LaTeX Thesis Template

Documentation

Version 3.2.2

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 `code.google.com/p/latexthesistemplate/`. Downloads 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 latest changes in the template are shortly presented in the first section 1.1. The full history can be found in appendix B.

In the second section 1.2 you find a general discussion on the typical user of this template followed by a tutorial (section 1.4) 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 Changes in the latest release

These changes were introduced in the latest release:

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.

See appendix B for all full list of the previous development process of this template.

1.2 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 theses had all a natural science background, which means that also 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 1.4.2.

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 1.3 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 ....

1.3 Features of the template

This section is structured as follows: section 1.3.1 describes the features and advantages of the template in general, whereas section 1.3.2 summarizes the possibilities for the creation of a document. The subsequent sections provide additional information.

1.3.1 Template features

This template provides a great variety of functionality for creating complex and demanding documents for the user, see section 1.3.2. 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 1.4.1

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.

1.3.2 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.

General

- Automatic detection of document encoding (`selinput`).
- Support for files with multiple dots, special characters and other pitfalls (`grffile`).

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`, `soul`)
- 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

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

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 (`scrpage2`).
- The Heading can be fully customized. In this template by default the chapter layout is changed with the provided functions (`titlesec`).

- 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`).

1.3.3 Speed of compilation

Since the preamble of this template is much longer than most other templates the compilation time of the preamble is consequently also longer. This view however is misleading. The compilation time is in the range of 2 to 4 seconds for the preamble[1], however a real document (like a master thesis) with many pictures takes much longer. The templates main file takes about 7 seconds with very few pages. The template documentation with above 200 pages and many pictures takes more than 40 seconds. My own phd-thesis took minutes to compile due to many high resolution pictures. The compilation time of the preamble therefore is in reality negligible or in other words, even though this templates preamble is quote complex it compile fast enough.

The concrete times of each part of the preamble are displayed in fig. 1.1. The code was executed several times and the average of the last three runs was used. This ensures that all files are in the cache of the hard disk or system memory. The execution time was measured with a batch script based on code from stackoverflow.com.

The direct visible result of this survey is, not very surprisingly, that the most complex packages such as `amsmath`, `biblatex`, `glossaries`, `listings`, `hyperref` consume most of the time. The loading of `pgf`, `tikz` and `pgfplots` stands out with more than 1000 ms. This can be reduced by removing unused libraries or removing these packages completely, if they are not required.

1 Measured on a Windows System (7, 64 bit) with Intel i5 processor and the file system on a SSD. The times for a standard magnetic hard disk should not differ much, since the files are in the memory cache anyway.

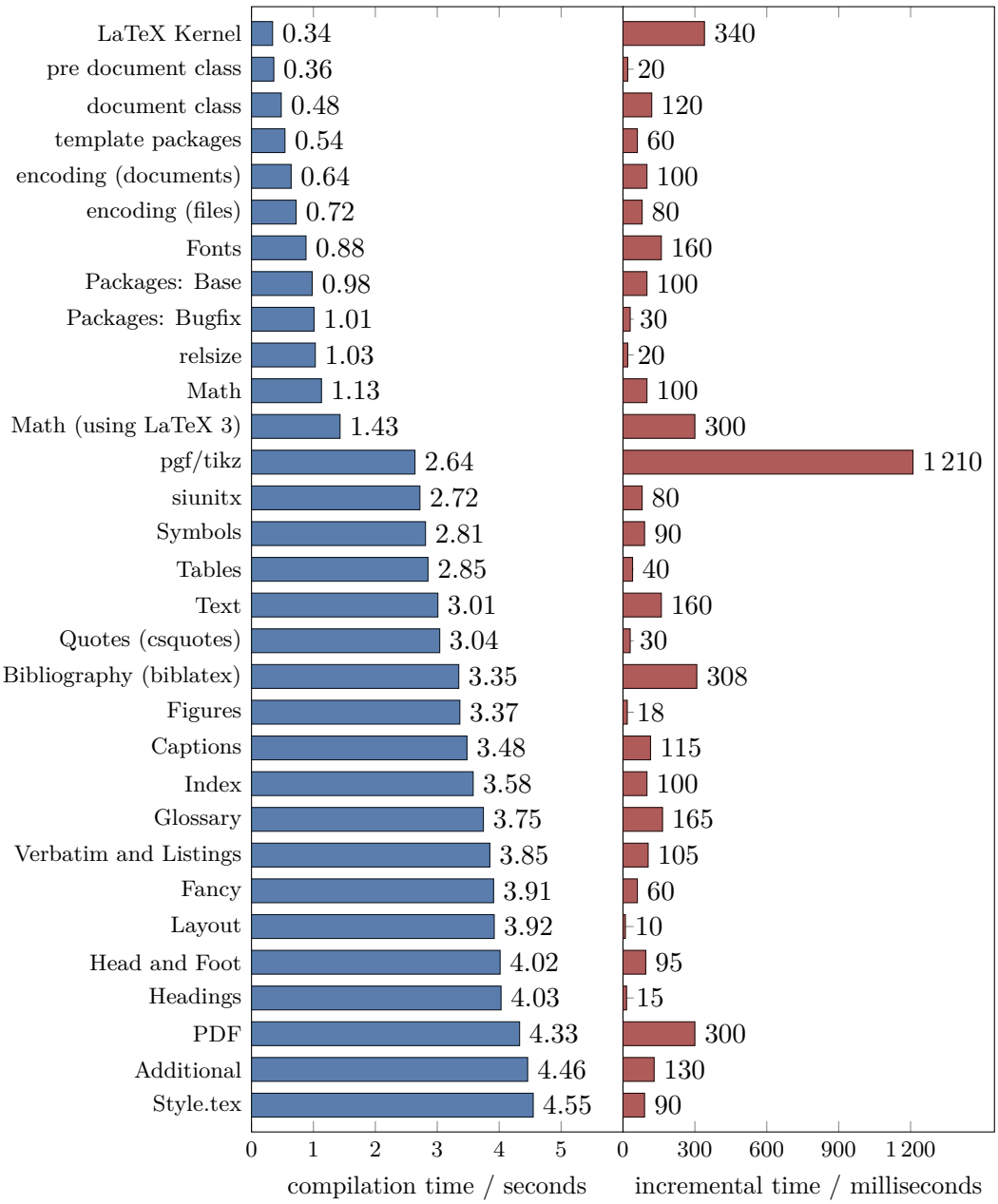

Figure 1.1: Execution times of the template divided into compilation steps. The largest execution times come from the major packages. The packages loaded in each step are listed in table A.1. Note that these times were measured with the packages loaded by the version of January 2013.

1.4 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.

1.4.1 Configure Editor and System Settings

The template needs to be configured for editor and system specific settings such as the encoding of the documents and the encoding of the file system. Both are configured in the main file in the section called *encoding*. These settings must 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. Anyway, the setting should typically be set up as `utf8`.

LaTeX detects the correct encoding with encoding specific characters (ä, ß, €) in the line with `\SelectInputMappings`. If you find that these characters are not printed correct in the editor reenter these characters. If your keyboard does not allow to enter ä and ß try at least if the euro character € is sufficient to detect an encoding.

If file names may have encoding specific characters the encoding of the operating system must be defined as well. Therefore the option `filenameencoding` should be configured for either `latin1` or `utf8`. Both should cover most demands.

1.4.2 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.

1.4.3 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: `LaTeXTemplate.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

continued on next page ...

Setting	Option/Value	Location
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
Settings and 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`

continued on next page . . .

Package / Topic	File
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
scrpage2	preamble/style-scrpage2.tex
titlesec	preamble/style-titlesec.tex
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 = pdflatex
```

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 `pdflatex`.

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 7.4.18.

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 7.3.19 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 7.4.2). 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`, `tabu`, `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 7.4.17.

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 7.3.15. 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 7.3.12, 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 7.4.24.

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 scrbook: Usage of package 'titlesec' together with a KOMA-Script class is not recommended

The `titlesec` is not compatible with KOMA-Script classes as in detail described in the warning message. Unless these features of KOMA-Script are not required it should cause no problem to load both together.

`titlesec` is used in this template to redefine the appearance of chapter and part headings as well as the spacing before and after sections in different levels.

```
Class scrbook Warning: Usage of package `titlesec' together
(scrbook)              with a KOMA-Script class is not recommended.
(scrbook)              I'd suggest to use the package only
(scrbook)              if you really need it, because it breaks several
(scrbook)              KOMA-Script features, i.e., option `headings' and
(scrbook)              the extended optional argument of the section
(scrbook)              commands .
(scrbook)              Nevertheless, using requested
(scrbook)              package `titlesec' on input line 824.
```

3.1.2 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.
```

3.1.3 tocstyle: This is an alpha version

Package `tocstyle` prints out the following warning:

```
Package tocstyle Warning: THIS IS AN ALPHA VERSION!
(tocstyle)                USAGE OF THIS VERSION IS ON YOUR OWN RISK!
(tocstyle)                EVERYTHING MAY HAPPEN!
(tocstyle)                EVERYTHING MAY CHANGE IN FUTURE!
(tocstyle)                THERE IS NO SUPPORT, IF YOU USE THIS PACKAGE!
(tocstyle)                Maybe it would be better, not to load this package.
```

This package is now in use with this template for several years (of development of the template before its release) and so far no problem has been found. Therefore I do not expect any problem because of this package and consider this warning to be ignorable.

3.1.4 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.

3.1.5 pageslts: Package pdfpages detected.

Package `hypennat` warns about the use of package `pdfpages`:

```
Package pageslts Warning: Package pdfpages detected.
(pageslts)                Using hyperref with pdfpages can cause problems. See
(pageslts)                ftp://ftp.ctan.org/tex-archive/
(pageslts)                macros/latex/contrib/pax/
(pageslts)                for project pax (PDFAnnotExtractor)..
```

This can be savely ignored, see http://tex.stackexchange.com/questions/73767/warning-about-pdfp for a discussion.

3.2 Errors

3.2.1 No room for new write

TeX uses output registers to write to files. Unfortunately TeX was designed to use only 16 of such registers of which the output registers 0, 1 and 2 are already used by (La)TeX itself. The remaining registers are consumed by additional packages that need to write to external files.

If you come across this error you have reached a fixed limitation of the TeX engine and there is nothing that can directly be done about this error, as you cannot extend the number of available registers without extending TeX itself.

Typical packages that consume output registers are:

- glossaries (acronym list, symbol list, glossary)
- biblatex (bibliography)
- listings (list of listings)
- imakeidx (index)
- fancyvrb
- pgf/tikz
- pgf/tikz with `external` option
- titletoc

The most promising solution about this problem is to reduce the number of used output registers. So for example if no index is required (package imakeidx) and the package fancyvrb is not needed both could be commented out and instead the list of listings could be activated.

The approach of this template is to use either the package `morewrites` or `scrwfile`, which hook at the lowest level (TEXprimitives) to solve this problem. These packages however might cause problems since they modify LATEXat a very basic level and can thus cause incompatibilities. For `scrwfile` it is know to that `titletoc` does no longer work. If however `titletoc` is not required `scrwfile` is recommended. These packages are loaded in `preamble/packages-SolutionsNoRoomForNewWrite.tex`.

Further information about this issue can be found at

- tex.stackexchange.com
- UK FAQ List

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 fonts listed in the following sections are not only a list of very common fonts, but also those that are supported within this template. If this should not be the case the commands that are necessary to load the font is provided, so that the font loading can be integrated in this template. The first section (4.1) lists most free fonts, which can be expected to be installed in a complete modern LaTeX distribution. The second section (4.2) is about packages for commercial fonts. These packages are available for free, however the fonts itself are not. The last section (4.3) is about fonts with math support.

4.1 Free fonts

Font	Loading command	Family
Font families		
Latin Modern	`\usepackage{lmodern}`	(see below)
Bera	`\usepackage{bera}`	(see below)
CM-Bright	`\usepackage{cmbright}`	(see below)
Latin Modern font family		
LM Roman	`\renewcommand{\rmdefault}{lmr}`	lmr
LM Sans	`\renewcommand{\sfdefault}{lmss}`	lmss
LM Mono	`\renewcommand{\ttdefault}{lmtt}`	lmtt
Bera font family		
Bera Serif	`\usepackage{beraserif}`	fve
Bera Sans	`\usepackage{berasans}`	fvs
Bera Mono	`\usepackage{beramono}`	fvm

continued on next page . . .

Font	Loading command	Family
CmBright font family		
CmBright Mono	`\renewcommand{\ttdefault}{cmtl}`	cmtl
CmBright Sans	`\renewcommand{\sfdefault}{cmbr}`	cmbr
Fonts in the PSNFSS collection (Type 1 postscript fonts)		
Times	`\usepackage{mathptmx}`	ptm
Helvetica	`\usepackage{helvet}`	phv
Courier	`\usepackage{courier}`	pcr
Palantino	`\usepackage{mathpazo}`	pplx, pplj
Charter	`\usepackage{charter}`	bch
Bookman	`\usepackage{bookman}`	pbk
New Century Schoolbook	`\usepackage{newcent}`	pnc
Avantgarde	`\usepackage{avantgar}`	pag
Zapf Chancery	`\usepackage{chancery}`	pzc
Fonts supplied by the getnonfreefonts script		
Arial (URW)	`\usepackage{uarial}`	ua1
Classico (URW)	`\renewcommand{\sfdefault}{uop}`	uop
DayRoman	`\renewcommand{\rmdefault}{dayrom}`	dayrom
GaramondNo8 (URW)	`\renewcomamnd{\rmdefault}{ugm}`	ugm
LetterGothic (URW)	`\usepackage{ulgothic}`	ulg
Luxi Mono	`\usepackage{luximono}`	ul9
Other Type 1 postscript fonts		
Fourier	`\usepackage{fourier}`	futm

4.2 Commercial fonts

In order to use these fonts for documents that shall be published it is absolutely essential to own a license. Most fonts can only be obtained by buying these fonts; others may be installed on the computer by programs. Nevertheless its use is restricted unless a license for using these fonts is owned!

If the fonts are available they need to be renamed and installed using the according manuals provided by Walter Schmidt

Font	Loading command	Family
Serif fonts		
Adobe Optima	`\usepackage{optima}`	pop, popm
Adobe Aldus	`\renewcommand\rmdefault{pasx}`	pasx, pasj
Adobe Garamond	`\usepackage{xagaramon}`	padx, padj
Adobe Stempel Garamond	`\renewcommand{\rmdefault}{pegx}`	pegx, pegj
Adobe Melior	`\renewcommand{\rmdefault}{pml}`	pml
Adobe Minion	`\usepackage{minion}`	pmnx, pmnj
Adobe Sabon	`\renewcommand{\rmdefault}{psbx}`	psbx, psbj
Adobe Times	`\renewcommand{\rmdefault}{ptmx}`	ptmx, ptmj
Adobe Rotis Serif	`\renewcommand{\rmdefault}{pro}`	pro
Adobe Rotis Semi-Serif	`\renewcommand{\rmdefault}{pr1}`	pr1
Linotype Meridien	`\renewcommand{\rmdefault}{lmd}`	lmd
Linotype ITC Charter	`\renewcommand{\rmdefault}{lch}`	lch
Sans serif fonts		
Adobe Frutiger	`\usepackage{frutiger}`	pfr
Adobe Futura	`\usepackage{futura}`	pfu
Adobe Gill Sans	`\usepackage{gillsans}`	pgs
Adobe Myriad	`\renewcommand{\sfdefault}{pmy}`	pmy, pmyc
Adobe Syntax	`\usepackage{asyntax}`	psx
Adobe Rotis Sans	`\renewcommand{\sfdefault}{pr4}`	pr4
Adobe Rotis Semi-Sans	`\renewcommand{\sfdefault}{pr3}`	pr3
Linotype ITC Officina Sans	`\renewcommand{\sfdefault}{lo9}`	lo9

4.3 Fonts with math support

The following table lists font packages that do not only load the font but also the according math font. The only exceptions are the packages `mathdesign`, `MnSymbol` and `MdSymbol`, which only load a math font.

Note that the package `MnSymbol` and `MdSymbol` have severe restrictions on the loading order and incompatible packages, which is taken care of in this template.

The package `eulervm` is special in the respect that it does not provide a math font for a specific roman font, but instead provides a math font that fits well to many common (commercial) serif fonts such as Adobe Aldus, Adobe Melior, Adobe Sabon and others for

which no LaTeX math font support exists.

Font	Loading command
Charter (Bitstream)	`\usepackage[bitstream-charter]{mathdesign}`
Garamond (URW)	`\usepackage[urw-garamond]{mathdesign}`
Latin Modern	`\usepackage{lmodern}`
New Century Schoolbook	`\usepackage{fouriernc}`
Times (Nimbus Roman (URW))	`\usepackage{mathptmx}`
Palatino	`\usepackage[sc]{mathpazo}`
Utopia (Fourier)	`\usepackage{fourier}`
Adobe Minion	`\usepackage{MnSymbol}`
Adobe Myriad	`\usepackage{MdSymbol}`
Euler	`\usepackage{eulervm}`

4.4 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 combination is shown because it is widely used but absolutely not recommendable.

