes}         % Times like font
%\setmathfont{TeX Gyre Termes Math}    % Times Like font - math version
%\setsansfont{TeX Gyre Heros}          % Helvetica (Arial) Like font
%[Scale=MatchLowercase]
%\setmonofont{TeX Gyre Cursor}         % Courier Like font
%[Scale=MatchLowercase]

%% -> Palantino, Helvetica, Courier
%\setmainfont{TeX Gyre Pagella}        % Palatino Like font
%\setmathfont{TeX Gyre Pagella Math}   % Palatino Like font - math version
%\setsansfont{TeX Gyre Heros}          % Helvetica (Arial) Like font
%[Scale=MatchLowercase]
%\setmonofont{TeX Gyre Cursor}         % Courier Like font
```

```
%[Scale=MatchLowercase]

%% -> Charter, Bera Sans, Luxi Mono
%\setmainfont{XCharter}           % Charter
%\setmathfont{XCharter-Math.otf}  % Charter - math version
%\setsansfont{Cabin}              % Bera Sans like font
%[Scale=MatchLowercase]
%\setmonofont{Luxi Mono}          % Luxi Mono
%[Scale=MatchLowercase]           % font is not installed by tex!
%\linespread{1.05} % for main font

%% -> Garamond, Fira Sans, Luxo Mono
%\usepackage{ebgaramond}         % Garamond
%\setmathfont{Garamond-Math}     % Math version
%\setsansfont{Fira Sans}         % Fira Sans
%[Scale=MatchLowercase]
%\setmonofont{Luxi Mono}         % Luxi Mono
%[Scale=MatchLowercase]          % font is not installed by tex!

%% -> MininPro/MyriadPro
%% Serif Font: Minion Pro (OTF)
%\setmainfont{MinionPro}         % font must be installed by user
%% Sans Font: MyriadPro (OTF)
%\setsansfont{MyriadPro}         % font must be installed by user
%% Math font is missing for Minion Pro (not available for free)
%% This is a workaround.
%\usepackage[italic]{mathastext}
%\MTsetmathskips {f}{3mu}{0mu}
%% Mono Font: Luxi Mono
%\setmonofont{Luxi Mono}
%[Scale=MatchLowercase]          % font is not installed by tex!

%% -> Cambria, Calibri, Consolas
%% Serif Font: Microsoft Cambria (TTF)
%\setmainfont{Cambria}
%\setmathfont{Cambria Math}
%% Sans Font: Microsoft Calibri (TTF)
%\setsansfont{Calibri}
%% Mono Font: Microsoft Consolas (TTF)
%\setmonofont{Consolas}[Scale=MatchLowercase]
%%\setmonofont{Lucida Console}[Scale=MatchLowercase]


%%%% =========== Typewriter =============

%\setmonofont{Consolas}[Scale=MatchLowercase]         %% Consolas
%\setmonofont{Lucida Console}[Scale=MatchLowercase]   %% Lucida Console
%\setmonofont{Luxi Mono}[Scale=MatchLowercase]        %% Luxi Mono
%\setmonofont{TeX Gyre Cursor}                        %% Courier Like font
```

```
%\setmonofont{Latin Modern Mono}

%%%% =========== Math fonts ================

%\setmathfont{Latin Modern Math}
%\setmathfont{Cambria Math}
%\setmathfont{Garamond-Math}
%\setmathfont{XCharter-Math.otf}
%\setmathfont{TeX Gyre Pagella Math}   % Palatino Like font - math version
%\setmathfont{TeX Gyre Termes Math}    % Times Like font - math version
```

7.5 macros/newcommands.tex

This file contains a collection of commands that might be useful in physics or math. Additional user commands should as well be inserted in this file.

```
% --| other new definitions |----------------------------------------



% --| Math |-------------------------------------------------------


% -- new commands --
\newcommand{\abs}[1]{\lvert#1\rvert}
\newcommand{\Abs}[1]{\left\lvert#1\right\rvert}
\newcommand{\norm}[1]{\left\Vert#1\right\Vert}
\newcommand{\Trace}[1]{\ensuremath{\Tr\left\{\,#1\,\right\}}} % Trace /Spur
%

% -- differentials --
\newcommand{\pd}{\partial\mspace{1mu}} % partial diff
\newcommand{\td}{\,\mathrm{d}}  % total diff

% -- Abbreviations --
\renewcommand{\Re}{\text{Re}}     % Real value
\renewcommand{\Im}{\text{Im}}     % Real value
\newcommand{\complex}{\mathbb{C}} % Complex
\newcommand{\real}{\mathbb{R}}    % Real
\renewcommand{\i}{\mathrm{i}}
%
\newcommand{\Ham}{\mathcal{H}}
\newcommand{\Prob}{\mathscr{P}}
\newcommand{\unity}{\mathds{1}}
%
% -- New Operators --
\IfDefined{DeclareMathOperator}{
  \DeclareMathOperator{\rot}{rot}
  \DeclareMathOperator{\grad}{grad}
  \DeclareMathOperator{\rect}{rect}
```

```
  \DeclareMathOperator{\divf}{\symup{div}} % \div is used by unicode-math!
  \DeclareMathOperator{\Tr}{Tr}
  \DeclareMathOperator{\const}{const}
  \DeclareMathOperator{\e}{e}       % exponatial Function
}

% -- new symbols --
\newcommand{\laplace}{\Delta}
\newcommand{\dalembert}{\Box}
```

7.6 content/hyphenation.tex

Contains all hyphenation patterns inside of the command `\hyphenation`.

```
\hyphenation{multi-pho-ton io-ni-za-tion}
```

7.7 preamble/makeCommands.tex

Calls make commands that are required inside the preamble, such as `\makeindex`, `\makeglossaries` and `\linenumbers`.

