UCR LaTeX Dissertation Template and Advanced Manuscript Formatting

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What is LaTeX

LaTeX is a document preparation system.

When writing, we use instructions as opposed to the formatted text found in WYSIWYG processors ("what you see is what you get") like Ms Word

```
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When writing, the writer uses plain text as opposed to the
formatted text found in WYSIWYG
("what you see is what you get") word processors like
Microsoft Word, LibreOffice Writer and Apple Pages.

\begin{table}[h!]
\begin{center}
\begin{tabular}{ |c|c|c| }
 \hline
 cell1 & cell2 & cell3 \\
 cell4 & cell5 & cell6 \\
 cell7 & cell8 & cell9 \\
 \hline
\end{tabular}
\caption{Table to test captions and labels}
\label{table:1}
\end{center}
\end{table}


\begin{figure}[h]
\centering
\includegraphics[width=4cm, height=4cm]{lion}
\label{figure:1}
\caption{This figure shows a lion.}
\end{figure}


In-line formulas  $\sum_{k=0}^{\infty} r^k$ are justified
within the text, and large symbols appear in a compact
notation


Displayed formulas require vertical spacing and
automatically creates an equation number as in the
following
\begin{equation}
\label{E:geometricSeries}
\sum_{k=0}^{\infty} r^k
\end{equation}
```

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cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

Table 1.1: Table to test captions and labels

Figure 1.1: This figure shows a lion.

In-line formulas $\sum_{k=0}^{\infty} r^k$ are justified within the text, and large symbols appear in a compact notation

Displayed formulas require vertical spacing and automatically creates an equation number as in the following

$$\sum_{k=0}^{\infty} r^k \tag{1.1}$$

This workshop

Good reasons to use LaTeX:

- Would like to use LaTeX for dissertation, but don't know where to start
- Documents written by your peers look a lot fancier than yours!!!

In this workshop:

- Downloading and understanding templates (UCR dissertation)
- Provide references to "work your way around"

Difficulties with using LaTeX:

- Way more time consuming than MS Word
- LaTeX is a lot of "guess-and-check"
- The most effective way is to learn by doing

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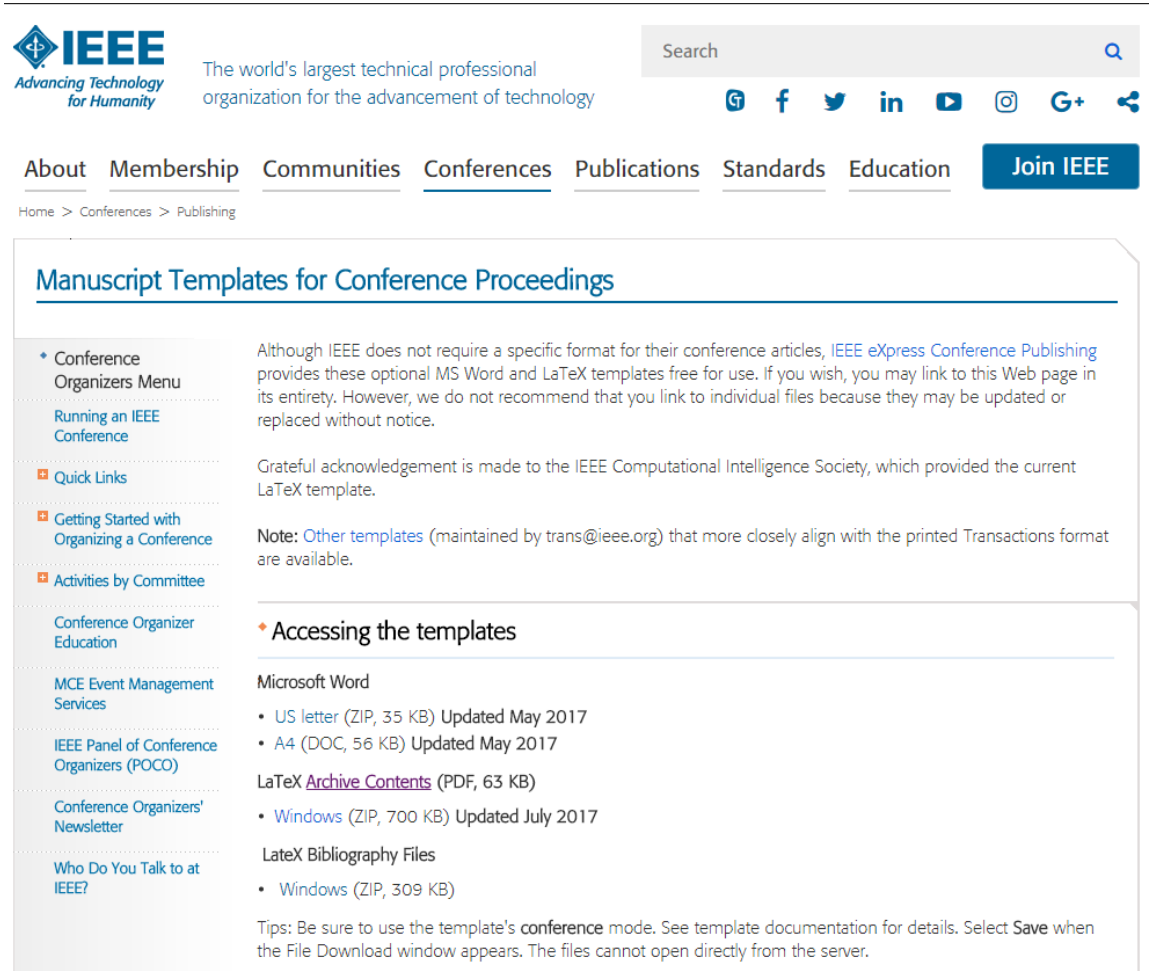
Advanced Formatting in LaTeX: Outline

