

Advanced Formatting in \LaTeX

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LFSC1425 - March 15, 2018

What is L^AT_EX

LaTeX is a document preparation system. 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^a.

^a<https://en.wikipedia.org/wiki/LaTeX>

```
\begin{document}
% paper title
\title{Our first paper in LATEX}

\author{\IEEEauthorblockN{Michael Shell}
\IEEEauthorblockA{School of Electrical and Computer Engineering\
Georgia Institute of Technology\
Atlanta, Georgia 30332-0250\
Email: http://www.michaelshell.org/contact.html}
\and
\IEEEauthorblockN{Homer Simpson}
\IEEEauthorblockA{Twentieth Century Fox\
Springfield, USA\
Email: homer@thesimpsons.com}
\and
\IEEEauthorblockN{James Kirk\ and Montgomery Scott}
\IEEEauthorblockA{Starfleet Academy\
San Francisco, California 96678-2391\
Telephone: (800) 555-1212\
Fax: (888) 555-1212}}
```

Our first paper in L^AT_EX

Michael Shell School of Electrical and Computer Engineering Georgia Institute of Technology Atlanta, Georgia 30332-0250 Email: http://www.michaelshell.org/contact.html	Homer Simpson Twentieth Century Fox Springfield, USA Email: homer@thesimpsons.com	James Kirk and Montgomery Scott Starfleet Academy San Francisco, California 96678-2391 Telephone: (800) 555-1212 Fax: (888) 555-1212
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Abstract—The abstract goes here.

About this workshop

Why you are here:

- Your advisor gets mad when he/she sees MS Word documents!!
- Papers written by your peers look a lot fancier than yours!!!

This workshop:

- Provides useful references to start using \LaTeX
- Discusses the usage of templates, and how to start using them
- \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

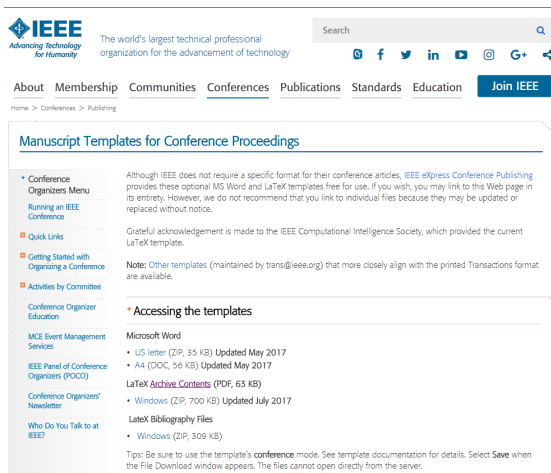
1 Using Templates

2 Document Body

3 Citations Using BibTeX

Using Templates

Most scientific paper venues provide templates for manuscripts:



The screenshot shows the IEEE website's navigation and content. At the top left is the IEEE logo with the tagline "Advancing Technology for Humanity". To the right is a search bar and social media icons for Twitter, Facebook, LinkedIn, YouTube, Instagram, and Google+. Below the logo is a navigation menu with links for "About", "Membership", "Communities", "Conferences", "Publications", "Standards", "Education", and a "Join IEEE" button. The breadcrumb trail reads "Home > Conferences > Publishing".

Manuscript Templates for Conference Proceedings

• **Conference Organizers Menu**
Running an IEEE Conference

• **Quick Links**

• **Getting Started with Organizing a Conference**

• **Activities by Committee**
Conference Organizer Education
MCE Event Management Services
IEEE Panel of Conference Organizers (POCO)
Conference Organizers' Newsletter
Who Do You Talk to at IEEE?

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](#)

Another template you may be looking for:

The screenshot shows the website for the University of California, Riverside Graduate Division. The page title is "Dissertation/Thesis Additional Paperwork & Information". The navigation menu includes: Home, Prospective Graduate Students, Graduate Programs at UCR, Current Graduate Students (with sub-links for Graduation Procedures, Commencement, Dissertation/Thesis Submission, Checklist for Submission, Filing Resources, Copyright Resources, ETD FAQs, Deadlines/Graduation Procedures, Employment (TAs/GSRs), Petitions & Forms, Important Resources, Funding Opportunities, Graduate Student Association, Regulations and Procedures for Graduate Academic Affairs), Faculty and Staff, and Postdoctoral Scholars. The main content area is divided into three columns:

- PhD Dissertation Paperwork:**
 - Signature Approval Page (PDF) - must include original signatures of all committee members
 - Form 5: Report on Final Examination for the Degree of Doctor of Philosophy, (i.e., Final Defense Report) (PDF)
 - NORC Survey of Earned Doctorates
 - Graduate Division Doctoral Exit Survey
 - Acknowledgment of Previously Published Material in the Dissertation (if applicable) (PDF)
- Master's Thesis Paperwork:**
 - Signature Approval Page (PDF) - must include original signatures of all committee members
 - Report of Final Defense of Master's Degree (if applicable) (PDF)
 - Acknowledgment of Previously Published Material in the Thesis (if applicable) (PDF)
- Additional Links and Information:**
 - Graduate Writing Resource Center
 - Dissertation Support Group—Counseling Center

On the right side, there is a search bar and a "A to Z Listing | Campus Map | Find People" link. Below the search bar, there is a "Formatting and Submission Information:" section with links to: Dissertation and Thesis Format Guide (PDF), Graduation Deadline Dates, PhD Dissertation and Master's Thesis Filing Checklist, ProQuest ETD - Begin the electronic submission process, ProQuest ETD FAQs, and Copyright Information. Below that is a "Templates:" section with links to: Word Template (PDF), Word Template with Landscape Table (PDF), LaTeX Template (Chairpersons)* (PDF), LaTeX Template (Co-Chairpersons)* (PDF), Margin and Page Number Placement Template (PDF), and Margin and Page Number Placement Template (with landscape table) (PDF). A note at the bottom right states: "LaTeX is often used for scientific document preparation. The Graduate Division provides this template as a courtesy, but we do not have a LaTeX expert on site. Please do not attempt to use LaTeX unless you have expertise or resources of your own that you can call on for assistance."

