

L^AT_EX Workshop

a bio^{*} event

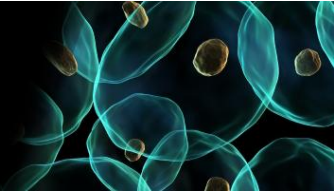
by *Ricardo Sousa*

Universidade do Porto



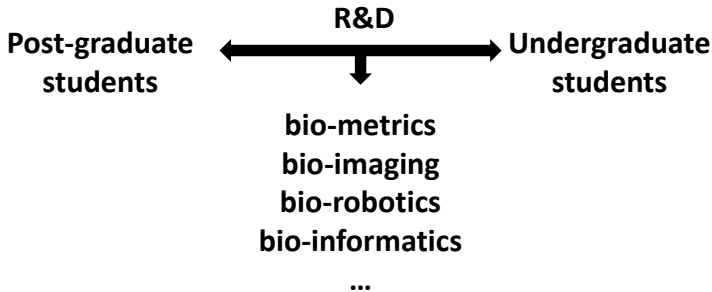
Universidade do Porto
Faculdade de Engenharia
FEUP

Bio-*



<http://biostar.fe.up.pt>

biostar@fe.up.pt



Past Workshops:

- Introduction to Matlab
- Image Processing using MatLAB
- Introduction to C/C++



Outline.

Introduction

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Installation

Maintenance

\LaTeX Documents

Graphical User Interface (GUI)

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What is \LaTeX ?

- ▶ \LaTeX is a typesetting system;
- ▶ Allows the production of scientific (and non-scientific) documents;
- ▶ High-quality results.

*Check references of this presentation for further information.

L^AT_EX in a nutshell.

Save following lines in a file named: `minimal.tex`

```
\documentclass{article}  
\begin{document}  
Small is beautiful.  
\end{document}
```

and then, on the command line (run twice at least):

```
$ pdflatex minimal  
...  
$ pdflatex minimal
```



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Installing L^AT_EX.

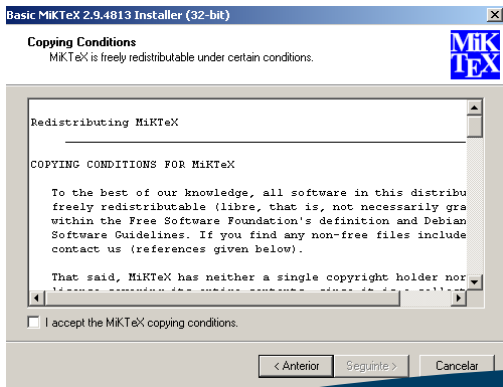
Figure : MiKTeX homepage.





Installing L^AT_EX.

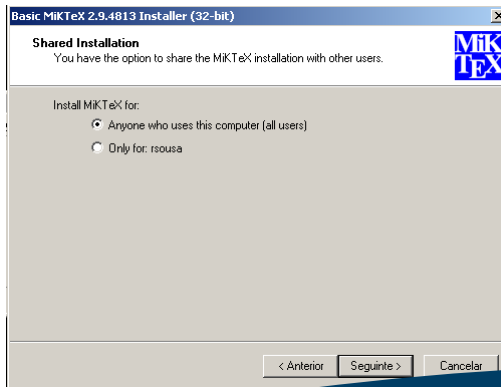
Figure : MiKTeX conditions.





Installing L^AT_EX.

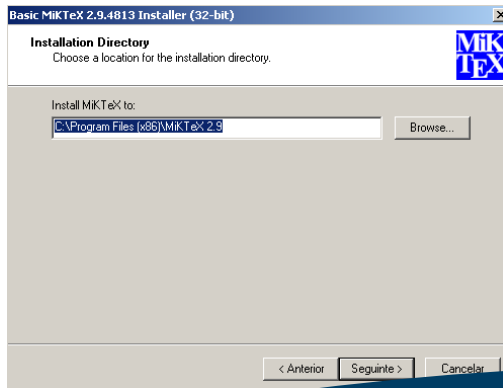
Figure : Standard configuration access profile.





Installing L^AT_EX.

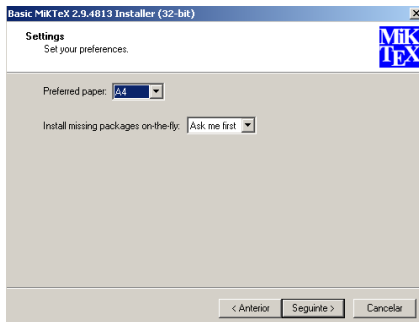
Figure : Installation directory.





Installing L^AT_EX.

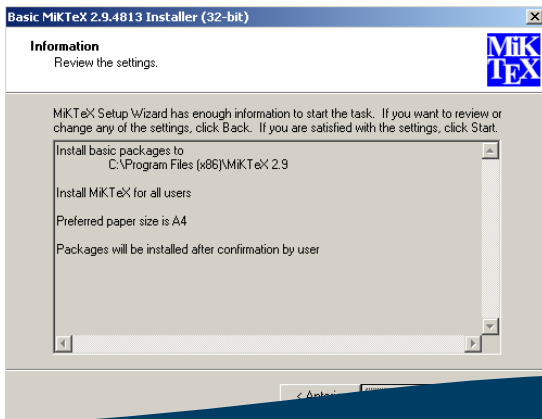
Figure : Some customizations (can be changed afterwards).





Installing L^AT_EX.

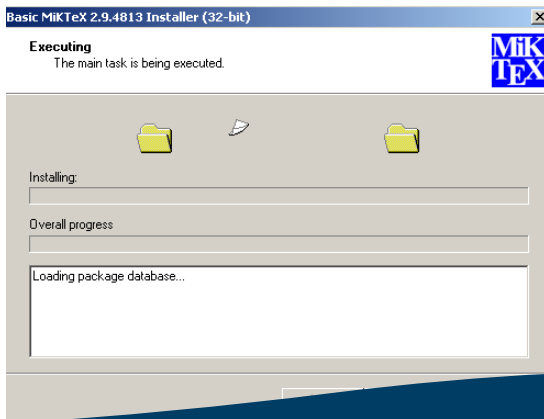
Figure : Review installation settings.





Installing L^AT_EX.

