LaTeX SUPPORT AT DTU

WEBSITE
www.latex.dtu.dk

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http://www.latex.dtu.dk/downloads/courses/custom_templates/latex_custom_templates_slides.pdf

Download the exercises from:
http://www.latex.dtu.dk/downloads/courses/custom_templates/latex_custom_templates_exercises.pdf

CUSTOM TEMPLATES IN LaTeX

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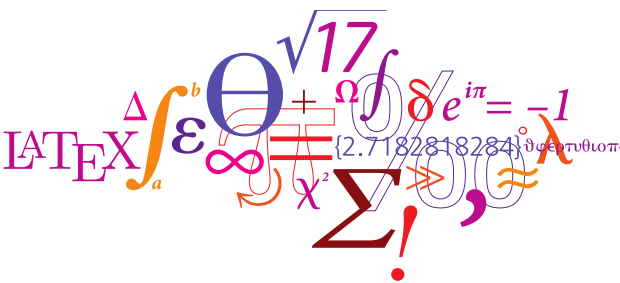


OUTLINE

- Writing reports with LaTeX
  - Choosing a documentclass – Memoir
  - Changing the layout
  - Structure and setup
- The contents of a report
  - Frontmatter
  - Mainmatter
  - Backmatter
  - TikZ and pgf
- Presentations with LaTeX- Beamer
  - Beamer

MEMOIR - A VERY FLEXIBLE DOCUMENT CLASS

INCLUDED (EMULATED) PACKAGES

- abstract
- appendix
- array
- booktabs
- ccaption
- chngcntr
- crop
- dcolumn
- delarray
- enumerate
- epigraph
- framed*
- fancyhdr*
- geometry*
- ifmtarg
- ifpdf
- index
- makeidx
- moreverb
- needspace
- newfile
- nextpage
- pagenote
- patchcmd
- parskip
- setspace
- shortvrb
- showidx
- sidecap*
- subfigure*
- tabularx
- titleref
- titlesec*
- tocbibind
- tocloft
- verbatim
- verse

DOCUMENTATION

- `memman.pdf` — Manual

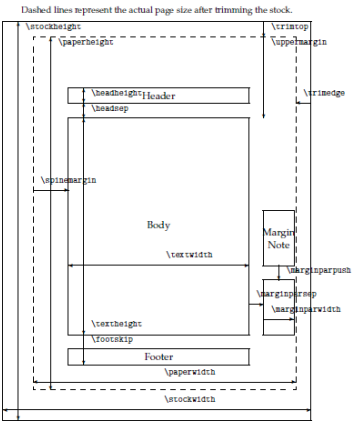
* Not emulated but Memoir provides equivalent functionality

MEMOIR

- Behaves almost like `book`.
- Can emulate `article` and `report`.
- Has more font sizes: `9pt`, `10pt`, `11pt`, `12pt`, `14pt`, `17pt`.
- Font commands from TeX are not supported (`\bf`, `\it`, etc.).
- Avoids problems with incompatible packages!

LAYOUT OF THE PAGE

```
\setlrmarginsandblock{<spline>}{<edge>}{<ratio>}
\setulmarginsandblock{<upper>}{<lower>}{<ratio>}
```



`memoir` will determine arguments replaced by an asterisk '*'

EXAMPLE

```
\setlrmarginsandblock{2cm}{*}{1.5}
\setulmarginsandblock{2cm}{2.5cm}{*}
```

Spline: 2 cm, Edge: 3 cm
Upper: 2 cm, Lower: 2.5 cm

HEADER AND FOOTER

```
\setheadfoot{<headheight>}{<footskip>}
\setheaderspaces{<headdrop>}{<headsep>}{<ratio>}
```

headheight	Height of the header.
footskip	Distance from end of text block to bottom of footer.
headdrop	Distance from top of page to top of header.
headsep	Distance from bottom of header to top of text block.

When the page layout is defined you *must* call `\checkandfixthelayout`

CONTENTS OF HEADER AND FOOTER

The contents of the header and footer is determined by the pagestyle.
Choose a predefined pagestyle with `\pagestyle` or `\thispagestyle`.

empty	empty header and footer.
plain	empty header, page number in footer.
chapter	pagestyle for `\chapter` pages (alias of plain).
cleared	pagesytle for cleared pages (e.g. before a new chapter, alias of empty).
title	pagestyle for page with `\maketitle` (alias of plain).
titlingpage	pagestyle for title page (alias of empty).
headings	titles go into the header.
many more	consult the `memoir` manual.

