

L^AT_EX THESIS TEMPLATE

Documentation

Version 3.2.1

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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PART I

User documentation

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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.

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

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

1.1 Target Users

This template was developed with all sorts of structured documents in mind that require a good citation and reference framework with a customizable layout. It has so far been used for bachelor, master and phd-thesis as well as the thesis of teachers in their practical year. These 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 [1.3.2](#).

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

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

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

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

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

1.2 Features of the template

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

1.2.1 Template features

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

Separation between function and layout

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

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

Documentation of the code

All code was included with a minimal documentation. Packages are loaded with a short description and important information about package loading orders (if necessary). The

code of the style modifications is also documented to some extent. If a certain code segment should be incomprehensible this should be reported as a bug.

Extensive options

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

Comprehensive documentation

The documentation of this template is very comprehensive. The code itself is documented as much as possible and necessary. Furthermore this documentation document provides an overview of the features and configuration possibilities (part I), a large collection of L^AT_EX 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 taken into consideration by putting all packages in the correct loading order and by preventing packages to load if this would raise an error.

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

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

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

1.2.2 Document features

This template provides all methods (commands, environments, work flows) that are required for a complex scientific document. This is realized by loading a large number of relevant and modern packages of L^AT_EX. 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`).

1.2.3 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 preamble¹, 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.

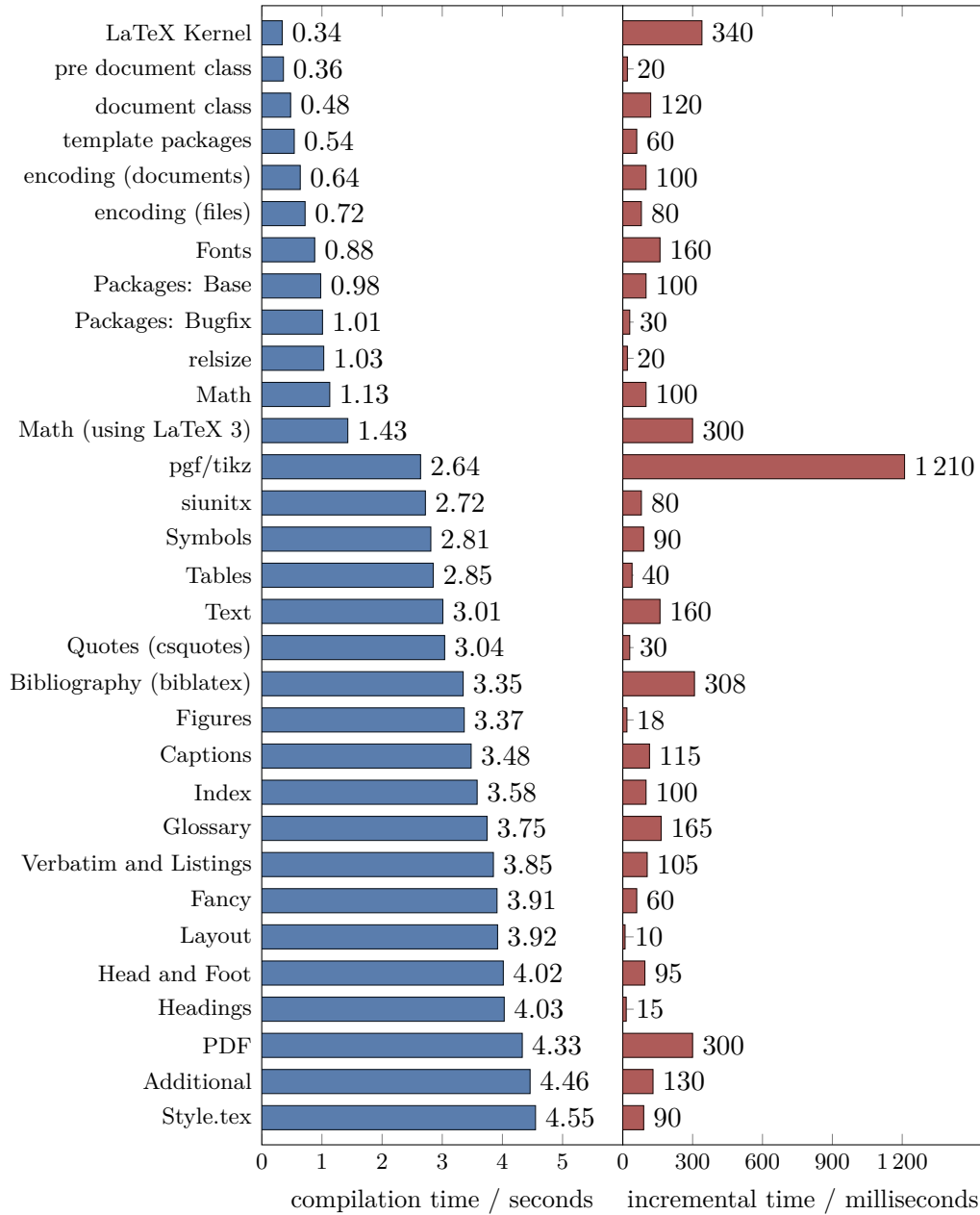


Figure 1.1: Execution times of the template divided into compilation steps. The largest execution times come from the major packages. The packages loaded in each step are listed in table A.1. Note that these times were measured with the packages loaded by the version of January 2013.

1.3 Tutorial - how to start

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

1.3.1 Configure Editor and System Settings

The 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: äüößè 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`.

L^AT_EX 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.

1.3.2 Configure the document

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

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

This is realized by changing the document class to `scrartcl` (main file at the `\documentclass` definition). The default class in this template is `scrbook`, which should not be changed for documents such as bachelor, master and phd thesis.

- The language of the text is chosen in the options of the documentclass. The default language is `english`. The setting for new German orthography is `ngerman`. Other language options are documented in the babel documentation: [babel.pdf](#)
- The double vs. single side printing is a bit more hidden in the file `preamble/style.tex` under the section *Page Layout Options*. To change to single side printing change the option `twoside` from `true` to `false`.

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

1.3.3 Start Writing your content

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

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

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

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

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

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

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

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

CHAPTER 2

Settings, locations, questions and solutions

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

2.1 Layout and style configuration

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

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

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

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

Setting	Option/Value	Location
Options in file: <code>LaTeXTemplate.tex</code>		
paper size	<code>paper=a4</code>	option of <code>\documentclass</code>
language	<code>english</code>	option of <code>\documentclass</code>
font size	<code>fontsize=11pt</code>	option of <code>\documentclass</code>
color of hyperlinks	<code>\UseDefinition{Target}{We}</code>	Section: Configurations
page layout in the pdf view	<code>pdfpagelayout</code>	Section: Configurations
Options in file: <code>preamble/packages.tex</code>		

continued on next page ...

Setting	Option/Value	Location
equation position	<code>fleqn</code>	Section: PackagesMath
quotation style	<code>german=quotes</code>	Section: PackagesQuotes
citation style	<code>style=alphabetic</code>	Section: PackagesCitation
bibliography backend	<code>backend=biber</code>	Section: PackagesCitation
header and footer	<code>automark,komastyle</code>	Section: PackagesHeadFoot
backlinks in the bibliography	<code>backref=page</code>	Section: PackagesPDF
Settings and options in file: preamble/style.tex		
url font	<code>\urlstyle{tt}</code>	Section: StyleText
threshold for <code>\blockquote</code>	<code>\SetBlockThreshold{2}</code>	Section: StyleQuotes
numbering of figures	<code>\numberwithin{figure}</code>	Section: StyleCaptions
paragraph skip or indentation	<code>parskip=false</code>	Section: StyleParagraph
line spacing	<code>\onehalfspacing</code>	Section: StyleLineSpacing
size of text body	<code>DIV=11</code>	Section: StylePageLayout
binding correction	<code>BCOR=10mm</code>	Section: StylePageLayout
single/two side layout	<code>twoside=true</code>	Section: StylePageLayout
separate title page	<code>titlepage=true</code>	Section: StyleTitlepage
sections numbering depth	<code>\setcounter{secnumdepth}{}</code>	Section: StyleHeadings
headings size	<code>headings=small</code>	Section: StyleHeadings
chapter prefix	<code>headings=nochapterprefix</code>	Section: StyleHeadings
heading fonts	<code>\setkomafont{sectioning}</code>	Section: StyleHeadingsFonts
toc numbering depth	<code>\setcounter{tocdepth}{3}</code>	Section: StyleLayoutTOC
bibliography in TOC	<code>bibliography=totoc</code>	Section: StyleLayoutTOC
index in TOC	<code>index=nottotoc</code>	Section: StyleLayoutTOC
LOF in TOC	<code>listof=notoc</code>	Section: StyleLayoutTOC

Table 2.2: Links to files for package configurations

Package / Topic	File
siunitx	preamble/style-siunitx.tex
pgfplots	preamble/style-pgfplots.tex
biblatex	preamble/style-biblatex.tex
biblatex style	preamble/style-biblatex-alpha.tex
caption, subcaption, subfig	preamble/style-caption.tex
floatrow	preamble/style-floatrow.tex
imakeidx	preamble/style-index.tex
glossaries	preamble/style-glossaries.tex
listings	preamble/style-listings.tex
geometry	preamble/style-geometry.tex
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 (pdf \LaTeX), 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.