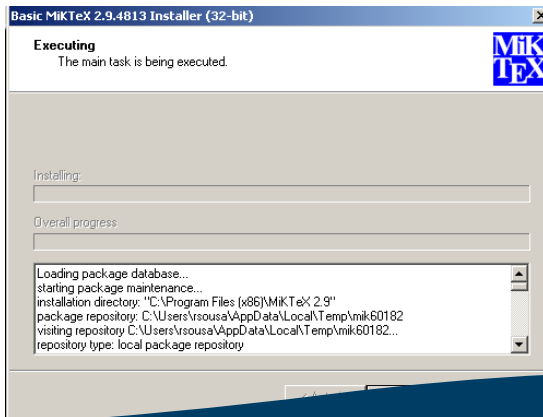
Figure : Installation (this may take a while).





Installing L^AT_EX.

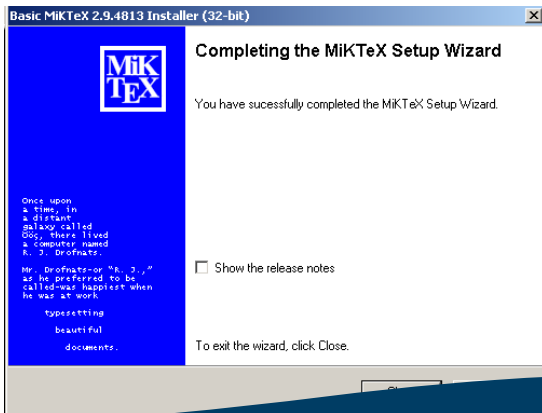
Figure : Installation (finished).





Installing L^AT_EX.

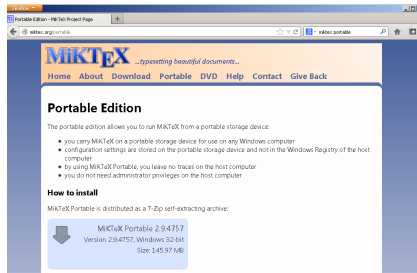
Figure : Installation finished.





Installing MiKTeX Portable.

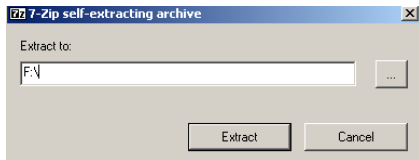
Figure : MiKTeX Portable Homepage.





Installing MiKTeX Portable.

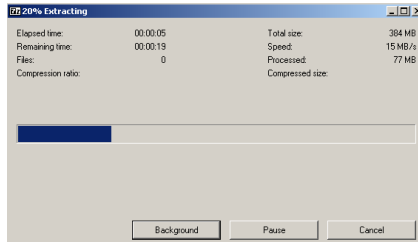
Figure : Extract to a given directory (e.g., pen drive).





Installing MiKTeX Portable.

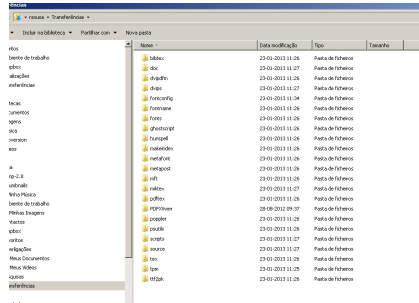
Figure : Extraction (this may take a while).





Installing MiKTeX Portable.

Figure : MiKTeX.





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Maintaining \LaTeX Updated - Part I.

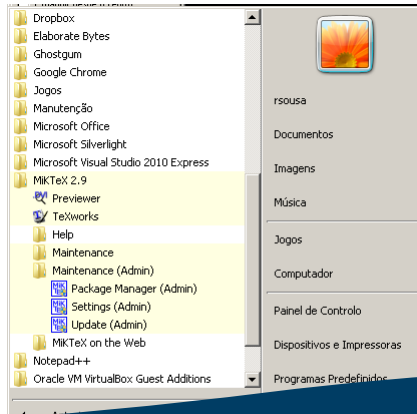
Figure : Maintaining \LaTeX (MiKTeX Portable).

| Nome | Data modificação | Tipo | Tamanho |
|-------------------|------------------|-----------------------|----------|
| mo_admin.exe | 29-07-2011 22:38 | Aplicação | 202 KB |
| mpm.exe | 24-04-2012 15:48 | Aplicação | 3.638 KB |
| mpm_mfc.exe | 29-07-2011 22:35 | Aplicação | 147 KB |
| mpm_mfc_admin.exe | 29-07-2011 22:36 | Aplicação | 148 KB |
| mpm_qt.exe | 29-07-2011 22:36 | Aplicação | 132 KB |
| mpm_qt_admin.exe | 29-07-2011 22:36 | Aplicação | 132 KB |
| mpost.exe | 29-07-2011 22:44 | Aplicação | 484 KB |
| mptopdf.exe | 01-06-2012 15:48 | Aplicação | 33 KB |
| msvcp100.dll | 19-02-2011 22:03 | Extensão da aplicação | 412 KB |
| msvcr100.dll | 18-02-2011 23:40 | Extensão da aplicação | 756 KB |
| mihelp.exe | 30-07-2011 02:35 | Aplicação | 33 KB |
| mkprint.exe | 29-07-2011 23:11 | Aplicação | 72 KB |
| m-bx.exe | 08-06-2012 16:36 | Aplicação | 49 KB |



Maintaining L^AT_EX Updated - Part I.

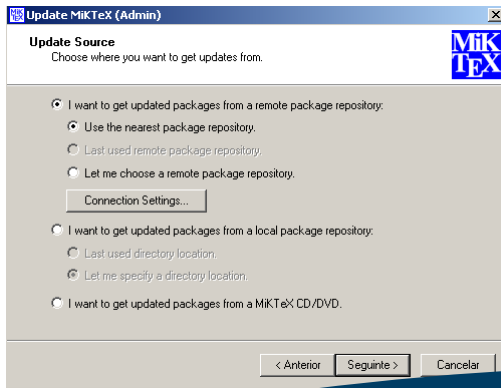
Figure : MiKTeX maintenance options (select update).





Maintaining L^AT_EX Updated - Part I.

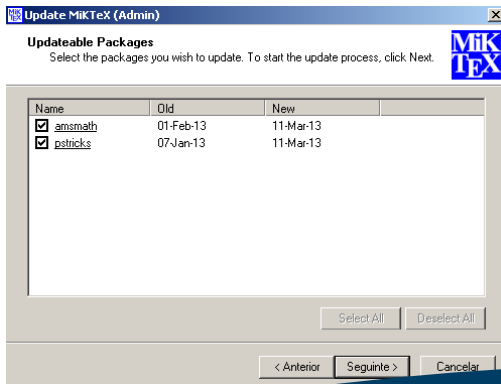
Figure : Select updates sources.