or define your own pagestyle with custom header and footer…

MAKING A NEW PAGESTYLE

```
\makepagestyle{<name>}
\makeevenhead{<name>}{<left>}{<center>}{<right>}
\makeoddhead{<name>}{<left>}{<center>}{<right>}
\makeevenfoot{<name>}{<left>}{<center>}{<right>}
\makeoddfoot{<name>}{<left>}{<center>}{<right>}
```

EXAMPLE

```
\makepagestyle{dtu}
\makeevenhead{dtu}{}{\sffamily Technical University of Denmark}{}
\makeoddhead{dtu}{}{\sffamily \today}{}
\makeevenfoot{dtu}{\sffamily\thepage}{}{}
\makeoddfoot{dtu}{}{}{\sffamily\thepage}
\makeheadrule{dtu}{\textwidth}{1pt}
\pagestyle{dtu}
```

SECTION LAYOUTS

CHAPTER FORMAT

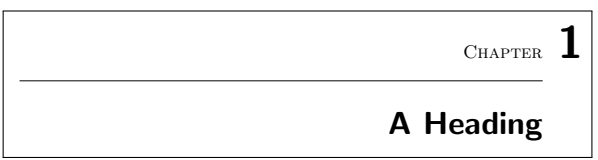
Use `\chapterstyle{<style>}`.
See the `memoir` manual for possible styles or
see the examples in `MemoirChapStyles.pdf` at
http://ctan.org/tex-archive/info/MemoirChapStyles/.

SECTION FORMAT

```
\setsecheadstyle{\Large\bfseries\sffamily\raggedright}
\setsubsecheadstyle{\large\bfseries\sffamily\raggedright}
\setsubsubsecheadstyle{\normalsize\bfseries\sffamily\raggedright}
```

CHANGING THE CHAPTER LAYOUT MANUALLY

```
\makechapterstyle{dktug}{
  \renewcommand\chapnamefont{
    \normalfont\Large\scshape\raggedleft
  }
  \renewcommand\chaptitlefont{
    \normalfont\Huge\bfseries\sffamily
  }
  \renewcommand\chapternamenum{}
  \renewcommand\printchapternum{%
    \makebox[0pt][l]{\hspace{0.4em}%
      \resizebox{!}{4ex}{% requires the graphicx package
        \chapnamefont\bfseries\sffamily\thechapter}}}
  \renewcommand\afterchapternum{%
    \par\hspace{1.5cm}\hrule\vskip\midchapskip}}
```



FONTS

FONT RELATED PACKAGES

```
\usepackage[T1]{fontenc}        % the font encoding
\usepackage[utf8]{inputenc}     % the input encoding
\usepackage{lmodern}            % the Latin Modern font
```

- Computer Modern is the default font used by LaTeX.
- Lots of other fonts are available:
  Palatino (`mathpazo`), Times (`mathptmx`) and Helvetica (`helvet`).
- See font samples at `http://www.tug.dk/FontCatalogue/`

BABEL AND HYPHENATION

MULTIPLE LANGUAGES

It is possible to change language in the middle of a document.
The `babel` package loads hyphenation patterns and controls the names of 'list of …', etc.

```
\usepackage[danish,english]{babel}
```

The last language defined is the default for the document.

DANISH TEXT IN ENGLISH DOCUMENT

```
\begin{otherlanguage}{danish}
  Dansk tekst.\\
  Og danske orddelingsmønstre.
\end{otherlanguage}
```

HYPHENATION

Add/change allowed break points with the `\hyphenation` command

```
\hyphenation{u-sand-syn-ligt}
\hyphenation{hvor}
```

MICRO TYPOGRAPHIC IMPROVEMENTS

Enable font expansion and margin kerning with `microtype`.

WITH MICROTYPE

Margin kerning is the adjustments of the characters at the margins of a typeset text. A simplified employment of margin kerning is hanging punctuation. Margin kerning is needed for optical alignment of the margins of a typeset text, because mechanical justification of the margins makes them look rather ragged. Some characters can make a line appear shorter to the human eye than others. Shifting such characters by an appropriate amount into the margins would greatly improve the appearance of a typeset text.

WITHOUT MICROTYPE

Margin kerning is the adjustments of the characters at the margins of a typeset text. A simplified employment of margin kerning is hanging punctuation. Margin kerning is needed for optical alignment of the margins of a typeset text, because mechanical justification of the margins makes them look rather ragged. Some characters can make a line appear shorter to the human eye than others. Shifting such characters by an appropriate amount into the margins would greatly improve the appearance of a typeset text.