```
%% Index (package imakeidx)
\IfDefined{makeindex}{%
 \IfPackageLoaded{imakeidx}{%
  \makeindex[%
    ,title=\indexname%
    ,program=makeindex% (makeindex,xindy,texindy)
    ,intoc=true,%
    ,columns=2%
    ,columnsep=35pt%
    ,columnseprule=false%
  ]%
 }%
}%
%% Glossary/Acronym list/list of symbols (glossaries package)
\IfDefined{makeglossaries}{\makeglossaries}

%% Glossary (depreciated glossary package - not supported by this template!)
\IfDefined{makenomenclature}{\makenomenclature}

%% Mini TOC (package minitoc - not supported by this template!)
\IfPackageLoaded{minitoc}{\IfElseUndefined{chapter}{\dosecttoc}{\dominitoc}}

%% Line numbers (package lineno)
%\IfDefined{linenumbers}{\linenumbers}

%% prints all new columntype definitions into the log file.
\IfDefined{showcols}{\showcols}
```

CHAPTER 8

Document content files

The structure of this part inside `LuaLaTeXTemplate.tex` is described in section 6.4.7 on page 119.

8.1 content/Z-GlossaryEntries.tex

Definition of acronyms, symbol list and glossary entries using commands `\newacronym` and `\newglossaryentry` from package `glossaries`.

Note that this file must be loaded before `\begin{document}`.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

%%% --- Acronym definitions
\IfDefined{newacronym}{%
% place these definitions before \begin{document}
\newacronym{NA}{NA}{numerical Apertur}
\newacronym{DOF}{DOF}{depth of field}
\newacronym{PSF}{PSF}{point spread function}
}%


%%% --- Symbol list entries
\IfDefined{newglossaryentry}{%
% place these definitions before \begin{document}
\newglossaryentry{symb:Pi}{%
  name=$\pi$,%
  description={mathematical constant},%
  sort=symbolpi, type=symbolslist%
}
\newglossaryentry{symb:Phi}{%
  name=$\varphi$,%
  description={arbitrary angle},%
  sort=symbolphi, type=symbolslist%
}
\newglossaryentry{symb:Lambda}{%
  name=$\lambda$,%
  description={wavelength},%
  sort=symbollambda, type=symbolslist%
}
}%
```

```
%%% --- Glossary entries

% place these definitions before \begin{document}
\IfDefined{newglossaryentry}{%
\newglossaryentry{glos:CD}{name=Compact disc (CD),
  description={The Compact Disc (also known as a CD) is an optical disc used
    to store digital data. It was originally developed to store and playback
sound
    recordings exclusively, but later expanded to encompass storage of data (
Source:
    wikipedia)}
}%
\newglossaryentry{glos:DVD}{name=DVD,
  description={DVD is an optical disc storage media format, invented and
    developed by Philips, Sony, Toshiba, and Panasonic in 1995. DVDs offer
    higher storage capacity than Compact Discs while having the same dimensions.
    The basis of the DVD name stems from the term \textit{digital versatile disc
}.
    (Source: wikipedia)}
}%
}%
```

8.2 content/title.tex

Here different approaches to generate a title are shown. The first uses `\maketitle` which however is difficult to modify and therefore not used. The title used makes use of several `\vspace` commands for manual alignment. The same layout is shown as a template for bachelor and master thesis. For phd-thesis however it usually must be created according to the rules of the university.

8.3 content/0-Abstract.tex

The abstract should only be included in a phd thesis. In master and bachelor thesis this is typically not desired. Here it is on two pages. The first for the language of the thesis and the second for an English translation. If the thesis itself is in english the first page should be removed.

8.4 content/Z-Declaration.tex

This file prints a declaration stating the work was done by the author himself. It may belong to a phd thesis, but often this is on a separated document. In all bachelor and master thesis I know of, this was part of the thesis itself.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

%% ---------------------------------------------
\chapter*{Declaration}
% no page number on this page
```

```
\thispagestyle{empty}
%
I hereby declare that this thesis is my own work and effort and that it has not
been submitted anywhere for any award. Where other sources of information have
been used, they have been acknowledged.
%
\mbox{}\vspace{4\baselineskip}\\
%
<insert data and location> \hfill <insert full name>
% sign this page!
% add empty back page
\clearpage\mbox{}\thispagestyle{empty}


%% ----------------------------------------------
%\chapter*{Erklärung der Selbstständigkeit}
%% no page number on this page
% \thispagestyle{empty}
%%
%Hiermit versichere ich, die vorliegende Arbeit selbstständig verfasst und keine
%anderen als die angegebenen Quellen und Hilfsmittel benutzt sowie die Zitate
%deutlich kenntlich gemacht zu haben.
%%
%\mbox{}\vspace{4\baselineskip}\\
%%
%<Ort>, den <Datum einfügen> \hfill <Vorname Nachname>
%% diese Seite unterschreiben!
%
%% Leere Rückseite einfügen
%\clearpage\mbox{}\thispagestyle{empty}
```

8.5 content/0-Introduction.tex, content/1-Theory.tex, ...

These document contain *your* content. Fill them with the content of the thesis. The commands available for creating your document are shown in the example code demonstration in documentation in part II.

8.6 content/Z-Appendix.tex

Contains all chapters or sections for the appendix.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

%
% add files for appendix chapter here
\input{content/Z-Appendix-01.tex}
```

8.7 content/Z-Publications.tex

Add all your publications to this file. Unfortunately I did not find a satisfactory way of creating this bibliographic data other than manually.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

%% This list is from the phd publication
%% of Matthias Pospiech
%%
\chapter*{Publications}
\markboth{Publications}{Publications}

\IfPackageLoaded{hyperref}{
  \phantomsection
  \addcontentsline{toc}{chapter}{Publications}
}

%% In these lists the publications are numbered by date of publications
%% and the author of the thesis can be printed in bold.

\section*{Scientific publications}
% \section*{Wissenschaftliche Veröffentlichungen}
\begin{refsection}
\nocite{Siegel2007, Palmer2010, Pospiech2009, Pospiech2010, Pospiech2011}
% print all combinations in this list bold (makes name of author bold)
\IfDefinedBibEnvironment{numbered+bold}{%
  \forcsvlist{\listadd\bibboldnames}
    {{Pospiech, Matthias}, {Pospiech, M.}}
  \begin{refcontext}[sorting=nyt]
    \printbibliography[env=numbered+bold, heading=none, resetnumbers=true]
  \end{refcontext}
}{Error: environment numbered+bold not defined}
\end{refsection}