Maintaining L^AT_EX Updated - Part I.

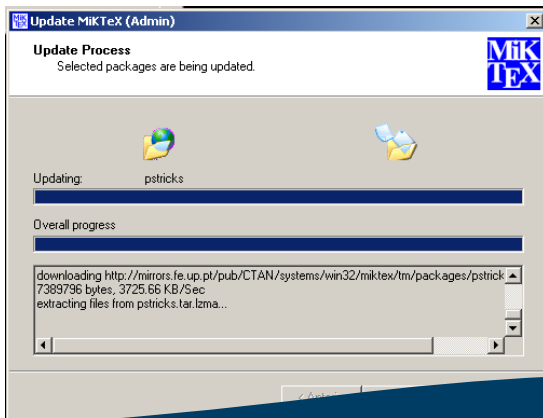
Figure : Example of packages to be updated.





Maintaining L^AT_EX Updated - Part I.

Figure : Update ongoing.





Maintaining L^AT_EX Updated - Part I.

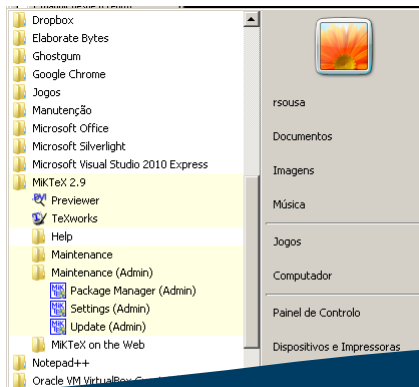
Figure : Update conclusion.





Maintaining L^AT_EX Updated - Part II.

Figure : MiKTeX maintenance options (select package manager).





Maintaining L^AT_EX Updated - Part II.

Figure : Packages listing.

| TeX Live Package Manager (Admin) | | | | | |
|-------------------------------------|------------------------------|---------|-------------|--------------|--|
| File Edit View Task Repository Help | | | | | |
| | | Name: | Keywords: | File name: | Filter: Reset |
| Name | Category | Size | Packaged on | Installed on | Title |
| library | (Format)LaTeXeLaTeXe contrib | 490263 | 2011-07-15 | | Generating mathematical index sets |
| altpaper | (Format)LaTeXeLaTeXe contrib | 230286 | 2004-02-13 | | Support for designing posters on large paper |
| article | (Format)LaTeXeLaTeXe contrib | 137107 | 2011-01-07 | | "article" article layout |
| afonts | (Format)LaTeXeLaTeXe contrib | 100456 | 2010-03-22 | | Support for all paper sizes |
| astex | (Format)LaTeXeLaTeXe contrib | 2359094 | 2005-06-25 | | Macros for Manuscript Preparation for AAS Journals |
| abc | (Format)LaTeXeLaTeXe contrib | 54141 | 2008-03-13 | | Support ABC music notation in LaTeX |
| abntex2 | Unkategorisiert | 421849 | 2013-02-25 | | Typeset technical and scientific Brazilian documents based on ABNT rules |
| abntex | Unkategorisiert | 295574 | 2012-09-16 | | Automatic over-underbraces in math |
| abstract | (Format)LaTeXeLaTeXe contrib | 189542 | 2009-09-03 | | Control the typesetting of the abstract environment |
| adstiles | Unkategorisiert | 292402 | 2011-07-15 | | Adaptable BibTeX styles |
| adcfonts | Unkategorisiert | 191608 | 2009-04-21 | | Utilities to derive new fonts from existing ones |
| acchemo | (Format)LaTeXeLaTeXe contrib | 730136 | 2012-03-08 | | Support for American Chemical Society journal submissions |
| acconfer | (Format)LaTeXeLaTeXe contrib | 295936 | 2005-05-31 | | Class for ACM conference proceedings |
| acron | Unkategorisiert | 917579 | 2012-02-11 | | Typeset acronyms |
| acronym | (Format)LaTeXeLaTeXe contrib | 841373 | 2010-09-27 | | Create a graphics widget in a PDF file |
| acronymary | (Format)LaTeXeLaTeXe contrib | 9594796 | 2012-01-02 | | Memory games in LaTeX |
| acronym | (Format)LaTeXeLaTeXe contrib | 304028 | 2012-01-02 | | Expand acronyms at least once |
| acronsort | (Format)LaTeXeLaTeXe contrib | 434763 | 2012-01-02 | | Sort dead usage into order |
| acronm | (Format)LaTeXeLaTeXe contrib | 101047 | 2010-11-24 | | Manage and index acronyms and terms |
| acronex | (Format)LaTeXeLaTeXe contrib | 2959985 | 2012-07-11 | | The AcronTeX education bundle |
| active-conf | (Format)LaTeXeLaTeXe contrib | 244464 | 2008-09-23 | | Class for typesetting ACM conference papers |
| actualebible | Unkategorisiert | 8044 | 2012-10-17 | | Symbol for use in "transcript value" statements of an ontology |
| addlines | (Format)LaTeXeLaTeXe contrib | 15218 | 2008-09-19 | | A user-friendly wrapper around (en)largefhepage |
| addfhepage | (Format)LaTeXeLaTeXe contrib | 200771 | 2011-09-01 | | Australian Defence Force Academy thesis format |
| adfont | (Format)LaTeXeLaTeXe contrib | 417245 | 2010-10-07 | | Overlaid LaTeX font with TeXLive support |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 403299 | 2010-09-09 | | SymbolaTeX with TeXLive support |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 321385 | 2012-02-01 | | Adjusting margins for multicol and single column output |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 895248 | 2012-09-29 | | Graphics package-able macros for "general" boxes |
| adfontbld | Unkategorisiert | 907218 | 2012-06-11 | | Adobe Cmap font in LaTeX |
| adfontbld | Unkategorisiert | 497328 | 2010-04-13 | | BibTeX styles to implement an address database |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 24007 | 2005-05-14 | | Using address lists in LaTeX |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 150287 | 2010-02-22 | | Print a date relative to "today" |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 506513 | 2007-07-05 | 2013-03-12 | Virtual fonts for PDF files with T1 encoded CMap fonts |
| adfontbld | (Format)LaTeXeLaTeXe contrib | 271424 | 2010-09-27 | | Multi-line links with hyperref |
| adfontbld | Unkategorisiert | 885592 | 2012-07-11 | | Format PDF files for use on a smartphone |
| | | | | | Total: 2472 |



Maintaining L^AT_EX Updated - Part II.

