Title

Subtitle

Author: Author, Matr.-No.
Date: Graz, April 25, 2023
Rev.:   alpha 1.0

Contents

1 Introduction and Usage

The SPSC Thesis/Report/Homework Template provides you with several commands that have proven useful in the creation of a thesis. Nontheless, they are by no means mandatory. You have to decide which methods and commands you find useful and which you don't. Also, if you have a specific command or best-practice approach you found useful: Tell us! If it fits into this template, we will add it. As always: Feedback, bug reports, feature request, ..., are greatly appreciated!

1.1 Structure of Sections

The template provides several pre-defined commands for parts, chapters, sections, subsections, and subsubsections. These commands contain a mandatory argument for the label, and prevent floats (images and tables) to cross part- chapter and section boundaries. Table **??** in Subsection **??** lists these commands.

Command	FloatBarrier	Reference As
\newpart{Title}{label}	yes	\ref{part:label}
\newchapter{Title}{label}	yes	\ref{chp:label}
\newsection{Title}{label}	yes	\ref{sec:label}
\newsubsection{Title}{label}	no	\ref{sec:label}
\newsubsubsection{Title}{label}	no	\ref{sec:label}

Table 1.1: Commands to start new parts, chapters, sections, ...

1.2 Layout of Files/Directories

Bringing order to the chaos of a thesis is always a problem. Especially the file/directory structure can become somewhat huge and make later changes difficult. The command \pwd (present working directory) can be used to divide the thesis into smaller parts and make absolute paths (from the main file) unnecessary.

By starting a new chapter with \newchapter{Introduction}{intro} directly followed by \renewcommand{\pwd}{chapter1}, the working directory is set to the subdirectory chapter1. The command \pwd can then be used in all file paths (e.g., \input or \includegraphics) to make sure all files can be loaded without having to define a path. For example, this file is loaded via \input{\pwd/intro_basics}.

Consider creating one directory per chapter, and one file per section. This will make it easier to identify the correct file, and also to shift chapters and especially sections. External files (figures, code, ...) can for example be placed in subdirectories for each chapter.

1.3 Floats: Graphics, Tables, and Listings

1.3.1 Figures and Tables

Even relatively complex figures are easy to create, as you can see from this example. Note that you can refer to Figure **??**, but also to the subfigures: Figure **??** and Figure **??**.
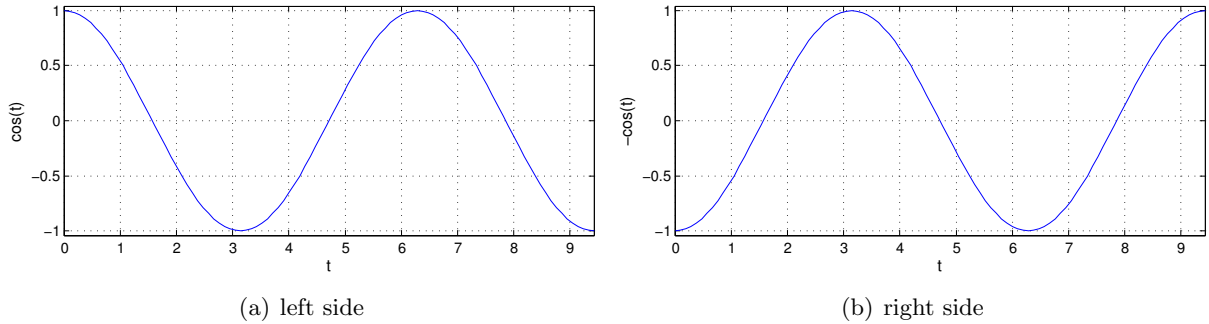
(a) left side   (b) right side

Figure 1.1: Two subplots.

The same image can be created via a standardized command,

```
\twofigs{\pwd/plots/example1}{left side}{-ex1}{\pwd/plots/example2}{right side}{-ex2}{Two subplots.}{intro:floats:usage:figure-std}
```

and referenced like this: Fig. **??**. There are several more standardized functions for figures, cf. Table **??**. Captions and labels are mandatory for all these commands.

Command	Description
`\fig{file}{caption}{label}`	Standard figure, full textwidth.
`\figc{param}{file}{caption}{label}`	Standard figure with controllable parameters for includegraphics.
`\twofig{file_l}{caption_l}{file_r}{caption_r}{caption}{label}`	Two figures, side by side.
`\twofigs{file_l}{caption_l}{add.label_l}{filename_r}{caption_r}{add.label_l}{caption}{label}`	Two figures, side by side, with labels for each subfigure. Figure **??** is created by this command.
`\twofigc{param_l}{file_l}{caption_l}{param_l}{filename_r}{caption_r}{caption}{label}`	Two figures, side by side, with controllable parameters for includegraphics.
`\figf, \figcf, \twofigf, \twofigsf, \twofigcf`	Like the above, but with framed figures.

Table 1.2: Standardized commands for figures.