- Latin Modern Family
- Charter, Bera Sans, Luxi Mono
- Garamond, Bera Sans, Luxi Mono
- Fourier (Utopia), Latin Modern (Sans and Typewriter)
- Palantino, Arial, Courier
  Note that Palantino fits very well to Gill Sans, which however is a commercial font.
- Times, Arial, Courier

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

```
\usepackage{lmodern}
\input{fonts/fonts-lmodern-sansmath.tex}
```

Plain text

The following paragraph is text taken from http://www.blindtextgenerator.de to show the appearance of the text. It is a text without any meaning translated from the original German text into English text. The translation was done automatic and thus the text has even less meaning after the translation.

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. The Big Oxmox advised her not to, because there swarming of bad Commas, wild Question Marks and devious Semikoli, but the Little Blind Text did not listen. She packed her seven capitals, pushing her initial into the belt and made herself on the way. When she reached the first hills of the Italic Mountains, she had a last view back on the skyline of her hometown Bookmarksgrove, the headline of Alphabet Village and the subline of her own road, the Line Lane. Pityful was a rhetorical question on the cheek, then she continued her way. Her way she met a copy. The copy warned the Little Blind Text, where it came from it would have been rewritten a thousand times and everything that was left from its origin would be the word ‘and’ and the Little Blind Text should turn around and return to its own, safe country. But nothing the copy said could convince her and so it did not take long until a few insidious Copy Writers ambushed her, made her drunk with Longe and Parole and made it dragged her into their agency, where they abused it for their projects again and again. And if it has not been rewritten, then they are still.

Two fast boxer chasing the vivacious Eva and her pug by Sylt. Fox jumps over the lazy dog Bavaria. Twelve boxer Viktor hunt across the big Sylt dike. Bird Quax tweaks Johnys

horse Bim. Sylvia dares quick to joke at Pforzheim. Polyfon Mäxchens twittering birds ate beets, yogurt and cottage cheese. 'Fix, Schwyz!' Jürgen squawks stupid from the pass. Victor chases twelve boxer across the great Sylt dike. Wrong practicing of xylophone music tortures every larger dwarf.

Math formulas

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

Green's theorem

$$\iiint_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3V = \oiint_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2A \tag{0.1}$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\ j=1,\ldots,n} \tag{0.2}$$

Tables

The following table lists some properties of the material *fused silica*.

The left side in serif font, the right in sans serif font.

Properties of fused silica

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

Properties of fused silica

description	property
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The sans serif variant is realized with `\mathversion{sans}`

Charter, Bera Sans, 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, Bera Sans, Luxi Mono*. The fonts are loaded with

```
\usepackage{charter}\linespread{1.05} %% --- Charter
\renewcommand{\sfdefault}{fvs}        %% --- Bera Sans
\usepackage[charter]{mathdesign}      %% --- Charter (Math)
\usepackage[scaled=0.85]{luximono}    %% --- Luxi Mono (Typewriter)
% Note: There is a better Charter font by Linotype
%       called 'ITC Charter'
```

Plain text

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Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\ j=1,\ldots,n} \tag{0.2}$$

Tables

The following table lists some properties of the material *fused silica*.

Properties of fused silica

description	property
density	$\rho = 2.2\,\mathrm{g/cm^3}$
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Garamond, Bera Sans, Luxi Mono

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```
\renewcommand{\rmdefault}{ugm}        %% --- URW Garamond
\renewcommand{\sfdefault}{fvs}        %% --- Bera Sans
\usepackage[garamond]{mathdesign}     %% --- Garamond (Math)
\usepackage[scaled=0.85]{luximono}    %% --- Luxi Mono (Typewriter)
% Note:  If you can efford it, combine with commercial
%        sans fonts like: Syntax, Frutiger or Thesis
%        (but then also use the commercial Garamond ...)
```

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Tables

The following table lists some properties of the material *fused silica*.

Properties of fused silica

description	property
density	$\rho = 2.2\,\mathrm{g/cm^3}$
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Fourier (Utopia), Latin Modern (Sans and Typewriter)

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 *Fourier (Utopia), Latin Modern (Sans and Typewriter)*. The fonts are loaded with

```
\usepackage{lmodern}
\usepackage{fourier}
```

Plain text

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Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\ j=1,\ldots,n} \tag{0.2}$$

Tables

The following table lists some properties of the material *fused silica*.

Properties of fused silica

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

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 *Palantino, Arial, Courier*. The fonts are loaded with

```
\usepackage{mathpazo}                    %% --- Palantino (incl math)
\usepackage[scaled=.95]{helvet}          %% --- Helvetica (Arial)
\usepackage{courier}                     %% --- Courier
```

Plain text

The following paragraph is text taken from http://www.blindtextgenerator.de to show the appearance of the text. It is a text without any meaning translated from the original German text into English text. The translation was done automatic and thus the text has even less meaning after the translation.

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. The Big Oxmox advised her not to, because there swarming of bad Commas, wild Question Marks and devious Semikoli, but the Little Blind Text did not listen. She packed her seven capitals, pushing her initial into the belt and made herself on the way. When she reached the first hills of the Italic Mountains, she had a last view back on the skyline of her hometown Bookmarksgrove, the headline of Alphabet Village and the subline of her own road, the Line Lane. Pityful was a rhetorical question on the cheek, then she continued her way. Her way she met a copy. The copy warned the Little Blind Text, where it came from it would have been rewritten a thousand times and everything that was left from its origin would be the word ‘and’ and the Little Blind Text should turn around and return to its own, safe country. But nothing the copy said could convince her and so it did not take long until a few insidious Copy Writers ambushed her, made her drunk with Longe and Parole and made it dragged her into their agency, where they abused it for their projects again and again. And if it has not been rewritten, then they are still.

Two fast boxer chasing the vivacious Eva and her pug by Sylt. Fox jumps over the

lazy dog Bavaria. Twelve boxer Viktor hunt across the big Sylt dike. Bird Quax tweaks Johnys horse Bim. Sylvia dares quick to joke at Pforzheim. Polyfon Mäxchens twittering birds ate beets, yogurt and cottage cheese. 'Fix, Schwyz!' Jürgen squawks stupid from the pass. Victor chases twelve boxer across the great Sylt dike. Wrong practicing of xylophone music tortures every larger dwarf.

Math formulas

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

Green's theorem

$$\iiint_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3 V = \oiint_{S} u \frac{\partial v}{\partial n} \mathrm{d}^2 A \tag{0.1}$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\ j=1,\ldots,n} \tag{0.2}$$

Tables

The following table lists some properties of the material *fused silica*.

Properties of fused silica

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

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 *Times, Arial, Courier*. The fonts are loaded with

```
\usepackage{mathptmx}                  %% --- Times (incl math)
\usepackage[scaled=.90]{helvet}        %% --- Helvetica (Arial)
\usepackage{courier}                   %% --- Courier
```

Plain text

The following paragraph is text taken from http://www.blindtextgenerator.de to show the appearance of the text. It is a text without any meaning translated from the original German text into English text. The translation was done automatic and thus the text has even less meaning after the translation.

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Two fast boxer chasing the vivacious Eva and her pug by Sylt. Fox jumps over the lazy dog Bavaria. Twelve boxer Viktor hunt across the big Sylt dike. Bird Quax tweaks Johnys horse Bim. Sylvia dares quick to joke at Pforzheim. Polyfon Mäxchens twittering birds ate beets, yogurt and

cottage cheese. ‘Fix, Schwyz!’ Jürgen squawks stupid from the pass. Victor chases twelve boxer across the great Sylt dike. Wrong practicing of xylophone music tortures every larger dwarf.

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Green's theorem

$$\iiint_{\mathcal{G}} \left[u\nabla^2 v + (\nabla u, \nabla v)\right] \mathrm{d}^3V = \oiint_{\mathcal{S}} u \frac{\partial v}{\partial n} \, \mathrm{d}^2A \tag{0.1}$$

Jacobian matrix

$$J_f(a) := \frac{\partial f}{\partial x}(a) := \frac{\partial(f_1, \ldots, f_m)}{\partial(x_1, \ldots, x_n)}(a) := \left(\frac{\partial f_i(a)}{\partial x_j}\right)_{i=1,\ldots,m;\ j=1,\ldots,n} \tag{0.2}$$

Tables

The following table lists some properties of the material *fused silica*.

Properties of fused silica

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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. One example for this is the code for package `subfloat` in section 5.7.7, which was intentionally removed because of incompatibilities and better alternatives. Therefore 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
```

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

```
\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}}.
```

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.

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:

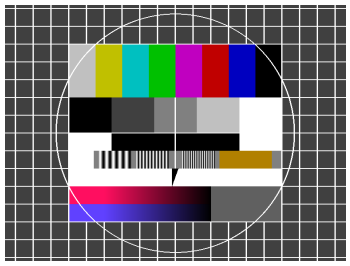


Figure 5.1: Long figure caption displayed in the document.

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:

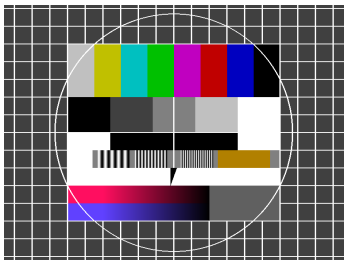


Figure 5.2: An example for a caption without a figure environment

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:

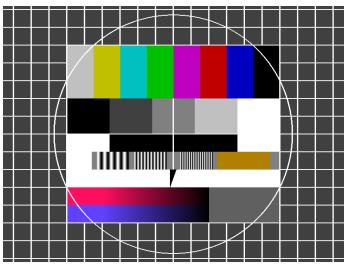


Figure 5.3: Another example for a caption without a figure environment

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:

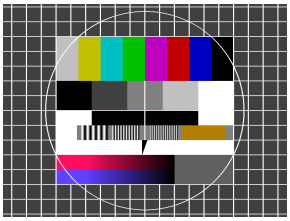


Figure 5.4: A figure

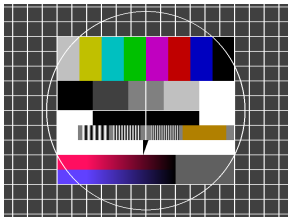


Figure 5.5: Another figure

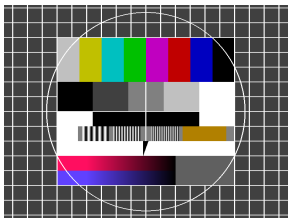
5.7.5 subcaption in minipages (caption)

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

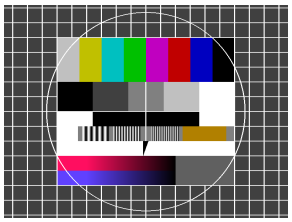
Code:

```
\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

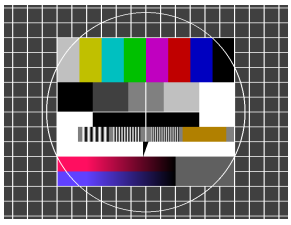
5.7.6 subfigure environment (caption)

The `subfigure` environment has a syntax equal to the normal figure environment, enhanced with the width and positioning arguments of a minipage environment.

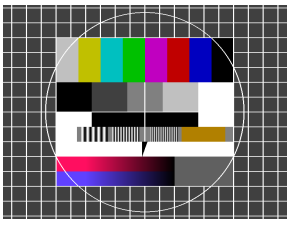
Code:

```
\begin{figure}[H]
  \begin{subfigure}[b]{.5\linewidth}
    \centering
    \includegraphics[width=0.5\linewidth]{images/testimage.png}
    \caption{A subfigure}\label{fig:2a}
  \end{subfigure}%
  \begin{subfigure}[b]{.5\linewidth}
    \centering
    \includegraphics[width=0.5\linewidth]{images/testimage.png}
    \caption{Another subfigure}\label{fig:2b}
  \end{subfigure}
  \caption{A figure}\label{fig:2}
\end{figure}
```

Result:



(a) A subfigure



(b) Another subfigure

Figure 5.7: A figure

5.7.7 subcaption with subfloat command (subfig)

Error: Command `subfloat` not available

5.7.8 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:

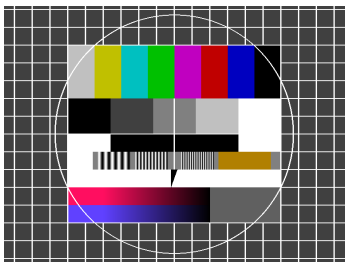


Figure 5.8: caption spanning the width of the picture

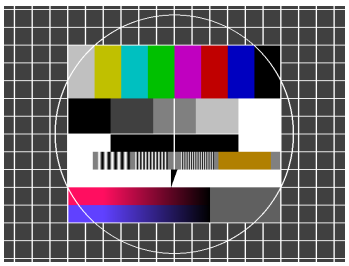


Figure 5.9: caption spanning the remaining width of the text width

5.7.9 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:

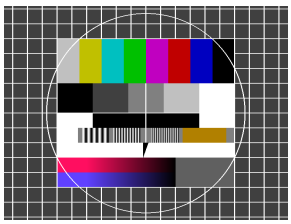


Figure 5.10: first image positioned at the top

Figure 5.11: second image positioned at the top

Figure 5.12: third image positioned at the bottom

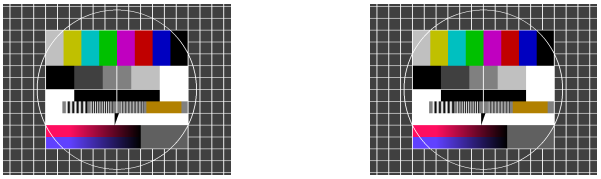
5.7.10 subfigures with subfloatrow environment (floatrow)

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 5.13: subcaptions using subfloatrow environment

5.7.11 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:

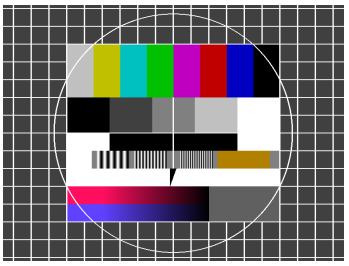


Figure 5.14: caption beside the figure with some more text and a bit more text and a little more text to fill space

5.7.12 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:

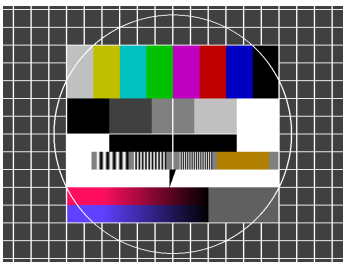


Figure 5.15: Example of captionbeside, with inside caption and with some more text and a bit more text and a little more text to fill space.

5.7.13 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:

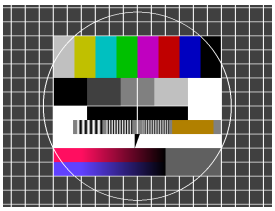


Fig. 5.16: A wrapfigure example

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.

5.7.14 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.

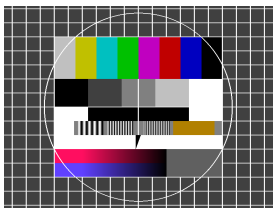


Fig. 5.17: A wrapfloat example

5.7.15 floating figure inside the paragraph (floatflt)

Error: Environment `floatingfigure` not available

5.7.16 Koma Script: addmargin (default)

In this example the caption is as wide as the figure, which means that the caption spans 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.

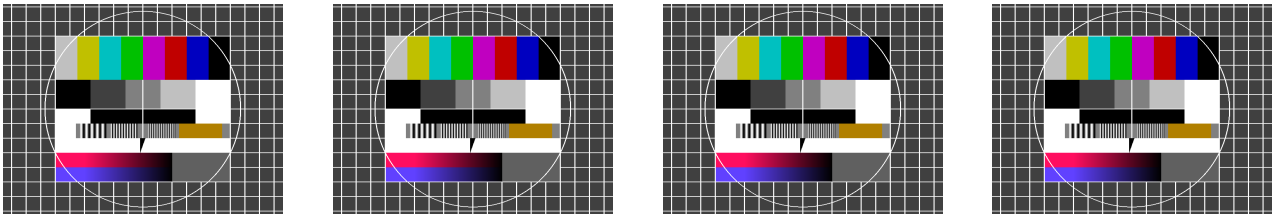


Figure 5.18: pictures extended into the margin – Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

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

5.7.17 Koma Script: addmargin (with parboxrestore)

Here the caption is only as wide as the textwidth, which is corrected using the code `\captionsetup{parboxrestore=full}`.

Code:

```
\captionsetup{parboxrestore=full}

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]
\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.full}
```

```
\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.

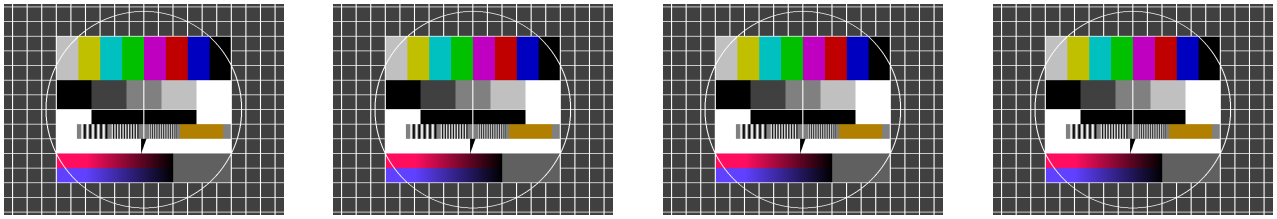


Figure 5.19: pictures extended into the margin – Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

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

5.7.18 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

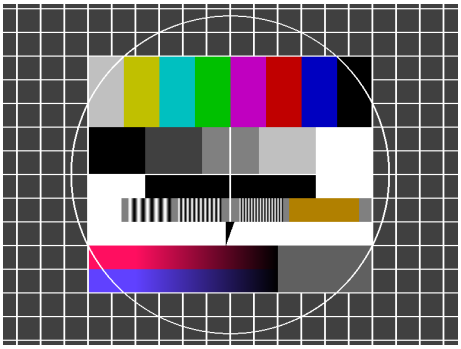


Fig. 5.20: long caption text with some more text and a bit more text and a little more text to fill space.