HYPERREFERENCES AND BOOKMARKS

hyperref makes the links created using \label and \ref active and makes it possible to add metadata to pdf-files created by LaTeX.

```
\usepackage{hyperref}
\hypersetup{%
  pdfauthor={Author Name},
  pdftitle={Title of the document},
  pdfkeywords={List, of, important, keywords}
}
```

Create hyperlinks with \url and \href:

\url{http://www.dtu.dk} ⇒ http://www.dtu.dk

\href{http://www.dtu.dk}{DTU} ⇒ DTU

Exercises

Solve exercise 1.1 to 1.6

Experiment and ask questions!

Download slides from:

http://www.latex.dtu.dk/downloads/courses/latex_custom_templates_slides.pdf

Download exercises from:

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SPLIT LARGE DOCUMENTS INTO SEVERAL FILES AND FOLDERS


```
Document directory ..... main_file.tex
├── front ..... frontpage, preface, etc.
├── chapters ..... one file per chapter
├── appendix ..... e.g. source code
├── figures ..... illustrations
└── references ..... BibTeX-database
```

- Input each chapter file with `\include{<filename>}`.
- Specify which files you are working on in `\includeonly{<chap1>,<chap2>}`
- Tell LaTeX where to look for graphics files with (`graphicx`)
  `\graphicspath{\{./figurer/\}}`
- Input any text or LaTeX code with `\input{<filename>}`

THE MAIN FILE

```
\documentclass[a4paper,twoside]{memoir}
% Preamble
\graphicspath{{./figurer/}}
\includeonly{front/titlepage}
\begin{document}
\frontmatter
\include{front/titlepage}
\mainmatter
\include{chapters/chap1}
\include{chapters/chap2}
\include{chapters/chap3}
\backmatter
\include{references/bib}
\end{document}
```

- Avoid problems with two persons editing the same file.
- Using `\includeonly` makes the document compile faster.
- It is easier to work with smaller files in the editor.

DOCUMENT DIVISIONS

`memoir` provides commands for dividing the document into logical divisions

`\frontmatter` Page numbers are lowercase roman numerals, no numbering of sectional divisions. Intended for `\tableofcontents` and friends.

`\mainmatter` Page numbers are arabic numbers, sections etc. are numbered. This is the bulk of the document.

`\backmatter` No change in page numbering, but sections etc. are not numbered. Put the bibliography, index etc. here.

TITLE PAGE

```
\begin{titlingpage}
  \enlargethispage{4cm}
  \null\vspace{1cm}
  \calccentering{\unitlength}
  \begin{adjustwidth*}{\unitlength}{-\unitlength}
    \scshape
    \begin{center}
      {\Large Master Thesis}\\[1cm]
      {\Huge This is a nice title}\\[1cm]
      {\LARGE Subtitle}
    \end{center}
  \end{adjustwidth*}
\end{titlingpage}
```

- `memoir` has the environment `titlingpage` for making the title page.
- The page is blank without a page number.
- The next page has page no. 1.

LIST OF SOMETHING

Table of Contents, List of Figures and List of Tables are generated by

- `\tableofcontents`
- `\listoffigures`
- `\listoftables`

You can get additional lists for numbered elements with

- `\newlistof{listof}{ext}{name}`

All lists have a *'ed version which does not enter the TOC.

EXAMPLE

```
\newcommand{\examplelistname}{Examples}
\newlistof{listofexamples}{exa}{\examplelistname}
\newcounter{example}
\newcommand{\example}[1]{%
  \refstepcounter{example}
  \par\noindent\textbf{Example \theexample. #1}
  \addcontentsline{exa}{section}{%
    \protect\numberline{\theexample}#1}\par}
```

EXAMPLE

```
\listofexamples
\example{Test example}
This is an example.
```

NEW FLOATS

```
\newfloat[<nr.within>]{<environment>}{<ext>}{<prefix>}
```

CHEMICAL REACTIONS --- IN PREAMBLE

```
\newfloat[chapter]{scheme}{sch}{Chemical reaction}
```

IN THE DOCUMENT

```
\begin{scheme}
  \centering
  \ce{6CO2 + 6H2O -> C6H12O6 + 6O2}
  \caption{Photosynthesis.}
\end{scheme}
```

Here we have used the package `mhchem` to typeset the chemical reaction.
Output: $6\,CO_2 + 6\,H_2O \longrightarrow C_6H_{12}O_6 + 6\,O_2$.

PLACEMENT OF FLOATS

t top of page.

b bottom of page.

p on a floatpage without text.

h here – if possible.

! Ignore `\fraction` commands.

