

Custom Templates in L^AT_EX - Exercises

DTU L^AT_EX Support Group

March 2017

All exercises should be solved in the same document. No exercise is mandatory. If you do not think an exercise is relevant for you then skip it. Also remember to use the terminal program `texdoc` when you need help, i.e. `texdoc memman` for the memoir documentation. Alternatively, you can Google “memoir documentation” and find the same document.

1 Layout

In this exercise we will look at different layout customizations possible with the memoir class.

1.1 Create the document

Start by opening the memoir documentation (`texdoc memman`), keep this document open and use it when needed. Now create a new L^AT_EX document containing the following code:

```
\documentclass[a4paper]{memoir}
\usepackage[utf8]{inputenc}
\usepackage[english]{babel}
\usepackage[T1]{fontenc}
\usepackage{lmodern}
\usepackage{lipsum} % for inserting dummy text:
                    % \lipsum or \lipsum[n], where n is 1,2,...,150 or ie. 1-4

\begin{document}
\chapter{Exercise}
\lipsum
\section{A section}
\lipsum
\end{document}
```

1.2 Margins

By default memoir expects that the user is printing duplex and therefore the default margins are: small spline margins (the margins in the centre of the book) and large edge margins. If you do not print duplex you should specify the oneside option.

1. Try changing the margins (remember the `\checkandfixthelayout` command).

Example:

```
\setlrmarginsandblock{2cm}{*}{1.5} % changed values
\setulmarginsandblock{2cm}{2.5cm}{*} % changed values
\setheadfoot{1cm}{0.9cm} % default values
\setheaderspaces{*}{0.635cm}{*} % default values
\checkandfixthelayout
```

1.3 Header and footer

1. Create your own page style, e.g. try changing the position of the page number.

Hint: Use `\leftmark` and `\rightmark` to get the current chapter and the current section respectively. Use `\thepage` to get the page number.

Note: Changing the header and footer on the page where a chapter starts requires that you change the page style plain.

1.4 Chapterstyle

1. Create the chapter style described in the slides.

Experiment with the different font commands: `\sffamily`, `\scshape`, `\bfseries` and `\itshape`.

1.5 Fonts and hyphenation

1. Try adding the microtype package to your document. Can you see the difference?
2. Try changing the font (replace the lmodern package).
3. Add a second language to the babel configuration, and insert a section in the other language. Remember that the last language specified in the babel configuration is the default language for the document.

1.6 Hyperref

The hyperref package takes the L^AT_EX PDF output to the next level. Including this package will make references and your table of contents active hyperlinks.

1. Create some labels in your document, i.e. place a label at the first chapter.
2. Refer to the label later in the document and insert the table of contents in the beginning of your document.
3. Insert the hyperref package in your preamble.
4. Typeset to PDF. You will see that references now are active links.
5. Insert a link to a webpage using `\url` or `\href` and typeset to see the result.

Note: hyperref also provides the possibility to add metadata to the PDF (see handouts and the hyperref documentation, `texdoc hyperref`).

2 Contents

In this part of the exercise we will look at the contents of the document.

2.1 File structure

When writing larger projects it is a good idea to split the document in to smaller parts. This makes it easier to navigate the document. It is also very usefully when more than one person is working on the document. By splitting the document into multiple files one person can work on one chapter and another person can work on another chapter without the need of copy–pasting between documents etc.

1. Move the first chapter of your document to a new file and include it into your main document (remember to name the new file with the extension `.tex`).
2. Start a new chapter in a new file and include this in your main document.

Notes: The `\include` command inserts the \LaTeX code on a new page, one can use the command `\input` instead to insert the \LaTeX code without a page break (`\input` does not have a `\includeonly` equivalent).

Also you may notice that there may be a blank page before a new chapter, that is because by default every chapter must start on a right page. You can specify the memoir option `openany` to allow chapters to start on any page.

Most \LaTeX editors provides the ability to specify the which document should be typeset when you call \LaTeX . In TeXmaker this is done by selecting the menu Options \rightarrow Define current document as 'Master Document'.

