

Writing a Scientific Paper in L^AT_EX

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Abstract In the previous tutorial, you have learnt how to work with L^AT_EX. In this tutorial you write your first scientific paper in L^AT_EX in just under 10 minutes. We will use the class file provided by the publisher to format our document. Simply by changing the first line of your earlier file, we should have a paper formatted as required by the publisher.

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1 Introduction

In the previous tutorial, you have learnt how to work with L^AT_EX. In this tutorial you write your first scientific paper in L^AT_EX in just under 10 minutes. We will use the class file provided by the publisher to format our document. Simply by changing the first line of your earlier file, we should have a paper formatted as required by the publisher.

```
\documentclass[twocolumn]{svjour3}
```

L^AT_EX (pronounced La-Tech) is a document markup language and document preparation system for the TeX typesetting program. L^AT_EX is a flexible typesetting package. Various fonts and sizes of font are available. For example **typewriter**, *italic*, *emphasised*, **san serif**, **bold** as well as the default roman. Combinations of some are possible *emphasised san serif*, for example.

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L^AT_EX is an excellent package to deal with equations and graphics.

2 What Do I Need?

To start working with L^AT_EX, you will need L^AT_EX compiler and a text editor!

2.1 L^AT_EX Compiler

To convert your L^AT_EX source file, you will need a compiler to make real documents out of your L^AT_EX source file. MiKTeX is a free L^AT_EX compiler for windows and its installation is extremely simple. LaTeX compiler produces so called DVI file or PDF which can be then inspected and printed by YAP viewer or Adobe Reader. Download the package from: <http://miktex.org/2.9/setup>

2.2 L^AT_EX Editor

You will also need a L^AT_EX editor to write your text in, because you cannot just write it in MS Word or OpenOffice Writer and compile it from there. Just to set the record straight, L^AT_EX is a markup language, which uses commands to make your text look bold, coloured or any other text alignments you want to put it in. Assuming that you are using Windows, you might want to TeXnicCenter available from:

<http://www.texniccenter.org/resources/downloads>

3 Producing a LaTeX \LaTeX Document

The first line of the input file should normally consist of an appropriate `\documentclass` command. If an article (or similar document) is to be produced on A4 paper, and if the main body of the text is to be set with a font whose natural size is ‘12 point’, then the appropriate `\documentclass` command is:

```
\documentclass[a4,12pt]{article}
```

Other forms of the `\documentclass` command can be used for letters, reports or books. If 12pt is omitted from the `\documentclass` command (with the preceding comma), then the document will be set in a ‘10 point’ size. One may also replace 12pt with 11pt.

After the `\documentclass` command and these other optional commands, we place the command `\begin{document}`

This command is then followed by the main body of the text, in the format prescribed by the rules of LaTeX. Finally, we end the input file with a line containing the command `\end{document}`.

Your first LaTeX file could be something like this:

```
\documentclass[a4,12pt]{article}
\begin{document}
Hello World.
\end{document}
```

3.1 Document Classes

The way your document will look and be structured depends on the `\documentclass` command at the top of the file. Useful classes are: `letter`, `article`, for reports and journal articles and `book` for theses and books. For a specific publication, if you are given a document class, then replace the documentclass name to your class file.

3.2 Sections

Articles are usually structured into sections, and books into chapters and chapter sections. To create a new section use `\section{Section Title}`. Subsection or Sub-sub-section can also be used. Sections can be cross referenced, if you `\label` them. For example the Introduction is section 1 in this document.

If you prefer a section without a number, then you should use `*` after the section i.e. `\section*{Title}`.

```
\documentclass[a4,12pt]{article}
\begin{document}
\section{Introduction}
Hello World.\
\section{More Text}
More Text here.
\end{document}
```

3.3 Spaces, Gaps, Breaks, etc.

Sometimes you want to over-ride the default formatting in various ways. Here are a few common examples. If you leave a blank line between two lines of text LaTeX assumes that you want a new paragraph and indents accordingly.

Sometimes you don’t want this indentation and the `\noindent` command is useful. Sometimes you may want to

break a line in a different place to the default in which case use `\\` to insert a line break.

`\pagebreak` will start a new page.

4 Equations

The real beauty of LaTeX is equations. For inline equations like, $\mu(x_1, x_2) = 2x_1 + 2x_2$, simply insert the instructions defining the equation between single `$` signs. If you want a display equation without a number put the instructions between `$$`’s like this:

$$\mu(x_1, x_2) = \alpha 2x_1 + 2x_2$$

If you want an equation to have a number then you need to use `\begin{equation}` and `\end{equation}` for example

$$\theta = \int Mx \, dx \tag{1}$$

Numbered equations like equation (1) can be referenced using `\ref`.