1. Getting started with templates
2. Working on the document body
3. Citations with BibTeX
4. Extras: Double spacing, environments, and editors

Getting started with templates

Articles template: IEEE

Most scientific paper venues provide templates for manuscripts:



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Although IEEE does not require a specific format for their conference articles, IEEE eXpress Conference Publishing provides these optional MS Word and LaTeX templates free for use. If you wish, you may link to this Web page in its entirety. However, we do not recommend that you link to individual files because they may be updated or replaced without notice.

Grateful acknowledgement is made to the IEEE Computational Intelligence Society, which provided the current LaTeX template.

Note: Other templates (maintained by trans@ieee.org) that more closely align with the printed Transactions format are available.

Accessing the templates

Microsoft Word

- US letter (ZIP, 35 KB) Updated May 2017
- A4 (DOC, 56 KB) Updated May 2017

LaTeX Archive Contents (PDF, 63 KB)

- Windows (ZIP, 700 KB) Updated July 2017

LateX Bibliography Files

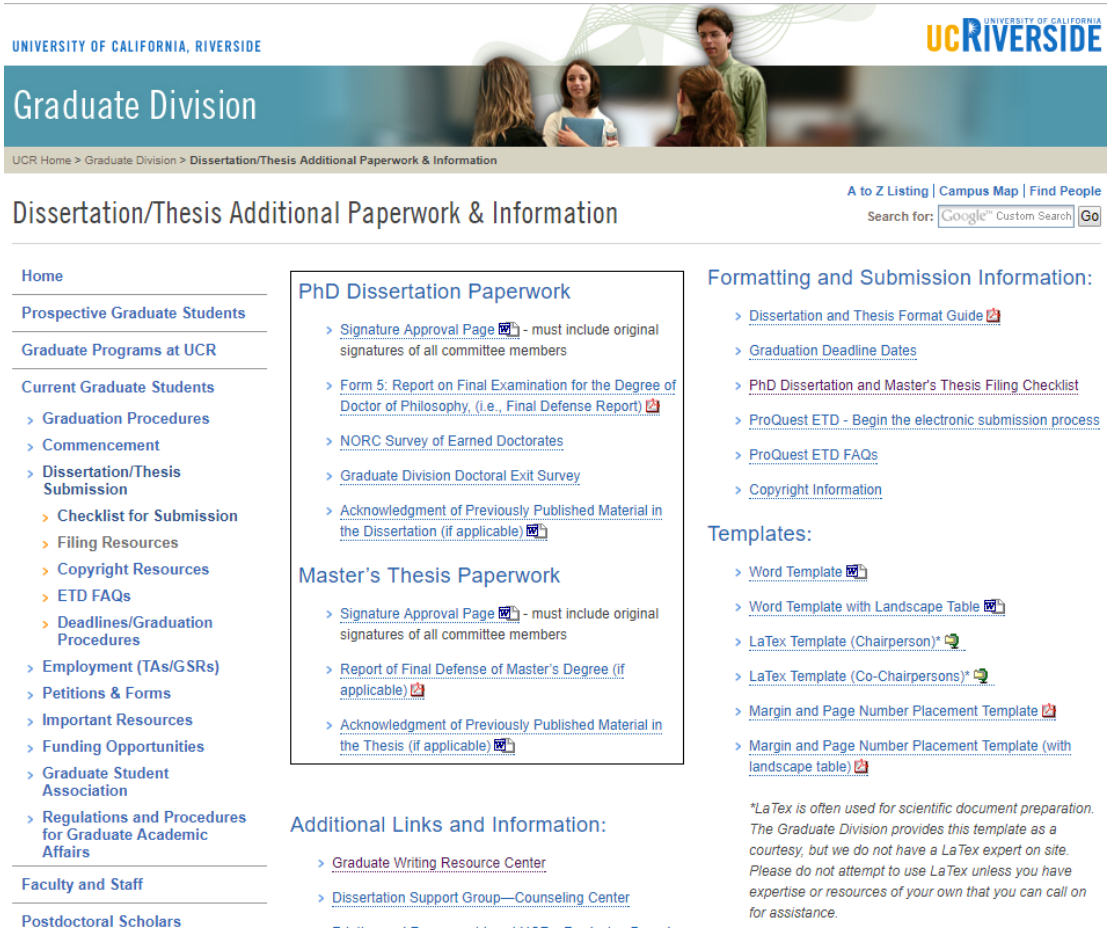
- Windows (ZIP, 309 KB)