2.2 Document parts

The memoir class provides three logical divisions of the document: `\frontmatter`, `\mainmatter` and `\backmatter`.

1. Add the three commands to your document.

Example: place `\frontmatter` just after the `\begin{document}` command, place `\mainmatter` after the table of contents, and place the `\backmatter` command at the end of the document.

2.3 Custom commands

It is possible to create your own custom commands. This is done using the `\newcommand` command: `\newcommand{<command name>}[<number of arguments>]{<action>}`. The input arguments are accessed by the `#<argument number>`, i.e. `#1`. An example of a command could be:

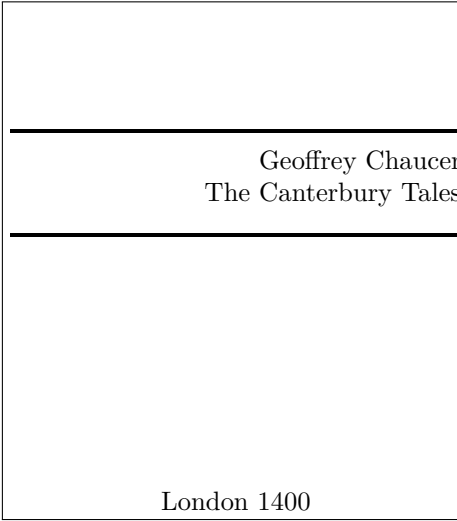
```
\newcommand{\abs}[1]{\ensuremath{\left\vert #1\right\vert}}
```

The `\ensuremath` makes, as the name refer to, sure that the current mode is math (`\left`, `\right` and `\vert` only work in mathmode). The `\vert` command inserts the vertical line. The `\left` and `\right` commands scales a symbol, in this case the vertical line, to fit the contents between `\left` and `\right`. Note when there is a `\left` command there must be a corresponding `\right` command, if you only need a scaled symbol at the left side you must use full stop as the right symbol which will not be visible, i.e. `"\left\{ ... \right."`.

1. Try adding the `\abs` command to your document and use it.

2.4 Front page

When creating a front page in L^AT_EX you will need to use several formatting commands. In this exercise we will show an example and explain the different commands.

L ^A T _E X code	Output
<pre>\newcommand\HRule{% \noindent\rule{\linewidth}{3.5pt}} \begin{titlingpage} \null\vspace{\stretch{1}} \HRule \begin{flushright} \bfseries \LARGE Geoffrey Chaucer \\\ The Canterbury Tales \end{flushright} \HRule \vspace{\stretch{2}} \begin{center} \textsc{London 1400} \end{center} \end{titlingpage}</pre>	

First a command is created to insert a ruler with a width of the text width and a thickness of 3.5pt. The `titlingpage` environment ensures that the page has no header and no footer, and that the next page number will be 1.

The `\vspace` command inserts vertical space, in this case the space is `\stretch{1}` which is a rubber space. That is `\stretch{n}` will be equal to the vertical space left on the page. The factor n determines the ratio between multiple `\stretch{n}` commands: if two `\stretch{1}` are issued on the same page they will be of the same size, if a `\stretch{1}` and a `\stretch{2}` are issued on the same page the former will be 1/3 of the size left on the page and the latter will be 2/3 of the size left on the page.

The `flushright` environment make the text right justified.

If you are using the `twoside` layout you want the front page to be centred. Consult the handouts for how to do this.

1. Create a new file containing your front page.
2. Include it in your document.

2.5 Floats

Sometimes it can be useful to create new floats i.e. for chemistry equations.

1. Add the `mhchem` package to your document.
2. Create a new float environment for chemistry equations (see handouts).
3. Use the new environment.

`Memoir` includes functionality for changing the caption layout and for having subcaptions.

4. Add the command `\newsfloat{figure}` to your preamble.
5. Add the `graphicx` package to the preamble.
6. Fetch the `xfig_figure.png` from http://www.latex.dtu.dk/downloads/courses/miscellaneous/xfig_figure.png. Remember to place the figures in the same folder as your L^AT_EX document or in the folder specified by `\graphicspath`.