2.3 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 L^AT_EX 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-Summary`
- `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 tocsyle: This is an alpha version

Package tocsyle prints out the following warning:

```
Package tocsyle Warning: THIS IS AN ALPHA VERSION!
(tocsyle)                USAGE OF THIS VERSION IS ON YOUR OWN RISK!
(tocsyle)                EVERYTHING MAY HAPPEN!
(tocsyle)                EVERYTHING MAY CHANGE IN FUTURE!
(tocsyle)                THERE IS NO SUPPORT, IF YOU USE THIS PACKAGE!
(tocsyle)                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 safely ignored, see <http://tex.stackexchange.com/questions/73767/warning-about-pdfpages-with-hyperref> 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 L^AT_EX at a very basic level and can thus cause incompatibilities. For `scrwfile` it is known 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 L^AT_EX 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 L^AT_EX 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	<code>\usepackage{lmodern}</code>	(see below)
Bera	<code>\usepackage{bera}</code>	(see below)
CM-Bright	<code>\usepackage{cmbright}</code>	(see below)
Latin Modern font family		
LM Roman	<code>\renewcommand{\rmdefault}{lmr}</code>	lmr
LM Sans	<code>\renewcommand{\sfdefault}{lmss}</code>	lmss
LM Mono	<code>\renewcommand{\ttdefault}{lmtt}</code>	lmtt
Bera font family		
Bera Serif	<code>\usepackage{beraserif}</code>	fve

continued on next page ...

Font	Loading command	Family
Bera Sans	<code>\usepackage{berasans}</code>	fvs
Bera Mono	<code>\usepackage{beramono}</code>	fvm
CmBright font family		
CmBright Mono	<code>\renewcommand{\ttdefault}{cmtl}</code>	cmtl
CmBright Sans	<code>\renewcommand{\sfdefault}{cmbr}</code>	cmbr
Fonts in the PSNFSS collection (Type 1 postscript fonts)		
Times	<code>\usepackage{mathptmx}</code>	ptm
Helvetica	<code>\usepackage{helvet}</code>	phv
Courier	<code>\usepackage{courier}</code>	pcr
Palantino	<code>\usepackage{mathpazo}</code>	pplx, pplj
Charter	<code>\usepackage{charter}</code>	bch
Bookman	<code>\usepackage{bookman}</code>	pbk
New Century Schoolbook	<code>\usepackage{newcent}</code>	pnc
Avantgarde	<code>\usepackage{avantgar}</code>	pag
Zapf Chancery	<code>\usepackage{chancery}</code>	pzc
Fonts supplied by the getnonfreefonts script		
Arial (URW)	<code>\usepackage{uarial}</code>	ual
Classico (URW)	<code>\renewcommand{\sfdefault}{uop}</code>	uop
DayRoman	<code>\renewcommand{\rmdefault}{dayrom}</code>	dayrom
GaramondNo8 (URW)	<code>\renewcomamnd{\rmdefault}{ugm}</code>	ugm
LetterGothic (URW)	<code>\usepackage{ulgothic}</code>	ulg
Luxi Mono	<code>\usepackage{luximono}</code>	ul9
Other Type 1 postscript fonts		
Fourier	<code>\usepackage{fourier}</code>	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	<code>\usepackage{optima}</code>	pop, popm
Adobe Aldus	<code>\renewcommand\rmdefault{pasx}</code>	pasx, pasj
Adobe Garamond	<code>\usepackage{xagaramon}</code>	padx, padj
Adobe Stempel Garamond	<code>\renewcommand{\rmdefault}{pegx}</code>	pegx, pegj
Adobe Melior	<code>\renewcommand{\rmdefault}{pml}</code>	pml
Adobe Minion	<code>\usepackage{minion}</code>	pmnx, pmnj
Adobe Sabon	<code>\renewcommand{\rmdefault}{psbx}</code>	psbx, psbj
Adobe Times	<code>\renewcommand{\rmdefault}{ptmx}</code>	ptmx, ptmj
Adobe Rotis Serif	<code>\renewcommand{\rmdefault}{pro}</code>	pro
Adobe Rotis Semi-Serif	<code>\renewcommand{\rmdefault}{pr1}</code>	pr1
Linotype Meridien	<code>\renewcommand{\rmdefault}{lmd}</code>	lmd
Linotype ITC Charter	<code>\renewcommand{\rmdefault}{lch}</code>	lch
Sans serif fonts		
Adobe Frutiger	<code>\usepackage{frutiger}</code>	pfr
Adobe Futura	<code>\usepackage{futura}</code>	pfu
Adobe Gill Sans	<code>\usepackage{gillsans}</code>	pgs
Adobe Myriad	<code>\renewcommand{\sfdefault}{pmy}</code>	pmy, pmyc
Adobe Syntax	<code>\usepackage{asyntax}</code>	psx
Adobe Rotis Sans	<code>\renewcommand{\sfdefault}{pr4}</code>	pr4
Adobe Rotis Semi-Sans	<code>\renewcommand{\sfdefault}{pr3}</code>	pr3
Linotype ITC Officina Sans	<code>\renewcommand{\sfdefault}{lo9}</code>	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)	<code>\usepackage[bitstream-charter]{mathdesign}</code>
Garamond (URW)	<code>\usepackage[urw-garamond]{mathdesign}</code>
Latin Modern	<code>\usepackage{lmodern}</code>
New Century Schoolbook	<code>\usepackage{fouriernc}</code>
Times (Nimbus Roman (URW))	<code>\usepackage{mathptmx}</code>
Palatino	<code>\usepackage[sc]{mathpazo}</code>
Utopia (Fourier)	<code>\usepackage{fourier}</code>
Adobe Minion	<code>\usepackage{MnSymbol}</code>
Adobe Myriad	<code>\usepackage{MdSymbol}</code>
Euler	<code>\usepackage{eulervm}</code>

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

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Math formulas

These math formulas are taken from [wikipedia.org](https://www.wikipedia.org). They show well known formulas used in math and physics.

Green's theorem

$$\iiint_{\mathcal{V}} [u \nabla^2 v + (\nabla u, \nabla v)] d^3 V = \oint_{\mathcal{S}} u \frac{\partial v}{\partial n} d^2 A \quad (0.1)$$

Jacobian matrix

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

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		Properties of fused silica	
description	property	description	property
density	$\rho = 2.2 \text{ g/cm}^3$	density	$\rho = 2.2 \text{ g/cm}^3$
heat capacity	$c_p = 703 \text{ J/gK}$	heat capacity	$c_p = 703 \text{ J/gK}$
transmission	185 - 2500 nm	transmission	185 - 2500 nm

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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$$\iiint_{\mathcal{V}} [u \nabla^2 v + (\nabla u, \nabla v)] d^3V = \oint_{\mathcal{S}} u \frac{\partial v}{\partial n} d^2A \quad (0.1)$$

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Tables

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Properties of fused silica

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density	$\rho = 2.2 \text{ g/cm}^3$
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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 afford it, combine with commercial
%       sans fonts like: Syntax, Frutiger or Thesis
%       (but then also use the commercial Garamond ...)
```

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Tables

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Properties of fused silica

description	property
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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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Tables

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Properties of fused silica

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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

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Properties of fused silica

description	property
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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

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

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PART II

LaTeX Examples

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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 L^AT_EX code example may also work in any other L^AT_EX 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 packages¹ 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 L^AT_EX standard commands

Code:

```
The standard commands for font attributes:
```

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

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

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,
u n d e r l i n i n g,
~~o v e r s t r i k i n g~~
and **h i g h l i g h t i n g**.

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 Ipsum,
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 Ipsum, 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 `[\langle left \rangle]{\langle right \rangle}`, 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 consectetur 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, consectetur
eget, congue at, feugiat et, elit. Praesent sem. Curabitur interdum placerat
odio.
\end{multicols}
```

Result:

Text with three columns created with package multicol		
<p>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 consectetur dignissim,</p>	<p>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 dignis-</p>	<p>sim, 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, consectetur eget, congue at, feugiat et, elit. Praesent sem. Curabitur interdum placerat odio.</p>

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.
%
  \end{itemize}

```

```

\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:

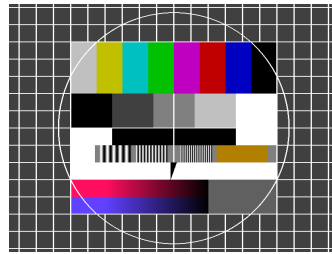


Figure 5.1: Long figure caption displayed in the document.

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:

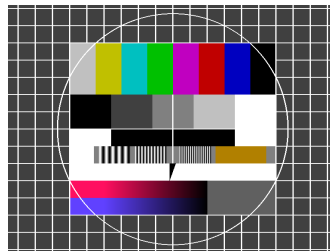


Figure 5.2: An example for a caption without a figure environment

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:

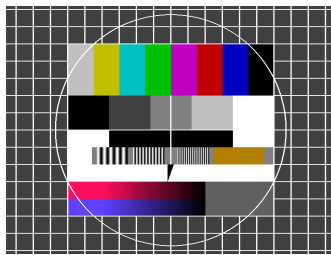


Figure 5.3: Another example for a caption without a figure environment

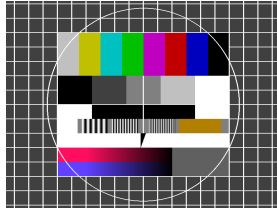
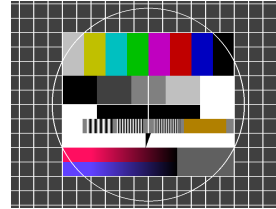
5.7.4 parallel figures with minipages

The minipage environment can be used to display figures in parallel. However if the floatrow package is loaded the standard L^AT_EX 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

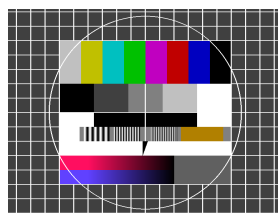
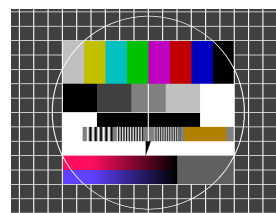
5.7.5 subcaption in minipages (caption)

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

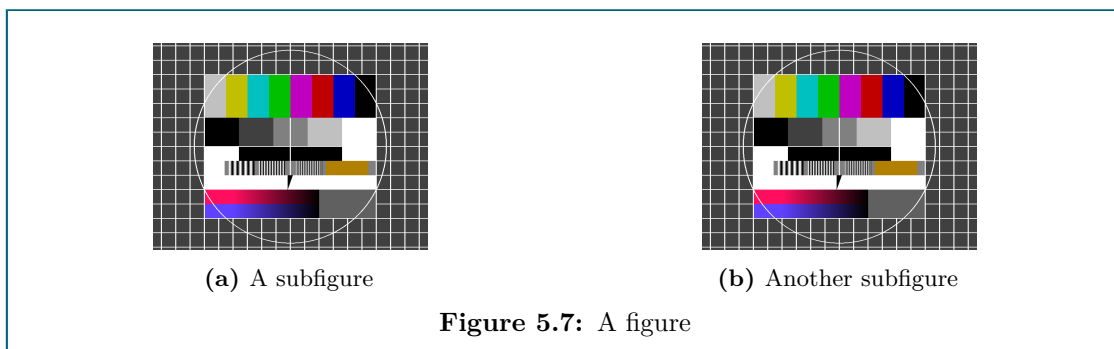
5.7.6 subfigure environment (caption)

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:



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:

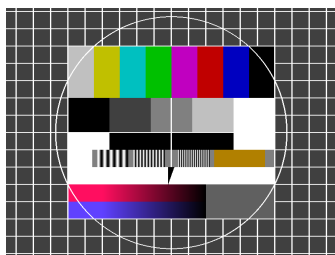


Figure 5.8: caption spanning the width of the picture

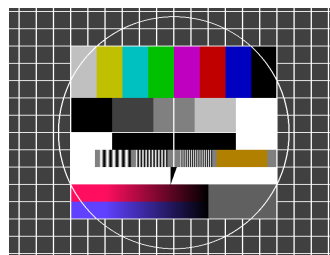


Figure 5.9: caption spanning the remaining width of the text width

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}}
\end{floatrow}
\end{figure}