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

5.7.19 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:
  - using booktabs line commands (5.8.1 and 5.8.1),
  - with custom commands for the style and the colors (5.8.1),
  - and with the package `tablestyles` (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 5.8.4 shows how to correct the indentation for itemize lists.
- Section 5.8.6 demonstrates the coloring of rows.
- Section 5.8.7 introduces the creation of tables with the `tabu` package.
- How to create and present very large tables is introduced in section 5.8.8.

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

- `\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

Tablestyles package

This package unifies the application of a style to a table. The following styles are predefined: `default`, `roman` (serif instead of sans fonts), `sansbold` (bold header), `sansboldbw` (white text on black background)

Code:

```
\begin{table}[H]
%
\tablestyle[sansbold]
%
\captionabove{table with bold header font using the styles by this package}
\begin{tabular}{*{2}{p{0.45\textwidth}}}
\theadstart
    \thead header &
```

```
    \thead header \\
\tbody
%
 content  & content \\
 content  & content \\
 content  & content \\
 content  & content \\
 content  & content \\
%
\tsubheadstart
 \tsubhead subhead &
 \tsubhead subhead \\
%
 content  & content \\
 content  & content \\
\tend
\end{tabular}
\end{table}
```

Result:

Table 5.3: table with bold header font using the styles by this package

header	header
content	content
content	content
content	content
content	content
content	content
subhead	subhead
content	content
content	content

One should note, that these commands do not work together with the package `tabu`, since in that package most row color command do not work as expected or need to be replaced by color commands from the tabu package, see section 5.8.7.

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 (tabularx)

The package `tabularx` defines a new tabular environment, which requires the total width of the tabular as a mandatory argument. The new X-columns take the remaining space to fill the tabular. Each column is aligned as justified.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\small
\begin{tabularx}{0.9\textwidth}{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{tabularx}
\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.

Custom column types: L, C, R

The predefined custom column types L, C and R all have a fixed width (they are based on the p-columns) but are aligned as left (L), centered (C) and right (R). All columns include hyphenation.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\small
\begin{tabular}{|L{0.3\linewidth}|C{0.3\linewidth}|R{0.3\linewidth}|}
\hline
fixed width (L: left)   &
fixed width (C: center) &
fixed width (R: 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{tabular}
\end{center}
```

Result:

fixed width (L: left)	fixed width (C: center)	fixed width (R: 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.

Custom column types: W, Y, Z

The predefined custom column types W, Y and Z all have a variable width (they are based on the X-columns) but are aligned as left (W), centered (Z) and right (Y). All columns include hyphenation. The standard X column is left aligned but justified.

The choice of the character W, Y and Z is only based on the available characters. There is no hidden meaning behind them.

Code:

```
\begin{center}
% Style changes
\small\renewcommand{\arraystretch}{1.4}
% tabular
\small
\begin{tabularx}{\textwidth}{|W|Z|Y|}
\hline
variable (W: left)   &
variable (Z: center) &
variable (Y: 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{tabularx}
\end{center}
```

Result:

variable (W: left)	variable (Z: center)	variable (Y: 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 - $2500\,\mathrm{nm}$

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

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

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

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
\end{tabular}
\end{center}
```

Result:

left	center	right
3 columns		
1	2	3

Note, that such a grid should not be applied to a table. It is here only to demonstrate the usage of `\multicolumn`

Multirow

Code:

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

Result:

left	centered	right
two cells	b	c
	2	3

Note, that such a grid should not be applied to a table. It is here only to demonstrate the usage of `\multicolumn`

Multirow and multicolumn combined

Code:

```
\begin{center}
\renewcommand{\arraystretch}{1.4}
\begin{tabular}{|c|c|c|}  \hline
1  &  2  &  3  \\  \hline
\multicolumn{2}{|c|}{\multirow{2}{*}{2x
2  cells}}
         &  6  \\  \cline{3-3}
\multicolumn{2}{|c|}{}
         &  9  \\  \hline
\end{tabular}
\end{center}
```

Result:

1	2	3
2x2 cells		6
		9

Note, that such a grid should not be applied to a table. It is here only to demonstrate the usage of `\multicolumn`

Multirow usage in a complex example

Code:

```
\begin{center}
\renewcommand{\arraystretch}{1.4}
\begin{tabular}{|c|c|}
\hline
\multirow{4}{2cm}{text}
  & Column a \\
  & Column b \\
  & Column c \\
  & Column d \\
\hline
\multirow{3}[6]*{text}
  & Column a \bigstrut \\ \cline{2-2}
  & Column b \bigstrut \\ \cline{2-2}
  & Column c \bigstrut \\
\hline
\multirow{4}[8]{1in}{text}
  & Column a \bigstrut \\ \cline{2-2}
  & Column b \bigstrut \\ \cline{2-2}
  & Column c \bigstrut \\ \cline{2-2}
  & Column d \bigstrut \\
\hline
\multirow{4}*{%
  \begin{tabular}{c}
     row a \\ row b
  \end{tabular}
}
  & Column a \\
  & Column b \\
  & Column c \\
  & Column d \\
\hline
\end{tabular}
\end{center}
```

Result:

<table>
<tr><td rowspan="4">text</td><td>Column a</td></tr>
<tr><td>Column b</td></tr>
<tr><td>Column c</td></tr>
<tr><td>Column d</td></tr>
<tr><td rowspan="3">text</td><td>Column a</td></tr>
<tr><td>Column b</td></tr>
<tr><td>Column c</td></tr>
<tr><td rowspan="4">text</td><td>Column a</td></tr>
<tr><td>Column b</td></tr>
<tr><td>Column c</td></tr>
<tr><td>Column d</td></tr>
<tr><td rowspan="4">row a
row b</td><td>Column a</td></tr>
<tr><td>Column b</td></tr>
<tr><td>Column c</td></tr>
<tr><td>Column d</td></tr>
</table>

5.8.4 Item lists inside tabular cells

List require a special correction to be not, or rather to be intended correct in a tabular cell. The same commands work in tabu tables, see section 5.8.7.

Code:

```
\begin{center}
% Style changes
\small\centering\renewcommand{\arraystretch}{1.4}
% tabular
\begin{tabularx}{1\textwidth}{|X|X|X|}
\hline
```

```
   \centering header X &
   \centering header items (X) &
   \centering header enums (X) \tabularnewline
\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.
&
\tableitemize
\begin{itemize}
\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}
&
\tableitemize
\begin{enumerate}
\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}
\tabularnewline
\hline
\end{tabularx}
\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.

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

5.8.5 Footnotes in tables (tablefootnote)

Error: Command `\tablefootnote` not available

5.8.6 Colors in tables: 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

5.8.7 Tables with the tabu package

Simple table

The tabu environment from the tabu-package provides an alternative method for the creation of tables. This table is a very simple example where only the environment is exchanged.

Code:

```
\begin{center}
% Style changes
\small\sffamily\renewcommand{\arraystretch}{1.4}
% tabu
\begin{tabu}{|l|r|c|}
\hline
```

```
left & right & center \\ \hline
1    & 2     & 3 \\ \hline
4    & 5     & 6 \\ \hline
\end{tabu}
\end{center}
```

Result:

left	right	center
1	2	3
4	5	6

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

X columns

Tabu provides X-type columns which have an additional horizontal alignment as an argument.

Code:

```
\begin{center}
% Style changes
\small\sffamily\renewcommand{\arraystretch}{1.4}
% tabu
\begin{tabu} to 0.6\textwidth{|l|X[r]|X[l]|}
\hline
left &  X (right) &  X (left)  \\ \hline
1    & 2     & 3 \\ \hline
4    & 5     & 6 \\ \hline
\end{tabu}
\end{center}
```

Result:

left	X (right)	X (left)
1	2	3
4	5	6

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

X columns (multiples)

The X-columns can also be stretched using a multiplier.

Code:

```
\begin{center}
% Style changes
\small\sffamily\renewcommand{\arraystretch}{1.4}
% tabu
\begin{tabu}  to  0.6\textwidth
{|X[1,l]|X[2,c]|X[3,c]|X[1,r]|}
\hline
1x    &  2x     &  3x     &  1x    \\ \hline
left  &  center &  center &  right \\ \hline
text  &  text   &  text   &  text  \\ \hline
\end{tabu}
\end{center}
```

Result:

1x	2x	3x	1x
left	center	center	right
text	text	text	text

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

Vertical and horizontal alignment

The X-columns further take the alignment as an option. Possible values are L,C,R and J (justified) and in the vertical direction p,m and b.

Code:

```
\begin{center}
% Style changes
\small\sffamily\renewcommand{\arraystretch}{1.4}
% tabu
\begin{tabu}  to  0.9\textwidth{|X[2,Lp]|X[2,Cm]|X[2,Rb]|X[2,J]|}
\hline
left  (p)  &  left  (m)  &  left  (b)  &  justified  (p)  \\  \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 \\
\hline
\end{tabu}
\end{center}
```

Result:

left (p)	left (m)	left (b)	justified (p)
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

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

Colors in tabu tables

The color commands from the xcolor package (`\rowcolor`) can not be used in tabu-tables. For this purpose the commands from the tabu package need to be applied, such as `\taburowcolors`.

Code:

```
\begin{center}
% Style changes
\small\sffamily\renewcommand{\arraystretch}{1.4}
% tabu
\begin{tabu} to 0.9\textwidth {X[1,l]X[1,c]X[1,c]X[1,c]}
\hline
\rowfont[c]{\bfseries}
\taburowcolors 1{tableheadcolor .. tableheadcolor}
head    & head    & head    & head    \\
\hline
\taburowcolors 2{tablebodycolor .. tablerowcolor}
content & content & content & content \\
content & content & content & content\\
content & content & content & content\\
content & content & content & content\\
\hline
\end{tabu}
\end{center}
```

Result:

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

Item lists inside tabu tables

List require a special correction to intended correct in a tabu cell.

Code:

```
\begin{center}
% Style changes
\small\centering\renewcommand{\arraystretch}{1.4}
% tabular
\begin{tabu} to 1.0\textwidth {X[1,l]X[1,l]X[1,l]}
\hline
   \centering header X &
   \centering header items (X) &
   \centering header enums (X) \tabularnewline
\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.
&
\tableitemize
\begin{itemize}
\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}
&
\tableitemize
\begin{enumerate}
\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}
\tabularnewline
\hline
\end{tabu}
\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.

5.8.8 Large tables

Longtable

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

Code:

```
% Creation of the table in a separate file
\begin{filecontents}{content/longtable.tex}
\begin{longtable}{>{\itshape}l*{5}{Z}}
\captionabove{longtable tabular with tabularx columns} \\
  \hline
  \rowcolor{tableheadcolor}
  \upshape
  \bfseries title &
  \bfseries title &
  \bfseries title &
  \bfseries title &
  \bfseries title &
  \bfseries title \\ \hline
\endfirsthead
  \hline
\upshape
  title &
  title &
  title &
  title &
  title &
  title \\ \hline
\endhead
  \hline
  \multicolumn{6}{r}{\emph{continued on next page \ldots}}
\endfoot
  \hline
```

```
\endlastfoot
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 \\
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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 \\
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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 \\
\end{longtable}
\end{filecontents}

% Loading of the table from the separate file
{
  \small\renewcommand{\arraystretch}{1.4}\sffamily
  % required if floatrow is loaded
  \IfDefined{floatsetup}{\floatsetup[longtable]{font={sf,small}}}
  \rowcolors{1}{tablebodycolor}{tablerowcolor}
```

```
  \LTXtable{\textwidth}{content/longtable.tex}
}
```

Result:

Table 5.4: longtable tabular with tabularx columns

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

continued on next page . . .

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

longtabu (tabu package)

This code demonstrates how to create columns which span over more than one page using the `longtable` and the `tabu` package.

The advantage here is, that no extra file needs to be created and X columns can be used with the additional possibilities of the `tabu` package.

Code:

```
  { % start a group
  % style
  \small\renewcommand{\arraystretch}{1.4}\sffamily
  % required if floatrow is loaded
  \IfDefined{floatsetup}{\floatsetup[longtable]{font={sf,small}}}
  % the table
  \begin{longtabu} to \textwidth{>{\itshape}l*5{X[c]}}
\captionabove{longtabu tabular with X columns} \\
  \hline
  \taburowcolors 1{tableheadcolor .. tableheadcolor}
  \upshape
  \bfseries title &
  \bfseries title &
  \bfseries title &
  \bfseries title &
  \bfseries title &
  \bfseries title \\ \hline
\endfirsthead
  \hline
\upshape
  title &
  title &
  title &
  title &
```

```
  title &
  title \\ \hline
\endhead
  \hline
  \taburowcolors 1{white .. white}
  \multicolumn{6}{r}{\emph{continued on next page \ldots}}
\endfoot
  \hline
\endlastfoot
\taburowcolors 2{tablebodycolor .. tablerowcolor}
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 \\
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description   & content & content & content & content & content \\
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description   & content & content & content & content & content \\
description   & content & content & content & content & content \\
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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 \\
```

```
\end{longtabu}
} % close the group
```

Result:

Table 5.5: longtabu tabular with X columns

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

continued on next page . . .

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

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 5.7.16.

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 5.6: 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 5.7: 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

5.9 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

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

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} + \div \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):

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

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

Differentials (partial and total):

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

Abbreviations (real and imaginary)

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

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

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

New operators

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

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:      & $1,23\,\si{\micro m/s}$ \\
and with formating of the number: & $\SI{0,25e-11}{m/s^2}$ \\
and finally with an uncertainty:  & $\SI{1,7(5)e-11}{m/s^2}$ \\
\end{tabular}
```

Result:

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

5.10.2 compatible commands for units

The old `units` package defines the commands `\unit` and `\nicefrac`. The following commands are defined to provide some compatibility while the basic packages is switched to siunitx.

Note that the numbers must be provided in the siunitx format.

Code:

```
\begin{tabular}{ll}
units: & $1.23\,\unit{\micro m/s}$ \\
units: & $\unit[2.34]{\micro m/s}$ \\
unitfrac: & $1.23\,\unitfrac{\micro m}{s}$ \\
unitfrac: & $\unitfrac[2.34]{\micro m}{s}$ \\
\end{tabular}
```

Result:

units:	$1.23\,\mu m/s$
units:	$2.34\,\mu m/s$
unitfrac:	$1.23\,{}^{\mu m}/_{s}$
unitfrac:	$2.34\,{}^{\mu m}/_{s}$

5.11 Symbols

5.11.1 Zapf Dingbats Symbols

Code:

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

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 255.

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 255.

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

Code:

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

Result:

longtabuFancy

λ	wavelength
φ	arbitrary angle
π	mathematical constant

Code:

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

Result:

longtabuFancyHeader

Notation	Description
λ	wavelength
φ	arbitrary angle
π	mathematical constant

5.13.3 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:

The most common usage this package is to insert clearly visible todo notes in a latexdocument 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.

Should be written as LaTeX

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

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:

```
1  // interface
2  class Person
3  {
4  public:
5     Person();  // constructor
6     ~Person(); // destructor
7     void setName(string name);
8     string name();
9     void setAge(int age);
10    int age();
11 private:
12    string m_name;
13    int m_age;
14 };
```

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:

```
1  \documentclass[paper=a4,fontsize=11pt]{scrartcl}
2  %  preamble: (load packages, setup layout)
3  %  100 - 1000  lines of code (loc)
4  \usepackage[utf8]{inputenc}
5  \usepackage[ngerman]{babel}
6  ...
7  %  document:  >  2000  loc
8  \begin{document}
9  \chapter{Introduction}
10 Some text ...
11 \chapter{Theory}
12 ...
13 \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

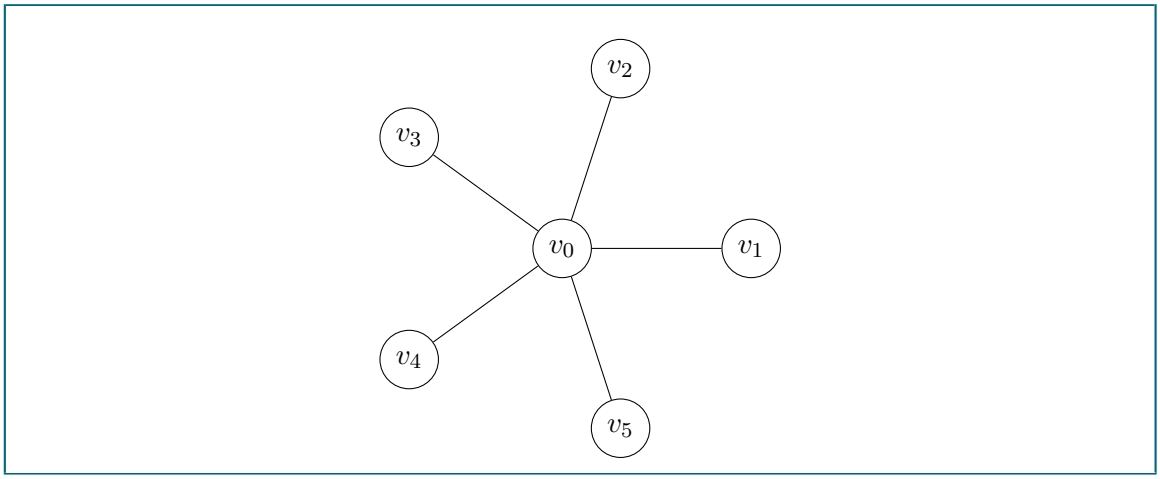
5.16.1 tikz/pgf

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:



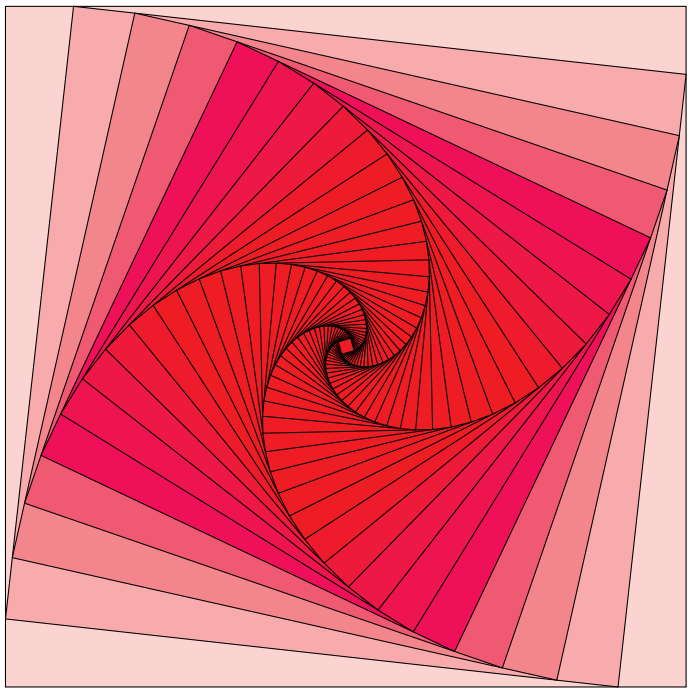
for each example

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:

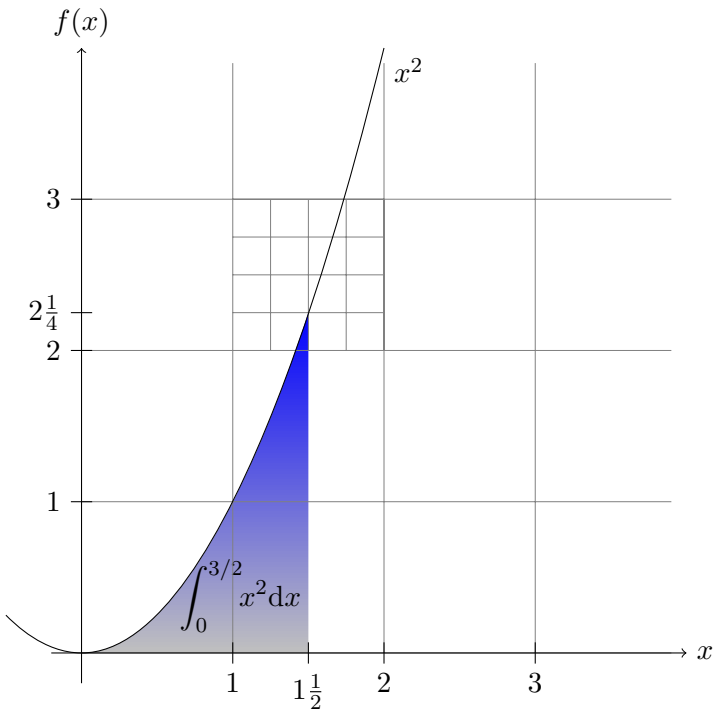


Fancy plot with tikz

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

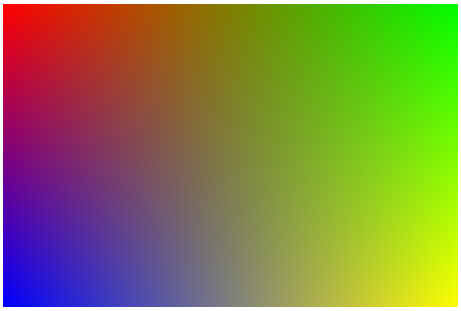
Error: tikz library ‘mindmap’ not loaded

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

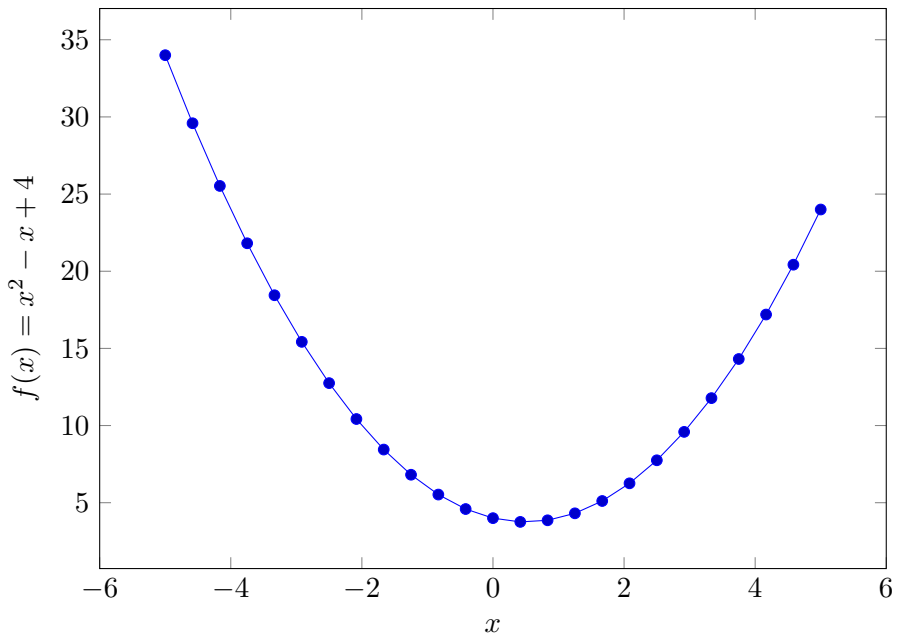
5.16.2 pgfplots

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:



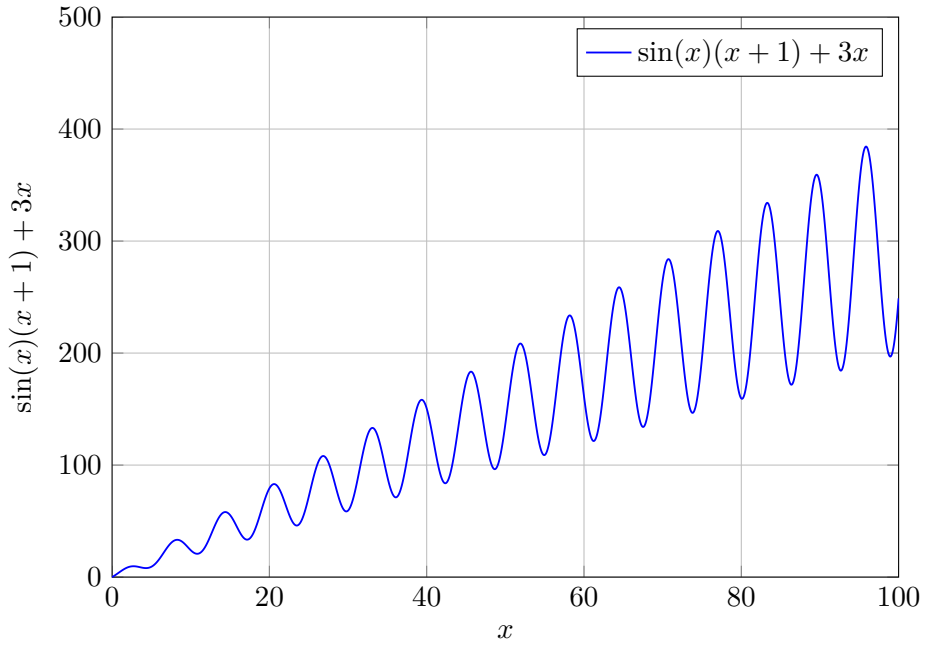
Simple plot with curve (calculated by gnuplot)

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:



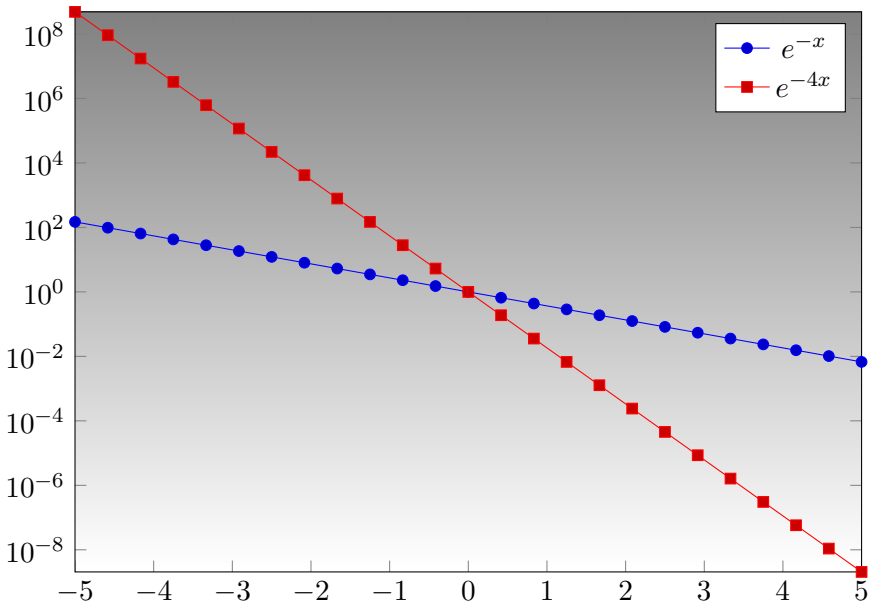
Semilog axis with filled background

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:



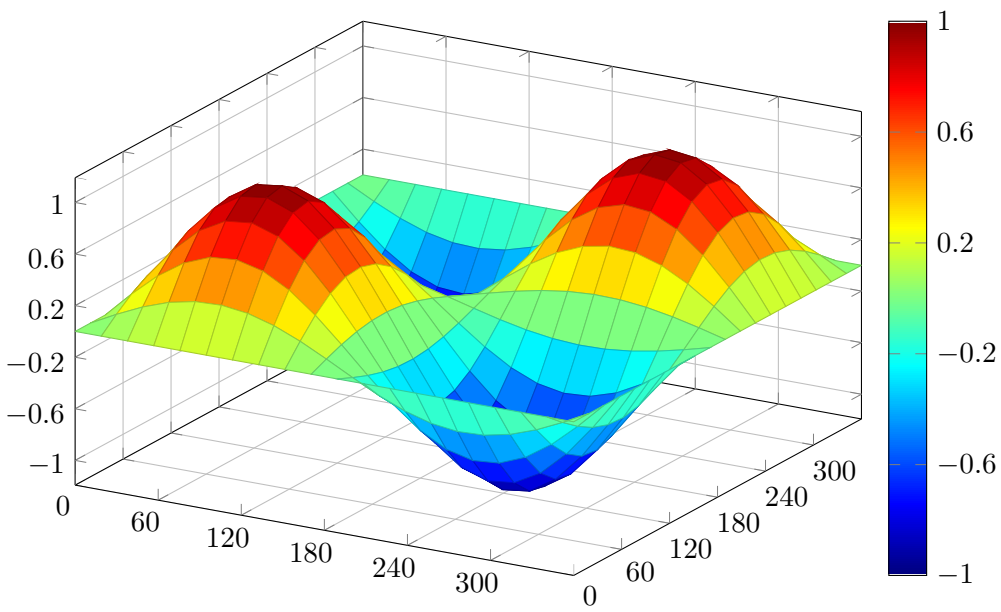
3D plot

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=20]
  {sin(x)*sin(y)};
\end{axis}
\end{tikzpicture}
\end{figure}
```

Result:

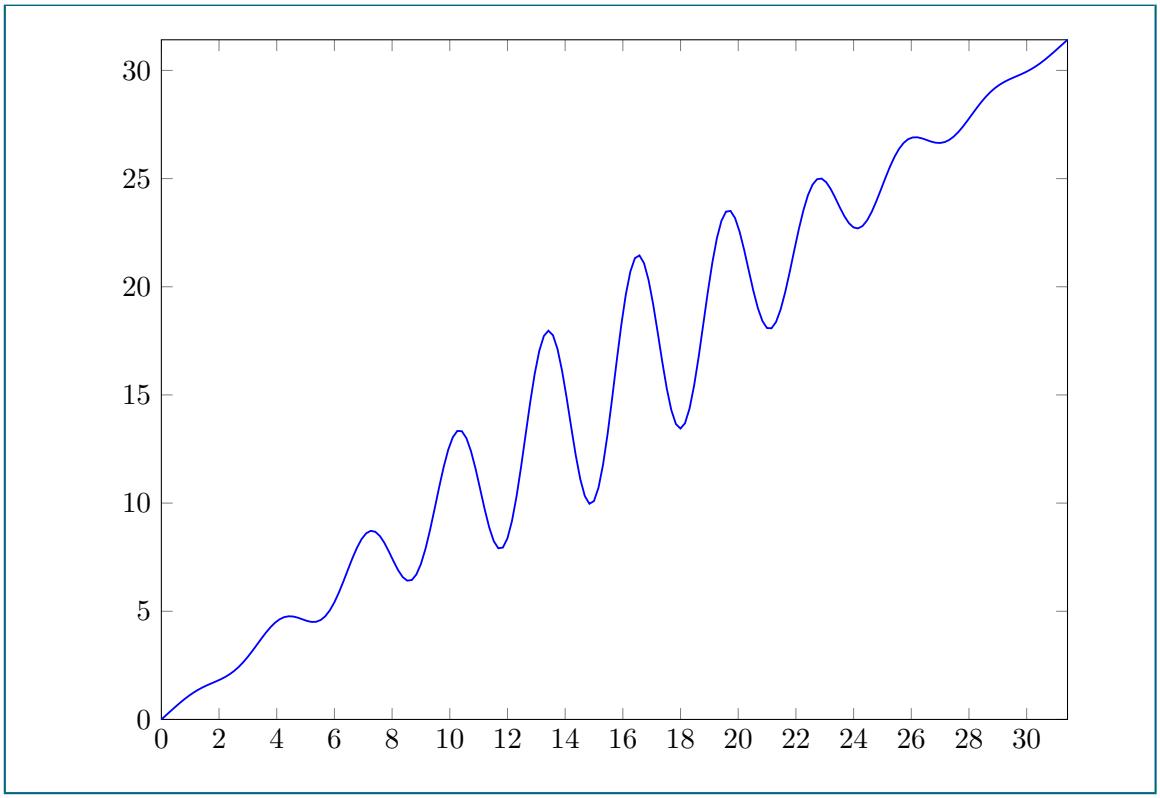


Plotting data from a file

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:



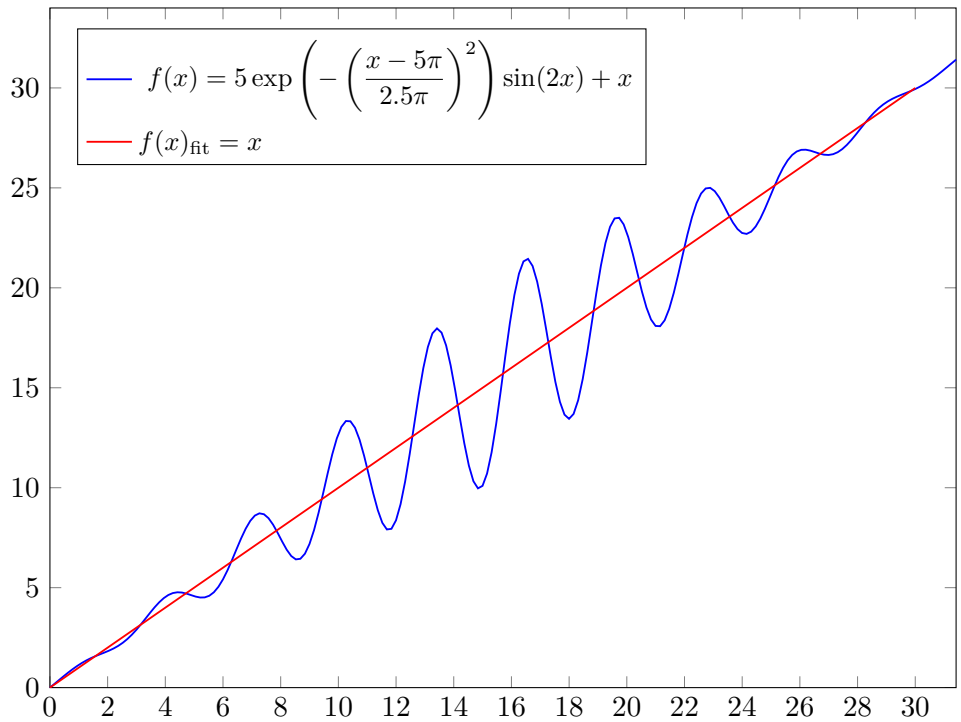
fitting with gnuplot

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:



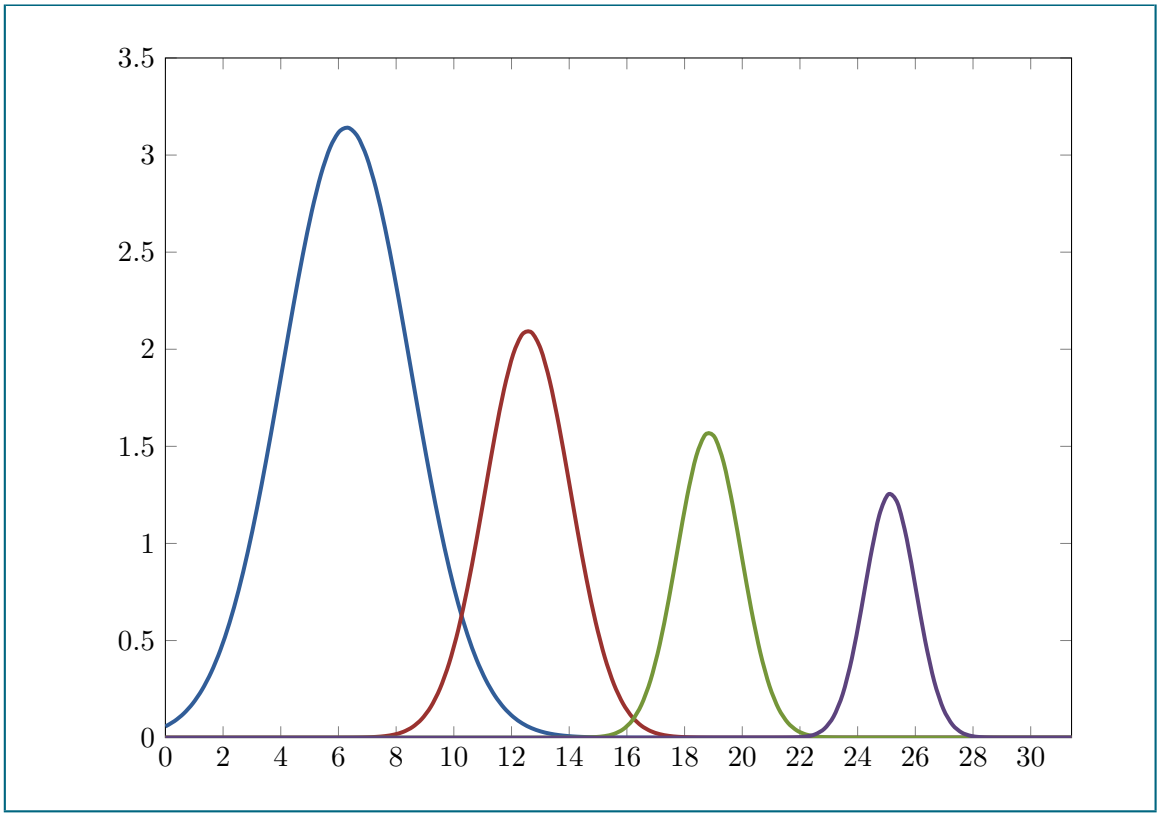
plotting multiple lines from single file

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 (LaTeXTemplate.tex)

6.1 Code before the documentclass

6.1.1 magic shortcodes

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

6.1.2 bug fix packages

