

Instructions for use with Acroread

Mouse activated controls:

Quit	quit Acroread
Close	close document
Info	document info
Help	jump to this page
←	go back
◀	previous page
Bookmarks	pop-up bookmarks
Thumbnails	pop-up thumbnails
▷	next page
→▷	go forward
internal link	go to link
external link	go to link via browser

Keyboard activated controls:

'page down'	next page
'page up'	previous page
'cursor up'	previous bookmark
'cursor down'	next bookmark
'enter'	go to bookmark
'escape'	window mode

An Introduction to Type-setting projects in \LaTeX with the **UoYCSProject** class

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What is L^AT_EX?

L^AT_EX is a *document description language* built on top of Donald Knuth's T_EX type-setting engine.

Cf. HTML and SGML/XML applications.

A minimal document

Source

```
\documentclass{minimal}  
\begin{document}  
Hello_World.  
\end{document}
```

Output

Hello World.

Quit Close Info Help



Bookmarks

Thumbnails



Introduction to L^AT_EX/3

Why use L^AT_EX?

- The sophisticated type-setting algorithm of T_EX, and the enhanced algorithm of *pdf_E(l_a)tex*. (See [the T_EX showcase](#).)
- The huge number of pre-defined packages for doing common things. (See [the T_EX catalogue](#).)
- The ability to define your own special purpose structures.
- Stable basis.
- Good for large, academic documents.

References

There are many good references for $\text{T}_{\text{E}}\text{X}$ and friends.

See “*A guide to type-setting project reports in \LaTeX with the UoYCSproject class*”.

UoYCSProject — a class for project reports

There are many pre-defined document classes:

Base minimal, article, report, book, letter, slides.

KOMA-Script scrartcl, scrreprt, scrbook, scrلتtr2.

Memorandum memorandum.

Others . . . , beamer, . . . , UoYCSproject, . . .

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Text, commands and environments

A \LaTeX source is a mix of:

text `Some text.`,

commands `\LaTeX`, `\frac{2}{3}`, and

environments

```
\begin{verse}  
  APRIL is the cruellest month, breeding  
  \\Lilacs out of the dead land, mixing  
  \\...  
\end{verse}
```

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The anatomy of a \LaTeX source

```
\documentclass[class options]{class name}  
preamble (definitions and declarations)  
\begin{document} % this is a comment.  
body  
\end{document}
```

The anatomy of a UoYCSproject preamble

```
\documentclass[citation_style]{UoYCSproject}
%_Order_of_declarations_does_not_matter.
\author{Anne_Student-Name}
\title{A_Solution_to_the_Problem_of_ $P=NP$ }
\date{30_February_2000}
\supervisor{Prof._Z._Soporific}
\MEng
\wordcount{2,345}\excludes{Appendix~\ref{sec:code}}
\dedication{To_My_Cat,_Jeoffery}
\abstract{The_well_known_problem_of_ $P=NP$ _is_explained,_together
  _with_its_significance_and_a_brief_history_of_attempts_to_solve
  _it._An_ingenious_solution_is_presented.}
\begin{document}
...
\end{document}
```

A full list of declarations is given in [AGtTSPRiLwtUC](#), Figure 7.1, P 46.

Extra definitions and package loading

You can load extra packages and make your own definitions.

These go in a file with the same name as your main file, but extension ‘`ldf`’. **THIS IS DIFFERENT TO THE WAY ALL OTHER CLASSES WORK.** (I have implemented UoYCSproject in this way to ensure that packages are loaded in the correct order.)

Useful packages include: `listings` , `graphics`, `graphicx`, `pdftricks` , `amsmath`.

The anatomy of the body

Front matter Title pages, abstract, contents, &c.

Main matter The text, divided into (parts,) chapters (, sections, subsections, subsubsections, paragraphs and subparagraphs).

Back matter Bibliography, appendices &c.

Front matter

Mostly generated automatically from the declarations. Optionally:

a list of figures generated by `\listoffigures`.

a list of tables generated by `\listoftables`.

document dependent lists for example, the ‘listings’ package provides
`\lstlistoflistings`.

Main matter

`\part{title}` % *Optional*
`\chapter{title}` % *Compulsory*
`\section{title}` % *Optional*
`\subsection{title}` % *Optional*
`\subsubsection{title}` % *Optional*
`\paragraph{title}` % *Optional*
`\subparagraph{title}` % *Optional*
Text. Text.

Back matter

`\bibliography{file 1,file 2}` % *Construct bibliography*

`\appendix` % *remaining chapters are appendices*

`\chapter{title}` % *One per appendix*

`\section{title}` % *Optional*

`\subsection{title}` % *Optional*

`\subsubsection{title}` % *Optional*

`\paragraph{title}` % *Optional*

`\subparagraph{title}` % *Optional*

Text. Text.

Text elements

Characters Can control series, family, shape, colour and size of each text character. See [AGtTSPRiLwtUC, §6.3.3](#).