Tips: Be sure to use the template's conference mode. See template documentation for details. Select Save when the File Download window appears. The files cannot open directly from the server.

For instance: IEEE templates link

UCR thesis template

If you are about to graduate ☺:



UCR thesis template link

Components of a template or LaTeX documents

Source code file:

- .tex file (source code)
  $\Rightarrow$ the only document you should edit

Formatting files:

- .cls file (document class file)
- .clo file (class option file)
- .sty file (style file)
- .bst file (BibTeX style file)
- .bib file (BibTeX file)

Typical (.tex) document

Typical LaTeX document:

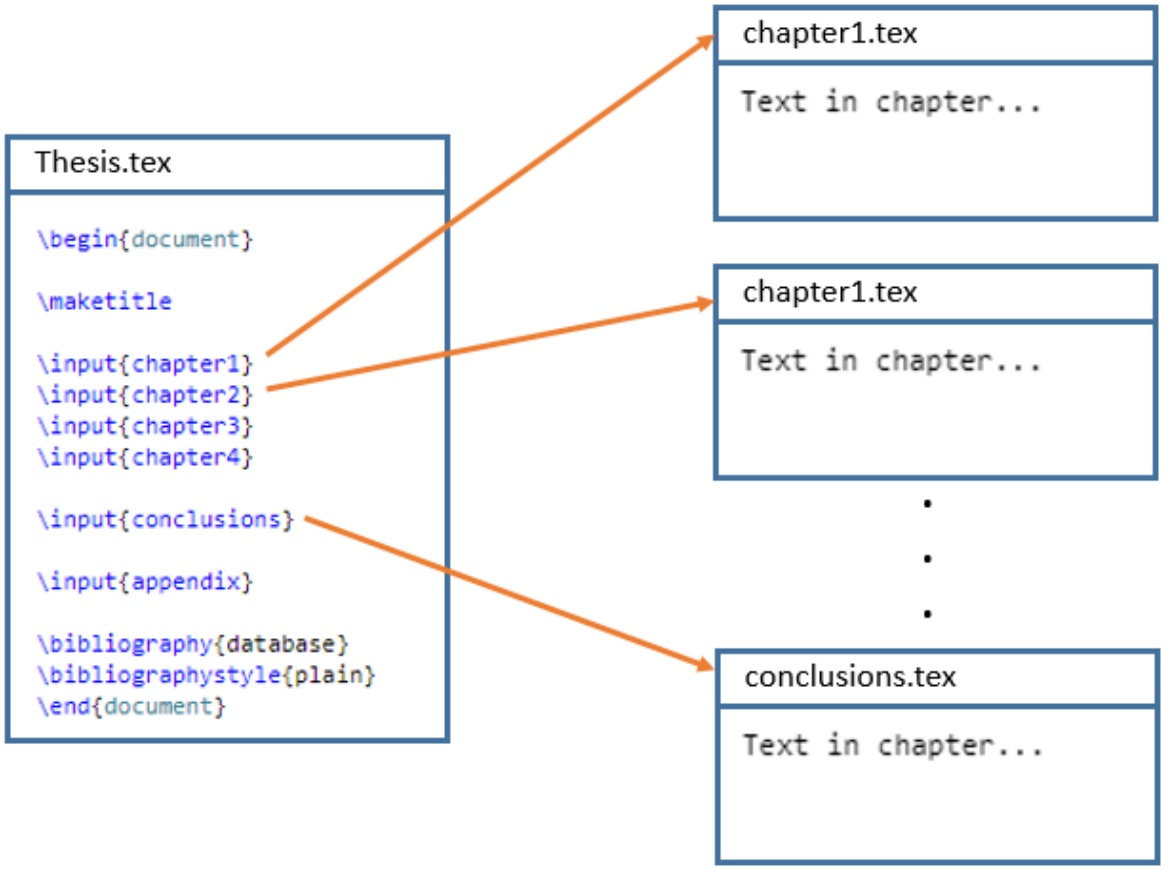
```
\documentclass[a4paper,11pt]{article}

\usepackage{mathptmx} % Use the mathptmx package

\author{A.\,U. Thor}
\title{Introduction to \LaTeX}
\date{\today}

\begin{document} % Here we go.

\maketitle

\section{Introduction}
The start.
\section{Conclusion}
The end.

\end{document}
```