7. Include the figure two times as subfigures.

Hint: Use `\subbottom` or `\subtop`.

8. Experiment with the caption commands.

2.6 Listings

The package listings can be used to include and pretty print all kinds of computer languages.

1. Add the xcolor package and the listings package to your preamble.
2. Add the listings configuration from the slides.
3. Fetch the file `matlab_code_fragment.m` from http://www.latex.dtu.dk/downloads/courses/miscellaneous/matlab_code_fragment.m. Remember to place the file in the same folder as your \LaTeX document.
4. Include the code in your document (remember to specify the language).
5. Play with the options, for more info consult the documentation (write `texdoc listings` in a terminal).

2.7 PGF/TikZ

You can create your diagrams in an external application like Xfig, but why not create them directly from your \LaTeX document?! With TikZ you can do just that and it has some advantages:

- The fonts are handled by \LaTeX which means that the fonts in the diagrams are the same as the one in the text.
- If you are drawing many similar diagrams you can define global styles. In this way you can i.e. change the colour of all you diagrams by changing one line of code.
- All you need to edit all parts of your document is your editor.

1. Add the tikz package to your preamble.
2. Create the following TikZ picture:

```
\tikzstyle{box}=[rectangle,
                 draw=black!50,
                 fill=blue!20,
                 minimum width=20mm,
                 minimum height=15mm,
                 text width=20mm,
                 text badly centered]

\begin{tikzpicture}[node distance=40mm]
  \node[box] (A) {\LaTeX};
  \node[box] (B) [right of=A] {Beautiful documents};
  \draw[->] (A) -- (B);
\end{tikzpicture}
```

Every object in TikZ are produced with the command `node` which have the following syntax:

```
\node[<options>] (<unique name>) [<placement>] {<text>};
```

Lines are produced with the command `\draw`, in fact you can draw anything with this command (also nodes), therefore for this exercise we have only shown the basic operation of drawing an arrow between two boxes.

3. Consult the TikZ manual (`texdoc pgfmanual`) and i.e. try drawing a circle.

3 Beamer

When you have delivered your project and you need to do a presentation you will want to create a slideshow, and of course you would do this with L^AT_EX.

In this exercise we will take a look at producing slideshows with the beamer class. Creating a slideshow with beamer is very similar to writing L^AT_EX reports, the only real difference being that every slide (page) is created with the frame environment.

1. Start by creating a new document with the following code.

```
\documentclass{beamer}
\usepackage[utf8]{inputenc}
\usepackage[english]{babel}
\usepackage[T1]{fontenc}

\begin{document}
\section{First slide}
\begin{frame}
  \begin{itemize}
    \item Using beamer for
    \item presentations.
  \end{itemize}
\end{frame}
\end{document}
```

This will produce a very basic slide.

2. Different themes exist for beamer: i.e. Warsaw (the one used in our presentation), Singapore, Berlin, and many more. Use the command `\usetheme{<theme name>}` in the preamble to load the Warsaw theme.
3. Add the following command to customise the colour.
4. Try creating the slide described in the handouts.
5. The title page is produced by the command `\titlepage`. Define the title, author, institute, and date as described below and issue the `\titlepage` command.

Insert this in your preamble:

```
\title{Beamer slideshow}
\author[<name in bottom>]{<name on titlepage>}
\date{\today}
\institute{<institute>}
```

Create a new frame in the beginning of the the document containing the `\titlepage` command.

6. Finally we will show how handouts can be made. The package pdfpages provides among others the ability to put multiple pages on one page, which is nice. Place the following code in your preamble.

```
\mode<handout>{%
  \setbeamercolor{background canvas}{bg=black!2}
  \beamertemplatenavigationsymbolseempty
  \usepackage{pgfpages}
  \pgfpagesuselayout{8 on 1}[a4paper,border shrink=2mm]
}
```

The code will run when the handout option is activated:

```
\documentclass[handout]{beamer}
```