\section*{Submissions to international conferences}
% \section*{Beiträge auf internationalen Konferenzen}
\begin{refsection}
\nocite{Morgner2008, Palmer2008a, Siegel2008,Pospiech2009a,Pospiech2010b,Pospiech
2010a}
% print all combinations in this list bold (makes name of author bold)
\IfDefinedBibEnvironment{numbered+bold}{%
  \forcsvlist{\listadd\bibboldnames}
  {{Pospiech, Matthias}, {Pospiech, M.}}
  \begin{refcontext}[sorting=nyt]
    \printbibliography[env=numbered+bold, heading=none, resetnumbers=true]
  \end{refcontext}
}{Error: environment numbered+bold not defined}
\end{refsection}
```

```
\section*{Submissions to national conferences}
% \section*{Beiträge auf nationalen Konferenzen}
\begin{refsection}
\nocite{EmonsDPG2009, HoffmannDPG2008, LangDPG2008, VaeckenstedtDPG2010,
PospiechDPG2009, PospiechDPG2010, PospiechDPG2011}
% print all combinations in this list bold (makes name of author bold)
\IfDefinedBibEnvironment{numbered+bold}{%
  \forcsvlist{\listadd\bibboldnames}
  {{Pospiech, Matthias}, {Pospiech, M.}}
  \begin{refcontext}[sorting=nyt]
    \printbibliography[env=numbered+bold, heading=none, resetnumbers=true]
  \end{refcontext}
}{Error: environment numbered+bold not defined}
\end{refsection}
%
% delete list
\IfDefined{bibboldnames}{\renewcommand*{\bibboldnames}{}}
```

8.8 content/Z-CV.tex

This CV is based on the CV in my own phd thesis (with little changes) and created with package `currvita`. A CV should only be part of a phd thesis, not a bachelor or master thesis. This CV should not be misunderstood with the CV in job application. The CV in a job application is something completely different and typically considerably longer and more detailed.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

\chapter*{Curriculum Vitae}
\markboth{Curriculum Vitae}{Curriculum Vitae}

\IfPackageLoaded{hyperref}{
  \phantomsection
  \addcontentsline{toc}{chapter}{Curriculum Vitae}
}

\IfPackagesLoaded{currvita,csquotes}{%

%% - notes --------------------
\minisec{Delete these notes:}
\small
This is a modified version of a german CV.
I have not translated it into English, because
I am not familiar with English CV styles.

Remember that you do not write this CV to apply for a job.
This is just a brief summary of your previous research career.
```

```
A `real' CV is much more complex!
\normalsize
%% ----------------------------

\begin{cv}{}
\begin{cvlist}{Personalien}
  \item[Name]
    Max Musterman \\
    geboren am 01.02.1979 in Berlin \\
    ledig, deutsch
\end{cvlist}
%
\begin{cvlist}{Schulbildung}
  \item[1998] Abitur, Gymnasium Musterschule in Berlin
\end{cvlist}
%
\begin{cvlist}{Zivildienst}
  \item[07/98 - 08/99]
  <Einfügen>
\end{cvlist}
%
\begin{cvlist}{Studium}
  \item[SS/99 - SS/06] Universität Hannover, Studium der Physik
  \\[0.5\baselineskip]
Thema der Diplomarbeit: \enquote{Charakterisierung des Rauschverhaltens eines
weit abstimmbaren Ytterbium dotierten kerngepumpten Faserlasers}, durchgeführt
am Laserzentrum Hannover e.\,V.
  \item[Mai 2006] Abschluss: Diplom-Physiker
\end{cvlist}
%
\begin{cvlist}{Promotion}
  \item[09/2006 - heute] Wissenschaftlicher Mitarbeiter am Institut für
Quantenoptik, Leibniz Universität Hannover
\end{cvlist}

\end{cv}

}{}%
```

8.9 content/Z-Thanks.tex

The thesis ends with some acknowledgment statements. Here a fixed paragraph skip is introduced and the paragraph indentation removed.

```
% !TeX encoding=utf8
% !TeX spellcheck = en-US

% change parskip
\setlength\parindent{0pt}
\setlength\parskip{\medskipamount}
```

```
% chapter without heading and without number
% \addchap*{Danksagung}
\addchap*{Acknowledgments}
%
% Add your text here! You may take the following text as a guide:

I thank ?? and ?? for giving me the opportunity to write this bachelor/master/phd
 thesis at ??, and for their professional advise.

I thank in particular the ?? team who readily/willingly provided information at
any time and ??.

I would also like to than all people who supported me in writing this thesis.

\cleardoublepage
```

8.10 content/Z-Todo.tex

This code prints out a todo list created by commands of package `todonotes`.

```
\IfPackageLoaded{todonotes}{
  \clearpage
  \IfPackageLoaded{hyperref}{\phantomsection}
  \todototoc   % add to toc
  \listoftodos % print to document
}
```

Bibliography

[Aug95] Augustine, Robert L.: *Heterogeneous catalysis for the synthetic chemist*. New York: Marcel Dekker, 1995 (cit. on p. 86).

[Ber96] Bertram, Aaron and Richard Wentworth: 'Gromov invariants for holomorphic maps on Riemann surfaces'. *J. Amer. Math. Soc.* (1996), vol. 9(2): pp. 529–571 (cit. on p. 86).

[Cot99] Cotton, Frank Albert, Geoffrey Wilkinson, Carlos A. Murillio, and Manfred Bochmann: *Advanced inorganic chemistry*. 6th ed. Chichester: Wiley, 1999 (cit. on p. 86).

[Goo94] Goossens, Michel, Frank Mittelbach, and Alexander Samarin: *The LaTeX Companion*. 1st ed. Reading, Mass.: Addison-Wesley, 1994. 528 pp. (cit. on pp. 85, 86).

[Ham97] Hammond, Christopher: *The basics of crystallography and diffraction*. Oxford: International Union of Crystallography and Oxford University Press, 1997 (cit. on p. 86).

[Hos98] Hostetler, Michael J., Julia E. Wingate, Chuan-Jian Zhong, Jay E. Harris, Richard W. Vachet, Michael R. Clark, J. David Londono, Stephen J. Green, Jennifer J. Stokes, George D. Wignall, Gary L. Glish, Marc D. Porter, Neal D. Evans, and Royce W. Murray: 'Alkanethiolate gold cluster molecules with core diameters from 1.5 to 5.2 nm. Core and monolayer properties as a function of core size'. *Langmuir* (1998), vol. 14(1): pp. 17–30 (cit. on p. 86).

[Mas04] Massa, Werner: *Crystal structure determination*. 2nd ed. Berlin: Spinger, 2004 (cit. on p. 86).

