



Degree in Industrial Technologies

Bachelor's or Master's final project

This is the title of your project

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Thank yous

And other important information



## **Abstract**

Abstract content



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# Listings



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# List of Symbols

Notation	Description
$x_t$	Value of variable $x$ at time step $t$



# Acronyms

Notation	Description	Page List
FIB	Focused Ion Beam	1



# Chapter 1

## An overview of L<sup>A</sup>T<sub>E</sub>X

In this section, a few basic tools will be presented. In following sections more advance functionality and complex tools will be showcased. Use this to your advantage!

### 1.1 Basics of L<sup>A</sup>T<sub>E</sub>X

#### 1.1.1 Text styles

The following table showcases some of the more common text styles in L<sup>A</sup>T<sub>E</sub>X.

Style	Code	Ouput
Quotes	<code>``Quotes''</code>	“Quotes”
Boldface	<code>\textbf{Boldface}</code>	<b>Boldface</b>
Italics	<code>\textit{Italics}</code>	<i>Italics</i>
Emphasis	<code>\emph{Emphasis}</code>	<i>Emphasis</i>
Underline	<code>\underline{Underline}</code>	<u>Underline</u>
Typewriter	<code>\texttt{Typewriter}</code>	Typewriter
Mathematical	<code>\$\text{Mathematical}^{\pi\cdot i}\$</code>	$\text{Mathematical}^{\pi\cdot i}$

Table 1.1: Text styles in L<sup>A</sup>T<sub>E</sub>X.

#### 1.1.2 Structure of a L<sup>A</sup>T<sub>E</sub>X document

For this template, which is based in the `book` class, we have the following major sections:

1. `\part{}`: Parts are fully self-contained portions of information. They leave a full blank page with only the title of the part. **This is not used and not recommended!**
2. `\chapter{}`: Your normal chapters, as you can see above. We are in the “*An overview of L<sup>A</sup>T<sub>E</sub>X.*”
3. `\section{}`: Normal sections for a chapter. We are in “*Basics of L<sup>A</sup>T<sub>E</sub>X.*”
4. `\subsection{}`: Subsections. We are in “*Structure of a L<sup>A</sup>T<sub>E</sub>X document.*”
5. `\subsubsection{}`: Subsubsections. This level tends to be quite deep and will most likely not appear in the index unless we include `\setcounter{secnumdepth}{3}` in the preamble<sup>1</sup>.
6. `\paragraph{}`: One step deeper. By default paragraphs are not numbered.

### 1.1.3 Mathematical notation

L<sup>A</sup>T<sub>E</sub>X provides several way to include symbols and write maths. The most basic way is to include mathematical notation or symbols into the text. This is known as *inline* and can be done with `$. . . $`. Whatever is between the `$` symbols, is typeset in mathematical notation. This is an example:  $2 = \frac{4}{2}$ . This is produced using `2 = \frac{4}{2}`.

Another method is to write mathematical formulas in *display* mode, which is separated from the text. This can be done by wrapping the text in `\[ . . . \]`. **This is not recommended** as the next method is better. Here is an example:

$$2 = \frac{4}{2}$$

Normally, the best way is to use mathematical environments. This environments will provide more functionality and generally number the equations and allows them to be labelled. Here are a few examples:

$$2 = \frac{4}{2} \tag{1.1}$$

The equation above, eq. (1.1), is produced by writing:

```
0 \begin{equation} \label{eq:simpleeq}
  2 = \frac{4}{2}
\end{equation}
```

---

<sup>1</sup>The preamble is the part before `\begin{document}`, basically, the setup section.

```

                                cover.tex
0 \pagestyle{empty} % Suppress the "fancy" headers in the front matter

% Change the page geometry to have a little bit more space
%\newgeometry{left=2.5cm,bottom=3cm,right=2.5cm}

5 % Begin title page
\begin{center}
    % Logo
    \begin{figure}
        \centering
10        \includegraphics[width=0.3\linewidth]{LogoUniversidadBN}
    \end{figure}
    % University degree
    \Large Degree in Industrial Technologies \\\ % Modify accordingly
    \vspace*{2.5em} % This just adds some vertical spacing
15 % Type of work
    Bachelor's or Master's final project \\\ % Modify accordingly
    \vspace*{1em}
    % Title of your work
    This is the title of your project
20 \\\ \large
    \vspace*{3em}
    Author \\\
    % Author's name
    Author's Name \\\
25 \vspace*{1em}
    % Add supervisors or directors
    Supervised by \\\ Prof. Dr. Mc Great$^a$ \\\ Prof. Dr. Mc Amazing$^b$ \\\
    $^a$, ${\footnotesize Institute of Greatness} \\\ $^b$, ${\footnotesize Amazing
    University}
    % Uncomment this line if you would like to add a signature space
30 % {\vfill \vspace*{3em}{Author's signature:\hrulefill \hfill} \hfill \\\ \vspace*{4em}
    }Supervisors' signatures:\hrulefill \hfill}
    \vfill
    München 2022 % Modify accordingly
\end{center}

35 % Restore the geometry that was defined
%\restoregeometry
% Next page should open on the right
\cleardoublepage

```

Lets showcase some more environments that help us write beautiful formulas!  
 The `\begin{array}` environment helps us write vertically aligned formulas!

$$f(t) = \begin{cases} A_0 + A \cdot e^{-\frac{t-t_0}{t_d}} & \text{for } t \geq t_0 \\ A_0 & \text{for } t < t_0 \end{cases} \quad (1.2)$$

```

0 \begin{equation} \label{eq:abaqus-exponential-decay}
  f(t) = \left\{
    \begin{array}{lcc}
      A_0 + A \cdot e^{-\frac{t-t_0}{t_d}} & \text{for } t \geq t_0 \\
      A_0 & \text{for } t < t_0
    \end{array}
  \right.
5 \end{equation}

```

The `\begin{aling}` environment may be easier to use, but it has a few quirks. Read the documentation<sup>2</sup> for more information.

$$a_{11} = b_{11} \qquad a_{12} = b_{12} \qquad (1.3)$$

$$a_{21} = b_{21} \qquad a_{22} = b_{22} + c_{22} \qquad (1.4)$$

```

0 \begin{align}
  a_{11} &= b_{11} & \\
  a_{12} &= b_{12} & \\
  a_{21} &= b_{21} & \\
  a_{22} &= b_{22} + c_{22} & \\
5 \end{align}

```

The `\begin{subequations}` allows us to have several formulas numbered into the same reference. As shown in eq. (1.5), with the first entry being eq. (1.5a).

$$XSYMM \equiv U1 = UR2 = UR3 = 0 \qquad (1.5a)$$

$$ZSYMM \equiv U3 = UR1 = UR2 = 0 \qquad (1.5b)$$

```

0 \begin{subequations} \label{eq:symmetry-bc}
  \begin{equation} \label{eq:x-symmetry-bc}
    \text{\texttt{XSYMM}} \equiv U1 = UR2 = UR3 = 0
  \end{equation}

```

---

<sup>2</sup><http://tug.ctan.org/info/short-math-guide/short-math-guide.pdf>



```
\begin{equation}
\text{\texttt{ZSYMM}} \text{ \textcolor{blue}{\texttt{\textbackslash equiv}}} U3 = UR1 = UR2 = 0
\end{equation}
\end{subequations}
```



# Appendix A

This is an appendix