Sentences `Sentence_one._.Sentence_two.`

Paragraphs

`Paragraph_one._.%_blank_line_separates_paragraphs`

`Paragraph_two.`

Special features

Context dependent emphasis

Cross references Sectional units, floats, equations, &c.

Quotations Short and long

Lists Bulleted, numbered and labelled

Tables

Pictures

Floats Tables, Figures and others.

Citations and the bibliography

Through the *natbib* package. Two style options:

Harvard Use option: `authoryearcitations`

Cite as text ‘As Joyce (1939) says, life is complex.’

Cite in parenthesis ‘Life is complex (Joyce, 1939).’

Toronto Use option: `numericalcitations`

Cite as number ‘As Joyce [17] says, life is complex.’ or ‘Life is complex [17].’

Citations are kept in a **database in a flat file** and processed by a program called BibT_EX before inclusion in output file.

Mathematics

Very powerful facilities. May be enhanced by *amsmath* packages.

Inline Here is a formula: $\sum_{i=1}^n i = \frac{n(n+1)}{2}$; isn't it beautiful?

Displayed Here is a formula:

$$\sum_{i=1}^n i = \frac{n(n+1)}{2} \quad (1)$$

Isn't it beautiful?

Definitions

A major reason for using \LaTeX . Create special-purpose commands and environments for the structures in *your* document.

To define a command called `\UoY` that prints ‘The University of York’:

```
\newcommand*{\UoY}{The University of York}
```

To define a command that has two parameters:

```
\newcommand*{\C}[2]{_{{\#1}}C^{{\#2}}}
```

```
\begin{math}\C{x+2}{3y}\end{math} type-sets as  $x+2C^3y$ .
```

Case study: cryptographic protocols — 1

A *message* has three components: *sender*, *receiver* and *content*. So we write our document in terms of a command `\msg` that has 3 parameters.

Two possible definitions:

`\newcommand*\msg[3]{#1\rightarrow#2:#3}`

`\newcommand*\msg[3]{#2\Longleftarrow\left[#3\right]\Longleftarrow#1}`

`\msg{S}{R}{C^{A^B}}` type-sets as either:

$S \rightarrow R : C^{A^B}$ or $R \Leftarrow [C^{A^B}] \Leftarrow S$.

Case study: cryptographic protocols — 2a

A protocol is a sequence of messages. So we write our document in terms of an environment that collects a sequence of messages.

We will write, for example:

```
\begin{protocol}  
    \msg{A}{B}{X,Y,Z}  
    \sep \msg{B}{C}{W,X}  
    \sep \msg{C}{B}{W,X'}  
\end{protocol}
```

Case study: cryptographic protocols — 2b

Now we design the printed form.

The output should have numbered messages to which labels can be attached. Each message should be printed on a line of its own.

The definitions of `\msg` and `\sep` should be local to the environment.



Case study: cryptographic protocols — 2c

```
\newcounter{msgnumber}

\newenvironment*{protocol}

{\setcounter{msgnumber}{0}%

\newcommand*{\msg}[3]{%

\refstepcounter{msgnumber}\themsgnumber###1###2###3}

\newcommand*{\sep}{\ }

\begin{math}\displaystyle%

\begin{array}{r@{. \quad}l@{\rightarrow}l@{\;:\;}l}}

{\end{array}\end{math}}
```


Case study: cryptographic protocols — 2d

Source

```
\begin{protocol}  
    \msg{A}{B}{X,Y,Z}  
    \sep \msg{B}{C}{W,X}  
    \sep \msg{C}{B}{W,X'}  
\end{protocol}
```

Output

1. $A \rightarrow B : X, Y, Z$
2. $B \rightarrow C : W, X$
3. $C \rightarrow B : W, X'$

How to run L^AT_EX — 1

1. Create `<source>.tex`, `<source>.ldf`, bibliographic files, &c.
2. Run PDF(E)L^AT_EX (Using T_EXLive on Departmental Linux: `'pdflatex <source>'`). Collects auxiliary information in `<source>.aux`, `<source>.toc`, &c. and creates `<source>.pdf`.
3. Run BibT_EX (`'bibtex <source>'`). This uses the auxiliary information to determine database files and writes `<source>.bbl` file.
4. Run PDF(E)L^AT_EX (`'pdflatex <source>'`). Collects auxiliary information in `<source>.aux`, `<source>.toc`, &c., including bibliographic cross references.
5. Run PDF(E)L^AT_EX (`'pdflatex <source>'`). There should now be enough auxiliary information to generate the final version of `<source>.pdf`.

How to run \LaTeX — 2

Process can be eased by tools such as

- AUCTeX package for `emacs` (Linux and Microsoft).
- MikTeX and WinEDT on Microsoft systems.

Incremental processing and errors do not mean repeating the whole process: for example, BibTeX only needs to be re-run if the bibliographic files change or a new citation is added.