Figure : Search for “ieee” package.

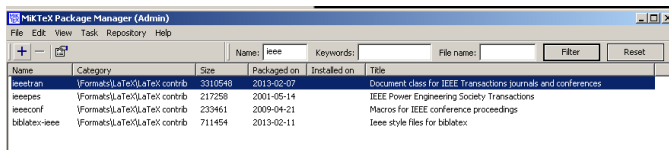
The screenshot shows the MikTeX Package Manager (Admin) window. At the top, there is a menu bar with 'File', 'Edit', 'View', 'Task', 'Repository', and 'Help'. Below the menu bar, there are search fields: 'Name:' with the value 'ieee', 'Keywords:', and 'File name:'. To the right of these fields are 'Filter' and 'Reset' buttons. Below the search fields is a table with the following data:

| Name | Category | Size | Packaged on | Installed on | Title |
|--------------|------------------------------|---------|-------------|--------------|---|
| ieeetran | \Formats\LaTeX\LaTeX contrib | 3310548 | 2013-02-07 | | Document class for IEEE Transactions journals and conferences |
| ieeepes | \Formats\LaTeX\LaTeX contrib | 217258 | 2001-05-14 | | IEEE Power Engineering Society Transactions |
| ieeeconf | \Formats\LaTeX\LaTeX contrib | 233461 | 2009-04-21 | | Macros for IEEE conference proceedings |
| bblatex-ieee | \Formats\LaTeX\LaTeX contrib | 711454 | 2013-02-11 | | Ieee style files for biblatex |



Maintaining L^AT_EX Updated - Part II.

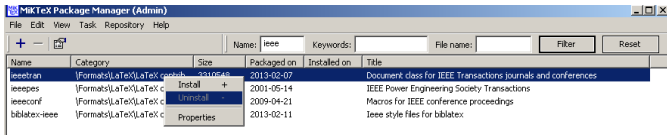
Figure : You can install by clicking in the “+” sign.





Maintaining L^AT_EX Updated - Part II.

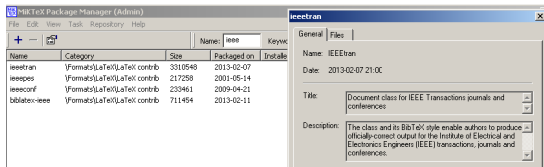
Figure : Or by pressing the right mouse button.





Maintaining L^AT_EX Updated - Part II.

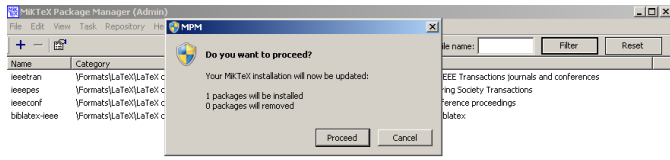
Figure : Package description.





Maintaining L^AT_EX Updated - Part II.

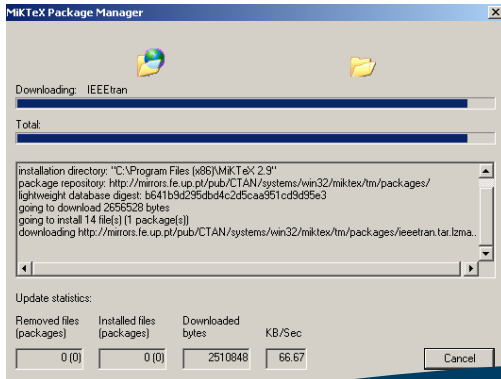
Figure : Installation confirmation box.





Maintaining L^AT_EX Updated - Part II.

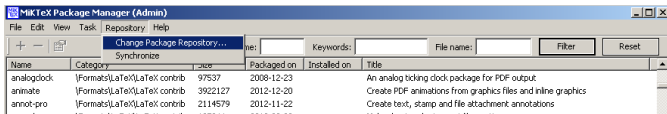
Figure : Installation.





Maintaining L^AT_EX Updated - Part II.

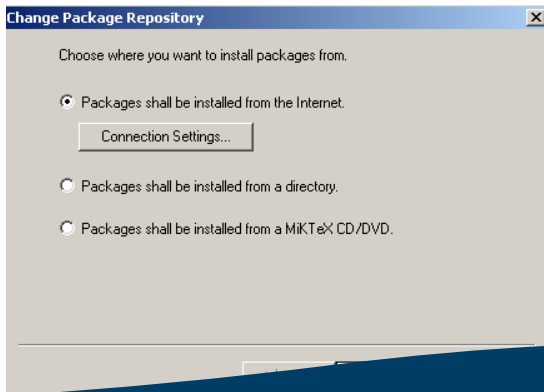
Figure : Changing package repository.





Maintaining L^AT_EX Updated - Part II.

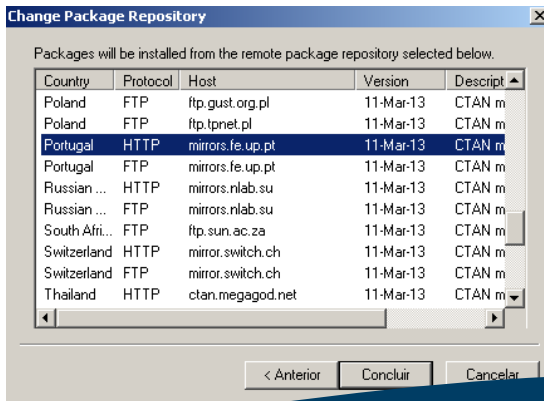
Figure : Select installation from internet for the most up to date packages.





Maintaining L^AT_EX Updated - Part II.

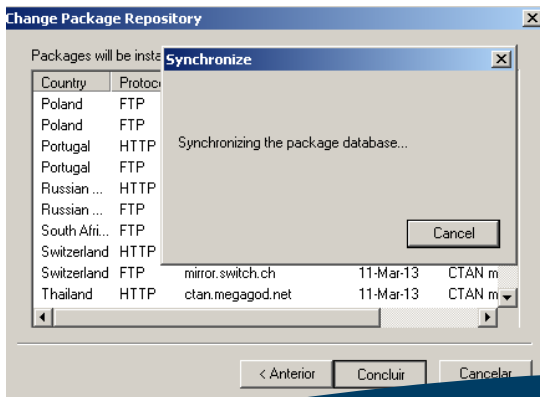
Figure : Select the closest one.





Maintaining L^AT_EX Updated - Part II.