```
%% Bug fixes and other packages to be loaded before the class
\RequirePackage[l2tabu, orthodox]{nag} % check for mistakes in the code
\RequirePackage{fix-cm} % permit Computer Modern fonts at arbitrary sizes.
```

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. This applies to all packages that modify TEXinternals and in this template loaded in

- preamble/packages-SolutionsNoRoomForNewWrite.tex

and for all packages that provide control sequences that are used within the template.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Must be loaded first!
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% packages to allow more \write outputs
\input{preamble/packages-SolutionsNoRoomForNewWrite.tex}
% packages required for the template
\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
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

% automatic selection of encoding
% insert chars for umlaut a and sz
\usepackage{selinput}
\SelectInputMappings{adieresis={ä},germandbls={ß},Euro={€}}

% Encoding of _files and directories_
% (ensures that any file can be loaded without problems)
\usepackage[%
   extendedchars, encoding, multidot, space,
   filenameencoding=latin1, % Windows XP, Vista, 7
   % filenameencoding=utf8,   % Linux, OS X
]{grffile}
```

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
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

%% select/load fonts
\input{fonts/fonts.tex}
%\input{fonts/font-commercial.tex}
%% load packages
\input{preamble/packages.tex}
%% apply style settings
\input{preamble/style.tex}
%% new commands / definitions (required by the template!)
\input{preamble/commands.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 7.3.12.

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{scrpage2}{\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 136. 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
  \IfDefined{phantomsection}{\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\IfDefined{phantomsection}{\phantomsection}\label{sec:lof}
\listoffigures
\cleardoublepage\IfDefined{phantomsection}{\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 section 3.2.1.

```
%% -- 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
\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\IfDefined{phantomsection}{\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 section 3.2.1.

```
% 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-SolutionsNoRoomForNewWrite.tex

This file loads either the packages `scrwfile` or `morewrites` and `etex`.

```
% Description: Package scrwfile provides a general change of the LaTeX kernel,
%              that solve problems with the
%              error "no room for a new \write"
% Incompatible: titletoc (bot redefine the LaTeX kernel and are incompatible by
design)
% Doc: scrguien.pdf
%
%% If titletoc is not required, the usage of this package is recommended!
% \usepackage{scrwfile}

% Description: This package is meant to be a solution for the
%              error "no room for a new \write"
% Note: it is less efficent than scrwfile, but the best alternative
% Doc: morewrites.pdf
\usepackage{morewrites}


% Description: see http://www.tex.ac.uk/cgi-bin/texfaq2html?label=noroom
%   short summery: The e-TeX extensions do not help with the
%                  "no room for a new \write" problem, but in other cases
%                  of "no room for a new <thing> "
\usepackage{etex}
\reserveinserts{28}
```

7.2 fonts/fonts.tex

This file loads the packages `cmap`, `fontenc` and `textcomp`. The default font is *Latin Modern*, loaded with package `lmodern`. Further font families and typical font combinations are presented but not loaded.

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

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

% Make PDF files searchable and copyable
% load before: fontenc
\usepackage{cmap}

% T1 Schrift Encoding
\usepackage[T1]{fontenc}

% Description: Additional Symbols (Text Companion font extension)
% Doc: encguide.pdf
\usepackage{textcomp}

% DO NOT LOAD ae Package as a font !

%% ==== Font Families / Font Combinations  (Sans + Serif) ================

%% - Latin Modern (LaTeX Standard)
\usepackage{lmodern}
%% sans math, use with '\mathversion{sans}'
\IfPackageLoaded{lmodern}{\input{fonts/fonts-lmodern-sansmath.tex}}

%% -------------------
%
%% - Times, Helvetica, Courier (Word Standard...)
%\usepackage{mathptmx}                  %% --- Times (incl math)
%\usepackage[scaled=.90]{helvet}        %% --- Helvetica (Arial)
%\usepackage{courier}                   %% --- Courier
%% -------------------
%%
%% - Palantino , Helvetica, Courier
%\usepackage{mathpazo}                  %% --- Palantino (incl math)
%\usepackage[scaled=.95]{helvet}        %% --- Helvetica (Arial)
%\usepackage{courier}                   %% --- Courier
%% -------------------
%
%% - Charter, Bera Sans
%\usepackage{charter}\linespread{1.05} %% --- Charter
%\renewcommand{\sfdefault}{fvs}         %% --- Bera Sans
%\usepackage[charter]{mathdesign}       %% --- Charter (Math)
%\usepackage[scaled=0.85]{luximono}     %% --- Luxi Mono (Typewriter)
%% Note: There is a better Charter font by Linotype
%%       called 'ITC Charter'
%% -------------------

%% - URW Garamond
%\renewcommand{\rmdefault}{ugm}          %% --- URW Garamond
%\renewcommand{\sfdefault}{fvs}          %% --- Bera Sans
%%%\usepackage[small]{eulervm}             %% --- EulerVM (MATH)
```

```
%\usepackage[garamond]{mathdesign}    %% --- Garamond (Math)
%\usepackage[scaled=0.85]{luximono}    %% --- Luxi Mono (Typewriter)
%% Note:  If you can efford it, combine with commercial
%%        sans fonts like: Syntax, Frutiger or Thesis
%%        (but then also use the commercial Garamond ...)
%% --------------------


%%%% =========== Typewriter =============

%\usepackage{courier}                    %% --- Courier
%\renewcommand{\ttdefault}{cmtl}         %% --- CmBright Typewriter Font
%\usepackage[scaled=0.9]{luximono}       %% --- Luxi Mono (Typewriter)
%\usepackage{ulgothic}                   %% --- Letter Gothic

%%%% =========== Math fonts ================

%% Recommanded to use with fonts: Aldus, Garamond, Melior, Sabon
%\usepackage[                            %% --- EulerVM (MATH)
%   small,       %for smaller Fonts
%  euler-digits % digits in euler fonts style
%]{eulervm}

%% combine with utopia, garamond or charter font
%\usepackage[
%%   utopia,
%%   garamond,
%%   charter
%]{mathdesign}
```

7.2.1 fonts/fonts-lmodern-sansmath.tex

This file defines a sans math version for package `lmodern`. It is activated with `\mathversion{sans}`.

```
\DeclareMathVersion{sans}
% Math letters from Latin Modern Sans
\SetSymbolFont{letters}{sans}{OML}{cmbr}{m}{it}
% Math operators
\SetSymbolFont{operators}{sans}{OT1}{lmss}{m}{n}
% Math symbols
\SetSymbolFont{symbols}{sans}{OMS}{lmsy}{m}{n}
% Large symbols
\SetMathAlphabet{\mathrm}{sans}{OT1}{lmr}{m}{n}
\SetMathAlphabet{\mathsf}{sans}{OT1}{lmss}{m}{n}
\SetMathAlphabet{\mathit}{sans}{OT1}{lmr}{m}{it}
```

7.2.2 fonts/fonts-commercial.tex

If you own commercial fonts and have the required LaTeX packages installed then this file might be of interest for you. It shows how to load *some* of the available fonts for pdflatex.

The file fonts/fonts.tex must still be loaded because it contains further packages that are required.

For MyriadPro and MinionPro the code is extracted into extra files because these package come with a lot of functionality and thus options.

```
\DeclareMathVersion{sans}
% Math letters from Latin Modern Sans
\SetSymbolFont{letters}{sans}{OML}{cmbr}{m}{it}
% Math operators
\SetSymbolFont{operators}{sans}{OT1}{lmss}{m}{n}
% Math symbols
\SetSymbolFont{symbols}{sans}{OMS}{lmsy}{m}{n}
% Large symbols
\SetMathAlphabet{\mathrm}{sans}{OT1}{lmr}{m}{n}
\SetMathAlphabet{\mathsf}{sans}{OT1}{lmss}{m}{n}
\SetMathAlphabet{\mathit}{sans}{OT1}{lmr}{m}{it}
```

fonts/fonts-MinionPro.tex

File that loads MinionPro and takes care of the package loaded order.

```
% load after textcomp, amsmath and MnSymbol
\IfFileExists{MinionPro.sty}{
%
\ExecuteAfterPackage{amsmath}{
% Minion Pro
\usepackage[%
%%% Font selection
  %smallfamily, % (std) use only regular and bold face
  medfamily,    % use semibold face in addition to smallfamily
  %fullfamily,  % use medium face in addition to medfamily
  noopticals,   % (std) use only the optical size Text
  %opticals     % use the optical sizes Caption, Text, Subhead, and Display
  %slides,      % use only the optical size Caption (useful for slides)
  normalsize,   % (std) adapt optical sizes to the normal font size
  %nonormalsize,% use static settings for the optical sizes
  % onlytext,   % only change the text fonts
  % onlymath,   % only change the math fonts
%%% Figure selection
  % textosf,    % use text figures in text mode
  % mathosf,    % use text figures in math mode
  % osf,        % (std) use text figures in text and math mode
  % textlf,     % use lining figures in text mode
  % mathlf,     % use lining figures in math mode
  lf,,          % use lining figures in text and math mode
  mathtabular,  % use tabular figures in math mode
%%% Miscellaneous options
  % scaled=1.0, % scale the font size by <factor>
%  minionint,    % take the integral symbols from MyriadPro, not from MnSymbol
]{MinionPro}
```

```
} % end of ExecuteAfter
%
% file not found:
}{\PackageWarning{template}{File 'MinionPro.sty' not found!\MessageBreak}{}}
```

fonts/fonts-MyriadPro.tex

File that loads MyriadPro and takes care of the package loaded order. MyriadPro must be loaded after MinionPro if both shall be loaded.

```
\IfFileExists{MyriadPro.sty}{
% load after textcomp, amsmath and MnSymbol
\ExecuteAfterPackage{amsmath}{
%% Myriad Math Fonts
%\usepackage[onlysansmath]{MdSymbol}
%
\usepackage[%
%%% Font selection
  % smallfamily, % (std) use only regular and bold face
  medfamily,   % use semibold face in addition to smallfamily
  onlytext,    % only change the text fonts
  % onlymath   % only change the math fonts
  sansmath,     % provide math version sans and sansbold
%%% Figure selection
  % textosf, % use text figures in text mode
  % mathosf, % use text figures in math mode
  % osf,       % (std) use text figures in text and math mode
  textlf,  % use lining figures in text mode
  mathlf,    % use lining figures in math mode
  % lf,      % use lining figures in text and math mode
  mathtabular, % use tabular figures in math mode
%%% Miscellaneous options
  % scaled=1.0, % scale the font size by <factor>
]{MyriadPro}[2012/01/07 v0.1c]

} % end of ExecuteAfter
%
% file not found:
}{\PackageWarning{template}{File 'MyriadPro.sty' not found!\MessageBreak}{}}

% set bold to medium bold by default
\renewcommand{\bfdefault}{sb}

%% If you want to use MyriadPro as your mainfont:
% \renewcommand{\familydefault}{\sfdefault}
```

7.3 preamble/packages.tex

7.3.1 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]{PackagesDiagrams}
\DefineCodeSection[true]{PackagesMath}
\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.

7.3.2 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.

- calc
- babel, translater
- xcolor
- graphicx
- epstopdf
- ragged2e

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: support automatic translations
% Doc: beameruserguide.pdf
\usepackage{translator}


% 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)
  hyperref,   % Support the hyperref package
  fixinclude, % Prevent dvips color reset before .eps file inclusion
]{xcolor}

% 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}

\EndCodeSection{PackagesBase}
```

7.3.3 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.

- `fixltx2e`
- `marginnote`, (`mparhack`)
- `scrhack`
- `marginfix`
- `xspace`

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

% Description: Fix known LaTeX2e bugs
% Doc: fixltx2e.pdf
\usepackage{fixltx2e}

% Description: This package implements a workaround for the LaTeX bug that
%              marginpars sometimes appear on the wrong margin.
% \usepackage{mparhack}
% BUG: in some case this causes an error in the index together with package
%      pdfpages the reason is unkown. Therefore I recommend to use the
%      margins of marginnote
% incompatible: marginfix

% 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 (TODO: why not used)
\usepackage{marginfix}

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

\EndCodeSection{PackagesBugfixes}
```

7.3.4 Font packages

This section is rather empty since the fonts and most of the related packages are already loaded in the file `fonts/fonts.tex`.

- `relsize`

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

\BeginCodeSection{PackagesFonts}

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

\EndCodeSection{PackagesFonts}
```

7.3.5 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`.

- `amsmath`
- `mathtools`
- `onlyamsmath`
- `braket`
- `cancel`

- empheq
- exscale
- fixmath
- icomma
- xfrac

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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
\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: fixes for the default Computer Modern math fonts
% Doc: fixmath.pdf
\IfPackageLoaded{lmodern}{%
  \usepackage{fixmath}
}

% Description: Enables the correct use of the comma as
%              a decimal separator in math mode
% Doc: icomma.pdf
\usepackage{icomma}

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

\EndCodeSection{PackagesMath}
```

7.3.6 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.

- `tikz`
- `pgf`
- `pgfplots`
- `pgfplotstable`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}

\input{preamble/fix-pgfplots.tex} % fix bug in pgfplots with \directlua

\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}
%%% 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}
}
```

7.3.7 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.

- `siunitx`
- not recommended: `gensymb`, `upgreek`, `units`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% science packages
```

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

% Description: upright symbols from euler package
%              [Euler] or Adobe Symbols [Symbol]
% Provides:    \upmu
% Doc: upgreek.pdf
%\usepackage[Symbolsmallscale]{upgreek}
% --> Use only if the original font does not provide
%     the necessary upright symbols

% Description: Commands/symbols for both math and text mode
% Provides:    \degree, \celsius, \perthousand, \ohm, \micro
% Incompatible: siunitx
% Requires: Command \upmu
% \IfDefined{upmu}{\usepackage[upmu]{gensymb}}

% Description:  package for setting units in a
%               typographically correct way.
% Incompatible: siunitx
%\usepackage{units}

% 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}
```

7.3.8 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.