Change default float placement specifiers from [tbp]:

```
\makeatletter
\def\fps@figure{htbp}
\makeatother
```

COUNTERS

topnumber max number of top floats = 2

bottomnumber max number of bottom floats = 1

totalnumber max number of floats pr. page = 3

Change the default values with `\setcounter`.

Limit floating by using `\FloatBarrier` from the `placeins` package.

PLACEMENT OF FLOATS

COMMANDS

`\topfraction` max fraction of top floats (0.7)

`\bottomfraction` max fraction of bottom floats (0.3)

`\textfraction` min fraction of text on a text page (0.2)

`\floatpagefraction` min fraction of floats on a float page (0.5)

Change with `\renewcommand`.

LENGTHS

`\floatsep` distance between floats (12pt)

`\textfloatsep` separation between `t`- or `b`-float and text (20pt)

`\intextsep` separation from `h`-float (12pt)

Change with `\setlength`.

FIGURE SUBCAPTIONS

CAPTIONS ABOVE AND BELOW FIGURES

```
\caption[<for list of figures>]{<figure caption>}
\subbottom[<for list of figures>][<figure caption>]{<figure>}
\subtop[<for list of figures>][<figure caption>]{<figure>}
```

Define a subfloat to enable subcaptions: `\newsubfloat{figure}`

CAPTION STYLE

CHANGING CAPTION STYLE

Name font	`\captionnamefont{\sffamily}`
Delimiter	`\captiondelim{: }`
Text font	`\captiontitlefont{\itshape}`

RESULT

Figure 1: *Caption text.*

QUANTITIES AND UNITS

The SI-standards requires units to be typeset with an upright font.
The `siunitx` package is useful for writing quantities and units consistently throughout the entire document.

INPUT

```
\SI{1e-3}{Pa.s}
\SI{9.82}{m/s^2}
\SI{1.0}{\micro m}
\si{kg}
```

OUTPUT

$1 \times 10^{-3}\,\mathrm{Pa\,s}$
$9.82\,\mathrm{m/s^2}$
$1.0\,\mu\mathrm{m}$
kg

CONFIGURATION

```
\sisetup{unitsep=<spacing cmd>} [default: thin]
\sisetup{decimalsymbol=<cmd>}   [default: \fullstop]
```

Exercises

Solve exercise 2.1 to 2.5

Experiment and ask questions!

Download slides from:

http://www.latex.dtu.dk/downloads/courses/latex_custom_templates_slides.pdf

Download exercises from:

http://www.latex.dtu.dk/downloads/courses/latex_custom_templates_exercises.pdf

COMPUTER LISTINGS

`\appendix` changes the chapter numbers to letters starting from A.

`listings` can be used to pretty print computer programs for *a lot* of different programming languages.

```
%% plot of sin(t)
t = linspace(0,2*pi,50);
s = sin(t);
plot(t,s)
% axis and labels
axis([0 2*pi -1 1]);box on
xlabel('t');
ylabel('sin t');
```

```
\lstset{caption = {Matlab script.},
  language = Matlab,
  keywordstyle = \bfseries,
  commentstyle = \itshape
   ↪  \color{green!50!black},
  stringstyle = \color{magenta},
  numbers = left,
  backgroundcolor =
   ↪  \color{lightgray!50!white}
}
```

Environment: `\begin{minted}{latex}` ...`\end{minted}` or input an entire file using `\lstinputlisting{<filename>}`.

BIBLIOGRAPHY INPUT

BibTeX is a database for managing references.

BOOK INFO IN BIBTEX-FORMAT

```
@book{companion,
  author    = {Michel Goossens and Frank Mittelbach},
  title     = {The \LaTeX\ Companion},
  publisher = {Addison-Wesley Publishing Company},
  year      = {2004},
  edition   = {2}
}
```

Use `\cite[p.~56]{companion}` in the document to refer to the book.

There are several GUI tools for managing BibTeX databases:

- JabRef: http://jabref.sourceforge.net/
- Mendeley: www.mendeley.com

BIBLIOGRAPHY OUTPUT

COMPILATION SEQUENCE

LaTeX, BibTeX, LaTeX, LaTeX

This is the reference [1] produced by `\cite{companion}`.

TYPESET OUTPUT

[1] Michel Goossens and Frank Mittelbach.
The LaTeX Companion.
Addison-Wesley Publishing Company, 2 edition, 2004.

The typeset output depends on the chosen `\bibliographystyle`, e.g. `alpha`, `plain`, `apalike`, ...