List of Figures

List of Tables

Listings

A List of packages loaded

A.1 Complete File list

The following list is extracted from the log file of `LuaLaTeXTemplate.tex` from the compilation of the document. It thus shows the most recent list of files used.

```
     *File List*
     scrbook.cls  2023/07/07  v3.41  KOMA-Script document class (book)
    scrkbase.sty  2023/07/07  v3.41  KOMA-Script package (KOMA-Script-dependent
 basics and keyval usage)
     scrbase.sty  2023/07/07  v3.41  KOMA-Script package (KOMA-Script-independe
nt basics and keyval usage)
    scrlfile.sty  2023/07/07  v3.41  KOMA-Script package (file load hooks)
scrlfile-hook.sty  2023/07/07  v3.41  KOMA-Script package (using LaTeX hooks)
     scrlogo.sty  2023/07/07  v3.41  KOMA-Script package (logo)
      keyval.sty  2022/05/29  v1.15  key=value parser (DPC)
    tocbasic.sty  2023/07/07  v3.41  KOMA-Script package (handling toc-files)
 scrsize11pt.clo  2023/07/07  v3.41  KOMA-Script font size class option (11pt)
    typearea.sty  2023/07/07  v3.41  KOMA-Script package (type area)
atveryend-ltx.sty  2020/08/19  v1.0a  Emulation of the original atveryend packa
ge
with kernel methods
 codesection.sty  2014/06/27  v0.1   disableable code sections
    etoolbox.sty  2020/10/05  v2.5k  e-TeX tools for LaTeX (JAW)
templatetools.sty  2023/03/26  v0.2   Collection of conditional commands useful
 inside templates
       iftex.sty  2022/02/03  v1.0f  TeX engine tests
     ltxcmds.sty  2023-12-04  v1.26  LaTeX kernel commands for general use (HO)

       array.sty  2023/10/16  v2.5g  Tabular extension package (FMi)
     ifdraft.sty  2016/05/16  v1.4   Detect class options draft and final (HO)
preamble/packages.tex   * NOT FOUND *
        calc.sty  2023/07/08  v4.3   Infix arithmetic (KKT,FJ)
       babel.sty  2023/12/06  v3.98  The Babel package
     english.ldf  2017/06/06  v3.3r  English support from the babel system
babel-english.tex   * NOT FOUND *
      xcolor.sty  2023/11/15  v3.01  LaTeX color extensions (UK)
       color.cfg  2016/01/02  v1.6   sample color configuration
      luatex.def  2022/09/22  v1.2d  Graphics/color driver for luatex
   mathcolor.ltx   * NOT FOUND *
    dvipsnam.def  2016/06/17  v3.0m  Driver-dependent file (DPC,SPQR)
    colortbl.sty  2022/06/20  v1.0f  Color table columns (DPC)
  ninecolors.sty  2022-02-13  v2022D Select colors with proper color contrast
      xparse.sty  2023-10-10   --    L3 Experimental document command parser
       expl3.sty  2023-12-08   --    L3 programming layer (loader)
```

```
l3backend-luatex.def  2023-11-09   --    L3 backend support: PDF output (LuaTeX
)
    graphicx.sty  2021/09/16  v1.2d  Enhanced LaTeX Graphics (DPC,SPQR)
    graphics.sty  2022/03/10  v1.4e  Standard LaTeX Graphics (DPC,SPQR)
        trig.sty  2021/08/11  v1.11  sin cos tan (DPC)
    graphics.cfg  2016/06/04  v1.11  sample graphics configuration
    epstopdf.sty  2020-01-24  v2.11  Conversion with epstopdf on the fly (HO)
   infwarerr.sty  2019/12/03  v1.5   Providing info/warning/error messages (HO)

      grfext.sty  2019/12/03  v1.3   Manage graphics extensions (HO)
kvdefinekeys.sty  2019-12-19  v1.6   Define keys (HO)
   kvoptions.sty  2022-06-15  v3.15  Key value format for package options (HO)
   kvsetkeys.sty  2022-10-05  v1.19  Key value parser (HO)
  pdftexcmds.sty  2020-06-27  v0.33  Utility functions of pdfTeX for LuaTeX (HO
)
epstopdf-base.sty  2020-01-24  v2.11  Base part for package epstopdf
epstopdf-sys.cfg  2010/07/13  v1.3   Configuration of (r)epstopdf for TeX Live
    ragged2e.sty  2023/06/22  v3.6   ragged2e Package
    varwidth.sty  2009/03/30   --    ver 0.92;  Variable-width minipages
  marginnote.sty  2018/08/09   --    1.4b non floating margin notes for LaTeX
     scrhack.sty  2023/07/07  v3.41  KOMA-Script package (hacking other package
s)
      xpatch.sty  2020/03/25  v0.3a  Extending etoolbox patching commands
   marginfix.sty  2020/05/06  v1.2   Fix Margin Paragraphs
      xspace.sty  2014/10/28  v1.13  Space after command names (DPC,MH)
        cmap.sty  2021/02/06  v1.0j  CMap support: searchable PDF
    fontspec.sty  2022/01/15  v2.8a  Font selection for XeLaTeX and LuaLaTeX
fontspec-luatex.sty  2022/01/15  v2.8a  Font selection for XeLaTeX and LuaLaTeX

     fontenc.sty  2021/04/29  v2.0v  Standard LaTeX package
    fontspec.cfg   * NOT FOUND *
     amsmath.sty  2023/05/13  v2.17o AMS math features
     amstext.sty  2021/08/26  v2.01  AMS text
      amsgen.sty  1999/11/30  v2.0   generic functions
      amsbsy.sty  1999/11/29  v1.2d  Bold Symbols
      amsopn.sty  2022/04/08  v2.04  operator names
   mathtools.sty  2022/06/29  v1.29  mathematical typesetting tools
     mhsetup.sty  2021/03/18  v1.4   programming setup (MH)
 onlyamsmath.sty  2016/12/18  v0.20  Destroy the standard math environments
      braket.sty   --  -- --   --
      cancel.sty  2013/04/12  v2.2   Cancel math terms
      empheq.sty  2017/03/31  v2.15  Emphasizing equations
     exscale.sty  2018/09/24  v2.1i  Standard LaTeX package exscale
       xfrac.sty  2023-10-10   --    L3 Experimental split-level fractions