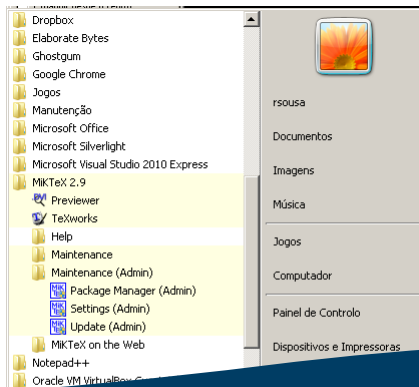
Figure : And let it synchronize.





Maintaining L^AT_EX Updated - Part III.

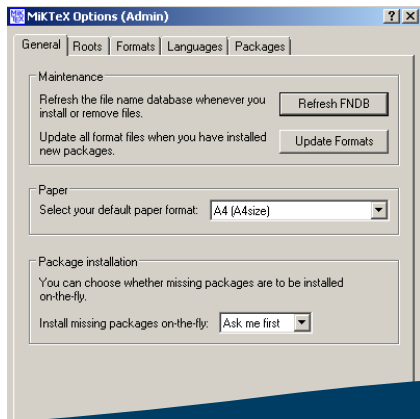
Figure : MiKTeX maintenance options (select package manager).





Maintaining L^AT_EX Updated - Part III.

Figure : Change settings.





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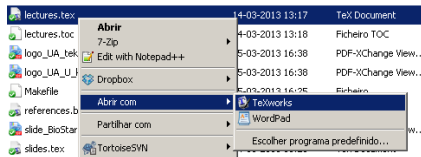
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User Interface: TeXworks

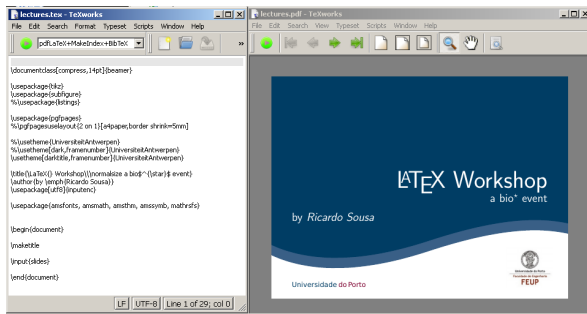
Figure : Right click on the main \LaTeX file and press “open with” TeXworks.





User Interface: TeXworks

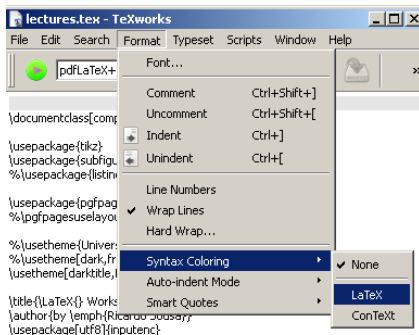
Figure : Expected result (for this presentation).





User Interface: TeXworks

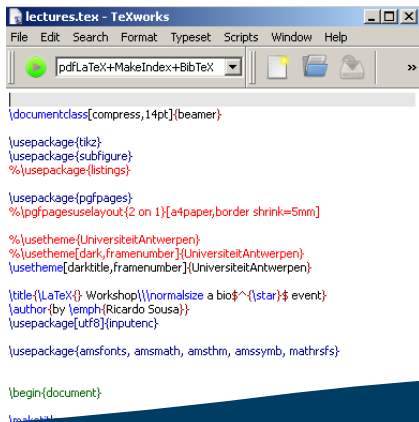
Figure : Syntax highlight.





User Interface: TeXworks

Figure : Expected result.



The screenshot shows the TeXworks application window titled "lectures.tex - TeXworks". The menu bar includes File, Edit, Search, Format, Typeset, Scripts, Window, and Help. Below the menu bar is a toolbar with icons for opening, saving, and other file operations. The main text area contains the following LaTeX code:

```
\documentclass[compress,14pt]{beamer}

\usepackage{tikz}
\usepackage{subfigure}
%\usepackage{listings}

\usepackage{pgfpages}
%\pgfpagesuselayout{2 on 1}[a4paper,border shrink=5mm]

%\usetheme{UniversiteitAntwerpen}
%\usetheme{dark,framenumber}{UniversiteitAntwerpen}
\usetheme{darktitle,framenumber}{UniversiteitAntwerpen}

\title{\LaTeX{} Workshop}{\normalsize a bio$^{\star}$ event}
\author{by \emph{Ricardo Sousa}}
\usepackage{utf8}{inputenc}

\usepackage{amsmath, amsthm, amssymb, mathrsfs}

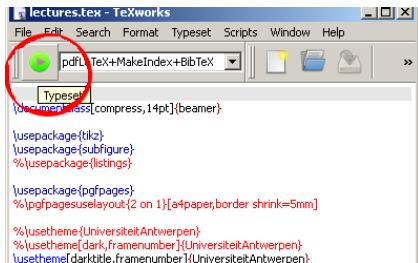
\begin{document}

\maketitle
```



TeXworks: Compiling.

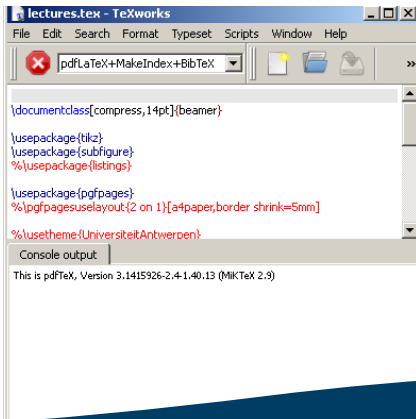
Figure : Compiling.





TeXworks: Compiling.

Figure : Console output.



The screenshot shows the TeXworks application window titled "lectures.tex - TeXworks". The menu bar includes File, Edit, Search, Format, Typeset, Scripts, Window, and Help. Below the menu bar is a toolbar with icons for opening, saving, and other file operations. The main text area contains LaTeX code for a Beamer presentation. The console output at the bottom shows the result of the compilation process.

```
\documentclass[compress,14pt]{beamer}

\usepackage{tikz}
\usepackage{subfigure}
%\usepackage{listings}

\usepackage{pgfpages}
%\pgfpagesuselayout{2 on 1}[a4paper,border shrink=5mm]

%\usetheme{UniversiteitAntwerpen}
```

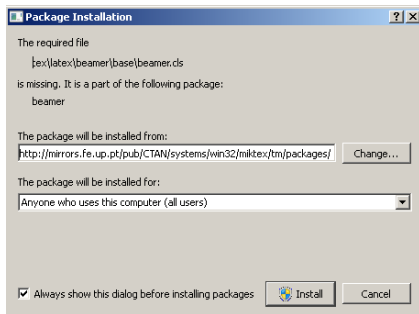
Console output

This is pdfTeX, Version 3.1415926-2.4-1.40.13 (MiKTeX 2.9)



TeXworks: Compiling.