BIBLIOGRAPHY IN DANISH

- Use package `\usepackage[url,isbn,issn]{dk-bib}`
- Danish bibliography styles:
  dk-abbrv, dk-alpha, dk-plain og dk-unsrt.
- Additional fields: URL, ISBN and ISSN.

EXTRA BIBLIOGRAPHIC POSSIBILITIES

NATBIB

- Easy to configure.
- Use the `natbib` bibliography styles `plainnat`, `abbrvnat`, `unsrtnat`.

CITATION COMMANDS WITH NATBIB

`\citet`	*textual*	Goossens et al. (2004)
`\citep`	*parenthetical*	(Goossens et al., 2004)
`\citeauthor`	*Author name*	
`\citeyear`	*Year*	

CUSTOM BIBLIOGRAPHY STYLES

- makebst – Make your own bibliography style by answering *many* questions about layout.
- dansk.mbs – Danish translations of bibliography-related words.

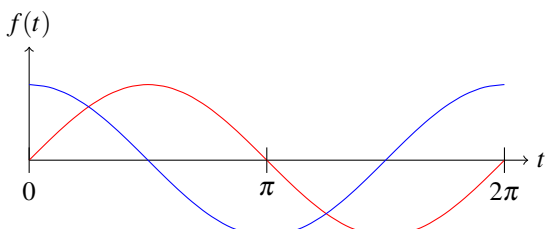
GRAPHS AND ILLUSTRATIONS

pstricks PostScript tricks. Comprehensive set of macros for using PostScript directly from LaTeX.
Requires LaTeX – dvips – ps2pdf.
www.tug.org/PSTricks/

pgf/TikZ Relatively new bundle of packages for creating graphics in LaTeX-documents.
Works with both LaTeX and pdfLaTeX.
Can work as an interface for `Gnuplot` for plotting complicated functions.
See `texdoc pgfuserguide` for more info.

TIKZ INPUT

```
\begin{tikzpicture}
  \tikzstyle{every plot}=[domain=0:2*pi,smooth];
  \draw[->] (0,0) -- (2.1*pi,0) node[right] {$t$};
  \draw[->] (0,0) -- (0,1.5)    node[above] {$f(t)$};
  \draw[red]  plot (\x,{sin(deg(\x))});
  \draw[blue] plot (\x,{cos(deg(\x))});
  \foreach \xtick/\xtickmark in {0/0,pi/\pi,2*pi/2\pi}{%
    \draw (\xtick,1ex) -- (\xtick,-1ex) node[below]{$\xtickmark$};
  };
\end{tikzpicture}
```



BEAMER

Presentation document class

- `Beamer` (used for this presentation).

Advantages:

- Copy/paste contents from LaTeX-documents into the presentations.
- Math and other technical contents is easy to present.
- pdf-format: All fonts are embedded, works on all platforms.

See `texdoc beameruserguide` for more info.

BUILDING A FRAME

```
\begin{frame}
  \frametitle{Frame title}
  \begin{columns}[t]
    \column{0.5\textwidth}
    \begin{block}{A block with important contents}
      \begin{itemize}
      \item Use the
      \item \alert<2>{itemize} environment
      \item<1,3> for bullet lists
      \end{itemize}
    \end{block}
    \column{0.5\textwidth}
    \begin{center}
      \includegraphics[width=0.5\linewidth]{dtu_logo}
    \end{center}
  \end{columns}
\end{frame}
```

FRAME TITLE

A BLOCK WITH IMPORTANT CONTENTS

- Use the
- itemize environment
- for bullet lists

FRAME TITLE

A BLOCK WITH IMPORTANT CONTENTS

- Use the
- itemize environment

FRAME TITLE

A BLOCK WITH IMPORTANT CONTENTS

- Use the
- itemize environment
- for bullet lists

HELP AND SUPPORT

If you want to know more about LaTeX then:

- Visit our homepage :-)
  `www.latex.dtu.dk`
- Post questions on:
  `www.tex.stackexchange.com`
- Look in the `memoir` manuals (memman).
- Check the `beamer` user guide (beameruserguide).
- Consult the `TikZ` user guide (pgfuserguide).

We provide support via email at
latex-support@student.dtu.dk

USEFUL HELPER PROGRAMS

- `texdoc` can find the documentation for packages installed on your system.
- Comprehensive TeX Archive Network (CTAN) `http://ctan.org/`
- Lars Madsens Danish LaTeX-book
  `http://www.imf.au.dk/system/latex/bog/`
- The LaTeX Companion 2ed [Mittelbach and Goossens]

Exercises

Solve exercises 2.6 to 2.7, and 3
Experiment and ask questions!

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