```

```
{\includegraphics[width=0.15\textwidth]{images/testimage.png}}
\end{floatrow}
\end{figure}
```

Result:

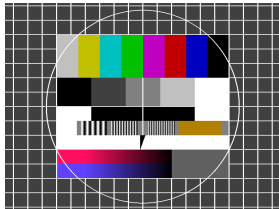


Figure 5.10: first image positioned at the top

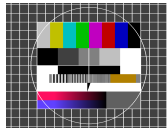


Figure 5.11: second image positioned at the top



Figure 5.12: third image positioned at the bottom

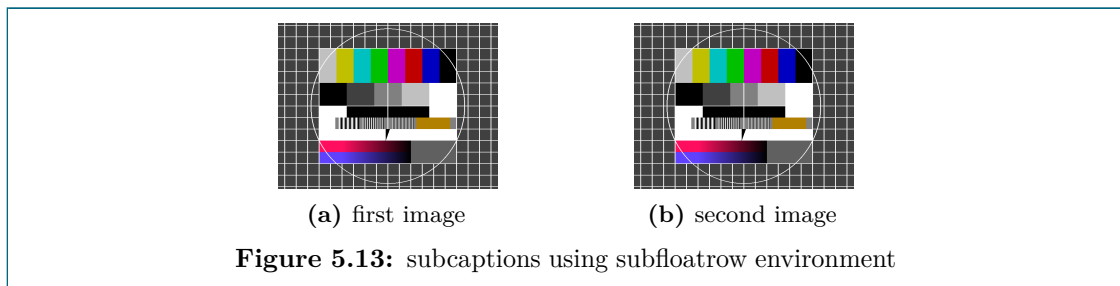
5.7.10 subfigures with subfloatrow environment (floatrow)

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:



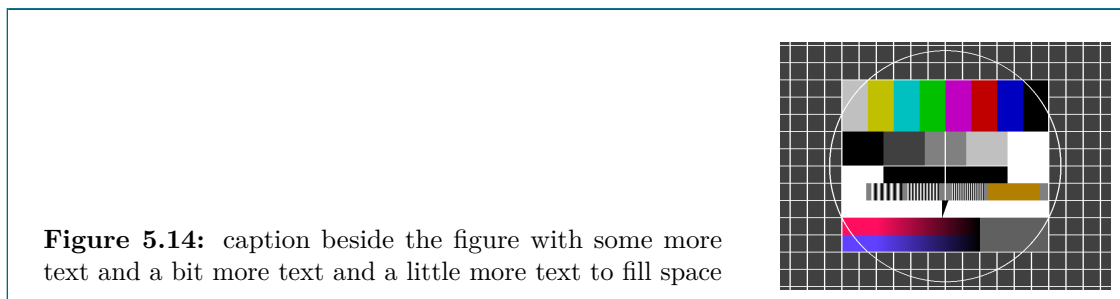
5.7.11 caption beside the figure (floatrow)

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:



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.

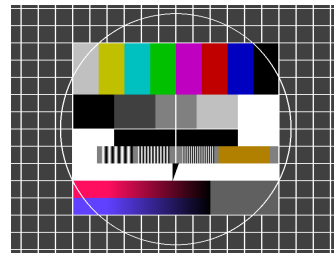
Code:

```
\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 appropriate `\vspace` commands at the top and/or bottom of the figure.

Code:

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

Result:

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

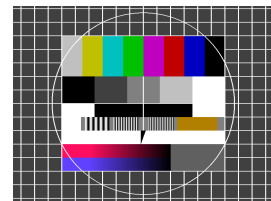


Fig. 5.16: A wrapfigure example

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.

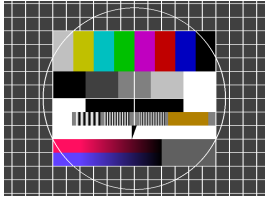


Fig. 5.17: A wrapfloat example

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.

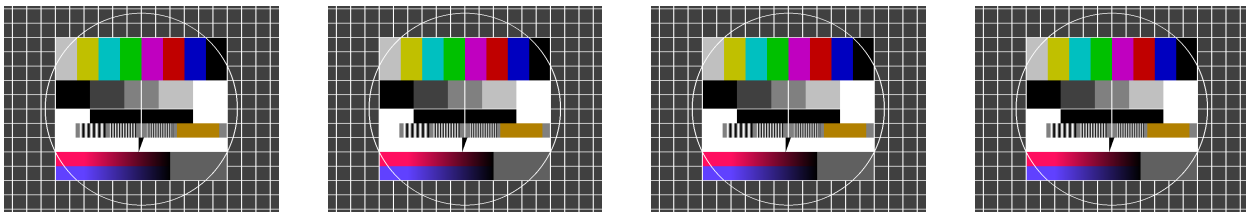


Figure 5.18: pictures extended into the margin – Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

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.

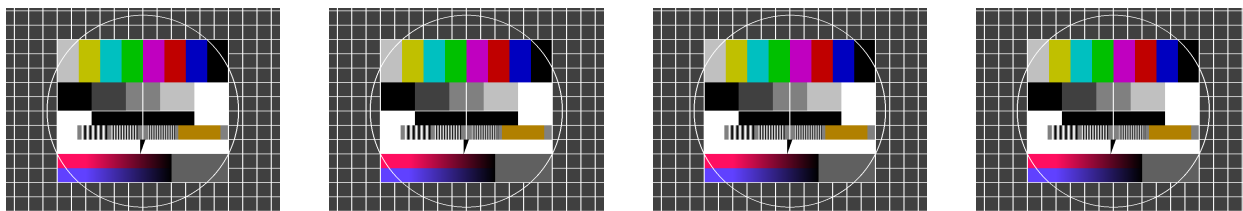


Figure 5.19: pictures extended into the margin – Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus.

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}

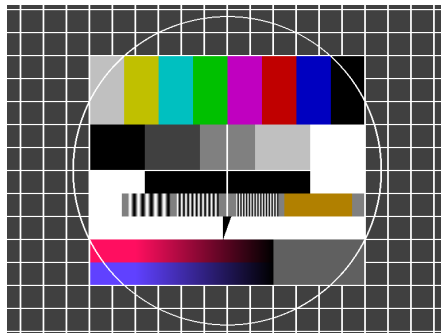
```

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.

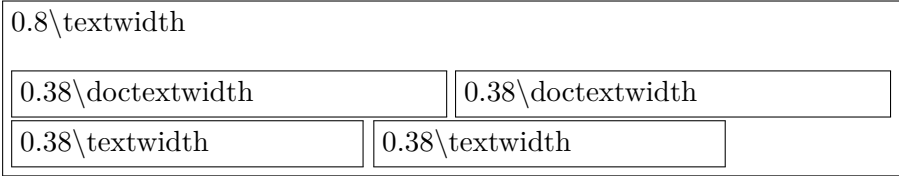


Pellentesque mollis nunc sed mauris tempor molestie. Aliquam adipiscing nisi eu metus. Proin viverra odio ac lorem consequat condimentum. Suspendisse bibendum tellus. Duis non diam. Aliquam sodales sapien in mauris. Sed euismod adipiscing lorem. Pellentesque nulla augue, nonummy vel, tincidunt at, blandit

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.



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 are 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 one, 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 readability 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 \\
%
\subheadstart
\subhead subhead &
\subhead 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}{lXX}
\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 ($\mathrel{>}\{\dots\}$, $\mathrel{!}\{\dots\}$)

In this code the $\mathrel{!}\{\dots\}$ specifier is used to replace the cell separation by the equal sign ($\mathrel{!}\{=\}$) and the preceding and following column are specified using $\mathrel{>}\{\$\}\dots\mathrel{<}\{\$\}$ 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	$\rho = 2.2 \text{ g/cm}^3$
heat capacity	$c_p = 703 \text{ J/gK}$
transmission	185 - 2500 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 \\ \hline
& 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}{*}{2x2 cells}} & 6 \\ \hline
\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 \\
& Column b \bigstrut \\
& Column c \bigstrut \\
\hline
\multirow{4}[8]{1in}{text}
& Column a \bigstrut \\
& Column b \bigstrut \\
& Column c \bigstrut \\
& 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:

text	Column a
	Column b
	Column c
	Column d
text	Column a
	Column b
	Column c
text	Column a
	Column b
	Column c
	Column d
row a row b	Column a
	Column b
	Column c
	Column d

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}
\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.	<ul style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

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` command. 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[1,1]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[1,1]X[1,1]X[1,1]}
\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}
\end{tableitemize}
\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.	<ul style="list-style-type: none">• 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.	<ol style="list-style-type: none">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}
```

[illegible]

```
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
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>continued on next page ...</i>					

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}1*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 \\\
```

Result:

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

continued on next page ...

[illegible]

continued on next page . . .

title	title	title	title	title	title
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	content	content	content	content	content
<i>description</i>	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 &
text which is considerably longer than the width of the column \\\
\hline
\end{tabularx}
\end{sideways}
\end{table}
```

Result:: Shown on the following page.

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 \\
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.