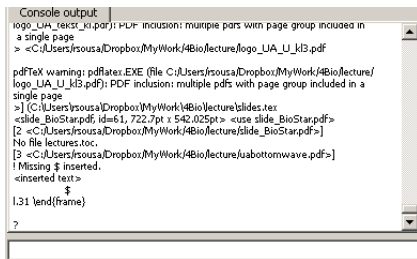
Figure : Pop-up window to install missing packages.





TeXworks: Compiling.

Figure : Compilation unsuccessful.



```
Console output
logo_UA_rekst_kl.por): PDF inclusion: multiple ports with page group included in
a single page
> <C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/logo_UA_U_kl3.pdf

pdfTeX warning: pdfLatex.EXE (file C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/
logo_UA_U_kl3.pdf): PDF inclusion: multiple pdfs with page group included in a
single page
>] (C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/slides.tex
<slide_BioStar.pdf, id=61, 722.7pt x 542.025pt> <use slide_BioStar.pdf>
[2 <C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/slide_BioStar.pdf>]
No file lectures.toc.
[3 <C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/uabottomwave.pdf>]
! Missing $ inserted.
<inserted text>
$
l.31 \end{frame}
?
```



Command line compilation.

Figure : Generating compile script.

| | | | |
|---|------------------|---------------------|-------|
|  logo_UA_U_jsj.pdr | 05-03-2013 16:38 | PUT-XChange view... | 74 KB |
|  Makefile | 05-03-2013 16:25 | Ficheiro | 1 KB |
|  compile.bat | 14-03-2013 13:33 | Documento de texto | 0 KB |
|  references.bib | 05-03-2013 16:45 | BibTeX Database | 1 KB |
|  ... | ... | ... | ... |



Command line compilation.

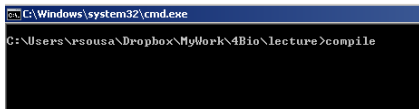
Figure : 3 main lines of code.

```
C:\Users\rsousa\Dropbox\MyWork\4Bio\lectur
File Edit Search View Encoding Language Settings
compile.bat
1 pdflatex lectures
2 pdflatex lectures
3 bibtex lectures
4 pdflatex lectures
```



Command line compilation.

Figure : Open a command line window



```
C:\Windows\system32\cmd.exe  
C:\Users\rsousa\Dropbox\MyWork\4Bio\lecture>compile
```



Command line compilation.

Figure : Pop-up window to install missing packages.

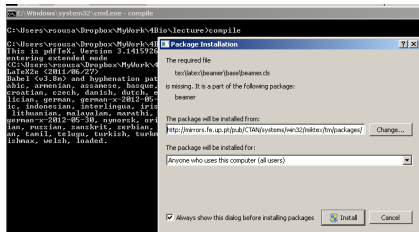




Figure : Compilation successful.

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Command line compilation.

Figure : Compilation unsuccessful.

```
pdfTeX warning: pdflatex <file C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/logo_u0_tekst_k1.pdf>: PDF inclusion: multiple pdfs with page group included in a single page
> C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/logo_u0_u_k13.pdf
pdfTeX warning: pdflatex <file C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/logo_u0_u_k13.pdf>: PDF inclusion: multiple pdfs with page group included in a single page
> l C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/slides.tex
slide_BioStar.pdf, 1d=61, 722.7pt x 542.825pt <use slide_BioStar.pdf>
l2 C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/slide_BioStar.pdf]
No file lectures.toc.
l3 C:/Users/rsousa/Dropbox/MyWork/4Bio/lecture/uabottomwave.pdf>]
! Missing $ inserted.
<inserted text>
1.31 \end{frame}
?
```




Command line compilation.

Figure : Good practice: erase those auxiliary files.

```
compile.bat
1 del /F *.log *.out *.bbl *.blg
2
3 pdflatex lectures
4 pdflatex lectures
5 bibtex lectures
6 pdflatex lectures
```



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Outline.

Introduction

Concepts

Installation

Maintenance

\LaTeX Documents

Graphical User Interface (GUI)

Creating Documents with \LaTeX

Bibliography



Creating my first L^AT_EX Manuscript

```
\documentclass{article}  
% preamble  
\begin{document}  
% core  
\end{document}
```



Creating my first L^AT_EX Manuscript

Typical structure:

```
\documentclass[twoside,a4paper,10pt]{article}  
% preamble  
\begin{document}  
% core  
\end{document}
```

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An a4 paper with font size of 10 points:

```
\documentclass[twoside,a4paper,10pt]{article}  
% preamble  
\usepackage[utf8]{inputenc} % general input encodings  
\begin{document}  
% core  
\end{document}
```



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Portuguese support:

```
\documentclass[twoside,a4paper,10pt]{article}  
% preamble  
\usepackage[utf8]{inputenc} % general input encodings  
\usepackage[portuguese]{babel}  
\begin{document}  
% core  
\end{document}
```



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Different packages at your disposal:

1. `\usepackage{graphicx}`: figures;
2. `\usepackage{subfig}`: when working with multiple figures;
3. `\usepackage{cite}`: citations;
4. `\usepackage{amsmath}`: mathematical features;
5. `\usepackage{amssymb}`: mathematical symbols;
6. and lots more ...

Check <http://www.ctan.org>.



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Creating Lists:

The `itemize` environment is for simple lists, the `enumerate` environment for enumerated lists, and the `description` environment for descriptions.



