

L^AT_EX

Beyond the basics

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[†] with thanks to last year's coordinator, Stuart Midgley

Extra document features

L^AT_EX allows the easy creation of a table of contents, list of figures and list of tables. These are automatically updated when you compile your document and are the same as your chapter, section, subsection headings and table/list captions. To build these lists simply include `\tableofcontents`, `\listoffigures` and `\listoftables` at the beginning of your document

```
\documentclass[12pt, a4paper]{book}

\begin{document}

\tableofcontents
\listoffigures
\listoftables
```

Another useful feature of L^AT_EX is the footnote, produced by¹
`\footnote{the text appears at the bottom of the page}`

Minipages and boxes

Often you need to create a text box which has all the features of a single character. This can be done with minipages and boxes.

```

                another
                minipage.
a minipage    Notice how
with a        they are
footnote a and aligned
This is _____
awhich
goes in the
minipage
with normal text.
```

```
This is \begin{minipage}[c]{2cm}
a minipage with a footnote
\footnote{which goes in the minipage}
\end{minipage}
and
\begin{minipage}[b]{2cm}
another minipage. Notice how they
are aligned
\end{minipage}

with normal text.
```

¹the text appears at the bottom of the page

There is also the

simple box	<code>\mbox{simple box}</code>	
make box	<code>\makebox[5cm][c]{make box}</code>	
<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>simple frame box</td></tr></table>	simple frame box	<code>\fbox{simple frame box}</code>
simple frame box		
<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> frame box</td></tr></table>	frame box	<code>\framebox[4cm][r]{frame box}</code>
frame box		
and many more	and many more	

More equations

Want more equations? Try writing these in MSWord and have them looking so good.

$$\mathcal{F} = ax + \begin{cases} bx^{y^2} + c & |x| \ll |y|, & x \ni \Re & \text{condition 1} \\
 by^{\psi y^2} + \alpha & |x| \gg |y|, & x \ni \Im & \text{condition 2} \\
 b\frac{1}{x \times y} + \beta & |x| \approx |y|, & x \ni \Re & \text{condition 3} \end{cases}$$

$$\Rightarrow \prod_{i=0}^N \left\{ \begin{array}{c} \begin{array}{cc} x & y^2 \\ x^2 & \underbrace{y}_{i \dots \infty} \end{array} \\ \begin{array}{cc} x & y^2 \\ x^2 & \underbrace{y}_{i \dots \infty} \end{array} \\ \underbrace{x + \int_0^\infty \exp(y^2) dy}_{\text{this is a little silly}} \end{array} \right\} + x + y \tag{1}$$

```

\begin{eqnarray}
\mathcal{F} & = & a x + \left\{ \begin{array}{l}
\begin{array}{l}
bx^{y^2} + c & |x| \ll |y|, & x \ni \Re & \mbox{condition 1} \\
by^{\psi y^2} + \alpha & |x| \gg |y|, & x \ni \Im & \mbox{condition 2} \\
b\frac{1}{x \times y} + \beta & |x| \approx |y|, & x \ni \Re & \mbox{condition 3}
\end{array}
\end{array} \right. \\
& \Rightarrow & \prod_{i=0}^N \left\{ \begin{array}{c} \begin{array}{cc} x & y^2 \\ x^2 & \underbrace{y}_{i \dots \infty} \end{array} \\ \begin{array}{cc} x & y^2 \\ x^2 & \underbrace{y}_{i \dots \infty} \end{array} \\ \underbrace{x + \int_0^\infty \exp(y^2) dy}_{\text{this is a little silly}} \end{array} \right\} + x + y
\end{eqnarray}

```

```

x & y^{2} \\
x^{2} & \underbrace{y}_{i \dots \infty}
\end{array}}
{x + \int_{0}^{\infty} \exp(y^{2}) dy}_{\mbox{this is a little silly}}
\right\} + x + y
\end{eqnarray}

```

Regardless of how complex your equations, L^AT_EX gets them right.

References, citations and the bibliography

L^AT_EX has very advanced referencing and citation abilities which are easy to use. The two commands are `\cite{...}` and `\ref{...}` which link into previously defined labels.

$$x^y + 1 = z \quad (2)$$

$$x^3 + y = \beta \quad (3)$$

You can now reference Eq. 2 with ease anywhere in the document along with Eq. 3.

```

\begin{equation}
x^{y}+1=z
\label{eq1}
\end{equation}
\begin{equation}
x^{3}+y=\beta
\label{eq2}
\end{equation}
You can now reference Eq.~\ref{eq1}
with ease anywhere in the document,
along with Eq.~\ref{eq2}.