- dsfont
- esint
- mathcomp
- euscript
- pifont

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Symbols
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{PackagesSymbols}
%%% General Doc: symbols-a4.pdf
```

```
%
%% Math symbols
\IfPackagesNotLoaded{mathdesign,MnSymbol,MdSymbol}{
  \usepackage{dsfont}   %% Double Stroke Fonts
  \usepackage{amssymb}
}{}
% Futher Math symbols and script fonts
\IfPackagesNotLoaded{MnSymbol,MdSymbol}{
  \usepackage{esint} % generate missing integrals for lmodern
  %
  % provides further symbols of the Text Companion (TC) fonts
  % such as \tcmu, \tcperthousand, \tcdegree
  \usepackage{mathcomp}
  \usepackage[mathcal]{euscript} %% adds euler mathcal font
  \IfPackagesNotLoaded{mdbch}{
    \usepackage{mathrsfs} % script font (\mathscr)
  }{}
}{}

%\usepackage[integrals]{wasysym}

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


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

\EndCodeSection{PackagesSymbols}
```

7.3.9 Table packages

Standard LaTeX tables are just ugly. In order to create good looking or even fancy tables further packages are necessary.

- `booktabs`
- `multirow`, `bigstrut`
- `ltxtable`, `tabularx`, `longtable`
- `tabu`
- `tablestyles`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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
\usepackage{tabu}

% tablestyles
\IfFileExists{tablestyles.sty}{
  \IfDefined{rowcolors}{\usepackage{tablestyles}}%
}{}


\EndCodeSection{PackagesTables}
```

7.3.10 Text related packages

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

- ellipsis
- ulem
- soulutf8
- url
- footmisc
- (chngcntr)
- (tablefootnote)
- varioref
- cleveref
- enumitem

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

```
\BeginCodeSection{PackagesText}

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

%%% 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, ...
% Doc: soulutf8.pdf (loads soul.sty)
\usepackage{soulutf8}

% 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}

%% Description: provides the command \tablefootnote to be used in
%%              a table or sidewaystable environment,
%%              where \footnote will not work.
%% Doc: tablefootnote.pdf
%% Bug: does not work as expected, bug not found so far
%% tablefootnote must be loaded after rotating
%\ExecuteAfterPackage{rotating}{%
% % and after hyperref
% \IfPackageNotLoaded{hyperref}{%
%  \ExecuteAfterPackage{hyperref}{%
%   \usepackage{tablefootnote}%
%  }%
% }{}%
%}%

%%% 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}
```

7.3.11 Quotes

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

- `csquotes`

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

\EndCodeSection{PackagesQuotes}
```

7.3.12 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`.

- biblatex

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

\EndCodeSection{PackagesCitation}
```

7.3.13 Packages for figures, placement and floats

The basic package `graphicx` for figures is already loaded at the beginning as shown in section 7.3.2. Here further packages are loaded that extent the placement and floating

possibilities.

- (`float` - replaced by `floatrow`)
- `wrapfig`
- `flafter`
- `placeins`
- (`floatflt`, unused alternative to `wrapfig`)

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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!
% \usepackage{float}

% 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}
%

%% Description: Floating figures as in wrapfloat
%%               (old LaTeX2e package from 1996)
%% Doc: floatflt.pdf
% \usepackage{floatflt}

\EndCodeSection{PackagesFigures}
```

7.3.14 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`.

- `floatrow`, `fr-fancy`
- `caption`
- `subcaption` (replaces `subfig`)
- `mcaption`
- `rotating`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}[2011/08/06]

%% subfig ist NOT recommended, use subcaption instead
%% Incompatible:
%% - loads package capt-of. Loading of 'capt-of' afterwards will fail therefor
%% - subcaption
%% loads: caption
%% Doc: subfig.pdf
%\usepackage{subfig}

% 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}
```

7.3.15 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.

- `lineno` (unused)

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}
```

7.3.16 Packages for index and other lists

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

- `imakeidx`
- `showidx`
- `glossaries`, `glossary-longragged`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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.)
              % WARNING: does not work in this template,
              % Error "\glswritefiles undefined."
  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}
}
```

```
\EndCodeSection{PackagesIndexes}
```

7.3.17 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`.

- `upquote`
- `verbatim`
- `fancyvrb`
- `listings`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}
```

7.3.18 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.

- `lettrine`
- `boxedminipage`
- `framed`
- `fancybox` (incompatible with fancyvrb)
- `mdframed`

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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 (take out ???)
\usepackage{framed}

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

\EndCodeSection{PackagesFancy}
```

7.3.19 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`.

- `indentation` (unused)
- `multicol`
- `setspace`
- `geometry` (unused)

- `typearea` (automatically loaded)
- `changepage` (unused)

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}
```

7.3.20 Packages for header and footer

The content in the header and footer of a page is defined with package `scrpage2`, with the settings defined in file `preamble/style-scrpage2.tex`.

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

- `scrpage2`
- `pageslts`

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

%%% Doc: scrguide.pdf
\usepackage[%
%%% Lines
   % headtopline,
   % plainheadtopline,
   % headsepline,
   % plainheadsepline,
   % footsepline,
   % plainfootsepline,
   % footbotline,
   % plainfootbotline,
   % ilines,
   % clines,
   % olines,
% column titles (content, style)
   automark,
   % autooneside,% ignore optional argument in automark at oneside
   komastyle,
   % standardstyle,
   % markuppercase,
   % markusedcase,
   nouppercase,
]{scrpage2}


% Description: provides total number of pages (ie. page 7 of 19)
% Provides: \lastpageref{LastPage}
% load after: hyperref
% Doc: pageslts.pdf
\ExecuteAfterPackage{hyperref}{\usepackage{pageslts}}
```

```
\EndCodeSection{PackagesHeadFoot}
```

7.3.21 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.
%%% Doc: titlesec.pdf
\ifcsdef{chapter}
  {\usepackage{titlesec}}
  {\usepackage{titlesec} \csundef{chapter}}


\EndCodeSection{PackagesHeadings}
```

7.3.22 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.

The format of the table of contents and other lists can defined by package `tocstyle`. It is currently unused because it lacks interaction with the `\setkomafont` command. If a manual setting in the table of contents is however not required the usage of this package is still encouraged.

The appendix title can be modified with package `appendix`. In this template it was so far not required, but other users might find its possibilities helpful.

- `titletoc`
- `tocstyle` (unused)
- `appendix` (unused)

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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
\usepackage{titletoc}

% Description: apply different styles for the formating of the
%              table of contents and lists of floats.
%%% Doc: tocstyle.pdf (Koma Script)
%% Alpha package, uses koma fonts (\setkomafont{}{}) only if KOMAlike is selected
%
\usepackage[%
%%% toc width calculation
  tocindentauto,     % all widths at the TOCs are calculated by tocindentauto
%  tocindentmanual,  % opposite of auto
%%% indentation of toc
  tocgraduated,      % standard
%  tocflat,           % no intendation, text aligned
%  tocfullflat,       % no intendation, no alignment
%%%  page breaking rules
  tocbreaksstrict,   % sets a lot of penalties before and after TOC entries
                     % to avoid page break between a TOC entry and it's parent.
%  tocbreakscareless,% allow more page breaks.
%%%  indentation of unnumbered TOC entries
% toctextentriesindented, % unnumbered TOC entrie are indented only as wide
%                         % as the number of numbered TOC entries of the same
%                         % level.
  toctextentriesleft,   % indented as if they have an empty number.
]{tocstyle}

% 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}
```

7.3.23 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`.

- `pdfpages`
- `pdflscape` (unused)
- `microtype`
- `hyperref`
- `bookmark`

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

\BeginCodeSection{PackagesPDF}

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

7.3.24 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 7.3.15.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}
```

7.3.25 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}
```

7.4 preamble/style.tex

7.4.1 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.

7.4.2 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}{gray!30}
\colorlet{tableheadcolor}{gray!25}

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

7.4.3 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}
```

7.4.4 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}{%

%  detect-family,
%  detect-weight,

\sisetup{%
  mode = math, % text is printed using a math font
  detect-all,
  separate-uncertainty=true,
}

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

\let\nicefrac\sfrac

% Emulate units package, sort of
\NewDocumentCommand\unit{om}{%
  \IfNoValueTF{#1}
    {\si{#2}}
    {\SI{#1}{#2}}%
}
\NewDocumentCommand\unitfrac{omm}{%
  \IfNoValueTF{#1}
    {\si{\sfrac{#2}{#3}}}
    {\SI{#1}{\sfrac{#2}{#3}}}%
}

} % end: \IfDefined
```

7.4.5 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=1.5.1}
%% 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
```

7.4.6 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}
```

7.4.7 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}

% removed because of warning - requires more documentation
%\KOMAoptions{%
%   footnotes=multiple% nomultiple
%}

% 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}
```

7.4.8 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}
```

7.4.9 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}

\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

\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{\mkbibnamefirst}{\textsc}
\renewcommand{\mkbibnamelast}{\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}{}

\newbibmacro*{name:bold}[2]{%
  \def\do##1{\ifstrequal{#1, #2}{##1}{\bfseries\listbreak}{}}%
  \dolistloop{\bibboldnames}}

%% # can not be used in patch command because the command is wrapped in another
macro.
%% Therefore we mus 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:last}{\begingroup\usebibmacro{name:bold}{?1}{?2}}{}{}
  \xpretobibmacro{name:first-last}{\begingroup\usebibmacro{name:bold
}{?1}{?2}}{}{}
  \xpretobibmacro{name:last-first}{\begingroup\usebibmacro{name:bold
}{?1}{?2}}{}{}
}%
\xpretobibmacro{name:delim}{\begingroup\normalfont}{}{}
\xapptobibmacro{name:last}{\endgroup}{}{}
\xapptobibmacro{name:first-last}{\endgroup}{}{}
\xapptobibmacro{name:last-first}{\endgroup}{}{}
\xapptobibmacro{name:delim}{\endgroup}{}{}

\DeclareNameAlias{default}{last-first/first-last}
```

```
% 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}
```

7.4.10 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}
```

7.4.11 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
```

7.4.12 Tables

Here new column types are defined if they are not yet defined.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% table packages
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
\BeginCodeSection{StyleTables}

% for Package tabu
\IfDefined{tabulinesep}{%
  \tabulinesep=5pt
}

% 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}}}
}

\EndCodeSection{StyleTables}
```

7.4.13 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
```

7.4.14 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++
}
```

7.4.15 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}
```

7.4.16 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}
```

7.4.17 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}
```

7.4.18 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
}
```

7.4.19 Titlepage

Configuration for the title page.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% Titlepage
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

```
\BeginCodeSection{StyleTitlepage}
\KOMAoptions{%
   titlepage=true % % separate page for title
   %titlepage=false %
}%
\EndCodeSection{StyleTitlepage}
```

7.4.20 Header and footer lines

Configuration of the (automatic) content in header and footer for `scrpage2` defined in file `preamble/style-scrpage2.tex`.

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

\input{preamble/style-scrpage2.tex}

\EndCodeSection{StyleHeadFoot}
```

preamble/style-scrpage2.tex

Configuration of header and footer defined by package `scrpage2`.

```
\IfPackageLoaded{scrpage2}{%

\IfElseDefined{chapter}{%
   \pagestyle{scrheadings} % pages with header
}{
   \pagestyle{scrplain} % pages without header but page numbers
}
%\pagestyle{empty} % empty pages
%
% delete predefined styles
\clearscrheadings
\clearscrplain
%
% 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
\IfDefined{chapter}{%
   % \setheadtopline{} % configures the line above the header
   \setheadsepline{.4pt}[\color{black}] % configures the line below the header
   % \setfootsepline{} % configures the line above the footer
   % \setfootbotline{} % configures the line below the footer
}

%% width of head and foot
\setheadwidth[0pt]{text}
\setfootwidth[0pt]{text}
%   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{scrpage2}
```

7.4.21 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}
```

7.4.22 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}
```

7.4.23 Headings: custom layout

Custom layouts for headings are defined use the package `titlesec` in file `preamble/style-titlesec.tex`.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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}}%

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

\EndCodeSection{StyleHeadingsLayout}
```

preamble/style-titlesec.tex

Changes to the layout of headings with package `titlesec`.

```
\IfPackageLoaded{titlesec}{

%% -> Section with rule below
% --------------------------------
% \titleformat{\section}
%   [hang]%[frame]display
%   {\usekomafont{sectioning}\Large}
%  {\thesection}
%   {6pt}
%   {}
%   [\titlerule \vspace{0.5\baselineskip}]
% --------------------------------

%--> chapter with 'chapter' + number boxed, name below centered
% --------------------------------
% \titleformat{\chapter}[display]     % {command}[shape]
%   {\usekomafont{chapter}\filcenter} % format
%   {                                 % label
%   {\fcolorbox{black}{frameshadecolor}{
%   {\huge\chaptertitlename\mbox{\hspace{1mm}}\thechapter}
%   }}}
%   {1pc}                             % sep (from chapternumber)
```

```
%   {\vspace{1pc}}                    % {before}[after] (before chaptertitle and
after)
%% ---------------------------------

%--> chapter with 'chapter' + number + rule + name + rule
% ---------------------------------
\titleformat{\chapter}[display]                % {command}[shape]
  {\usekomafont{chapter}\Large \color{black}} % format
  {\LARGE\MakeUppercase{\chaptertitlename}%   % label
   \Huge~\thechapter \filright}%
  {1pt}                      % sep (from chapternumber)
  {%
   \titlerule \vspace{0.9pc} %
   \filright
   \IfColorDefined{sectioncolor}{\color{sectioncolor}}{}
  }                                            % (before chaptertitle and after)
  [\color{black} \vspace{0.9pc} \filright {\titlerule}] %
% ---------------------------------

%--> part with 'PART' + number at frame and name inside frame
% ---------------------------------
\titleformat{\part}[frame]
  {\usekomafont{part}\Large\color{black}\centering}    % format
  % label: PART I
  {\enspace \LARGE\MakeUppercase{\partname}%
     \centering \Huge~\thepart \enspace }%
  % sep (from partnumber)
  {1.5\baselineskip}
  % (before chaptertitle and after)
  {\IfColorDefined{sectioncolor}{\color{sectioncolor}}{}%
  \filcenter}

% ---------------------------------

% spacing before and after sections
\titlespacing*{\section}{0pt}{*2.0}{*0.5}
\titlespacing*{\subsection}{0pt}{*1.5}{*0.5}
\titlespacing*{\subsubsection}{0pt}{*1.5}{*0.5}

}% end: \IfPackageLoaded{titlesec}
```

7.4.24 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}

% Setup using tocstyle
\IfPackageLoaded{tocstyle}{
% predefined styles
% \usetocstyle{standard} % A style similar to the standard classes.
%                        % \setkomafont has no effect!
\usetocstyle{KOMAlike} % A style similar to the KOMA-Script classes.
%%             % This is almost the same like standard, but instead
%%             % of bold face \usekomafont { disposition } will be used if
%%             % \usekomafont was defined and sans serif, bold face
%%             % (\sffamily\bfseries) if not.
%%             %
%\usetocstyle{classic}  % Like KOMAlike but all page numbers are set
%%                      % using normal font.
%\usetocstyle{allwithdot}  % Like classic but dots between entry text
%%                         % and page numbers are used at all depths.
%\usetocstyle{noonewithdot} % Like classic but not dots between entry
%%                          % text and page numbers are used.
%\usetocstyle{nopagecolumn} % Like noonewithdot but also the gap between
%                           % text and page numbersis omited.
}

% \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
}

\EndCodeSection{StyleLayoutTOC}
```

7.4.25 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 LaTeXTemplate.tex, see section section 6.3.4 on page 135.

```
\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}
```

7.4.26 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.

```
% ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
% 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
\input{preamble/fix-tabu-onlyamsmath.tex}

% fix Problem with onlyamsmath active $ char
% together with the tikz package
\input{preamble/fix-tikz-onlyamsmath.tex}


% fix problems with framed and marginnote
\input{preamble/fix-framed-marginnote.tex}



% ---------------------------------------------------------------------
\EndCodeSection{StyleFixProblems}
```

preamble/fix-tabu-onlyamsmath.tex

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.

```
% -> 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
```

preamble/fix-framed-marginnote.tex

the placement of margin notes of package `marginnote` is wrong next to frames created by package `framed`. This is corrected here.

```
\IfPackagesLoaded{marginnote, framed}{%
\ifpdftex{%
 \ifpdfoutput{}{%
     \begingroup
         \makeatletter
         \g@addto@macro\framed{%
            \let\marginnoteleftadjust\FrameSep
```

```
            \let\marginnoterightadjust\FrameSep
        }
        \makeatother
    \endgroup
  }% ifpdfoutput
 }{}% ifpdftex
}{}
```

7.5 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.