- **Packages:** Provide sets of commands or affect the appearance of the output document
- **Commands:** Provide markup, start by backslash `\commandName[...]{...}`

Document Hierarchy: Chapters

The main matter of a typical longer document is divided into chapters

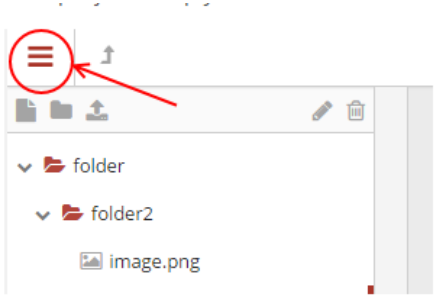
- For longer documents it is desirable to separate chapters into different LaTeX files for better organization and readability



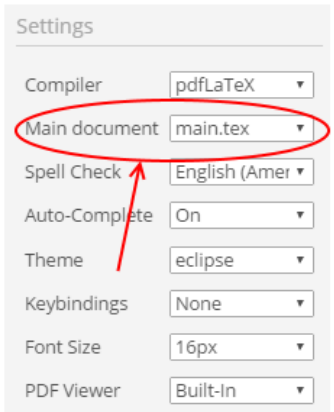
Defining the main file in ShareLaTeX

The main document is the file which LATEX will be told to compile first

- By default in ShareLaTeX, the main document will be set to be the document in the project which begins with:
  `\documentclass[...]{...}`



and go to **Main document**:



Working on the document body

Backslash operator in LaTeX

The Backslash operator is used for:

- Commands

  `\section{}`, `\cite{}`, `\ref{}`, `\label{}`, `\begin{}`, `\end{}`
- Formatting

  `\tetxit{}` (italic), `\textbf{}` (bold), `\\` (new line)
- Special characters and math

  `\sigma`, `\Phi`, `\frac{}{}`,`\sum_{}^{}`
- Display reserved characters

  `\#`, `\$`, `\^`, `\%`, `\&`, `\{`, `\}`

Sectioning

Chapters can be organized into sections, subsections, subsubsections, paragraphs, and subparagraphs:

```
\section{Title}
   \subsection{Title}
      \subsubsection{Title}
         \paragraph{Title}
            \subparagraph{Title}
```

Sectioning

Any sectioning command may be followed by
\label{labelName}
so that you can refer to the section number in the text

```
1 \section{My First Section}
2 \label{S:sec1}
3 We can reference "My first Section" in the text with the
      command \ref{S:sec1}, while the command \pageref{S:sec1}
      will reference the corresponding page.
```

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NOTE

- References are automatically updated whenever changes are made to the structure of the document
- Referencing requires compiling twice!

Numbered lists

A numbered list is created with the `enumerate` environment:

This space has the following properties:

(1) Grade 2 Cantor;
(2) Half-smooth Hausdorff;
(3) Metrizably smooth.