```

You can cite documents with ease [Lamport 1994] where the citation has been defined in the bibliography [Goossens *et al.* 1994].

```

You can cite documents with ease
\cite{bo:lamport} where the citation
has been defined in the
bibliography \cite{bo:goossens}.

```

The bibliography at the end of these notes was created with

```

\begin{thebibliography}{(goossens et al. 1994)}
\bibitem[Lamport 1994]{bo:lamport} ‘‘\LaTeX\ A Document Preparation
System 2nd Edition’’, Leslie Lamport,
Addison Wesley (1994)
\bibitem[Goossens \textit{et al.} 1994]{bo:goossens} ‘‘The \LaTeX
Companion’’, Goossens Mittelbach and Samarin,
Addison Wesley (1994)
\bibitem[CTAN]{web:ctan} \texttt{http://www.ctan.org}
\end{thebibliography}

```

Tables and figures

Tables and figures are just like any other environment in \LaTeX . Before you can use graphics, you need to load an appropriate package

```
\documentclass[a4paper,12pt]{book}
\usepackage{graphics}      % Standard graphics package
\usepackage{graphicx}     % Enable PDF graphics in pdflatex
\usepackage{epsfig}       % Enable PS and EPS graphics in latex
```

Now the inclusion of figures and tables is easy which is produced by the following

this is	the	tabular environment
used	inside the	table environment

Table 1: This is a floating table

```
\begin{table}[!ht]
\centering
\begin{tabular}{lc|r}
this is & the & tabular environment \\
\hline
used & inside the & table environment \\
\end{tabular}
\caption{This is a floating table}
\label{tbl1}
\end{table}
```

Notice the label in the table, which can be used for referencing Table 1 by $\text{\ref{tbl1}}$. The same goes for figures



Figure 1: This is a floating figure

which is produced by the following

```
\begin{figure}[!ht]
\centering
\epsfig{file=rat1.eps,width=5cm}
\caption{This is a floating figure}
\label{fig1}
\end{figure}
```

The figure can also be referenced Figure 1 by `\ref{fig1}`.

Managing large documents

\LaTeX is particularly good at managing large documents since all files are text files and all images etc. are linked to them, rather than being embedded in the document. To help manage documents with many parts, chapters and sections, there is the `\include{file}` command where `file.tex` is another file containing further \LaTeX commands.

Other useful features to help with large documents

- `\pagebreak` forces a page break
- `\newpage` moves to a new page
- `\clearpage` prints all figures and tables and starts a new page
- `\newcommand{\cmd}[n] [opt]{defn}` creates a new command called `\cmd`
- `\newenvironment{name}[n] [opt]{begin}{end}` creates a new environment called *name*

The management of a large number of bibliography entries is also possible with $\text{BIB}\TeX$, which is an add-on system to \LaTeX used to manage a database of citations. $\text{BIB}\TeX$ creates the bibliography of each of your documents for you, depending on which entries of the database have been cited in them.

Exercise

Write a dummy thesis. Use the book document class and put each chapter in a separate file, include a bibliography. Each chapter should have several sections and subsections. Chapter 1 should demonstrate equations. Chapter 2 should demonstrate footnotes. Chapter 3 should demonstrate boxes of various kinds. Chapter 4 should demonstrate figures (use the `rat1.eps` which can be downloaded from <http://wwwmaths.anu.edu.au/~chrisw/LaTeX/>). Chapter 5 should reference the previous chapters, equations, figures and include some citation references.

Finally, try to reproduce some of the side-by-side text shown in this course document.

Bibliography

- [Lamport 1994] “ \LaTeX A Document Preparation System 2nd Edition”, Leslie Lamport, Addison Wesley (1994)
- [Goossens *et al.* 1994] “The \LaTeX Companion”, Goossens Mittelbach and Samarin, Addison Wesley (1994)
- [CTAN] <http://www.ctan.org>

Module 1: Introduction – running L^AT_EX, chapters, special commands

Reference material 1
 A brief history of L^AT_EX 2
 How to run L^AT_EX, and what happens when we do 2
 A first L^AT_EX document 5
 Special characters 5
 Commands, declarations and environments 7
 Sectional units 9
 Titlepages and abstracts 10
 Spacing 11
 Accents, special symbols and the like 14
 Playing with fonts 14
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Module 2: Layout – lists, tables, figures, mathematics

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 Tabstops and tables 3
 Importing pictures 7
 Displaying tables and figures 8
 A relatively brief introduction to mathematics 9
 Quotations and so forth 15
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Module 3: Cross-referencing – numbering, bibliographies

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 Cross-referencing 3
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 List of figures, list of tables, and table of contents 8
 Counters and renumbering 9
 Customising displayed numbers 12
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Module 4: Customising – defining commands, L^AT_EX packages

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