    l3keys2e.sty  2023-10-10   --    LaTeX2e option processing using LaTeX3 key
s
    textcomp.sty  2020/02/02  v2.0n  Standard LaTeX package
   xtemplate.sty  2023-10-10   --    L3 Experimental prototype document functio
ns
```

```
unicode-math.sty  2023/08/13  v0.8r  Unicode maths in XeLaTeX and LuaLaTeX
unicode-math-luatex.sty  2023/08/13  v0.8r  Unicode maths in XeLaTeX and LuaLaT
eX
      fix-cm.sty  2020/11/24  v1.1t  fixes to LaTeX
      ts1enc.def  2001/06/05  v3.0e  (jk/car/fm) Standard LaTeX file
lualatex-math.sty  2022/01/01  v1.12  Patches for mathematics typesetting with
LuaLaTeX
      icomma.sty  2002/03/10  v2.0   (WaS)
preamble/packages-tikzpgf.tex   * NOT FOUND *
         pgf.sty  2023-01-15  v3.1.10 (3.1.10)
      pgfrcs.sty  2023-01-15  v3.1.10 (3.1.10)
 pgfrcs.code.tex   * NOT FOUND *
     pgfcore.sty  2023-01-15  v3.1.10 (3.1.10)
      pgfsys.sty  2023-01-15  v3.1.10 (3.1.10)
 pgfsys.code.tex   * NOT FOUND *
pgfsyssoftpath.code.tex  2023-01-15  v3.1.10 (3.1.10)
pgfsysprotocol.code.tex  2023-01-15  v3.1.10 (3.1.10)
pgfcore.code.tex   * NOT FOUND *
pgfcomp-version-0-65.sty  2023-01-15  v3.1.10 (3.1.10)
pgfcomp-version-1-18.sty  2023-01-15  v3.1.10 (3.1.10)
        tikz.sty  2023-01-15  v3.1.10 (3.1.10)
      pgffor.sty  2023-01-15  v3.1.10 (3.1.10)
     pgfkeys.sty   --  -- --   --
pgfkeys.code.tex   * NOT FOUND *
     pgfmath.sty   --  -- --   --
pgfmath.code.tex   * NOT FOUND *
 pgffor.code.tex   * NOT FOUND *
   tikz.code.tex   * NOT FOUND *
    tkz-base.sty  2022/07/14   --    4.2c tkz-base
    numprint.sty  2012/08/20  v1.39  Print numbers (HH)
         xfp.sty  2023-10-10   --    L3 Floating point unit
          fp.sty  1995/04/02
  defpattern.sty  1994/10/12
    fp-basic.sty  1996/05/13
   fp-addons.sty  1995/03/15
     fp-snap.sty  1995/04/05
      fp-exp.sty  1995/04/03
    fp-trigo.sty  1995/04/14
      fp-pas.sty  1994/08/29
   fp-random.sty  1995/02/23
      fp-eqn.sty  1995/04/03
      fp-upn.sty  1996/10/21
     fp-eval.sty  1995/04/03
    tkz-base.cfg   * NOT FOUND *
tkz-tools-modules.tex   * NOT FOUND *
tkz-lib-marks.tex   * NOT FOUND *
tkz-lib-shape.tex   * NOT FOUND *
     tkz-fct.sty  2022/01/27   --    1.7c function
 tkz-euclide.sty   --  -- --   --     2023/10/26 5.04c for pure Euclidean Geome
```

```
try
tkz-obj-eu-points.tex   * NOT FOUND *
tkz-obj-eu-points-by.tex   * NOT FOUND *
tkz-tools-eu-math.tex   * NOT FOUND *
tkz-tools-eu-intersections.tex   * NOT FOUND *
tkz-obj-eu-points-with.tex   * NOT FOUND *
tkz-obj-eu-points-spc.tex   * NOT FOUND *
tkz-tools-eu-angles.tex   * NOT FOUND *
tkz-obj-eu-circles.tex   * NOT FOUND *
tkz-obj-eu-circles-by.tex   * NOT FOUND *
tkz-obj-eu-points-rnd.tex   * NOT FOUND *
tkz-obj-eu-lines.tex   * NOT FOUND *
tkz-obj-eu-polygons.tex   * NOT FOUND *
tkz-obj-eu-triangles.tex   * NOT FOUND *
tkz-draw-eu-lines.tex   * NOT FOUND *
tkz-draw-eu-circles.tex   * NOT FOUND *
tkz-draw-eu-ellipses.tex   * NOT FOUND *
tkz-draw-eu-polygons.tex   * NOT FOUND *
tkz-draw-eu-angles.tex   * NOT FOUND *
tkz-draw-eu-sectors.tex   * NOT FOUND *
tkz-draw-eu-compass.tex   * NOT FOUND *
tkz-draw-eu-show.tex   * NOT FOUND *
tkz-draw-eu-protractor.tex   * NOT FOUND *
    pgfplots.sty  2021/05/15  v1.18.1 Data Visualization (1.18.1)
pgfplotstable.sty  2021/05/15  v1.18.1 Table typesetting and Pretty-printing (1
.18.1)
 pgfcalendar.sty   --  -- --   --
pgfcalendar.code.tex  2023-01-15  v3.1.10 (3.1.10)
     siunitx.sty  2023-11-14  v3.3.9 A comprehensive (SI) units package
translations.sty  2022/02/05  v1.12  internationalization of LaTeX2e packages (
CN)
      dsfont.sty  1995/08/01  v0.1   Double stroke roman fonts
       esint.sty   --  -- --   --
     eurosym.sty  1998/08/06  v1.1   European currency symbol ``Euro''
      pifont.sty  2020/03/25   --    PSNFSS-v9.3 Pi font support (SPQR)
        upzd.fd   2001/06/04   --    font definitions for U/pzd.
        upsy.fd   2001/06/04   --    font definitions for U/psy.
    latexsym.sty  1998/08/17  v2.2e  Standard LaTeX package (lasy symbols)
    booktabs.sty  2020/01/12  v1.61803398 Publication quality tables
    multirow.sty  2021/03/15  v2.8   Span multiple rows of a table
    bigstrut.sty  2021/03/15  v2.8   Provide larger struts in tabulars
  tabularray.sty  2023-03-01  v2023A Typeset tabulars and arrays with LaTeX3
   tcolorbox.sty  2023/09/26   --    version 6.1.0 text color boxes
    verbatim.sty  2023-11-06  v1.5v  LaTeX2e package for verbatim enhancements
     environ.sty  2014/05/04  v0.3   A new way to define environments
  trimspaces.sty  2009/09/17  v1.1   Trim spaces around a token list
    ellipsis.sty  2020/05/22  v1.8   fixes spacing around ellipses (three dots)

        ulem.sty  2019/11/18
```

```
        soul.sty  2023-06-14  v3.1   Permit use of UTF-8 characters in soul (HO
)
    soul-ori.sty  2023-06-14  v3.1   letterspacing/underlining (mf)
    etexcmds.sty  2019/12/15  v1.7   Avoid name clashes with e-TeX commands (HO
)
         url.sty  2013/09/16   --     ver 3.4  Verb mode for urls, etc.
    varioref.sty  2022/01/09  v1.6f  package for extended references (FMi)