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

$$\iiint_S [u \nabla^2 v + (\nabla u, \nabla v)] d^3V = \iint_S u \frac{\partial v}{\partial n} d^2A \quad (5.4)$$

Jacobian matrix

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

5.9.2 Multiline equations (align)

Code:

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

Result:

$$\dot{q}_i = \frac{\partial H}{\partial p_i} \quad (5.6)$$

$$\dot{p}_i = -\frac{\partial H}{\partial q_i} \quad (5.7)$$

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:

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

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:

$$a = b + c \quad \quad = d - c \quad (5.9)$$

$$m = n + k + w = l - f \quad (5.10)$$

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}
\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{\text{bra:}} \text{\text{Bra}}\{a\} \quad \text{\text{ket:}} \text{\text{Ket}}\{a\} \quad \text{\text{braket:}}
```

```
\Braket{a|b} \quad \Braket{a|A|b}
\end{equation}
```

Result:

$$\text{bra: } \langle a| \quad \text{ket: } |a\rangle \quad \text{braket: } \langle a|b\rangle \quad \langle a|A|b\rangle \quad (5.11)$$

5.9.8 special commands: cancel

Code:

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

Result:

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

5.9.9 special commands: empheq

Code:

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

Result:

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

5.9.10 Double stroke math font (mathbb)

Code:

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

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 $\frac{1}{2}$ 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 \, , \, \mathrm{d} x \, \mathrm{d} y
\end{equation}
%
Abbreviations (real and imaginary)
\begin{equation}
\mathrm{Re}\{\mathrm{i} - 1\} + \mathrm{Im}\{\mathrm{i} - 1\}
\end{equation}
%
Characters for: complex, real, hamiltonian, probability, unity
\begin{equation}
\mathrm{complex}, \mathrm{real}, \mathrm{Ham}, \mathrm{Prob}, \mathrm{unity}
\end{equation}
%
New operators
\begin{equation}
\mathrm{rot} \, \mathrm{vec}\{a\} + \mathrm{grad} \, \mathrm{vec}\{a\} + \mathrm{div} \, \mathrm{vec}\{a\} + \mathrm{rect} \, f(x) + \mathrm{e}^{-\mathrm{i} x} = \mathrm{const}
\end{equation}
%
New Symbols (laplace, dalembert)
\begin{gather}
\mathrm{laplace} \, f(x,y) = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} \, \, \, \\
\mathrm{dalembert} = \frac{\partial^2}{c^2 \partial t^2} - \mathrm{laplace}
\end{gather}
%

```

Result:

New commands (absolute, norm, trace):

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

$$\mathrm{Tr} \{ M \} = \mathrm{Tr} \left\{ \begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix} \right\} = \alpha + \delta \quad (5.15)$$

Differentials (partial and total):

$$\int xy \, \partial x \, \mathrm{d} y \quad (5.16)$$

Abbreviations (real and imaginary)

$$\mathrm{Re}\{\mathrm{i} - 1\} + \mathrm{Im}\{\mathrm{i} - 1\} \quad (5.17)$$

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

$$\mathbb{C}, \mathbb{R}, \mathcal{H}, \mathcal{P}, \mathbb{1} \quad (5.18)$$

New operators

$$\text{rot } \vec{a} + \text{grad } \vec{a} + \text{div } \vec{a} + \text{rect } f(x) + e^{-ix} = \text{const} \quad (5.19)$$

New Symbols (laplace, dalembert)

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

$$\square = \frac{\partial^2}{c^2 \partial t^2} - \Delta \quad (5.21)$$

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

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 $\mu\text{m/s}$
units:	2.34 $\mu\text{m/s}$
unitfrac:	1.23 $\mu\text{m/s}$
unitfrac:	2.34 $\mu\text{m/s}$

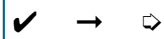
5.11 Symbols

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,masa,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 [273](#).

Code:

```

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

The resulting index is printed on page [273](#).

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 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, acronyms, glossaries) using styles. The package itself defines more than 20 styles. Here only a selection 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.

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

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

A todo note placed in the text

Should be
written as
LaTeX

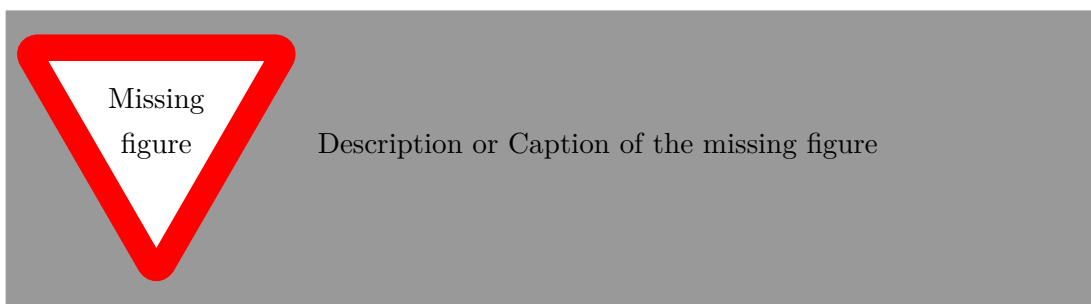
A note with
no line con-
necting the
note to the
placement in
the text.

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:



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

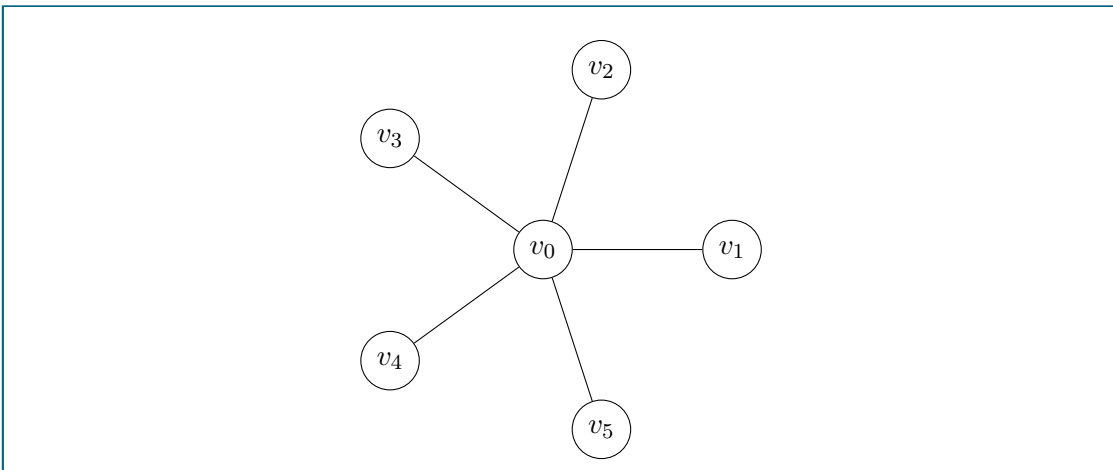
Code:

```

\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

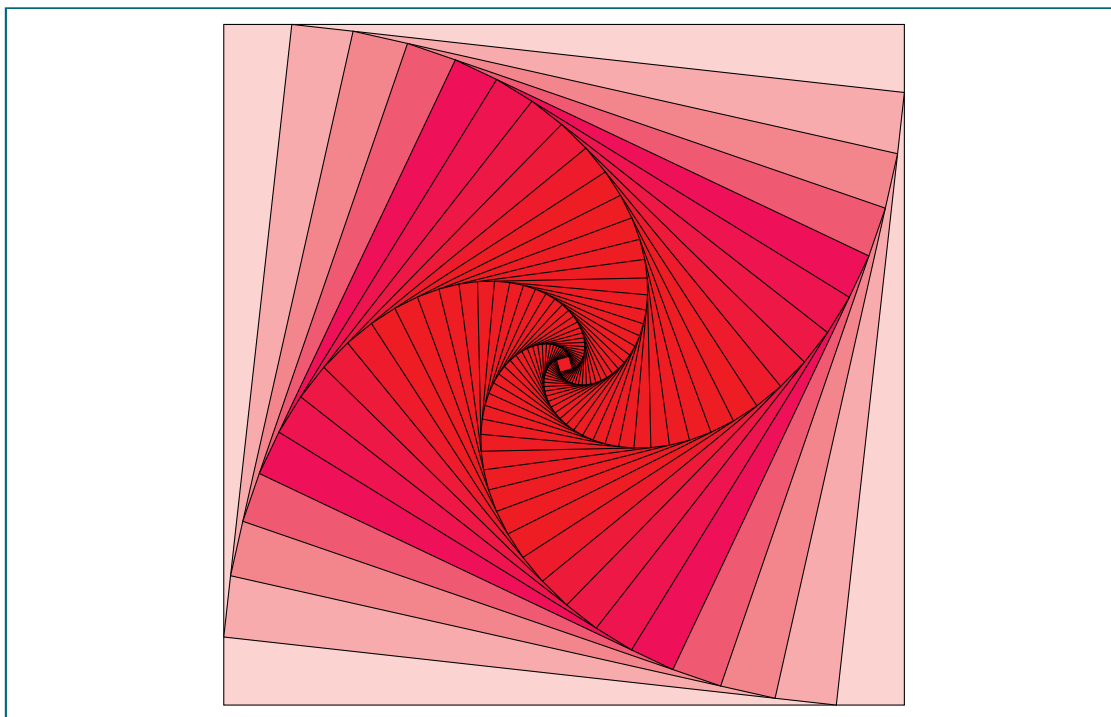
```

```

% 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

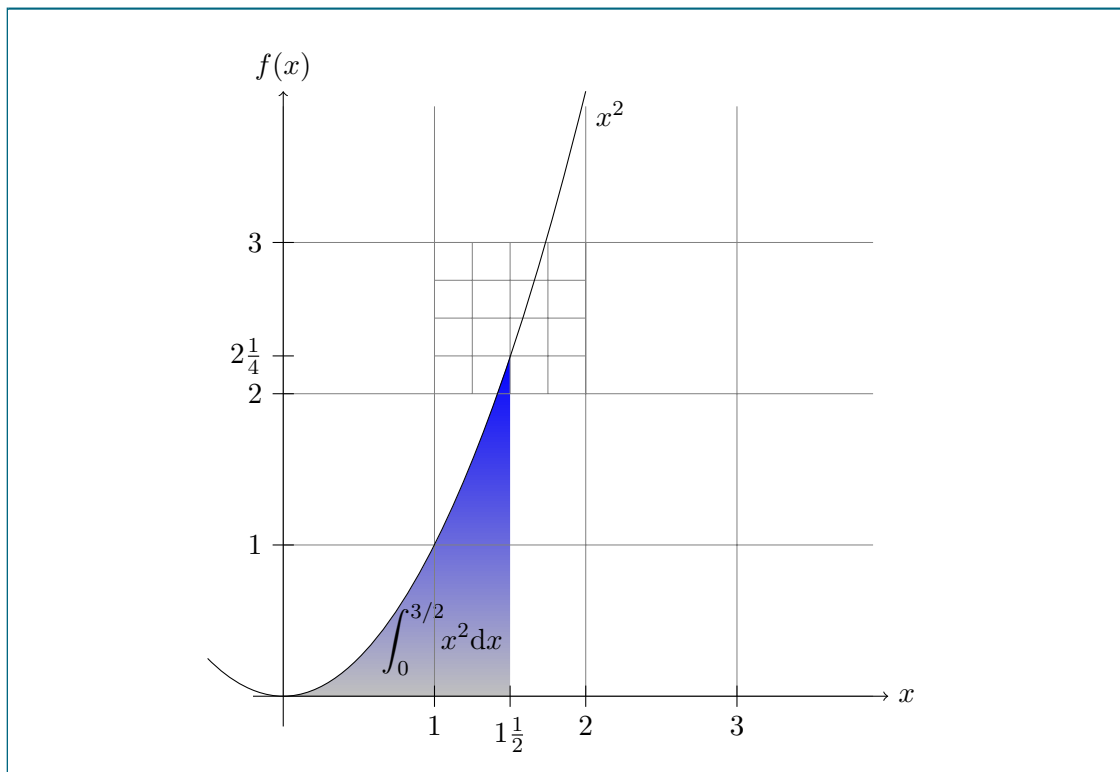
Code:

```

\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)

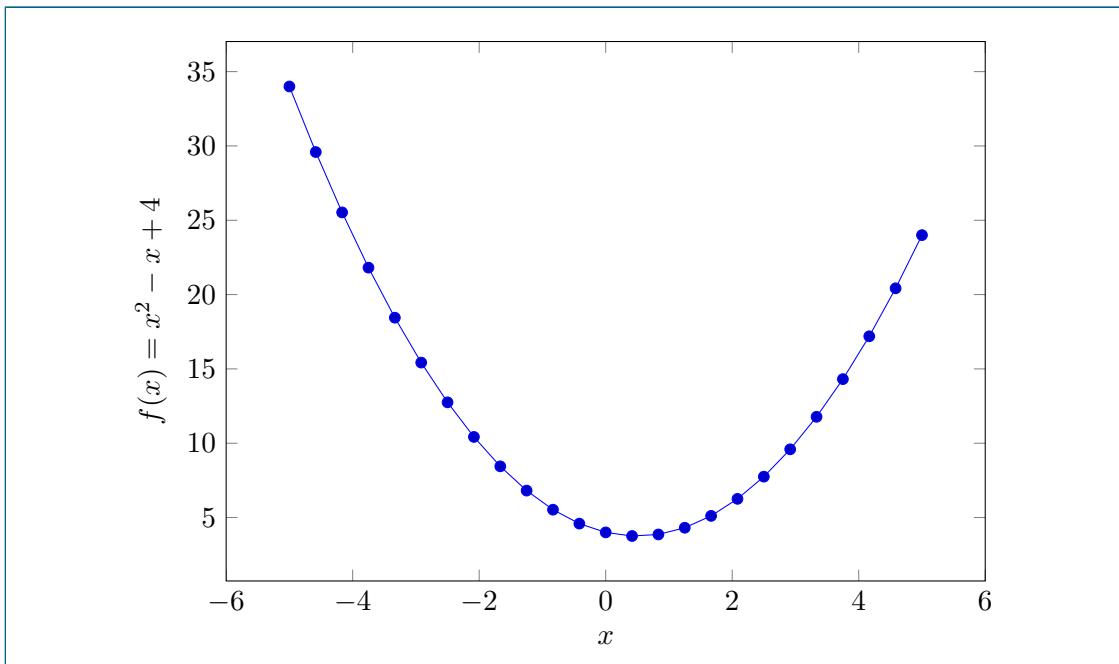
Code:

```

\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}

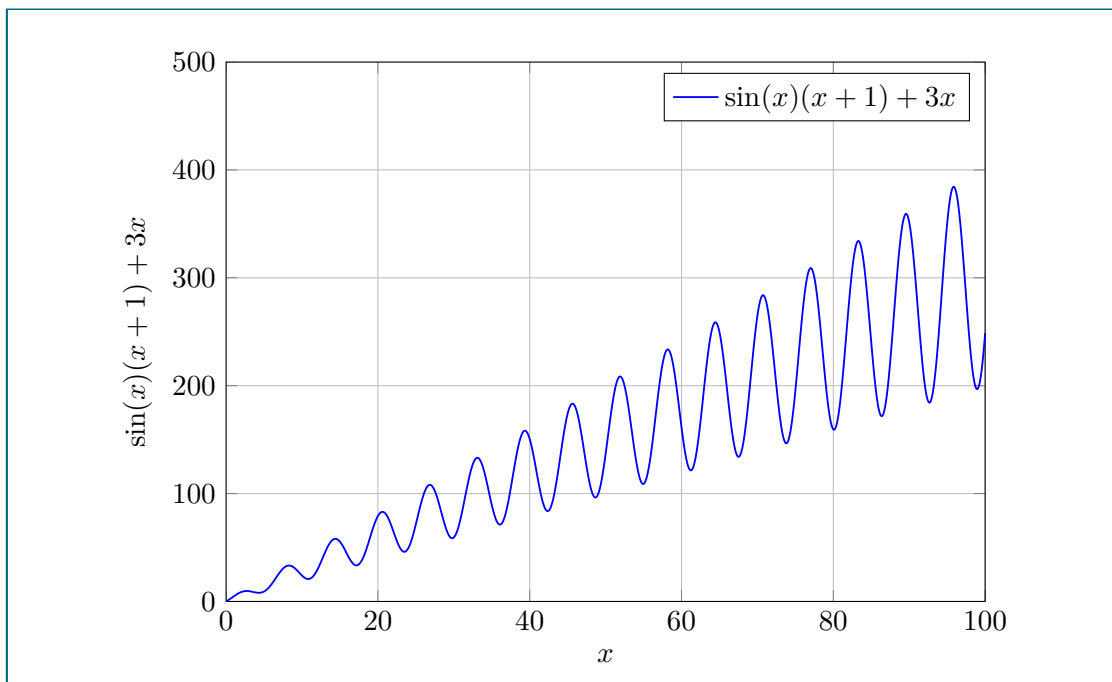
```

```

\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

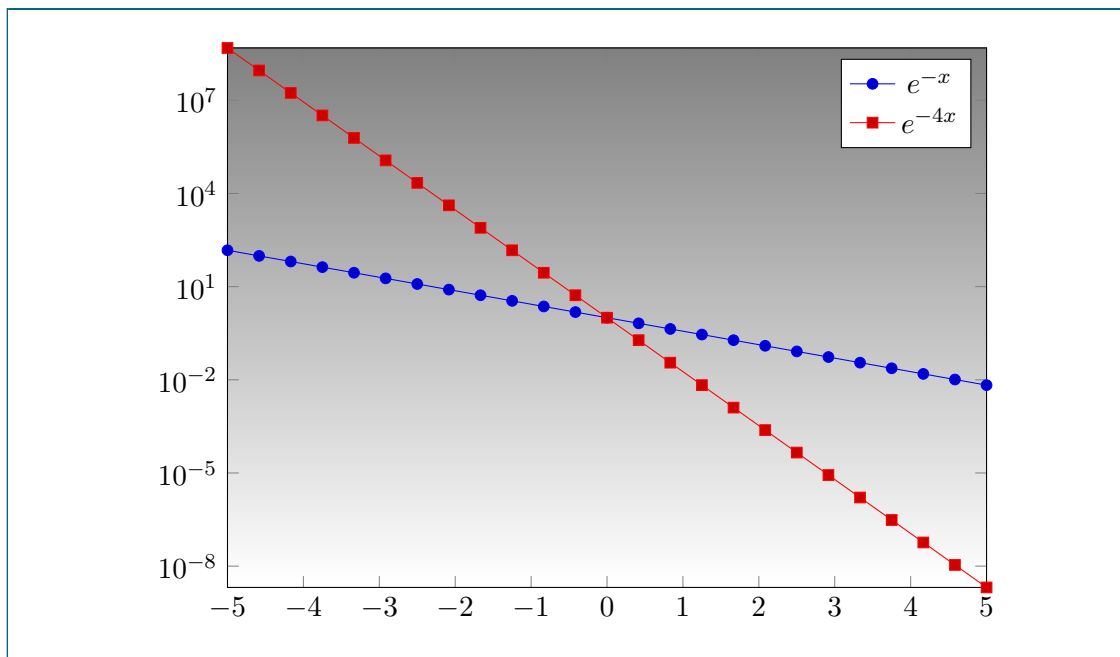
Code:

```

\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

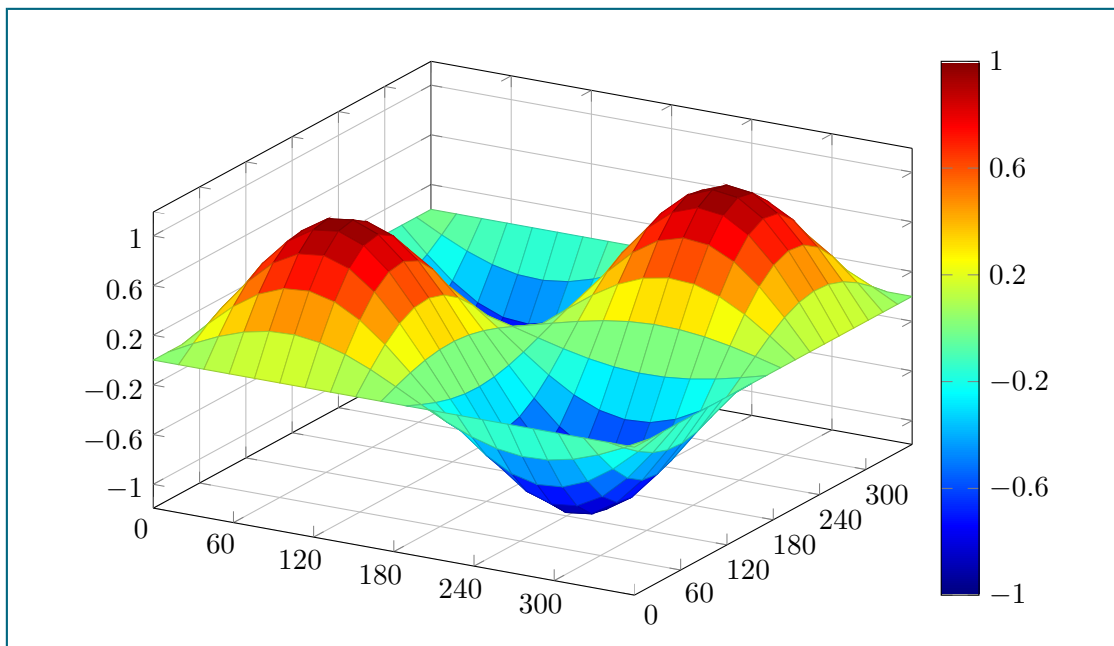
```

```

\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]

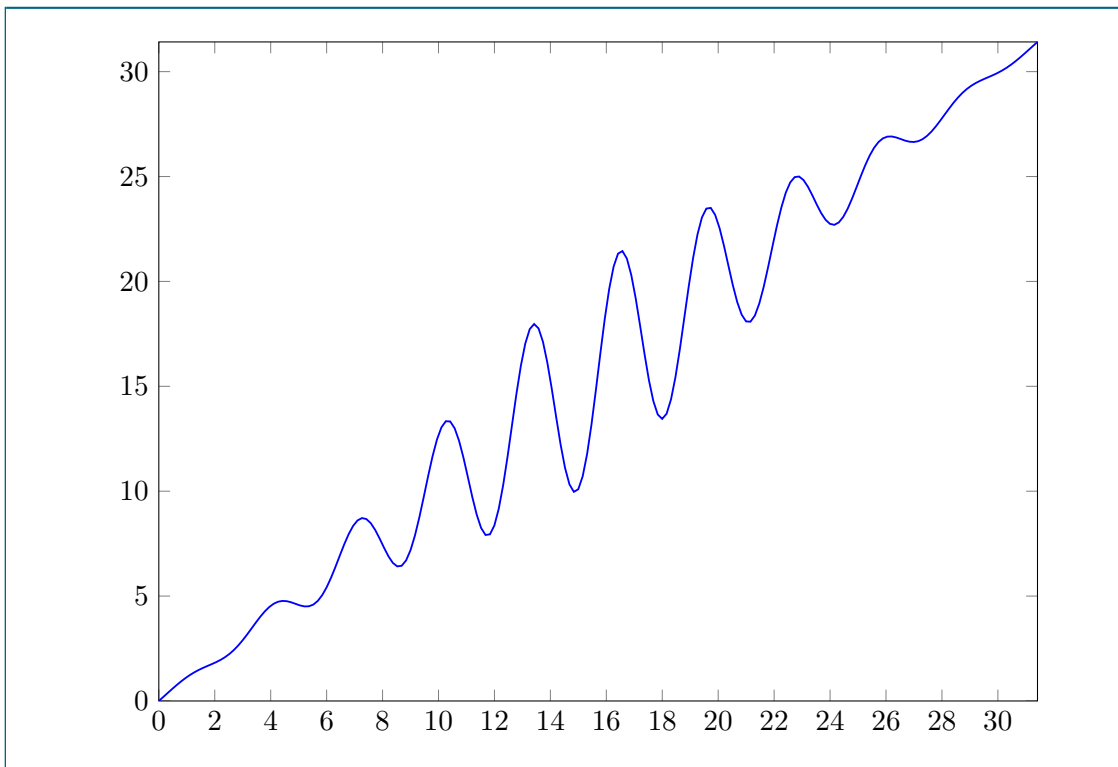
```

```

\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},

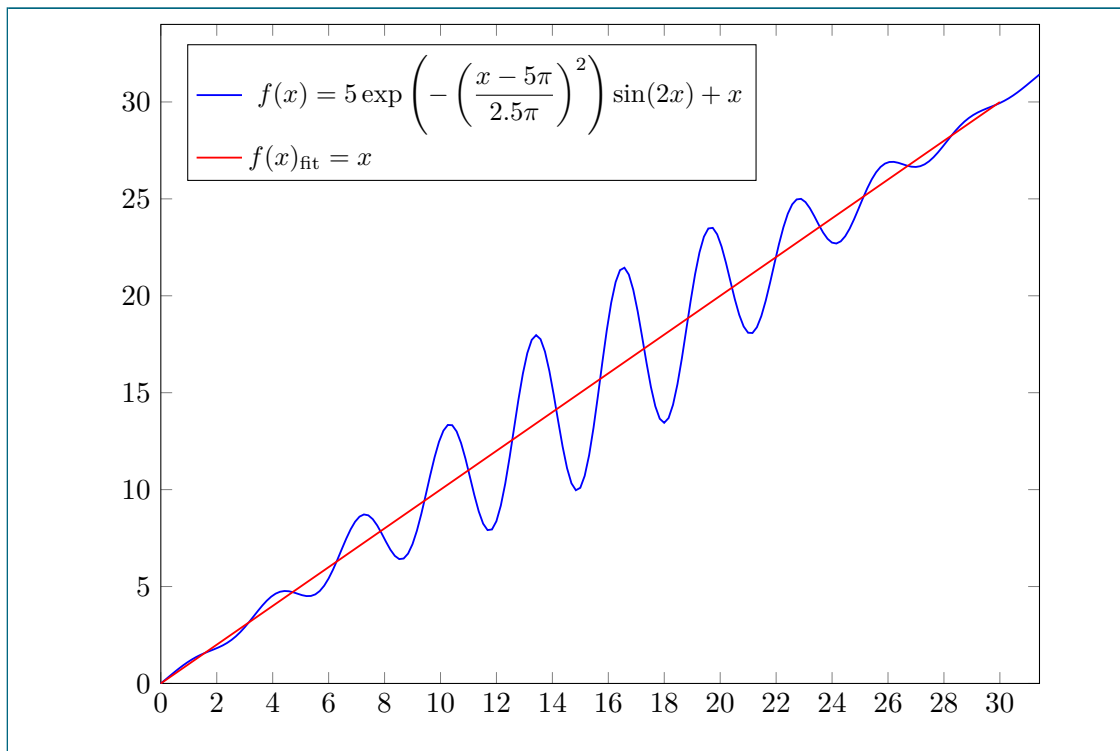
```

```

        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

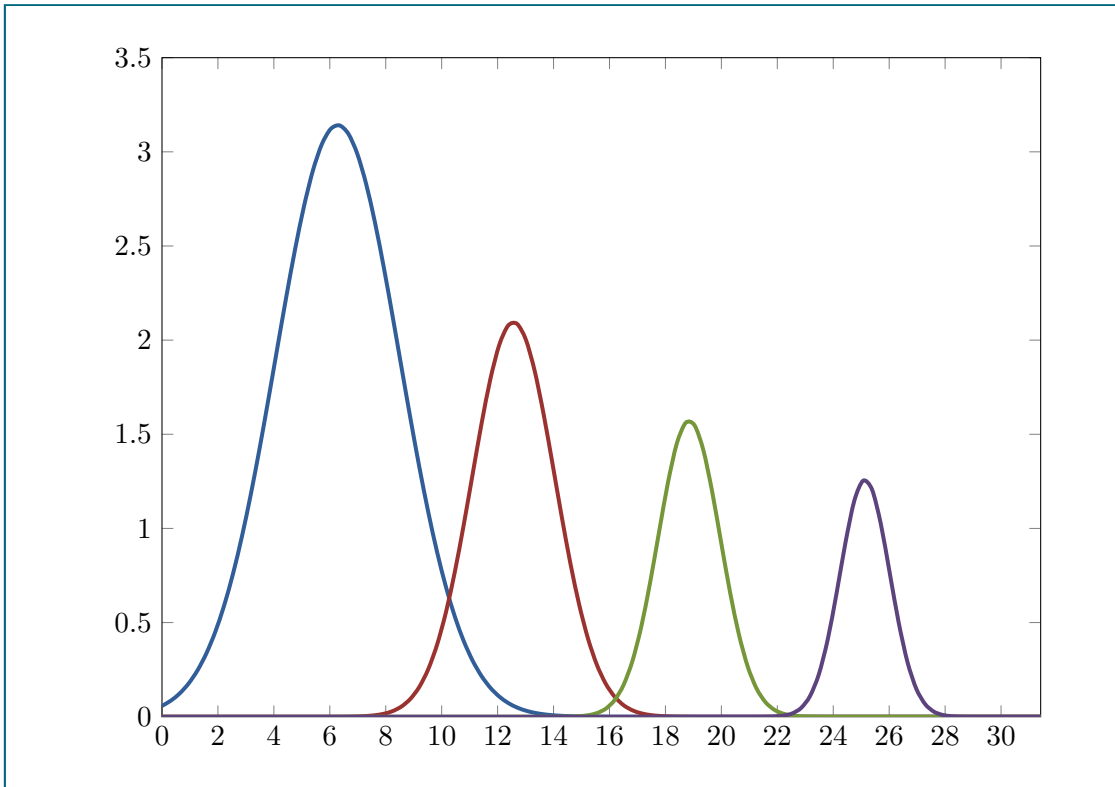
Code:

```
\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}
```



```
\end{tikzpicture}  
\end{figure}
```

Result:



PART III

Template code documentation

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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}

% display the layouts
% \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/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-Summary,
%} % end includeonly
```

6.4 The document (the content)

It starts 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{srcheadings}}
```

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 148. 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-Summary}

%% -- 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 L^AT_EX. 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 efficient than scrwfile, but the best alternative
% Doc: morewrites.pdf
\usepackage{morewrites}

% Description: see http://www.tex.ac.uk/cgi-bin/texfaq2html?label=noroom
% short summary: 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 afford 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 =====

%% Recommended 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}{lms}{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 L^AT_EX packages installed then this file might be of interest for you. It shows how to load *some* of the available fonts for pdf_latex. 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}{lms}{m}{n}
% Math symbols
\SetSymbolFont{symbols}{sans}{OMS}{lmsy}{m}{n}
% Large symbols
\SetMathAlphabet{\mathrm}{sans}{OT1}{lmr}{m}{n}
\SetMathAlphabet{\mathsf}{sans}{OT1}{lms}{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
  %nonnormalsize,% 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 their 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 sections are included in the compilation or excluded (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, translator
- 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 models
% 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 unknown. 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 L^AT_EX 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.
  intllimits, % Like sumlimits, but for integral symbols.
  %nointllimits, % (default) Opposite of intllimits.
  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,disallowspace]{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 L^AT_EX. 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, \tcpertousand, \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 L^AT_EX 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 stretchable columns (from tabularx package)
% Doc: ltxtable.pdf
% -> load after 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 footnotes 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 sidewaysstable 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 of 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. To 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,

\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: extends 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, sidewaysstable 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 placement (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 =====

% 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 onside
    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 be 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 formatting of the
%               table of contents and lists of floats.
%% Doc: tocstyle.pdf (Koma Script)
%% Alpha package, uses koma fonts (\setkomafont{}{ }) only if KOMAlite 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 indentation, text aligned
%   tocfullflat,       % no indentation, 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 textformatting, **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{pdfscape}

% 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 textformatting 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 loadable 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{frameshade}{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.

