LaTeX4EI Template Documentation

1. Introduction

1.1. Terms of use
This template may be used only for cheat sheets that are published on the *LaTeX4EI* web page.

A lot of effort has been put into this template and therefore all cheat sheets created with this template shall also be availible on the *LaTeX4EI* project web page.

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1.2. Purpuse
The purpuse of this document is to give an overview over all functions of the LaTeX4EI template with the goal to help the reader to create beautiful cheat sheets.

2. Box Environments

For the structuring of the document, the LaTeX4EI template offers different boxes.

2.1. Sectionbox
The main structure is defined through the *sectionbox* environment.

```
\begin{sectionbox}
    content of the sectionbox
\end{sectionbox}
```

2.2. Tablebox
Tables can be set using the *tablebox* or a *tablebox** environment. The table entries are embedded within `\begin{tablebox*}{llll}` and `\end{tablebox*}`.

Example for a table with *tablebox*:

vector $\vec{a} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ matrix $\underline{\underline{M}} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Example of the tablebox

In contrast to that a normal LaTeXtable:

A	small	table
with	two	lines

2.3. Symbolbox
A symbolbox can be used to define symbols for different values.

The equation is embedded within `\begin{symbolbox}` and `\end{symbolbox}`.

Example of a *symbolbox (to define symbols)*

Preasure	$[p]$	$\frac{\mathrm{N}}{\mathrm{m}^2}$
Seebeck-Ko.	$[S]$	$\frac{\mu\mathrm{V}}{\mathrm{K}}$
Wärmeleitf.	$[\lambda]$	$\frac{\mathrm{W}}{\mathrm{m\,K}}$

2.4. Cookbox
a so-called cookbox can be used to set beautiful step-by-step instructions. The items are embedded within `\begin{cookbox}` and `\end{cookbox}`.

How to create a beautiful cheat sheet

1. Read this manual
2. Create a beautiful cheat sheet

2.5. Emphbox
really important formulars can be set in a box with a red border.

The equations are embedded within `\begin{emphbox}` and `\end{emphbox}`.

$$x_{1/2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

3. Language and Text

3.1. Text
The LaTeXsource code of this template is interpreted as unicode. Therefore special characters like the german umlauts (ä,ö,ü) can be used easily.

Also greek characters can be written as math commands (`$\alpha, \beta, \gamma$` → α, β, γ) or as unicode (α, β, γ).

This is also vailid for the math characters: $\int, \partial, \mathbb{R}$ or ∫, ∂, ℝ.

3.2. Language
The language can be choosen with the options *english* or *german*.

It is also possible to define a different language for a part of a document: `\EngGer{You have chosen the language option *english*}{Du hast *ngerman* als Sprachoption gewählt}`

However, you can also switch to english in a german cheat sheet using `\selectlanguage{english}`. This guarantees that words are hyphenated correctly.
And back to german with `\selectlanguage{ngerman}` (use *ngerman* not *german*!)

4. Images

Images can be included using the `\includegraphics` command.

Do not use figure environment.
The width should be set as a fraction of `\columnwidth`.

```
\begin{center}
    \includegraphics[width = 0.5\columnwidth]{Logo}
\end{center}
```

The *includegraphics* command searches for images in `./` and `./img`. The file extension is added automatically.

5. Conventions

Why?
Different formatting is helpful for the understanding of: variables, constants, functions, fixed units, vectors, matrices, sets, complex values, random variables ...

5.1. General conventions for cheat sheets
- Always the name first and the the symbol afterwards!
  Example: "The angular velocity ω, "The angular velocity \omega"
- Densities are always set in small letters
- Brackets around fractions or bigger equations are set with `\left( ... \right)`

5.2. Tables

Line	B/W	Colored
Line on top	`\trule`	`\ctrule`
Linie in the middle	`\mrule`	`\cmrule`
Line at bottom	`\brule`	`\cbrule`

5.3. Boxes
Different topics are categorized within boxes. The following types of boxes are availible:
sectionbox: for a topic (grey)
tablebox: for colored tables
symbolbox: for units and symbols (orange)
emphbox: for very important equations (red box)
topicbox: for important overviews about the topic
For further information on how to use the different boxes please refer to section 2.

5.4. Vectors and matrices

vector symbol	`\vec r`
vector	`\vect{ x \\ y \\ z}`
transpose	`\vec r^\top`
matrix symbol	`\ma M`
matrix	`\mat{ a & b \\ c & d }`
tensor	`\tensor C`

5.5. Indicies and superscript
Depending on what the index refers to it should be set differently:
- E_{kin} (`E_{\ir kin}`) if an index refers to a word (e.g. "kinetic"). The command name `\ir` is an abbriviation for "index roman".
- E_x (`E_x`) if the index refers to a symbol (e.g. the x compontent of the electromagnetic field).

The same difference also applies for the superscript (`^`).

5.6. Functions
The trigonometric functions are usually set upright. Therefore the commands `\exp`, `\sin`, `\cos`, `\sinh`, `\cosh` and `\sinc` should be used.

Similar we can set:
Differential operators: `\grad`, `\div`, `\rot` and `\lpo`
Maximum, minium and limes operators: `\min`, `\maxand` `\lim`
Stochastic operators: `\E`, `\Var` and `\Cov`

Transformations are usually set in italic letters: `\FT`, `\LT`, `\DFT`, `\ZT` and `\DTFT`

5.7. Complex values
Complex variable: `\cx z`
Complex conjugate: `\cxc z`
Imaginary: `\i` or `\j` or `\k` (hypercomplex)

6. Macros

6.1. Own Macros for cheat sheets
Arrows: →, ⇒, ↑, ↓

6.2. Own Macros in the `scientific` package

Vectors and Matrices:	$\vec{a} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ $\underline{\underline{M}} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$
Proper delta for differential equaions:	$\mathrm{d}^3x\,\mathrm{d}y\,\mathrm{d}z\,\frac{\mathrm{d}f(x)}{\mathrm{d}x}$
Functions: SI Units:	$G = 6.67 \times 10^{-11}\ \frac{\mathrm{kg}}{\mathrm{s}^2}$
Sets:	$\mathbb{N}\,\mathbb{R}\,\mathbb{C}$
Random variable:	$X\ Y\ Z$
Stochastic:	$\mathrm{P}(X = 3), \mathrm{E}(X), \mathrm{Var}(X)$

Further information about the use of the *scientific* package can be found in *Scientific Package Documentation.pdf*