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Follows some examples:

```
\begin{enumerate}
\item You can mix the list environments to your taste:
  \begin{itemize}
    \item But it might start to look silly.
    \item[-] With a dash.
  \end{itemize}
\item Therefore remember:
\begin{description}
  \item[Stupid] things will not become smart because they are in a list.
  \item[Smart] things, though, can be presented beautifully in a list.
\end{description}
\end{enumerate}
```



Creating my first L^AT_EX Manuscript

Including a figure:

```
\documentclass[twoside,a4paper,10pt]{article}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}

\begin{document}
\begin{figure}
  \includegraphics{img.pdf}
\end{figure}
\end{document}
```



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`{\tiny A}`

`{\scriptsize A}`

`{\footnotesize A}`

`{\small A}`

`{\normalsize A}`

`{\large A}`

`{\Large A}`

`{\LARGE A}`

`{\huge A}`

`{\Huge A}`

A A A A A A A A A A



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Including a figure:

```
\documentclass[twoside,a4paper,10pt]{article}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\begin{document}

Logo.
\begin{figure}
  \includegraphics{img.pdf}
\end{figure}
End of document.
\end{document}
```



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Including a figure (Can you find the difference?):

```
\documentclass[twoside,a4paper,10pt]{article}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\begin{document}

Logo.
\begin{figure}[!h]
  \includegraphics{img.pdf}
\end{figure}
End of document.
\end{document}
```

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Including a figure (Can you find the difference?):

```
\documentclass[twoside,a4paper,10pt]{article}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\begin{document}

Logo.
\begin{figure}[!h] % <----- LOOK!!
  \includegraphics{img.pdf}
\end{figure}
End of document.
\end{document}
```



Floating Bodies.

How it affects the document?

- ▶ to place a figure/table right here (h);
- ▶ or at the bottom (b) of some page;
- ▶ or on a special floats page (p);
- ▶ and, all this even if it does not look that good (!)
- ▶ if no placement specifier is given: [tbp]

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To include figure between two paragraphs:

```
\documentclass[twoside,a4paper,10pt]{article}  
% preamble  
\usepackage[utf8]{inputenc} % general input encodings  
\usepackage{graphicx}  
\begin{document}
```

Logo.

```
\begin{figure}[!h]  
  \includegraphics{img.pdf}  
\end{figure}
```

End of document.

```
\end{document}
```


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Can we change the image size? Yes!

```
\documentclass[twoside,a4paper,10pt]{article}  
% preamble  
\usepackage[utf8]{inputenc} % general input encodings  
\usepackage{graphicx}  
\begin{document}
```

Logo.

```
\begin{figure}[!h]  
  \includegraphics[width=0.5\textwidth]{img.pdf}  
\end{figure}
```

End of document.

```
\end{document}
```



Creating my first L^AT_EX Manuscript

Can we center the image? Of course!

```
\documentclass[twoside,a4paper,10pt]{article}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\begin{document}
```

Logo.

```
\begin{figure}[!h]
  \centering
  \includegraphics[width=0.5\textwidth]{img.pdf}
\end{figure}
```

End of document.

```
\end{document}
```



Creating my first L^AT_EX Manuscript

Can we center the image? Another way!

```
\documentclass[twoside,a4paper,10pt]{article}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\begin{document}
```

Logo.

```
\begin{figure}[!h]
  \begin{center}
    \includegraphics[width=0.5\textwidth]{img.pdf}
  \end{center}
\end{figure}
```

End of document.

```
\end{document}
```



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And what about captions? Easy stuff :)

```
\begin{figure}[!h]
  \centering
  \includegraphics[width=0.5\textwidth]{img.pdf}
  \caption{Faculty Logo.}
\end{figure}
```



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Including more than one figure.

```
\begin{figure}[!h]
  \centering
  \includegraphics[width=0.5\textwidth]{img.pdf}
  \includegraphics[width=0.5\textwidth]{img.pdf}
  \caption{Faculty Logo.}
\end{figure}
```



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However, we should use package ‘subfig’ which provides support for the inclusion of small, ‘sub’, figures and tables.

```
...  
\usepackage{subfig}  
\begin{document}  
...  
\begin{figure}[!h]  
\subfloat[Imagem 1.]{\includegraphics[width=0.5\textwidth]{img.pdf}}  
\subfloat[Imagem 2.]{\includegraphics[width=0.5\textwidth]{img.pdf}}  
\end{figure}
```



Creating my first L^AT_EX Manuscript

How to create tables? The simplest way is:

```
\begin{tabular}{ccc}  
Evolutionary & SA & Simulated Annealing \\  
\end{tabular}
```

- ▶ *tabular* is the environment for tables;
- ▶ Triple “c” for three columns with centered (c) text;
- ▶ “&” is the column separator;
- ▶ \\ is the new line;



Creating my first L^AT_EX Manuscript

How to create tables? The simplest way is:

```
\begin{tabular}{|p{3cm}|c|c|}  
Evolutionary & SA & Simulated Annealing \\  
\end{tabular}
```

- ▶ besides “c” we can have:
 - ▶ l: left;
 - ▶ r: right;
 - ▶ p{2cm}: paragraph with 2cm width.
- ▶ we can also stylish our table by putting bars |.|

Creating my first L^AT_EX Manuscript

How to create tables? The simplest way is:

```
\begin{tabular}{|p{3cm}|c|c|}  
\hline  
Evolutionary & ZO & Genetic Algorithm\\  
Evolutionary & SA & Simulated Annealing \\  
\hline  
\end{tabular}
```

adding horizontal lines with `\hline`



Creating my first L^AT_EX Manuscript

Merging cells (rows).

```
\usepackage{multirow}
...
\begin{document}
\begin{tabular}{|p{3cm}|c|c|}
\hline
\multirow{2}{*}{Evolutionary} & ZO & Genetic Algorithm\\
& SA & Simulated Annealing \\
\hline
\end{tabular}
...
\end{document}
```



Creating my first L^AT_EX Manuscript

Merging cells (columns).

```
\begin{tabular}{|p{3cm}|c|c|}  
\hline  
\multicolumn{3}{|c|}{Heuristic Algorithms} \\  
\hline  
\multirow{2}{*}{Evolutionary} & ZO & Genetic Algorithm\\  
                             & SA & Simulated Annealing \\  
\hline  
\end{tabular}
```



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```
\begin{table}[!t]
\begin{tabular}{|p{3cm}|c|c|}
\hline
\multicolumn{3}{|c|}{Heuristic Algorithms} \\
\hline
\multirow{2}{*}{Evolutionary} & ZO & Genetic Algorithm\\
& & SA & Simulated Annealing \\
\hline
\end{tabular}
\caption{Table of some Heuristic Algorithms.}
\end{table}
```



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How can we reference tables in the document?