```
\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, npar, 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=false, %
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.

```

\IfPackageLoaded{biblatex}{%
% change alpha label to be without +
\renewcommand*{\labelalphaothers}{}

% change 'In: <magazine>' to "<magazine>"
\renewcommand*{\intitlepunct}{}
\DefineBibliographyStrings{german}{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}}

}% \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
indentation = 0em,   % indentation 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
}

% Predefined 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,
  indentation=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{hangleleft}%
  {\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 ---
%    % Predefined 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,
  capbesidessep=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{1X[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
% exists 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
% exists 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}{frameshade}{color}}
}
\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! otherwise recommended
  parskip=absolute, % do not change indentation according to fontsize
  parskip=false     % indentation of 1em
  % parskip=true     % parskip of 1 line - with free space in last line of 1em
  % parskip=full-    % parskip of 1 line - no adjustment
  % parskip=full+    % parskip of 1 line - with free space in last line of 1/4
  % parskip=full*    % parskip of 1 line - with free space in last line of 1/3
  % parskip=half     % parskip of 1/2 line - with free space in last line of 1
em
  % parskip=half-    % parskip of 1/2 line - no adjustment
  % parskip=half+    % parskip of 1/2 line - with free space in last line of
1/3
  % parskip=half*    % parskip of 1/2 line - with free space in last line of 1
em
}%
\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

\IfPackageLoaded{geometry}{%
  \input{preamble/style-geometry.tex}
} % Endif

% Layout mit 'typearea'
%%% Doc: scrguide.pdf

\IfPackageNotLoaded{geometry}{%
%
% Koma Script text area layout
\KOMAOPTIONS{%
  DIV=11,% (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)
}%
%
}% end: \IfPackageNotLoaded{geometry}

%%% === Page Layout Options ===
\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,%
    %
    headlines=2.1,%
    % headheight=2em,%
    headsepline=true,%
    footsepline=false,%
    cleardoublepage=empty %plain, headings
}%

% reloading of typearea, necessary if setting of spacing changed
\IfPackageLoaded{typearea}{% If typearea is loaded
  \IfPackageNotLoaded{geometry}{% and geometry is not loaded
    \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 }
%textwidth=, % modifies \textwidth, the width of body
%textheight=, % 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
%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=5mm, % removes a specified space for binding
%%% Dimensionen
%headheight=,     % 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=0pt, % 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,
textwidth=400pt, % sets \textwidth directly
%textheight=, % sets \textheight directly
%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[Opt]{text}
\setfootwidth[Opt]{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 recommended!)
%% 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}{frameshade}{
%   {\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 numbers is omitted.
}

% \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 147.

```

\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
  ,hypertextnames=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\|#1\right\|}
\newcommand{\Trace}[1]{\ensuremath{\mathrm{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 (deprecated 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 151.

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
%%
%% It was completely manually generated
%% because so far it was not possible to
%% automatically generate these lists.

\chapter*{Publications}
\markboth{Publications}{Publications}

\IfPackageLoaded{hyperref}{
  \phantomsection
  \addcontentsline{toc}{chapter}{Publications}
}

\providecommand{\emn}[1]{\textbf{#1}} %
\providecommand{\bibconf}[1]{\textit{#1}} %
\providecommand{\bibjournal}[1]{\textit{#1}} %
\providecommand{\bibauthor}[1]{\textsc{#1}} %
\newcommand{\bibtitle}[1]{\IfElseDefined{enquote}{\enquote{#1}}{\`{#1}}}%

\section*{Scientific publications}
% \section*{Wissenschaftliche Veröffentlichungen}

\begin{enumerate}
\item \bibauthor{Martin Siegel, Guido Palmer, Andy Steinmann,
  \emn{Matthias Pospiech} und Uwe Morgner}:
  \bibtitle{Theoretical and experimental limits of
  cavity-dumping in passively mode-locked thin-disk oscillators}.
  \bibjournal{Opt. Express} (2007), Bd. 15(25): S. 16860--16869.
%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Andy Steinmann,
  Guido Palmer, Roberto Osellame, Nicola Bellini, Giulio Cerullo und Uwe
  Morgner}:
  \bibtitle{Double waveguide couplers produced by simultaneous
  femtosecond writing}. \bibjournal{Opt. Express} (2009), Bd. 17(5):
  S. 3555--3563.
%
\item \bibauthor{Guido Palmer, Marcel Schultze, Moritz Emons, Anna Lena
  Lindemann, \emn{Matthias Pospiech}, Daniel Steingrube, Max Lederer und
  Uwe Morgner}: \bibtitle{12 MW peak power from a two-crystal Yb:KYW
  chirped-pulse oscillator with cavity-dumping}.
  \bibjournal{Opt. Express} (2010), Bd. 18(18): S. 19095--19100.

```

```

%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Benjamin
  Vackenstedt, Guido Palmer und Uwe Morgner}:
  \bibtitle{Single-sweep laser writing of 3D-waveguide
  devices}. \bibjournal{Opt. Express} (2010), Bd. 18(7): S. 6994--7001.
%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Kai Kuetemeyer,
  Alexander Heisterkamp und Uwe Morgner}:
  \bibtitle{Superresolved femtosecond laser nanosurgery
  of cells}. \bibjournal{Biomed. Opt. Express} (2011),
  Bd. 2(2): S. 264--271.
%
\end{enumerate}

\section*{Submissions to international conferences}
% \section*{Beitrage auf internationalen Konferenzen}

\begin{enumerate}
\item \bibauthor{Uwe Morgner, Guido Palmer, Andy Steinmann, Moritz Emons,
  \emn{Matthias Pospiech}, Marcel Schultze und Martin Siegel}:
  \bibtitle{High-Energy Laser Pulses Directly from the Oscillator:
  From Thin-Disk to Positive Dispersion}. \bibconf{Advanced Solid-State
  Photonics}. Optical Society of America, 2008: ME3.
%
\item \bibauthor{Guido Palmer, Moritz Emons, Martin Siegel, Andy Steinmann,
  \emn{Matthias Pospiech} und Uwe Morgner}:
  \bibtitle{Passively Mode-Locked and Cavity-Dumped
  Yb:KY(WO4)2 Oscillator with Positive Dispersion}.
  \bibconf{Conference on Lasers and Electro-Optics/Quantum Electronics
  and Laser Science Conference and Photonic Applications Systems
  Technologies}. Optical Society of America, 2008: CFB2.
%
\item \bibauthor{Martin Siegel, Guido Palmer, Andy Steinmann,
  \emn{Matthias Pospiech} und Uwe Morgner}:
  \bibtitle{Theoretical and Experimental Limits of
  Cavity-Dumping in Passively Mode-Locked Thin-Disk Oscillators}.
  \bibconf{Conference on Lasers and Electro-Optics/Quantum Electronics
  and Laser Science Conference and Photonic Applications Systems
  Technologies}. Optical Society of America, 2008: JWA73.
%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Andy Steinmann,
  Guido Palmer, Uwe Morgner, Roberto Osellame, Nicola Bellini
  und Giulio Cerullo}:
  \bibtitle{Simultaneous production of multiple waveguides for photonic
  devices by femtosecond laser writing}. \bibconf{CLEO/Europe and EQEC
  2009 Conference Digest}. Optical Society of America, 2009: S. CM73.
%

```

```

\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons,
  Benjamin Vackenstedt, Roberto Osellame, Nicola Bellini, Giulio Cerullo
  und Uwe Morgner}:
  \bibtitle{Waveguide Devices Produced by Adaptive Femtosecond Laser
  Writing}. \bibconf{Advanced Solid-State Photonics}. Optical Society of
  America, 2010: AMB27.
%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Benjamin Vackenstedt
  und Uwe Morgner}:
  \bibtitle{Single-Sweep Production of Complex 3-D-Waveguide Devices
  Produced by Adaptive Femtosecond Laser Writing}. \bibconf{Conference
  on Lasers and Electro-Optics}. Optical Society of America, 2010: S.
  CMLL2.
%
\end{enumerate}

\section*{Submissions to national conferences}
% \section*{Beitrage auf nationalen Konferenzen}

\begin{enumerate}
%
\item \bibauthor{Mathias Hoffmann, \emn{Matthias Pospiech}, Andy Steinmann,
  Guido Palmer und Uwe Morgner}:
  \bibtitle{Erzeugung und Detektion von gepulster Terahertz Strahlung mit
  GaP-Kristallen}. \bibconf{Verhandlungen}. DPG. Darmstadt, 2008.
%
\item \bibauthor{Tino Lang, \emn{Matthias Pospiech} und Uwe Morgner}:
  \bibtitle{Nichtlineare para\~metrische Konversion zu RGB direkt aus einem
  gutegeschalteten Oszillator}. \bibconf{Verhandlungen}. DPG. Darmstadt,
  2008.
%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Andy Steinmann, Guido
  Palmer, Uwe Morgner, Roberto Osellame, Nicola Bellini und Giulio
  Cerullo}:
  \bibtitle{Double waveguide couplers produced by adaptive femtosecond
  writing}. \bibconf{Verhandlungen}. DPG. Hamburg, 2009.
%
\item \bibauthor{Moritz Emons, \emn{Matthias Pospiech}, Andy Steinmann,
  Guido Palmer, Uwe Morgner, Roberto Osellame, Nicola Bellini
  und Giulio Cerullo}:
  \bibtitle{Simultaneous production of multiple waveguides for photonic
  devices by femtosecond laser writing}. \bibconf{Verhandlungen}. DPG.
  Hamburg, 2009.
%
\item \bibauthor{\emn{Matthias Pospiech}, Benjamin Vackenstedt, Moritz Emons,
  Guido Palmer und Uwe Morgner}:
  \bibtitle{Single-sweep production of complex 3D-waveguide devices in

```