Therefore, we can apply the Main Theorem.

```
1 This space has the following properties:
2 \begin{enumerate}
3 \item Grade 2 Cantor;                    \label{Cantor}
4 \item Half-smooth Hausdorff;             \label{Hausdorff}
5 \item Metrizably smooth.                 \label{smooth}
6 \end{enumerate}
7 Therefore, we can apply the Main Theorem.
```

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```

Bulleted lists

A bulleted list is created with the `itemize` environment:

We set out to accomplish a variety of goals:

- To introduce the concept of smooth functions.
- To show their usefulness in differentiation.
- To point out the efficacy of using smooth functions in Calculus.

```
1 We set out to accomplish a variety of goals:
2 \begin{itemize}
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4 \item To show their usefulness in differentiation.
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    Calculus.
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```

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      Calculus.
6 \end{itemize}
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Floating: tables and figures

Figures and tables are treated in a special way in LaTeX since they cannot be broken across pages

- LaTeX moves a table or an illustration (floats) to the top or bottom of the current or the next page if possible
- Further away otherwise

Placing tables and figures is often a tedious guess-and-check process, that **requires extensive online help**

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Tables

A simple table is set up as follows:

```
\begin{tabular}{ |c|c|c| }
 \hline
 cell1 & cell2 & cell3 \\
 cell4 & cell5 & cell6 \\
 cell7 & cell8 & cell9 \\
 \hline
\end{tabular}
```

Sample tables:

- ShareLaTeX page
- OverLeaf page

Tables

Including captions and references in the text requires more effort

```
\begin{table}[h!]
\begin{center}

\begin{tabular}{ |c|c|c| }
 \hline
 cell1 & cell2 & cell3 \\
 cell4 & cell5 & cell6 \\
 cell7 & cell8 & cell9 \\
 \hline
\end{tabular}

\caption{Table to test captions and labels}
\label{table:1}
\end{center}
\end{table}
```

Figures

```
\usepackage{graphicx}
```
(in the preamble of main file!!)

A figure environment is set up as follows:

```
1 \includegraphics[width=4cm, height=4cm]{lion}
```

Figures

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\usepackage{graphicx}
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(in the preamble of main file!!)

A figure environment is set up as follows:

```
1 \includegraphics[width=4cm, height=4cm]{lion}
```

TIP: organize your images in a single folder using:

```
\graphicspath{ {images_folder/} }
```

Reference for figures:

- ShareLaTeX page

Figures

Including captions and references in the text requires more effort:

```
\begin{figure}[h]
\centering

\includegraphics[width=4cm, height=4cm]{lion}

\label{figure:1}
\caption{This figure shows a lion.}
\end{figure}
```

Formulas: in-Line vs displayed

In-line formulas $\sum_{k=0}^{\infty} r^k$ are justified within the text, and large symbols appear in a compact notation

---

Displayed formulas require vertical spacing and automatically creates an equation number as in the following

$$\sum_{k=0}^{\infty} r^k \tag{1.1}$$

Syntax of mathematical expressions

Displayed formulas

- In-line formulas are delimited by $ $ symbols
- Displayed formulas are defined through the `equation` environment

```
This is an in-line formula  $\sum_{k=0}^{\infty} r^k$,
while the following is a displayed formula

\begin{equation}
\label{E:geometricSeries}
\sum_{k=0}^{\infty} r^k
\end{equation}
```

The equation number, which is automatically generated, depends on how many numbered displayed formulas occur before the given equation

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7 \end{equation}
```

The equation number, which is automatically generated, depends on how many numbered displayed formulas occur before the given equation

Aligned formulas

- Alignment is very important for multi-line formulas, especially when working with double column documents.
- LaTeX has many ways to typeset multiline formulas.
- One of these is the `align` environment.