    xr-hyper.sty  2023-11-26  v7.01g eXternal References (DPC)
    enumitem.sty  2019/06/20  v3.9   Customized lists
    csquotes.sty  2022-09-14  v5.2n  context-sensitive quotations (JAW)
    csquotes.def  2022-09-14  v5.2n  csquotes generic definitions (JAW)
    csquotes.cfg   --  -- --   --
    biblatex.sty  2023/03/05  v3.19  programmable bibliographies (PK/MW)
      logreq.sty  2010/08/04  v1.0   xml request logger
      logreq.def  2010/08/04  v1.0   logreq spec v1.0
      ifthen.sty  2022/04/13  v1.1d  Standard LaTeX ifthen package (DPC)
      blx-dm.def  2023/03/05  v3.19  biblatex localization (PK/MW)
 blx-unicode.def   * NOT FOUND *
  blx-compat.def  2023/03/05  v3.19  biblatex compatibility (PK/MW)
    biblatex.def  2023/03/05  v3.19  biblatex compatibility (PK/MW)
  blx-natbib.def  2023/03/05  v3.19  biblatex compatibility (PK/MW)
    standard.bbx  2023/03/05  v3.19  biblatex bibliography style (PK/MW)
  alphabetic.bbx  2023/03/05  v3.19  biblatex bibliography style (PK/MW)
  alphabetic.cbx  2023/03/05  v3.19  biblatex citation style (PK/MW)
    biblatex.cfg   --  -- --   --
blx-case-expl3.sty  2023/03/05  v3.19  expl3 case changing code for biblatex
     wrapfig.sty  2003/01/31   --     v 3.6
     flafter.sty  2021/07/31  v1.4e  Standard LaTeX floats after reference (FMi
)
    placeins.sty  2005/04/18   --     v 2.2
    floatrow.sty  2008/08/02  v0.3b  floatrow: float package extension
    caption3.sty  2023/07/31  v2.4d  caption3 kernel (AR)
caption-koma.sto  2023/09/08  v2.0e  Adaption of the caption package to the KOM
A-Script document classes (AR)
    floatrow.hak  2023/07/07  v3.41  KOMA-Script scrhack part (hacking package
floatrow)
    fr-fancy.sty  2007/11/28  v0.1i  floatrow: fancy boxes
    fancybox.sty  2010/05/15   --    1.4
     caption.sty  2023/08/05  v3.6o  Customizing captions (AR)
  subcaption.sty  2023/07/28  v1.6b  Sub-captions (AR)
    mcaption.sty  2009/03/13  v3.0   Put captions into the outer document margi
n (SH)
  changepage.sty  2009/10/20  v1.0c  check page and change page layout
    rotating.sty  2016/08/11  v2.16d rotated objects in LaTeX
    imakeidx.sty  2016/10/15  v1.3e  Package for typesetting indices in a synch
ronous mode
     xkeyval.sty  2022/06/16  v2.9   package option processing (HA)
     xkeyval.tex  2014/12/03  v2.7a  key=value parser (HA)
     ifxetex.sty  2019/10/25  v0.7   ifxetex legacy package. Use iftex instead.
```

```
    ifluatex.sty  2019/10/25  v1.5   ifluatex legacy package. Use iftex instead
.
    multicol.sty  2023/03/30  v1.9f  multicolumn formatting (FMi)
     upquote.sty  2012/04/19  v1.3   upright-quote and grave-accent glyphs in v
erbatim
    listings.sty  2023/02/27   --    1.9 (Carsten Heinz)
     lstmisc.sty  2023/02/27   --    1.9 (Carsten Heinz)
    listings.cfg  2023/02/27   --    1.9 listings configuration
    listings.hak  2023/07/07  v3.41  KOMA-Script scrhack part (hacking package
listings)
    lettrine.sty  2023-08-14  v2.52  (Daniel Flipo)
    lettrine.cfg   * NOT FOUND *
boxedminipage.sty  2020/04/19  v1.1   Boxed LaTeX2e minipages
    mdframed.sty  2012/01/09  v1.2a: mdframed
zref-abspage.sty  2023-09-14  v2.35  Module abspage for zref (HO)
   zref-base.sty  2023-09-14  v2.35  Module base for zref (HO)
     auxhook.sty  2019-12-17  v1.6   Hooks for auxiliary files (HO)
  md-frame-0.mdf  2012/01/09  v1.2a: md-frame-0
    setspace.sty  2022/12/04  v6.7b  set line spacing
    setspace.hak  2023/07/07  v3.41  KOMA-Script scrhack part (hacking package
setspace)
    footmisc.sty  2023/07/05  v6.0f  a miscellany of footnote facilities
     perpage.sty  2014/10/25   --    2.0 Reset/sort counters per page
scrlayer-scrpage.sty  2023/07/07  v3.41  KOMA-Script package (end user interfac
e for scrlayer)
    scrlayer.sty  2023/07/07  v3.41  KOMA-Script package (defining layers and p
age styles)
    titletoc.sty  2023/10/27  v2.16  TOC entries
    pdfpages.sty  2022/12/19  v0.5x  Insert pages of external PDF documents (AM
)
     eso-pic.sty  2023/05/03  v3.0c  eso-pic (RN)
    ppluatex.def  2022/12/19  v0.5x  Pdfpages driver for LuaTeX (AM)
   microtype.sty  2023/03/13  v3.1a  Micro-typographical refinements (RS)
microtype-luatex.def  2023/03/13  v3.1a  Definitions specific to luatex (RS)
   microtype.cfg  2023/03/13  v3.1a  microtype main configuration file (RS)
    hyperref.sty  2023-11-26  v7.01g Hypertext links for LaTeX
   pdfescape.sty  2019/12/09  v1.15  Implements pdfTeX's escape features (HO)
     hycolor.sty  2020-01-27  v1.10  Color options for hyperref/bookmark (HO)
 letltxmacro.sty  2019/12/03  v1.6   Let assignment for LaTeX macros (HO)
     nameref.sty  2023-11-26  v2.56  Cross-referencing by name of section
    refcount.sty  2019/12/15  v3.6   Data extraction from label references (HO)

gettitlestring.sty  2019/12/15  v1.6   Cleanup title references (HO)
      pd1enc.def  2023-11-26  v7.01g Hyperref: PDFDocEncoding definition (HO)
     intcalc.sty  2019/12/15  v1.3   Expandable calculations with integers (HO)

       puenc.def  2023-11-26  v7.01g Hyperref: PDF Unicode definition (HO)