```

        fused-silica produced by adaptive femtosecond laser writing}.
        \bibconf{Verhandlungen}. 2010.
%
\item \bibauthor{Benjamin Väckenstedt, \emn{Matthias Pospiech}, Moritz Emons,
        Guido Palmer und Uwe Morgner}:
        \bibtitle{Erzeugung komplexer Wellenleiterstrukturen mithilfe
        adaptiver Strahlformung in Quarzglas}. \bibconf{Verhandlungen}. 2010.
%
\item \bibauthor{\emn{Matthias Pospiech}, Moritz Emons, Kai Küttemeyer,
        Alexander Heisterkamp und Uwe Morgner}:
        \bibtitle{Superresolved femtosecond nanosurgery of cells}.
        \bibconf{Verhandlungen}. DPG. Dresden, 2011.
%
\end{enumerate}
%
```

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}
  \todotoc % add to toc
  \listoftodos % print to document
}
```

Bibliography

- [Aug95] ROBERT L. AUGUSTINE: *Heterogeneous catalysis for the synthetic chemist*. New York: Marcel Dekker, 1995 (cit. on p. 115).
- [Ber96] AARON BERTRAM and RICHARD WENTWORTH: ‘Gromov invariants for holomorphic maps on Riemann surfaces’. In *J. Amer. Math. Soc.* (1996), vol. 9(2): pp. 529–571 (cit. on p. 115).
- [Cot99] FRANK ALBERT COTTON, GEOFFREY WILKINSON, CARLOS A. MURILLIO, and MANFRED BOCHMANN: *Advanced inorganic chemistry*. 6th ed. Chichester: Wiley, 1999 (cit. on p. 115).
- [Goo94] MICHEL GOOSSENS, FRANK MITTELBAACH, and ALEXANDER SAMARIN: *The LaTeX Companion*. 1st ed. Reading, Mass.: Addison-Wesley, 1994. 528 pp. (cit. on pp. 114, 115).
- [Ham97] CHRISTOPHER HAMMOND: *The basics of crystallography and diffraction*. Oxford: International Union of Crystallography and Oxford University Press, 1997 (cit. on p. 115).
- [Hos98] MICHAEL J. HOSTETLER, 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’. In *Langmuir* (1998), vol. 14(1): pp. 17–30 (cit. on p. 115).
- [Mas04] WERNER MASSA: *Crystal structure determination*. 2nd ed. Berlin: Springer, 2004 (cit. on p. 115).

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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, scrfile.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

continued on next page ...

Section	List of Packages
fonts/fonts.tex	
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, everyl.sty
Packages: Bugfix	fixltx2e.sty, marginnote.sty, scrhack.sty, marginfix.sty, xspace.sty
preamble/packages.tex	
resize	resize.sty
Math	amsmath.sty, amstext.sty, amsgen.sty, amsbsy.sty, amsopn.sty, mathtools.sty, mhsetup.sty, onlyamsmath.sty, bracket.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-abspace.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
<code>preamble/style.tex</code>	
Style.tex	
<code>LaTeXTemplate.tex</code> after <code>\{begin\}\{document\}</code>	
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   2006/09/13 v1.1m fixes to LaTeX
tslenc.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   1999/03/16 v1.13 key=value parser (DPC)
scrfile.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     2014/01/07 v4646 L3 Experimental code bundle wrapper
l3names.sty   2014/01/04 v4640 L3 Namespace for primitives
l3bootstrap.sty 2014/01/04 v4640 L3 Experimental bootstrap code
etex.sty      1998/03/26 v2.0 eTeX basic definition package (PEB)
l3basics.sty  2014/01/04 v4642 L3 Basic definitions
l3expan.sty   2014/01/04 v4642 L3 Argument expansion
l3tl.sty      2013/12/27 v4625 L3 Token lists
l3seq.sty     2013/12/14 v4623 L3 Sequences and stacks
l3int.sty     2013/08/02 v4583 L3 Integers
l3quark.sty   2013/12/14 v4623 L3 Quarks
l3prg.sty     2014/01/04 v4642 L3 Control structures
l3clist.sty   2013/07/28 v4581 L3 Comma separated lists
l3token.sty   2013/08/25 v4587 L3 Experimental token manipulation
l3prop.sty    2013/12/14 v4623 L3 Property lists
l3msg.sty     2013/07/28 v4581 L3 Messages
l3file.sty    2013/10/13 v4596 L3 File and I/O operations
l3skip.sty    2013/07/28 v4581 L3 Dimensions and skips
l3keys.sty    2013/12/08 v4614 L3 Experimental key-value interfaces
l3fp.sty      2014/01/04 v4642 L3 Floating points
l3box.sty     2013/07/28 v4581 L3 Experimental boxes
l3coffins.sty 2013/12/14 v4624 L3 Coffin code layer
l3color.sty   2012/08/29 v4156 L3 Experimental color support
l3luatex.sty  2013/07/28 v4581 L3 Experimental LuaTeX-specific functions
l3candidates.sty 2014/01/06 v4643 L3 Experimental additions to l3kernel

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ifpdf.sty	2011/01/30 v2.3 Provides the ifpdf switch (HO)
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)
codesection.sty	2014/01/25 v0.1 disableable code sections
etoolbox.sty	2011/01/03 v2.1 e-TeX tools for LaTeX
templatetools.sty	2014/01/25 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	2013/08/26 1.5b (Carsten Heinz)
lstmisc.sty	2013/08/26 1.5b (Carsten Heinz)
listings.cfg	2013/08/26 1.5b 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	2013/12/31 v4634 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	2008/03/30 v1.1d 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
tlenc.dfu	2008/04/05 v1.1m UTF-8 support for inputenc
otlenc.dfu	2008/04/05 v1.1m UTF-8 support for inputenc
omsenc.dfu	2008/04/05 v1.1m UTF-8 support for inputenc
tslenc.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	
tlenc.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	2013/12/03 3.9h 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	1999/02/16 v3.0i Driver-dependant file (DPC,SPQR)
graphicx.sty	1999/02/16 v1.0f 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)
everyysel.sty	2011/10/28 v1.2 EverySelectfont Package (MS)
fixltx2e.sty	2006/09/13 v1.1m 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	2013/02/12 v1.13 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

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fixmath.sty      2000/04/11 v0.9 (WaS)
icomma.sty      2002/03/10 v2.0 (WaS)
xfrac.sty       2012/11/09 v4299 L3 Experimental split-level fractions
l3keys2e.sty     2013/12/31 v4634 LaTeX2e option processing using LaTeX3 keys
xtemplate.sty    2013/12/31 v4634 L3 Experimental prototype document functions
preamble/packages-tikzpgf.tex
  pgf.sty        2008/01/15 v2.10 (rcs-revision 1.12)
  pgfrcs.sty     2010/10/25 v2.10 (rcs-revision 1.24)
everyshi.sty     2001/05/15 v3.00 EveryShipout Package (MS)
  pgfrcs.code.tex
pgfcore.sty      2010/04/11 v2.10 (rcs-revision 1.7)
  pgfsys.sty     2010/06/30 v2.10 (rcs-revision 1.37)
  pgfsys.code.tex
pgfsyssoftpath.code.tex  2008/07/18 (rcs-revision 1.7)
pgfsysprotocol.code.tex  2006/10/16 (rcs-revision 1.4)
  pgfcore.code.tex
pgfcomp-version-0-65.sty  2007/07/03 v2.10 (rcs-revision 1.7)
pgfcomp-version-1-18.sty  2007/07/23 v2.10 (rcs-revision 1.1)
  tikz.sty       2010/10/13 v2.10 (rcs-revision 1.76)
  pgffor.sty     2010/03/23 v2.10 (rcs-revision 1.18)
pgfkeys.sty
pgfkeys.code.tex
  pgffor.code.tex
  tikz.code.tex
pgfplots.sty     2013/10/03 v1.9 Data Visualization (1.9)
pgfplotstable.sty 2013/10/03 v1.9 Table typesetting and Pretty-printing
(1.9
)
pgfcalendar.sty
pgfcalendar.code.tex  2007/07/23 v2.10 (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)

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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 (H0)
    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      2013/11/25 v2.8a programmable bibliographies (PK/JW/AB)
biblatex2.sty     2013/11/25 v2.8a 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    2013/11/25 v2.8a biblatex compatibility (PK/JW/AB)
biblatex.def
blx-natbib.def    2013/11/25 v2.8a biblatex compatibility (PK/JW/AB)
standard.bbx      2013/11/25 v2.8a biblatex bibliography style (PK/JW/AB)
alphabetic.bbx    2013/11/25 v2.8a biblatex bibliography style (PK/JW/AB)
alphabetic.cbx    2013/11/25 v2.8a biblatex citation style (PK/JW/AB)
biblatex.cfg
    wrapfig.sty   2003/01/31 v 3.6
    flafter.sty   2000/07/23 v1.2i 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 (

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SH		
change page.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	2012/10/14 v2.6b	package option processing (HA)
xkeyval.tex	2012/10/14 v2.6b	key=value parser (HA)
xpatch.sty	2012/10/02 v0.3	Extending etoolbox patching commands
multicol.sty	2011/06/27 v1.7a	multicolumn formatting (FMi)
upquote.sty	2012/04/19 v1.3	upright-quote and grave-accent glyphs in
verbatim		
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)
pppdx.tex	2013/08/25 v0.4v	Pdftex 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)

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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 (H0)
ltxttable.sty     1995/12/11 v0.2 longtable/tabularx merge (DPC)
tabularx.sty      1999/01/07 v2.07 `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    2014/01/20 v4.03 (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 2013/09/06 v2.18 (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  2013/11/14 v4.0 (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 (H0)
bookmark.sty       2011/12/02 v1.24 PDF bookmarks (H0)
bkm-pdfTeX.def     2011/12/02 v1.24 bookmark driver for pdfTeX (H0)
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    2014/01/25 v0.1 Empty package used for executing code after
this package
preamble/style.tex
preamble/style-siunitx.tex
preamble/style-pgfplots.tex

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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      2013/08/26 1.5b listings language file
lstlang2.sty      2013/08/26 1.5b listings language file
lstlang3.sty      2013/08/26 1.5b 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
content/demo/glossariesEntries.tex
demo-glossaries-acronym.tex
demo-glossaries-Symbolslist.tex
demo-glossaries-Glossary.tex
    english.lbx   2013/11/25 v2.8a 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
ltxcaption.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

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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 (H0)
  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
content/demo/demo.tex
content/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
content/Z-Thanks.tex
content/Z-Todo.tex
doc/doc-z-appendix.tex
doc/history.tex
TemplateDocumentation.ind

APPENDIX B

History

The naming scheme of versions is as follows: 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.

2006/06 v2.0.0

Initial online release of the template. It is based on KOMA-Script 2.x, supports most modern package (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.

2008/12 v3.1.0

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.

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.

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.

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