```
\begin{table}[!t]
\begin{tabular}{|p{3cm}|c|c|}
\hline
\multicolumn{3}{|c|}{Heuristic Algorithms} \\
\hline
\multirow{2}{*}{Evolutionary} & ZO & Genetic Algorithm \\
& SA & Simulated Annealing \\
\hline
\end{tabular}
\caption{Table of some Heuristic Algorithms.}
\label{tab:table}
\end{table}
Please check Table~\ref{tab:table}.
```

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Can I divide my document by sections? Of course

```
\section{Introduction}  
...  
\section{State-of-the-Art}  
\subsection{Biology Concepts}  
...  
\subsection{Image Processing}  
...  
\subsection{Pattern Recognition}  
...
```



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References can be used anywhere.

```
\section{Introduction}
\label{sec:intro}
...
\section{State-of-the-Art}
\label{sec:soa}
\subsection{Biology Concepts}
\label{sec:bio}
...
\subsection{Image Processing}
\label{sec:ip}
...
\subsection{Pattern Recognition}
\label{sec:pr}
...
```

Further image processing details can be found in Section~\ref{sec:ip}.



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Document can also be divided in parts, chapters and so on.

```
\documentclass[twoside,a4paper,10pt]{book}  
...  
\begin{document}  
\part{Basic Concepts: Part I}  
\chapter{Beginning}  
\section{How does it starts?}  
  
\part{Basic Concepts: Part II}  
\end{document}
```




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Title, authors..

```
\documentclass[twoside,a4paper,10pt]{book}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\usepackage{multirow}

\title{Book Sample}
\begin{document}
\tableofcontents % simple, isn't it?

\part{Basic Concepts: Part I}
\chapter{Beginning}
\section{How does it starts?}

\part{Basic Concepts: Part II}
\end{document}
```



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maketitle after the `\begin{document}`

```
\documentclass[twoside,a4paper,10pt]{book}
% preamble
\usepackage[utf8]{inputenc} % general input encodings
\usepackage{graphicx}
\usepackage{multirow}

\title{Book Sample}
\begin{document}
\maketitle % tells latex to put title here!
\tableofcontents % simple, isn't it?

\part{Basic Concepts: Part I}
\chapter{Beginning}
\section{How does it starts?}

\part{Basic Concepts: Part II}
\end{document}
```



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author and date

```
\title{Book Sample}  
\author{X and Y}  
\date{16/03/2013}  
\begin{document}  
\maketitle  
\tableofcontents % simple, isn't it?
```

It is also possible to specify current date through command `\date{\today}`



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Mathematical Formulas

```
\begin{equation}
```

```
e = mc^2
```

```
\label{eq:massenergy}
```

```
\end{equation}
```

Mass Energy Einstein equivalence formula (Eq.~\ref{eq:massenergy}).

- ▶ equation environment;
- ▶ \wedge is for superscript text.

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Mathematical Formulas (summations):

```
\begin{equation}  
1/N \sum_{i=1}^N x_i  
\end{equation}
```

- ▶ \vee is for subscript;
- ▶ $/$ can be substituted by `\frac{1}{N}` (output result will be different, $\frac{1}{N}$).



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Symbols:

| | | |
|---------------------|------------------------|---------------------|
| <code>\alpha</code> | <code>\theta</code> | <code>\tau</code> |
| <code>\beta</code> | <code>\vartheta</code> | <code>\pi</code> |
| <code>\gamma</code> | <code>\gamma</code> | <code>\varpi</code> |

You do not need know them by heart. Check
<http://www.tex.ac.uk/tex-archive/info/symbols/comprehensive/symbols-a4.pdf>



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Symbols:

$$\alpha \qquad \theta \qquad \tau \qquad (1)$$

$$\beta \qquad \vartheta \qquad \pi \qquad (2)$$

$$\gamma \qquad \gamma \qquad \varpi \qquad (3)$$



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Mathematical Formulas (without numbering):

```
\begin{equation*}  
1/N \sum_{i=1}^N x_i  
\label{eq:avg}  
\end{equation*}  
Average formula (Eq.~\ref{eq:avg}).
```

What you think that will happen?



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Mathematical Formulas (without numbering):

```
\begin{equation*}  
1/N \sum_{i=1}^N x_i  
\label{eq:avg}  
\end{equation*}  
Average formula (Eq.~\ref{eq:avg}).
```

What you think that will happen? The \star symbol can be also applied in tables, figures, sections, . . .



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Mathematical Formulas (inline):

$\frac{1}{N} \sum_{i=1}^N x_i$

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Mathematical Formulas (inline):

`$1/N \sum_{i=1}^N x_i$`

you can also put inline formulas centered in the text

```
\[  
1/N \sum_{i=1}^N x_i  
\]
```



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Finally, we also may need to add some bibliographic references.

Add `bibtex` to the compilation script (TeXworks already does this!).

```
pdflatex document  
pdflatex document  
bibtex document  
pdflatex document
```



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You need to create a file for the references (named it references.bib) and the following content:

```
book{calder1979einstein,                % key
     title={Einstein's universe},       % title
     author={Calder, Nigel and Albert, Einstein}, % author
     year={1979},                       % year
     publisher={Viking Press}           % publisher
}
```



Creating my first \LaTeX Manuscript

In your \LaTeX main file you should call now the bibliography file.

```
\begin{document}
```

```
\begin{equation}
```

```
e = mc^2
```

```
\label{eq:massenergy}
```

```
\end{equation}
```

Mass Energy Einstein equivalence formula (Eq.~\ref{eq:massenergy}).

```
\bibliographystyle{plain}
```

```
\bibliography{references}
```

```
\end{document}
```



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Previous gave a warning when generating the references list. Do you know why?



Creating my first L^AT_EX Manuscript

Previous gave a warning when generating the references list. Do you know why?

```
\begin{document}

\begin{equation}
e = mc^2
\label{eq:massenergy}
\end{equation}
Mass Energy Einstein equivalence formula
(Eq.~\ref{eq:massenergy})~\cite{calder1979einstein}.

\bibliographystyle{plain}
\bibliography{references}

\end{document}
```




Bibliography



Michael McNeil Forbes.

Documentation for the ubcthesis_new latex class.

2011.



Tobias Oetiker, Hubert Partl, Irene Hyna, and Elisabeth Schlegl.

The not so short introduction to \LaTeX , 2010.



Sources of Information.

More documentation can also be found in the following references:

1. <http://www.latex-project.org/>
 2. <http://www.ctan.org>
 3. <http://www.texdoc.net/>
- ... and, of course ...



Sources of Information.

More documentation can also be found in the following references:

1. <http://www.latex-project.org/>
 2. <http://www.ctan.org>
 3. <http://www.texdoc.net/>
- ...and, of course ... <http://www.google.com>



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Lets practice!

Exercises.