      bitset.sty  2019/12/09  v1.3   Handle bit-vector datatype (HO)
```

```
  bigintcalc.sty  2019/12/15  v1.5   Expandable calculations on big integers (H
O)
atbegshi-ltx.sty  2021/01/10  v1.0c  Emulation of the original atbegshi
package with kernel methods
     hluatex.def  2023-11-26  v7.01g Hyperref driver for luaTeX
   stringenc.sty  2019/11/29  v1.12  Convert strings between diff. encodings (H
O)
rerunfilecheck.sty  2022-07-10  v1.10  Rerun checks for auxiliary files (HO)
uniquecounter.sty  2019/12/15  v1.4   Provide unlimited unique counter (HO)
    ltxtable.sty  2021/06/13  v0.4   longtable/tabularx merge (DPC)
    tabularx.sty  2023/07/08  v2.11c `tabularx' package (DPC)
   longtable.sty  2023-11-01  v4.19  Multi-page Table package (DPC)
    cleveref.sty  2018/03/27  v0.21.4 Intelligent cross-referencing
  glossaries.sty  2023/09/29  v4.53  (NLCT)
    mfirstuc.sty  2022/10/14  v2.08  (NLCT)
        xfor.sty  2009/02/05  v1.05  (NLCT)
datatool-base.sty  2019/09/27  v2.32  (NLCT)
      substr.sty  2009/10/20  v1.2   Handle substrings
 datatool-fp.sty  2019/09/27  v2.32  (NLCT)
   tracklang.sty  2022/12/13  v1.6.1 (NLCT) Track Languages
   tracklang.tex  2022/12/13  v1.6.1 (NLCT) Track Languages Generic Code
  translator.sty  2021-05-31  v1.12d Easy translation of strings in LaTeX
glossaries-english.ldf  2014/11/23  v1.0
glossary-hypernav.sty  2023/09/29  v4.53  (NLCT)
glossary-list.sty  2023/09/29  v4.53  (NLCT)
glossary-long.sty  2023/09/29  v4.53  (NLCT)
glossary-super.sty  2023/09/29  v4.53  (NLCT)
supertabular.sty  2020/02/02  v4.1g  the supertabular environment
glossary-tree.sty  2023/09/29  v4.53  (NLCT)
glossary-longragged.sty  2023/09/29  v4.53  (NLCT)
    pageslts.sty  2015/12/21  v1.2f  Refers to special pages' numbers/names (HM
M)
    everyshi.sty  2020/11/18  v4.00  EveryShipout Package
    undolabl.sty  2023-02-14  v1.0m  Overriding labels (HMM)
    alphalph.sty  2019/12/09  v2.6   Convert numbers to letters (HO)
    bookmark.sty  2020-11-06  v1.29  PDF bookmarks (HO)
  bkm-pdftex.def  2020-11-06  v1.29  bookmark driver for pdfTeX (HO)
    hyphenat.sty  2009/09/02  v2.3c  hyphenation utilities
   todonotes.sty  2023/01/31
    currvita.sty  1999/09/13  v0.9i  Typesetting a Curriculum Vitae
nicefilelist.sty  2023/02/13  v0.9b  more file list alignment (UL)
    monofill.sty  2012/10/29  v0.2   monospace alignment (UL)
 lastpackage.sty  2014/06/27  v0.1   Empty package used for executing code afte
r this package
preamble/style.tex   * NOT FOUND *
preamble/style-siunitx.tex   * NOT FOUND *
preamble/style-pgfplots.tex   * NOT FOUND *
preamble/style-biblatex.tex   * NOT FOUND *
preamble/style-biblatex-alpha.tex   * NOT FOUND *
```

```
preamble/style-caption.tex   * NOT FOUND *
preamble/style-floatrow.tex   * NOT FOUND *
tikzfill.image.sty  2023/08/08  v1.0.1 Image filling library for TikZ
tikzfill-common.sty  2023/08/08  v1.0.1 Auxiliary code for tikzfill
preamble/style-index.tex   * NOT FOUND *
preamble/style-glossaries.tex   * NOT FOUND *
preamble/style-listings.tex   * NOT FOUND *
preamble/listings-latex.tex   * NOT FOUND *
preamble/listings-latex-texcs.tex   * NOT FOUND *
    lstlang1.sty  2023/02/27   --    1.9 listings language file
    lstlang2.sty  2023/02/27   --    1.9 listings language file
    lstlang3.sty  2023/02/27   --    1.9 listings language file
preamble/listings-cpp.tex   * NOT FOUND *
    lstlang1.sty  2023/02/27   --    1.9 listings language file
preamble/style-scrlayer-scrpage.tex   * NOT FOUND *
preamble/style-titletoc.tex   * NOT FOUND *
preamble/style-hyperref.tex   * NOT FOUND *
preamble/style-references.tex   * NOT FOUND *
preamble/commands.tex   * NOT FOUND *
 fonts/fonts.tex   * NOT FOUND *
      uesint.fd    --  -- --   --
macros/newcommands.tex   * NOT FOUND *
content/hyphenation.tex   * NOT FOUND *
preamble/makeCommands.tex   * NOT FOUND *
content/Z-GlossaryEntries.tex   * NOT FOUND *
    supp-pdf.mkii   * NOT FOUND *
translations-basic-dictionary-english.trsl   --  -- --   --    (english transla
tion file `translations-basic-dictionary')
     english.lbx  2023/03/05  v3.19  biblatex localization (PK/MW)
LuaLaTeXTemplate.bbl   * NOT FOUND *
   ltcaption.sty  2021/01/08  v1.4c  longtable captions (AR)
fr-longtable.sty  2007/11/28  v0.1b  (beta) floatrow: additions for longtable
   pdflscape.sty  2022-10-27  v0.13  Display of landscape pages in PDF
pdflscape-nometadata.sty  2022-10-28  v0.13  Display of landscape pages in PDF
(HO)
      lscape.sty  2020/05/28  v3.02  Landscape Pages (DPC)
      lscape.hak  2023/07/07  v3.41  KOMA-Script scrhack part (hacking package
lscape)
mt-LatinModernRoman.cfg  2021/02/21  v1.1   microtype config. file: Latin Moder
n Roman (RS)
content/0-title.tex   * NOT FOUND *
     version.txt   * NOT FOUND *
content/0-Abstract.tex   * NOT FOUND *
content/Z-Declaration.tex   * NOT FOUND *
content/0-Introduction.tex   * NOT FOUND *
content/1-Theory.tex   * NOT FOUND *
content/2-Experiments.tex   * NOT FOUND *
content/template/latextutorial.tex   * NOT FOUND *
images/testimage.png   * NOT FOUND *
```