```
% --| 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}
```

7.6 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}
  \renewcommand{\div}{\text{div}\,}
  \DeclareMathOperator{\Tr}{Tr}
  \DeclareMathOperator{\const}{const}
  \DeclareMathOperator{\e}{e}       % exponatial Function
}

% -- new symbols --
\newcommand{\laplace}{\Delta}
\newcommand{\dalembert}{\Box}
```

7.7 content/hyphenation.tex

Contains all hyphenation patterns inside of the command `\hyphenation`.

```
\hyphenation{multi-pho-ton io-ni-za-tion}
```

7.8 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 `LaTeXTemplate.tex` is described in section 6.4.7 on page 139.

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}{%
\newacronym{MFD}{MFD}{mode field diameter}
\newacronym{CPA}{CPA}{chirped pulse amplification}
\newacronym{NA}{NA}{numerical apertur}
\newacronym{MMI}{MMI}{multi-mode interference}
\newacronym{SLM}{SLM}{spatial light modulator}
\newacronym{LCD}{LCD}{liquid crystal display}
\newacronym{px}{px}{Pixel}
\newacronym{DNA}{DNA}{deoxyribonucleic acid}
\newacronym{DOF}{DOF}{depth of focus}
\newacronym{PSF}{PSF}{point spread function}
\newacronym{SNOM}{SNOM}{scanning nearfield optical microscope}
\newacronym{FWHM}{FWHM}{full width at half maximum}
}%

%%% --- Symbol list entries

%\newglossaryentry{symb:Pi}{%
%  name=$\pi$,%
%  description={mathematical constant},%
%  sort=symbolpi, type=symbolslist%
%}
```

```
%%% --- Glossary entries

%\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)
\forcsvlist{\listadd\bibboldnames}
  {{Pospiech, Matthias}, {Pospiech, M.}}
\printbibliography[env=numbered+bold, heading=none, sorting=ynt, resetnumbers=
true]
\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)
\forcsvlist{\listadd\bibboldnames}
  {{Pospiech, Matthias}, {Pospiech, M.}}
\printbibliography[env=numbered+bold, heading=none, sorting=ynt, resetnumbers=
true]
\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)
\forcsvlist{\listadd\bibboldnames}
  {{Pospiech, Matthias}, {Pospiech, M.}}
\printbibliography[env=numbered+bold, heading=none, sorting=ynt, resetnumbers=
true]
\end{refsection}
%
% standard style
\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. 106).

[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. 106).

[Cot99] Cotton, Frank Albert, Geoffrey Wilkinson, Carlos A. Murillio, and Manfred Bochmann: *Advanced inorganic chemistry*. 6th ed. Chichester: Wiley, 1999 (cit. on p. 106).

[Goo94] Goossens, Michel, Frank Mittelbach, and Alexander Samarin: *The LaTeX Companion*. 1st ed. Reading, Mass.: Addison-Wesley, 1994. 528 pp. (cit. on pp. 105, 106).

[Ham97] Hammond, Christopher: *The basics of crystallography and diffraction*. Oxford: International Union of Crystallography and Oxford University Press, 1997 (cit. on p. 106).

[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. 106).

[Mas04] Massa, Werner: *Crystal structure determination*. 2nd ed. Berlin: Spinger, 2004 (cit. on p. 106).

List of Figures

List of Tables

Listings

APPENDIX A

List of packages loaded

A.1 Sorted list for speed measurement

The packages listed in table A.1 were recorded by adding step by step more code and comparing the log files for changes in the list of packages. The execution times for each part were monitored as well. These numbers are presented in fig. 1.1. Here only .sty files are listed, all further files that are loaded by packages, such as .cfg or .fd files are not included in the list. For a complete list

This evaluation was done during the development of this template and not updated since then. The number of packages is thus not consistent with the current template. A recent list of all packages is presented in appendix A.2

Table A.1: Packages loaded by the template (Version of January 2013)

Section	List of Packages
`LaTeXTemplate.tex`	
LaTeX Kernel	
pre document class	nag.sty, fix-cm.sty
document class	scrbook.cls (scrkbase.sty, scrbase.sty, keyval.sty, scrlfile.sty, tocbasic.sty, typearea.sty)
template packages	etex.sty, codesection.sty, etoolbox.sty, templatetools.sty, ifpdf.sty, ltxcmds.sty, array.sty, ifdraft.sty
encoding (documents)	selinput.sty, inputenc.sty, kvsetkeys.sty, infwarerr.sty, etexcmds.sty, ifluatex.sty, stringenc.sty, pdfescape.sty, pdftexcmds.sty, kvoptions.sty
encoding (files)	grffile.sty, ifxetex.sty, graphics.sty, trig.sty, epstopdf-base.sty, grfext.sty, kvdefinekeys.sty
`fonts/fonts.tex`	

continued on next page . . .

Section	List of Packages
Fonts	cmap.sty, fontenc.sty, textcomp.sty, lmodern.sty
Packages: Base	calc.sty, babel.sty, translator.sty, xcolor.sty, colortbl.sty, graphicx.sty, epstopdf.sty, ragged2e.sty, everysel.sty
Packages: Bugfix	fixltx2e.sty, marginnote.sty, scrhack.sty, marginfix.sty, xspace.sty
preamble/packages.tex	
relsize	relsize.sty
Math	amsmath.sty, amstext.sty, amsgen.sty, amsbsy.sty, amsopn.sty, mathtools.sty, mhsetup.sty, onlyamsmath.sty, braket.sty, cancel.sty, empheq.sty, exscale.sty, fixmath.sty, icomma.sty
Math (using LaTeX 3)	xfrac.sty, l3keys2e.sty, expl3.sty, l3names.sty, l3bootstrap.sty, l3basics.sty, l3expan.sty, l3tl.sty, l3seq.sty, l3int.sty, l3quark.sty, l3prg.sty, l3clist.sty, l3token.sty, l3prop.sty, l3msg.sty, l3file.sty, l3skip.sty, l3keys.sty, l3fp.sty, l3box.sty, l3coffins.sty, l3color.sty, l3luatex.sty, l3candidates.sty, xparse.sty, xtemplate.sty
pgf/tikz	pgf.sty, pgfrcs.sty, everyshi.sty, pgfcore.sty, pgfsys.sty, tikz.sty, pgffor.sty, pgfkeys.sty, pgfplots.sty, pgfplotstable.sty, pgfcalendar.sty
siunitx	siunitx.sty
Symbols	dsfont.sty, esint.sty, mathcomp.sty, euscript.sty, eurosym.sty, pifont.sty
Tables	booktabs.sty, multirow.sty, bigstrut.sty, tabu.sty, varwidth.sty, tablestyles.sty, ltxtable.sty, tabularx.sty
Text	ellipsis.sty, ulem.sty, soulutf8.sty, soul.sty, url.sty, varioref.sty, xr-hyper.sty, enumitem.sty, footmisc.sty, cleveref.sty
Quotes (csquotes)	csquotes.sty
Bibliography (biblatex)	biblatex.sty, biblatex2.sty, logreq.sty, ifthen.sty
Figures	wrapfig.sty, flafter.sty, placeins.sty
Captions	floatrow.sty, caption3.sty, fr-fancy.sty, fancybox.sty, caption.sty, subcaption.sty, mcaption.sty, changepage.sty, rotating.sty, ltcaption.sty, fr-longtable.sty
Index	imakeidx.sty, xkeyval.sty, xpatch.sty, multicol.sty

continued on next page . . .

Section	List of Packages
Glossary	glossaries.sty, mfirstuc.sty, xfor.sty, datatool-base.sty, substr.sty, datatool-fp.sty, fp.sty, defpattern.sty, fp-basic.sty, fp-addons.sty, fp-snap.sty, fp-exp.sty, fp-trigo.sty, fp-pas.sty, fp-random.sty, fp-eqn.sty, fp-upn.sty, fp-eval.sty, glossary-hypernav.sty, glossary-list.sty, glossary-long.sty, glossary-super.sty, supertabular.sty, glossary-tree.sty, glossary-longragged.sty
Verbatim, Listings	upquote.sty, verbatim.sty, fancyvrb.sty, listings.sty, lstmisc.sty
Fancy	lettrine.sty, boxedminipage.sty, framed.sty, mdframed.sty, zref-abspage.sty, zref-base.sty, auxhook.sty, atbegshi.sty
Layout	setspace.sty (multicol.sty)
Head and Foot	scrpage2.sty, pageslts.sty, atveryend.sty, undolabl.sty, rerunfilecheck.sty, uniquecounter.sty, bigintcalc.sty, alphalph.sty, intcalc.sty
Headings	titlesec.sty
PDF	pdfpages.sty, eso-pic.sty, microtype.sty, hyperref.sty, hobsub-hyperref.sty, hobsub-generic.sty, hobsub.sty, ifvtex.sty, intcalc.sty, bigintcalc.sty, bitset.sty, uniquecounter.sty, letltxmacro.sty, hopatch.sty, xcolor-patch.sty, atveryend.sty, refcount.sty, hycolor.sty, bookmark.sty, nameref.sty, gettitlestring.sty
Additional	hyphenat.sty, todonotes.sty, currvita.sty
`preamble/style.tex`	
Style.tex	
`LaTeXTemplate.tex` after \{begin}{document}	
Document	

A.2 Complete File list

The following list is extracted from the log file of `TemplateDocumentation.tex` from the compilation of this document. It thus shows the most recent list of files used.

```
     nag.sty    2011/11/25 0.7 warning about old commands (ulmi)
nag-l2tabu.cfg    2010/05/17 v2.11 l2tabu rules for nag.sty (ulmi)
nag-orthodox.cfg    2006/04/19 v1.8 strict rules for nag.sty (ulmi)
  fix-cm.sty    2014/06/10 v1.1r fixes to LaTeX
  ts1enc.def    2001/06/05 v3.0e (jk/car/fm) Standard LaTeX file
 scrbook.cls    2013/12/19 v3.12 KOMA-Script document class (book)
scrkbase.sty    2013/12/19 v3.12 KOMA-Script package (KOMA-Script-dependent bas
ics and keyval usage)
 scrbase.sty    2013/12/19 v3.12 KOMA-Script package (KOMA-Script-independent b
asics and keyval usage)
  keyval.sty    2014/05/08 v1.15 key=value parser (DPC)
scrlfile.sty    2013/12/19 v3.12 KOMA-Script package (loading files)
tocbasic.sty    2013/12/19 v3.12 KOMA-Script package (handling toc-files)
scrsize11pt.clo    2013/12/19 v3.12 KOMA-Script font size class option (11pt)
typearea.sty    2013/12/19 v3.12 KOMA-Script package (type area)
preamble/packages-SolutionsNoRoomForNewWrite.tex
morewrites.sty    2013/01/08 v0.2e Always room for a new write
   expl3.sty    2014/06/10 v5105 L3 programming layer (loader)
expl3-code.tex    2014/06/10 v5105 L3 programming layer
    etex.sty    1998/03/26 v2.0 eTeX basic definition package (PEB)
l3pdfmode.def    2014/05/06 v4748 L3 Experimental driver: PDF mode
primargs.sty    2013/01/08 v0.2e Parsing arguments of primitives
atbegshi.sty    2011/10/05 v1.16 At begin shipout hook (HO)
infwarerr.sty    2010/04/08 v1.3 Providing info/warning/error messages (HO)
 ltxcmds.sty    2011/11/09 v1.22 LaTeX kernel commands for general use (HO)
   ifpdf.sty    2011/01/30 v2.3 Provides the ifpdf switch (HO)
codesection.sty    2014/06/27 v0.1 disableable code sections
etoolbox.sty    2011/01/03 v2.1 e-TeX tools for LaTeX
templatetools.sty    2014/06/27 v0.1 Collection of conditional commands useful
inside templates
   array.sty    2008/09/09 v2.4c Tabular extension package (FMi)
 ifdraft.sty    2008/08/11 v1.3 Detect class options draft and final (HO)
latexdemo.sty    2012/12/01 v0.1 typeset code and resulting output
listings.sty    2014/03/04 1.5c (Carsten Heinz)
 lstmisc.sty    2014/03/04 1.5c (Carsten Heinz)
listings.cfg    2014/03/04 1.5c listings configuration
  xspace.sty    2009/10/20 v1.13 Space after command names (DPC,MH)
filecontents.sty    2011/10/08 v1.3 Create an external file from within a LaTeX
 document
mdframed.sty    2012/01/09 v1.2a: mdframed
kvoptions.sty    2011/06/30 v3.11 Key value format for package options (HO)
kvsetkeys.sty    2012/04/25 v1.16 Key value parser (HO)
etexcmds.sty    2011/02/16 v1.5 Avoid name clashes with e-TeX commands (HO)
ifluatex.sty    2010/03/01 v1.3 Provides the ifluatex switch (HO)
  xparse.sty    2014/06/10 v5105 L3 Experimental document command parser
```

```
zref-abspage.sty    2012/04/04 v2.24 Module abspage for zref (HO)
zref-base.sty    2012/04/04 v2.24 Module base for zref (HO)
kvdefinekeys.sty    2011/04/07 v1.3 Define keys (HO)
pdftexcmds.sty    2011/11/29 v0.20 Utility functions of pdfTeX for LuaTeX (HO)
 auxhook.sty    2011/03/04 v1.3 Hooks for auxiliary files (HO)
   color.sty    1999/02/16
   color.cfg    2007/01/18 v1.5 color configuration of teTeX/TeXLive
  pdftex.def    2011/05/27 v0.06d Graphics/color for pdfTeX
md-frame-0.mdf    2012/01/09 v1.2a: md-frame-0
  framed.sty    2011/10/22 v 0.96: framed or shaded text with page breaks
selinput.sty    2007/09/09 v1.2 Semi-automatic input encoding detection (HO)
inputenc.sty    2014/04/30 v1.2b Input encoding file
stringenc.sty    2011/12/02 v1.10 Convert strings between diff. encodings (HO)
pdfescape.sty    2011/11/25 v1.13 Implements pdfTeX's escape features (HO)
 ix-name.def    2011/05/27 v1.10 Name list (inputenx)
 se-utf8.def    2011/12/02 v1.10 stringenc: UTF-8
    utf8.def    2008/04/05 v1.1m UTF-8 support for inputenc
   t1enc.dfu    2008/04/05 v1.1m UTF-8 support for inputenc
  ot1enc.dfu    2008/04/05 v1.1m UTF-8 support for inputenc
  omsenc.dfu    2008/04/05 v1.1m UTF-8 support for inputenc
  ts1enc.dfu    2008/04/05 v1.1m UTF-8 support for inputenc
 grffile.sty    2012/04/05 v1.16 Extended file name support for graphics (HO)
 ifxetex.sty    2010/09/12 v0.6 Provides ifxetex conditional
graphics.sty    2009/02/05 v1.0o Standard LaTeX Graphics (DPC,SPQR)
    trig.sty    1999/03/16 v1.09 sin cos tan (DPC)
graphics.cfg    2010/04/23 v1.9 graphics configuration of TeX Live
fonts/fonts.tex
    cmap.sty    2008/03/06 v1.0h CMap support: searchable PDF
 fontenc.sty
   t1enc.def    2005/09/27 v1.99g Standard LaTeX file
textcomp.sty    2005/09/27 v1.99g Standard LaTeX package
 lmodern.sty    2009/10/30 v1.6 Latin Modern Fonts
fonts/fonts-lmodern-sansmath.tex
preamble/packages.tex
    calc.sty    2007/08/22 v4.3 Infix arithmetic (KKT,FJ)
   babel.sty    2014/03/24 3.9k The Babel package
 english.ldf    2012/08/20 v3.3p English support from the babel system
translator.sty    2010/06/12 ver 1.10
translator-language-mappings.tex
  xcolor.sty    2007/01/21 v2.11 LaTeX color extensions (UK)
colortbl.sty    2012/02/13 v1.0a Color table columns (DPC)
dvipsnam.def    2014/04/23 v3.0j Driver-dependant file (DPC,SPQR)
graphicx.sty    2014/04/25 v1.0g Enhanced LaTeX Graphics (DPC,SPQR)
epstopdf.sty    2010/02/09 v2.5 Conversion with epstopdf on the fly (HO)
epstopdf-base.sty    2010/02/09 v2.5 Base part for package epstopdf
  grfext.sty    2010/08/19 v1.1 Manage graphics extensions (HO)
epstopdf-sys.cfg    2010/07/13 v1.3 Configuration of (r)epstopdf for TeX Live
ragged2e.sty    2009/05/21 v2.1 ragged2e Package (MS)
everysel.sty    2011/10/28 v1.2 EverySelectfont Package (MS)
```

```
fixltx2e.sty    2014/06/10 v1.1r fixes to LaTeX
marginnote.sty    2012/03/29 v1.1i non floating margin notes for LaTeX
 scrhack.sty    2013/12/19 v3.12 KOMA-Script package
listings.hak    2013/12/19 v3.12 KOMA-Script package (hacking package listings)

marginfix.sty    2013/09/08 v1.1 Fix Margin Paragraphs
 relsize.sty    2013/03/29 ver 4.1
 amsmath.sty    2013/01/14 v2.14 AMS math features
 amstext.sty    2000/06/29 v2.01
  amsgen.sty    1999/11/30 v2.0
  amsbsy.sty    1999/11/29 v1.2d
  amsopn.sty    1999/12/14 v2.01 operator names
mathtools.sty    2014/05/21 v1.14 mathematical typesetting tools
 mhsetup.sty    2010/01/21 v1.2a programming setup (MH)
onlyamsmath.sty    2012/01/01 v0.10 Destroy the standard math environments
  braket.sty
  cancel.sty    2013/04/12 v2.2 Cancel math terms
  empheq.sty    2013/02/12 v2.13 Emphasizing equations
 exscale.sty    2007/10/29 v2.1h Standard LaTeX package exscale
 fixmath.sty    2000/04/11 v0.9 (WaS)
  icomma.sty    2002/03/10 v2.0 (WaS)
   xfrac.sty    2014/05/04 v4728 L3 Experimental split-level fractions
l3keys2e.sty    2014/06/10 v5105 LaTeX2e option processing using LaTeX3 keys
xtemplate.sty    2014/06/10 v5105 L3 Experimental prototype document functions
preamble/packages-tikzpgf.tex
     pgf.sty    2013/12/18 v3.0.0 (rcs-revision 1.14)
  pgfrcs.sty    2013/12/20 v3.0.0 (rcs-revision 1.28)
everyshi.sty    2001/05/15 v3.00 EveryShipout Package (MS)
  pgfrcs.code.tex
 pgfcore.sty    2010/04/11 v3.0.0 (rcs-revision 1.7)
  pgfsys.sty    2013/11/30 v3.0.0 (rcs-revision 1.47)
  pgfsys.code.tex
pgfsyssoftpath.code.tex    2013/09/09  (rcs-revision 1.9)
pgfsysprotocol.code.tex    2006/10/16  (rcs-revision 1.4)
 pgfcore.code.tex
pgfcomp-version-0-65.sty    2007/07/03 v3.0.0 (rcs-revision 1.7)
pgfcomp-version-1-18.sty    2007/07/23 v3.0.0 (rcs-revision 1.1)
    tikz.sty    2013/12/13 v3.0.0 (rcs-revision 1.142)
  pgffor.sty    2013/12/13 v3.0.0 (rcs-revision 1.25)
 pgfkeys.sty
 pgfkeys.code.tex
 pgfmath.sty
 pgfmath.code.tex
  pgffor.code.tex
    tikz.code.tex
pgfplots.sty    2014/02/28 v1.10 Data Visualization (1.10-2-gb39fe75)
pgfplotstable.sty    2014/02/28 v1.10 Table typesetting and Pretty-printing (1.
10-2-gb39fe75)
pgfcalendar.sty
```

```
pgfcalendar.code.tex    2007/07/23 v3.0.0 (rcs-revision 1.11)
preamble/fix-pgfplots.tex
 siunitx.sty    2013/07/31 v2.5s A comprehensive (SI) units package
  dsfont.sty    1995/08/01 v0.1 Double stroke roman fonts
 amssymb.sty    2013/01/14 v3.01 AMS font symbols
amsfonts.sty    2013/01/14 v3.01 Basic AMSFonts support
   esint.sty
mathcomp.sty    2001/01/07 v0.1f (TBo)
euscript.sty    2009/06/22 v3.00 Euler Script fonts
mathrsfs.sty    1996/01/01 Math RSFS package v1.0 (jk)
 eurosym.sty    1998/08/06 v1.1 European currency symbol ``Euro''
  pifont.sty    2005/04/12 PSNFSS-v9.2a Pi font support (SPQR)
    upzd.fd    2001/06/04 font definitions for U/pzd.
    upsy.fd    2001/06/04 font definitions for U/psy.
booktabs.sty    2005/04/14 v1.61803 publication quality tables
multirow.sty
bigstrut.sty
    tabu.sty    2011/02/26 v2.8 - flexible LaTeX tabulars (FC)
varwidth.sty    2009/03/30 ver 0.92;  Variable-width minipages
tablestyles.sty    2011/10/01 v0.1 tablestyles
ellipsis.sty    2004/9/28 v1.6 ellipsis: fixes spacing around \global\let .\ker
n \fontdimen 3\font .\kern \fontdimen 3\font .\kern \fontdimen 3\font .\kern \f
ontdimen 3\font .\kern \fontdimen 3\font .\kern \fontdimen 3\font .\kern \fontd
imen 3\font .\kern \fontdimen 3\font .\kern \fontdimen 3\font
    ulem.sty    2012/05/18
soulutf8.sty    2007/09/09 v1.0 Permit use of UTF-8 characters in soul (HO)
    soul.sty    2003/11/17 v2.4 letterspacing/underlining (mf)
     url.sty    2013/09/16  ver 3.4  Verb mode for urls, etc.
varioref.sty    2011/10/02 v1.4z package for extended references (FMi)
xr-hyper.sty    2000/03/22 v6.00beta4 eXternal References (DPC)
enumitem.sty    2011/09/28 v3.5.2 Customized lists
csquotes.sty    2011/10/22 v5.1d context-sensitive quotations
csquotes.def    2011/10/22 v5.1d csquotes generic definitions
csquotes.cfg
biblatex.sty    2014/06/25 v2.9a programmable bibliographies (PK/JW/AB)
biblatex2.sty    2014/06/25 v2.9a programmable bibliographies (biber) (PK/JW/AB
)
  logreq.sty    2010/08/04 v1.0 xml request logger
  logreq.def    2010/08/04 v1.0 logreq spec v1.0
  ifthen.sty    2001/05/26 v1.1c Standard LaTeX ifthen package (DPC)
  blx-dm.def
alphabetic.dbx
biblatex-dm.cfg
blx-compat.def    2014/06/25 v2.9a biblatex compatibility (PK/JW/AB)
biblatex.def
blx-natbib.def    2014/06/25 v2.9a biblatex compatibility (PK/JW/AB)
standard.bbx    2014/06/25 v2.9a biblatex bibliography style (PK/JW/AB)
alphabetic.bbx    2014/06/25 v2.9a biblatex bibliography style (PK/JW/AB)
alphabetic.cbx    2014/06/25 v2.9a biblatex citation style (PK/JW/AB)
```