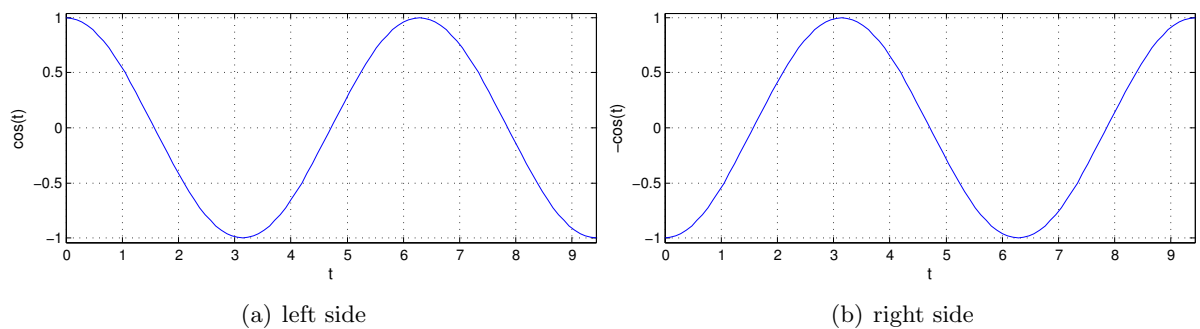(a) left side   (b) right side

Figure 1.2: Two subplots.

1.3.2 Listings

```
 1   % init
 2   clear; close all; clc;
 3   addpath('~/spr/matlab'); globalinit('silent');
 4
 5   % example plots
 6   %      example1
 7   figure; plot(linspace(0,3*pi,100), cos(linspace(0,3*pi,100)));
 8   grid on; xlim([0,3*pi]); ylim(xyzlimits([-1,1])); setlabels('', 't', 'cos(t)');
 9   savefigure(gcf, 'example1', 'eps', struct('papersize',[14.5,7]));
10   %      example2
11   figure; plot(linspace(0,3*pi,100), -cos(linspace(0,3*pi,100)));
12   grid on; xlim([0,3*pi]); ylim(xyzlimits([-1,1])); setlabels('', 't', '-cos(t)');
13   savefigure(gcf, 'example2', 'eps', struct('papersize',[14.5,7]));
```

Listing 1.1: Some matlab code example (highlighting can be configured).

1.4 Miscellaneous

The template also provides several commands that make life easier. The "reminder" commands, for example, can be used to mark something that should be revised, but also as a placeholder for leftout parts of a (...), if there is some open question ???, or you have to look up some reference [?]. They can easily be found in the source code: Just search for \rem. A second group of commands is used to create nice value-unit pairs, such as $f = 3\,\mathrm{kHz}$, $2\,\mathrm{\mu V} \pm 1\,\%$, or $T \leq 735° \pm 4\,‰$. Feel free to redefine them to your needs.

Oh, by the way: This section is

... under construction ...

2 Fancy and Advanced

2.1 Bringing Style Into Your Thesis

> *"They misunderestimated me."*
> *– Guess Who*

The template does not provide too many "stylish" commands. One of them created the quote above, the others are intended to mark a part of the text using the margins. You can, for example

...state that this is dangerous.

...tell the reader to "better pay attention".

...mark some central results.

...also admit that you're just clueless.

2.2 Higher Mathematics

Naturally, there are also several commands that should make life easier when dealing with equations. One of the central ideas is to be able to change the general style of something, for example vector/matrix highlighting ($\boldsymbol{\phi}$ vs. ϕ), just by modifying the template command.

Here are a few examples. Note that equations (**??**) and (**??**), but also (**??**) and (**??**) do not necessarily make sense...

$$\mathrm{var}\{a+b\} \stackrel{!}{=} \mathrm{var}\{a\} + \mathrm{var}\{b\} + 2\mathrm{cov}\{a,b\} \tag{2.1}$$

$$\begin{aligned}
\boldsymbol{H} &:= \mathrm{e}^{\mathrm{E}\{\boldsymbol{h}^T\boldsymbol{h}\}} - \ln(\boldsymbol{h}^T\boldsymbol{h}) + \log(\boldsymbol{h}^T\boldsymbol{h}) - \frac{\mathrm{ld}(\boldsymbol{h}^T\boldsymbol{h})}{\log_3(\boldsymbol{h}^T\boldsymbol{h})} \\
&= \begin{bmatrix} h1 & h2 & \ldots \\ 0 & h1 & \ldots \\ \vdots & \vdots & \ddots \end{bmatrix}
\end{aligned} \tag{2.2}$$

$$\mathrm{E}\{ab^*cd^*\} = \mathrm{E}\{ab^*\} \cdot \mathrm{E}\{cd^*\} + \mathrm{E}\{ad^*\} \cdot \mathrm{E}\{cb^*\} \tag{2.3}$$

$$\mathrm{E}\{ab^*\} \cdot \mathrm{E}\{cd^*\} \neq \mathrm{E}\{ad^*\} \cdot \mathrm{E}\{cb^*\} - \mathrm{E}\{ab^*cd^*\} \tag{2.4}$$