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images/testimage.png   * NOT FOUND *
images/testimage.png   * NOT FOUND *
    lstlang1.sty  2023/02/27   --    1.9 listings language file
    lstlang2.sty  2023/02/27   --    1.9 listings language file
    lstlang3.sty  2023/02/27   --    1.9 listings language file
    lstlang1.sty  2023/02/27   --    1.9 listings language file
    lstlang2.sty  2023/02/27   --    1.9 listings language file
    lstlang3.sty  2023/02/27   --    1.9 listings language file
     lstmisc.sty  2023/02/27   --    1.9 (Carsten Heinz)
content/template/latextutorial.tex   * NOT FOUND *
content/3-Results.tex   * NOT FOUND *
content/4-Summery.tex   * NOT FOUND *
content/Z-Appendix.tex   * NOT FOUND *
content/Z-Appendix-01.tex   * NOT FOUND *
content/Z-Publications.tex   * NOT FOUND *
content/Z-CV.tex   * NOT FOUND *
LuaLaTeXTemplate.ind   * NOT FOUND *
content/Z-Thanks.tex   * NOT FOUND *
```

B Changes and history

Version numbers

The version number is defined by the KOMA-Script version followed by the template version. Version 3.2.0 is thus a huge change from 3.1.0 with both compatible for version 3 of KOMA-script.

2023/12 v3.3.0

Huge changes to adapt the code for post 2020 packages and make it ready for LuaLaTeX. PDFLateX is not supported anymore.

- removed fix-cm which cannot be used together with luatex.
- removed all package for no room for new write problem.
- removed all packages for encoding.
- Changed the order of packages loading and fonts. Previously the fonts were loaded first. However, with lualatex packages for fonts must be loaded before the actual fonts. Therefore the fonts configuration is loaded at the end.
- removed all font loading classes such as lmodern and replaced the code by font loading commands.
- removed package fixmath.
- added package fontspec and unicode-math.
- removed package tabu.
- added packages tabularray and tcolorbox.
- removed package tocstyle. This package was discontinued 2020 and removed from all distributions.
- several minor changes due to incompatible and discontinued package options.

2018/09 v3.2.5

Minor bug fixes and other changes

- The template failed to compile the `biblatex` code in the publication list correct. This was due to a change in the code base of `biblatex`.
- Examples for `glossaries` were added to the template.
- replaced `scrpage2` by `scrlayer-scrpage`

A switch to luatex is currently not planed. This would mean a major change and would be Version 3.3

2015/08 v3.2.4
Minor bug fixes and other changes

- The template failed to compile with latest package `titlesec` in combination with KOMA-script. Since both are not compatible and can be used only with workarounds within KOMA-Script the package `titlesec` was removed and the style changes applied using different commands.

2015/08 v3.2.3
Minor bug fixes and other changes

- The template failed to compile with TeX Live 2015. Package `pageslts` requires `atveryend` to be loaded before `etoolbox`.
- Removed package `fixltx2e`

2014/07 v3.2.2
Bug fixes, Improvements and other changes

- The template failed to compile with TeX Live 2014. The error was in the definition of `\addmoretexcs`.
- The options of `geometry` were not well thought out. If a spacing factor was introduced this could lead to an ugly page layout. All options of `geometry` are now such that the page layout is similar to the one of `typearea` with DIV12.
- The publications lists are now bibliography lists create with `\printbibliography`. Previously these needed to be created completely manual.
- New magic comment for the bibliography tool added.
- Removed packages. These are now available from CTAN or better the distribution package manager.

2014/01 v3.2.1
Mainly enhancements and bug fixing. The following list is a selection:

- Selection of packages for the "no room for a new \write´´ problem added.
- Update of glossary lists handling. New file for definitions and update of `glossaries` options.
- Added `tocstyle` to the list of used packages.
- Added file list with date of release
- Enabled `typearea` instead of `geometry`. This was basically a mistake in the code.

2013/06 v3.2.0
Initial Release of the complete reworked template with several outstanding features and changes:

- Complete new compilation of packages (up to date at 2013) with framework for selecting package sections.

- Focus on a target group of user who want to write thesis like documents.
- Introduction of a template documentation.
- Significant enhancements in the latex examples. It transformed from a simple rudimentary test and sample document to a test and example framework with examples for every package.
- Translation of all texts and comments into English. It targets therefor a much broader audience.

2008/12 v3.1.0 (LaTeX-Vorlage 3)
New release due to a rework for KOMA-Script 3.x. The basic design was adopted from the previous version. Further changes mainly in terms of package updates and bug fixes.

2006/06 v2.0.0 (LaTeX-Vorlage)
Initial online release of the template. It is based on KOMA-Script 2.x, supports most modern packages (at year 2006), provides most package options in the code and a documentation of the preamble code. The basic language is German. Additionally it provides a demo file for testing and showing the document layout.

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