Multi-line equations (without numbering) are produced like this:

$$\begin{aligned} (af_{\theta_1} + bf_{\theta_2})(x) &:= af_{\theta_1}(x) + bf_{\theta_2}(x) \\ &= x^t(a\theta_1 + b\theta_2). \end{aligned}$$

or with numbering like this:

$$\begin{aligned} \Theta(n, T) &= B(n, T) \times \Sigma(n, T) \\ &= \{\mu \mid \mu = X\beta, \beta^{nT}\} \times \{\Sigma_\epsilon \mid i \neq j\} \end{aligned} \tag{2}$$

Often you may want something like this:

$$f(x_i) = \begin{cases} (\beta + 1)x_i^\beta & 0 < x_i < 1 \\ 0 & \text{otherwise} \end{cases}$$

the large `{` is achieved using the bracketing commands `\left` and `\right` along with the null bracket symbol ‘.’.



Fig. 1: Figure Caption.

5 Figures

You will need to include figures. It is best to use .jpg, .eps or .pdf files. Save images in a folder and include them into your document.

```
\begin{figure}[h]
\centering
\includegraphics[width=8cm]{images/image1}
\caption{Figure Caption.}
\label{fig:image1}
\end{figure}
```

You can control size of figure and by adding a label, they can be referenced any any point. Figure 1 is saved in folder images.

Before using `\includegraphics` you should add graphics package. To add a package, add the following line after `\documentclass`.

```
\documentclass[a4,12pt]{article}
\usepackage{graphicx,epsfig,subfig}
\begin{document}
Hello World.
\end{document}
```

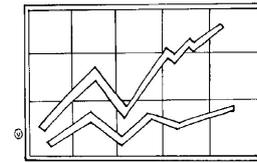
To add sub-figures use the following format which and the results are shown in Figure 2.

6 Tables

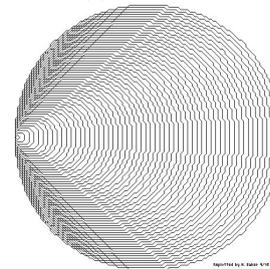
Nicely placed tables with captions, numbers and labels like table 1, can be produced with `\begin{table}` and `\end{table}`.

7 Lists

Devotees of the bullet point:



(a) Rectangle



(b) Circle

Fig. 2: Image caption. a) Rectangle, b) Circle.

- Should use the `\begin{itemize}` command to start a bulleted list.
- Should use the `\item` command to add items to the list.
- Should use the `\end{itemize}` command to end a bulleted list.

Numbered lists can be useful and use `\begin{enumerate}` and `\end{enumerate}` to generate the list.

1. the first item.
2. the second item.
3. the third item and possibly some sub-items.
 - (a) examination questions.
 - (b) algorithms.
 - (c) er.

8 Including Computer Code

Computer code represents a special problem, because it often uses characters that have a special meaning in

Table 1: Orbits of S_n in Ω^3 (with $n > 3$) and in Ω^4 (with $n > 4$)

Orbits in Ω^3		Orbits in Ω^4	
Orbit type	multiplicity	Orbit type	multiplicity
$\{(i)\}$	1	$\{(i, i)\}$	1
$\{(i)\}$	3	$\{(i, j)\}$	4
$\{(i)\}$	1	$\{(i, j)\}$	3
		$\{(i, i)\}$	6
		$\{(i, l)\}$	1
Total	5	Total	15

L^AT_EX and is often carefully laid out in a way that the author does not want messed around by automatic text processing.

9 Bibliography and references

Quite nice bibliography creating facilities are available using the BibTeX program. Basically you create a separate file ('mybib.bib') containing all your references, cite them using `\cite{ref1}` in the document using standard commands and then place a command at the end of your document to create the reference list - only references that you actually cited will appear on this list. For example a few references added here [3], [4].

To create a 'bib' file, use your RefWorks and export references in BibTeX format. You can format your references using different publishers style. You need a 'bst' file and you have to replace the default plain style with the publisher bibliography style file.

9.1 Harvard Citation Style

If you want to use citation styles other than numerical, then you need an extra package. The first job is to add the following to your preamble in order to get Latex to use the Natbib package:

```
\usepackage{natbib}
```

Also, you need to change the bibliography style file to be used, so edit the appropriate line at the bottom of the file so that it reads: `\bibliographystyle{plainnat}`. Once done, it is basically a matter of altering the existing `\cite` commands to display the type of citation you want.

```
\citet{lotfi09} for Lotfi et al. (2009)
\citep{lotfi09} for (Lotfi et al., 2009)
\citet*{lotfi09} for Lotfi & Langensiepen (2009)
```

The main commands simply add a *t* for 'textual' or *p* for 'parenthesised', to the basic `\cite` command. You will also notice how Natbib by default will compress references with three or more authors to the more concise 1st surname et al version. By adding an asterisk (*), you can override this default and list all authors associated with that citation. There is a command called `\bibpunct` that can be used to override the defaults and change certain settings.

```
\bibpunct{(}{)}{;}{a}{,}{,}
```

In summary, you need to add the following:

1. Add the following to your preamble of your tex file.

```
\usepackage{natbib}
\bibpunct{(}{)}{;}{a}{,}{,}
```

2. Replace `\cite` with `\citep` or `\citet`.
3. Add the following to the end of your document.

```
\bibliographystyle{plainnat}
% or abbrvnat or unsrnat
\bibliography{myBib}
```

10 Misc.

A table of contents can be inserted anywhere with the command `\tableofcontents`. You can also use:

- `\listoffigures` or
- `\listoftables`.

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