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biblatex.cfg
 wrapfig.sty    2003/01/31  v 3.6
 flafter.sty    2014/04/24 v1.2n 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    2013/05/02 v1.6-88 caption3 kernel (AR)
floatrow.hak    2013/12/19 v3.12 KOMA-Script package (hacking package floatrow)
fr-fancy.sty    2007/11/28 v0.1i floatrow: fancy boxes
fancybox.sty    2010/05/15 1.4
 caption.sty    2013/05/02 v3.3-89 Customizing captions (AR)
subcaption.sty    2013/02/03 v1.1-62 Sub-captions (AR)
mcaption.sty    2009/03/13 v3.0 Put captions into the outer document margin (SH
changepage.sty    2009/10/20 v1.0c check page and change page layout
rotating.sty    2009/03/28 v2.16a rotated objects in LaTeX
imakeidx.sty    2013/07/11 v1.3a Package for typesetting indices in a synchrono
us mode
 xkeyval.sty    2014/05/25 v2.7 package option processing (HA)
 xkeyval.tex    2014/05/25 v2.7 key=value parser (HA)
  xpatch.sty    2012/10/02 v0.3 Extending etoolbox patching commands
multicol.sty    2014/04/23 v1.8e multicolumn formatting (FMi)
 upquote.sty    2012/04/19 v1.3 upright-quote and grave-accent glyphs in verbat
im
verbatim.sty    2003/08/22 v1.5q LaTeX2e package for verbatim enhancements
lettrine.sty    2013/03/14 v1.64 (Daniel Flipo)
lettrine.cfg
boxedminipage.sty
setspace.sty    2011/12/19 v6.7a set line spacing
footmisc.sty    2011/06/06 v5.5b a miscellany of footnote facilities
scrpage2.sty    2013/12/19 v3.12 KOMA-Script package (page head and foot)
titlesec.sty    2011/12/15 v2.10.0 Sectioning titles
titletoc.sty    2011/12/15 v1.6 TOC entries
tocstyle.sty    2013/08/11 v0.2e-alpha LaTeX2e KOMA-Script package (versatile t
oc styles)
pdfpages.sty    2013/08/25 v0.4v Insert pages of external PDF documents (AM)
 eso-pic.sty    2013/10/06 v2.0d eso-pic (RN)
pppdftex.def    2013/08/25 v0.4v Pdfpages driver for pdfTeX (AM)
microtype.sty    2013/05/23 v2.5a Micro-typographical refinements (RS)
microtype-pdftex.def    2013/05/23 v2.5a Definitions specific to pdftex (RS)
microtype.cfg    2013/05/23 v2.5a microtype main configuration file (RS)
hyperref.sty    2012/11/06 v6.83m Hypertext links for LaTeX
hobsub-hyperref.sty    2012/05/28 v1.13 Bundle oberdiek, subset hyperref (HO)
hobsub-generic.sty    2012/05/28 v1.13 Bundle oberdiek, subset generic (HO)
  hobsub.sty    2012/05/28 v1.13 Construct package bundles (HO)
  ifvtex.sty    2010/03/01 v1.5 Detect VTeX and its facilities (HO)
 intcalc.sty    2007/09/27 v1.1 Expandable calculations with integers (HO)
bigintcalc.sty    2012/04/08 v1.3 Expandable calculations on big integers (HO)
  bitset.sty    2011/01/30 v1.1 Handle bit-vector datatype (HO)
uniquecounter.sty    2011/01/30 v1.2 Provide unlimited unique counter (HO)
letltxmacro.sty    2010/09/02 v1.4 Let assignment for LaTeX macros (HO)
```

```
 hopatch.sty    2012/05/28 v1.2 Wrapper for package hooks (HO)
xcolor-patch.sty    2011/01/30 xcolor patch
atveryend.sty    2011/06/30 v1.8 Hooks at the very end of document (HO)
refcount.sty    2011/10/16 v3.4 Data extraction from label references (HO)
 hycolor.sty    2011/01/30 v1.7 Color options for hyperref/bookmark (HO)
  pd1enc.def    2012/11/06 v6.83m Hyperref: PDFDocEncoding definition (HO)
hyperref.cfg    2002/06/06 v1.2 hyperref configuration of TeXLive
 hpdftex.def    2012/11/06 v6.83m Hyperref driver for pdfTeX
rerunfilecheck.sty    2011/04/15 v1.7 Rerun checks for auxiliary files (HO)
ltxtable.sty    1995/12/11 v0.2 longtable/tabularx merge (DPC)
tabularx.sty    2014/05/13 v2.10 `tabularx' package (DPC)
longtable.sty    2004/02/01 v4.11 Multi-page Table package (DPC)
cleveref.sty    2013/12/28 v0.19 Intelligent cross-referencing
glossaries.sty    2014/04/04 v4.07 (NLCT)
mfirstuc.sty    2013/11/04 v1.08 (NLCT)
textcase.sty    2004/10/07 v0.07 Text only upper/lower case changing (DPC)
    xfor.sty    2009/02/05 v1.05 (NLCT)
datatool-base.sty    2014/06/10 v2.22 (NLCT)
  substr.sty    2009/10/20 v1.2 Handle substrings
datatool-fp.sty    2013/08/29 v2.17 (NLCT)
      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
glossaries-compatible-307.sty    2013/11/14 v4.0 (NLCT)
glossary-hypernav.sty    2013/11/14 v4.0 (NLCT)
glossary-list.sty    2013/11/14 v4.0 (NLCT)
glossary-long.sty    2013/11/14 v4.0 (NLCT)
glossary-super.sty    2013/11/14 v4.0 (NLCT)
supertabular.sty    2004/02/20 v4.1e the supertabular environment
glossary-tree.sty    2014/03/06 v4.04 (NLCT)
glossary-longragged.sty    2013/11/14 v4.0 (NLCT)
pageslts.sty    2014/01/19 v1.2c Refers to special pages' numbers/names (HMM)
undolabl.sty    2012/01/01 v1.0k Overriding labels (HMM)
alphalph.sty    2011/05/13 v2.4 Convert numbers to letters (HO)
bookmark.sty    2011/12/02 v1.24 PDF bookmarks (HO)
bkm-pdftex.def    2011/12/02 v1.24 bookmark driver for pdfTeX (HO)
hyphenat.sty    2009/09/02 v2.3c hyphenation utilities
todonotes.sty    2012/07/25
currvita.sty    1999/09/13 v0.9i Typesetting a Curriculum Vitae
lastpackage.sty    2014/06/27 v0.1 Empty package used for executing code after
```

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this package
preamble/style.tex
preamble/style-siunitx.tex
preamble/style-pgfplots.tex
preamble/style-biblatex.tex
preamble/style-biblatex-alpha.tex
preamble/style-caption.tex
preamble/style-floatrow.tex
preamble/style-index.tex
preamble/style-glossaries.tex
preamble/style-listings.tex
preamble/listings-latex.tex
preamble/listings-latex-texcs.tex
lstlang1.sty    2014/03/04 1.5c listings language file
lstlang2.sty    2014/03/04 1.5c listings language file
lstlang3.sty    2014/03/04 1.5c listings language file
preamble/listings-cpp.tex
   t1lmr.fd    2009/10/30 v1.6 Font defs for Latin Modern
preamble/style-scrpage2.tex
preamble/style-titlesec.tex
   frame.tss    2011/12/15
preamble/style-titletoc.tex
preamble/style-hyperref.tex
preamble/style-references.tex
preamble/fix-tabu-onlyamsmath.tex
preamble/fix-tikz-onlyamsmath.tex
preamble/fix-framed-marginnote.tex
preamble/commands.tex
macros/newcommands.tex
content/hyphenation.tex
preamble/makeCommands.tex
doc/demo/glossariesEntries.tex
demo-glossaries-acronym.tex
demo-glossaries-Symbolslist.tex
demo-glossaries-Glossary.tex
 english.lbx    2014/06/25 v2.9a biblatex localization (PK/JW/AB)
supp-pdf.mkii
doctools.sty    2012/12/01 v0.1 commands and packages for documenting LaTeX Cod
e
kvoptions-patch.sty    2011/06/30 v3.11 LaTeX patch for keyval options (HO)
 xstring.sty    2013/10/13  v1.7c  String manipulations (C Tellechea)
translator-months-dictionary-English.dict
translator-basic-dictionary-English.dict
glossaries-dictionary-English.dict
siunitx-abbreviations.cfg    2013/07/31 v2.5s siunitx: Abbreviated units
TemplateDocumentation.bbl
ltcaption.sty    2013/02/03 v1.3-62 longtable captions (AR)
fr-longtable.sty    2007/11/28 v0.1b (beta) floatrow: additions for longtable
  ot1lmr.fd    2009/10/30 v1.6 Font defs for Latin Modern
```

```
  omllmm.fd    2009/10/30 v1.6 Font defs for Latin Modern
 omslmsy.fd    2009/10/30 v1.6 Font defs for Latin Modern
    umsa.fd    2013/01/14 v3.01 AMS symbols A
    umsb.fd    2013/01/14 v3.01 AMS symbols B
  uesint.fd
   ursfs.fd    1998/03/24 rsfs font definition file (jk)
  mt-cmr.cfg    2013/05/19 v2.2 microtype config. file: Computer Modern Roman (
RS)
 nameref.sty    2012/10/27 v2.43 Cross-referencing by name of section
gettitlestring.sty    2010/12/03 v1.4 Cleanup title references (HO)
  t1lmtt.fd    2009/10/30 v1.6 Font defs for Latin Modern
 ot1lmss.fd    2009/10/30 v1.6 Font defs for Latin Modern
 ot1lmtt.fd    2009/10/30 v1.6 Font defs for Latin Modern
doc/0-title.tex
  mt-msa.cfg    2006/02/04 v1.1 microtype config. file: AMS symbols (a) (RS)
  mt-msb.cfg    2005/06/01 v1.0 microtype config. file: AMS symbols (b) (RS)
 version.txt
  t1lmss.fd    2009/10/30 v1.6 Font defs for Latin Modern
doc/doc-introduction.tex
  ts1lmr.fd    2009/10/30 v1.6 Font defs for Latin Modern
doc/plot.executiontimes.tex
 ts1lmtt.fd    2009/10/30 v1.6 Font defs for Latin Modern
se-iso-8859-1.def    2011/12/02 v1.10 stringenc: ISO-8859-1
fonts/fontsample - Latin Modern Family.pdf
fonts/fontsample - Charter-Bera Sans-Luxi Mono.pdf
fonts/fontsample - Garamond-Bera Sans-Luxi Mono.pdf
fonts/fontsample - Fourier (Utopia)-Latin Modern (Sans and Typewriter).pdf
fonts/fontsample - Palantino-Arial-Courier.pdf
fonts/fontsample - Times-Arial-Courier.pdf
doc/demo/demo.tex
doc/demo/democode.tex
images/testimage.png
content/longtable.tex
    ueus.fd    2013/01/14 v3.01 Euler Script
  mt-eus.cfg    2006/07/28 v1.2 microtype config. file: AMS Euler Script (RS)
  udsrom.fd
TemplateDocumentation.acr
TemplateDocumentation.syi
TemplateDocumentation.gls
doc/doc-code-filled.tex
LaTeXTemplate.tex
fonts/fonts-MinionPro.tex
fonts/fonts-MyriadPro.tex
preamble/style-geometry.tex
content/Z-GlossaryEntries.tex
content/Z-Declaration.tex
content/Z-Appendix.tex
content/Z-Publications.tex
content/Z-CV.tex
```

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content/Z-Thanks.tex
content/Z-Todo.tex
doc/doc-z-appendix.tex
doc/history.tex
TemplateDocumentation.ind
```

APPENDIX 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.

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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