To generate multiple lines, separate each line with \\ symbols

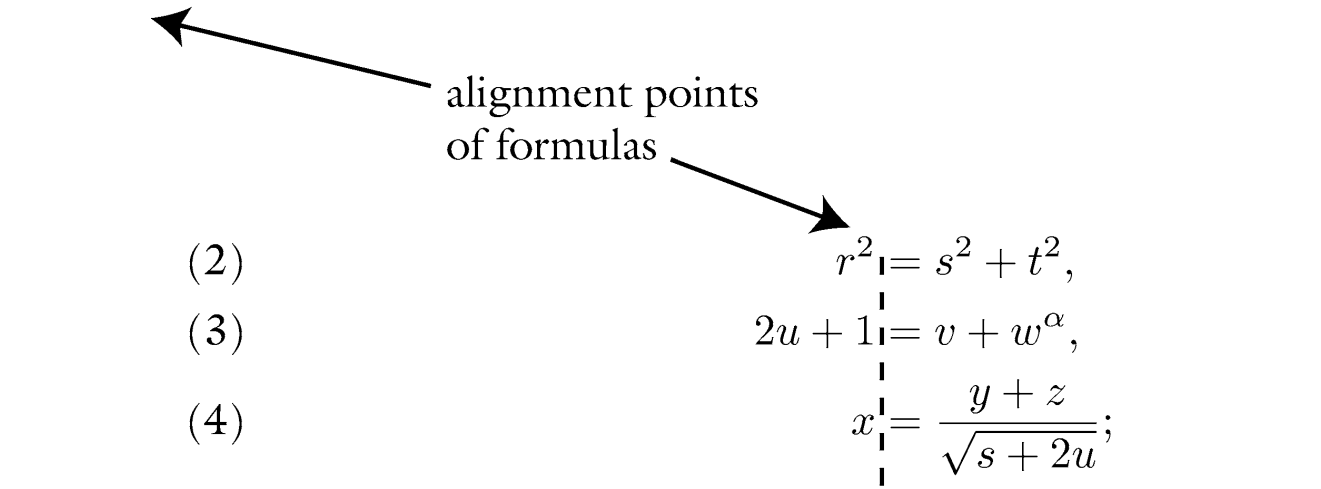
```
\begin{align*}
    r^{2}    = s^{2}+t^{2}, \\
    2u + 1   = v + w^{\alpha}, \\
    x        = \frac{x+z}{\sqrt{s+2u}} \\
\end{align*}
```

$$r^2 = s^2 + t^2,$$
$$2u + 1 = v + w^{\alpha},$$
$$x = \frac{x + z}{\sqrt{s + 2u}}$$

Aligned formulas

To create an alignment use the `&` symbol

```
r^{2}  &= s^{2} + t^{2},                \label{E:Pyth}\\
2u + 1 &= v + w^{\alpha},               \label{E:alpha}\\
     x &= \frac{y + z}{\sqrt{s + 2u}};  \label{E:frac}
```



$$r^2 = s^2 + t^2, \tag{2}$$

$$2u + 1 = v + w^{\alpha}, \tag{3}$$

$$x = \frac{y + z}{\sqrt{s + 2u}}; \tag{4}$$

Citations with BibTeX

BibTeX: Basics

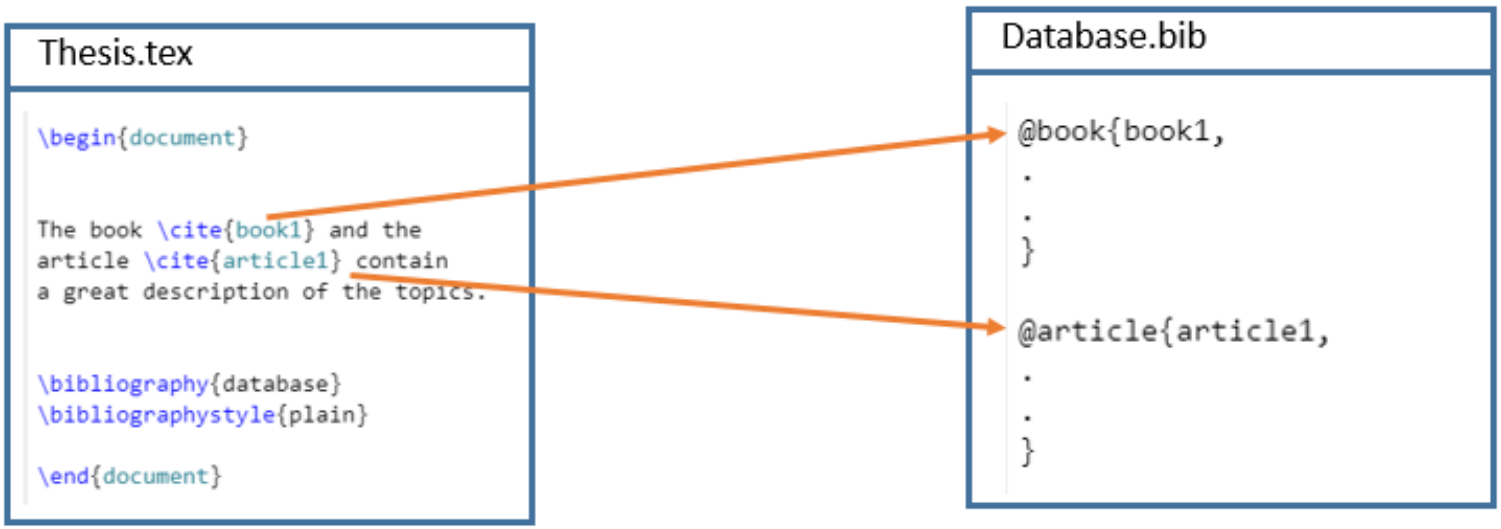
There are two ways of composing a bibliography in LaTeX:

- Package thebibliography (manual)
- Package BibTeX (automated)

BibTeX: Basics

Three elements of a bibliography in BibTeX:

- Bibliographic database file
- A bibliographic style
- Citations in the text



BibTeX: The Database

A BibTeX database has extension .bib and contains bibliographic entries

```
@article{einstein,
    author =        "Albert Einstein",
    title =         "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})
        [{On} the electrodynamics of moving bodies]",
    journal =       "Annalen der Physik",
    volume =        "322",
    number =        "10",
    pages =         "891--921",
    year =          "1905",
    DOI =           "http://dx.doi.org/10.1002/andp.19053221004"
}

@book{latexcompanion,
    author    = "Michel Goossens and Frank Mittelbach and Alexander Samarin",
    title     = "The \LaTeX\ Companion",
    year      = "1993",
    publisher = "Addison-Wesley",
    address   = "Reading, Massachusetts"
}

@misc{knuthwebsite,
    author    = "Donald Knuth",
    title     = "Knuth: Computers and Typesetting",
    url       = "http://www-cs-faculty.stanford.edu/\~{}uno/abcde.html"
}
```

The keyword `einstein` is a TAG, and will be used to cite in the text

BibTeX: The database

Common ways to (quickly) create a database are:

- Google Scholar
- Paper Management apps (Paperpile, Mendeley)

BibTeX: The main file

- The following command declares the database and makes the bibliography visible:

  ```
  \bibliography{nameOfYourBibliographyFile}
  ```

TIP: place it at the end of your document, before `\end{document}`

BibTeX: The main file

- The following command declares the database and makes the bibliography visible:

  `\bibliography{nameOfYourBibliographyFile}`

TIP: place it at the end of your document, before `\end{document}`

- The following command defines the style of your bibliography

  `\bibliographystyle{styleOfYourBibliography}`

Common styles and layouts link

BibTeX: The main file

Only the entries referenced in the .tex file will be shown in the Bibliography

- `\cite{myBook}` shows the reference in the bibliography and cites the entry in the text
- `\nocite{pK57}` shows the reference in the bibliography
- `\nocite{*}` shows all references in the bibliography

Extras: Double spacing, environments, and editors

Aligned formulas

Default document spacing (and more formatting) are specified in the style-file ucr.cls (you are not supposed to modify this file)

```
%    ****************************************
%    *            INITIALIZATION            *
%    ****************************************
%
% Default initializations

\ps@plain                              % 'plain' page style
\pagenumbering{arabic}                 % Arabic page numbers
\if@twoside\else\raggedbottom\fi       % Ragged bottom unless twoside
                                       % option.
\if@twocolumn
 \@@input twocolum.sty\relax
\else
 \onecolumn                            % Single-column.
\fi

\def\dsp{\def\baselinestretch{2.0}\large\normalsize}
\dsp

\endinput
```

Compiling LaTeX documents directly in your computer

Compiling documents directly in your computer may be desirable for faster file management (images), faster compiling times, online app licence, ...

Installing LaTeXon your computer requires two steps:

1. Install the typesetting environment (MikTeX for Windows, MacTeX for Mac)
2. Use a text editor to create a .tex source file

GradQuat at UCR

GradQuant:

- Website: http://gradquant.ucr.edu
- Workshops → Previous workshop resources
- Resources → Programming and databases

If you seek help with LaTeX:

- Drop-in hours: Thursday 12pm-2pm
- Schedule a consultation (Gianluca)
- Email: GQstaff1@ucr.edu