UCR thesis template link

Components of a template or L^AT_EX documents

Source code file:

- .tex file (source code)
⇒ 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)

Document Body

The main matter of a typical shorter document is divided into sections

- \LaTeX is instructed to start a section with the `\section{title}` command
- A section may be subdivided into subsections, which may themselves be divided into subsubsections, paragraphs, and subparagraphs

```
1 \section{}
2   \subsection{}
3     \subsubsection{}
4       \paragraph{}
5         \subparagraph{}
```

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```

Any `\section` command may be followed by a `\label` command, so that you can refer to the section number generated by \LaTeX

```
1 \section{Introduction}
2 \label{Sec:intro}
3 The command \ref{S:intro} refers to the number of the section
   and the command \pageref{S:intro} refers to the number of
   the typeset page where the section title appears.
```

The Backslash operator is used for

- Commands

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

- Formatting (discuss double backslash)

`\textit{}` , `\textbf{}` , `\\`

- Special characters and math

`\sigma`, `\Phi`, `\frac{}{}` , `\sum-{}^{}`

- Show reserved characters

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

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) Metrizable 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 Metrizable smooth.       \label{smooth}
6 \end{enumerate}
7 Therefore, we can apply the Main Theorem.
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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.

```
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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 (floats) a table or an illustration 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 help from Google**

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Tables

A table environment is set up as follows:

```
1 \begin{table}
2 Place the table here
3 \caption{title }
4 \label{Ta:xxx }
5 \end{table}
```

where `\ref{Ta:xxx }` references the table in the text

Most templates have strict rules on tables formatting (see `conference.tex`)

Figures

A figure environment is set up as follows:

```
1 ( \usepackage{graphicx} )
2
3 \begin{figure}
4 Place the graphics here
5 \caption{title }
6 \label{Fi:xxx }
7 \end{figure}
```

where `\ref{Fi:xxx }` references the figure in the text

Most templates have strict rules on figures formatting (see `conference.tex`)

In-Line vs Displayed formulas

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

$$\sum_{k=0}^{\infty} r^k \quad (1)$$

- Large symbols appear in a "compact" version in in-line formulas.

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Displayed formulas

The equation environment creates a displayed formula and automatically generates an equation number

$$(1) \quad \int_0^{\pi} \sin x \, dx = 2$$

```
1 \begin{equation}
2 \label{E:firstIntegral}
3 \int_{0}^{\pi} \sin x \, dx = 2
4 \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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Displayed formulas: referencing

To reference a formula without having to remember its number (which also can change when you edit your document) give the equation a symbolic label by using the `\label` command and refer to the equation in your document by using

```
1 see~(\ref{E:firstIntegral}) on page~\pageref{E:firstIntegral}.
```

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.

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

```
1 \begin{align*} \% Non-starred version will add multiple numbers \\ 2 r^{\wedge}\{2\} = \sqrt{s}, \\ 3 2u + 1 = v + w^{\wedge}\{\alpha\}, \\ 4 x = \frac{x+z}{\sqrt{s+2u}} \\ 5 \end{align*}
```

The `align` environment provides a way for horizontal alignment

```
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}
```

|



alignment points
of formulas

(2) $r^2 = s^2 + t^2,$

(3) $2u + 1 = v + w^\alpha,$

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

Citations Using BibTeX

There are two ways of composing a bibliography in \LaTeX :

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

Three elements of a bibliography in BibTeX:

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

BibTeX: The Database

A BibTeX database is a text file (with extension .bib) containing bibliographic entries

```
@BOOK{gM68,  
  author = "George A. Menuhin",  
  title = "Universal Algebra",  
  publisher = "D.~Van Nostrand",  
  address = "Princeton",  
  year = 1968,  
}  
  
@ARTICLE{eM57,  
  author = "Ernest T. Moynahan",  
  title = "On a Problem of {M. Stone}",  
  424 Chapter 15 BIBTEX  
  journal = "Acta Math. Acad. Sci. Hungar.",  
  pages = "455-460",  
  volume = 8,  
  year = 1957,  
}
```

The keyword `gM68` is a TAG, and will be used to cite the book in the text

Common ways to (quickly) create a database are:

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

The following two lines (to include before the command `\end{document}`) declare the style and database of your bibliography:

```
1 \bibliographystyle{styleOfYourBibliography}  
2 \bibliography{nameOfYourBibliographyFile}
```

Common styles and layouts can be found [here](#)

For example, `\cite{myBook}` includes the reference in the bibliography and cites the entry with label `myBook` , whereas `\nocite{pK57}` includes the reference in the bibliography but does not cite the entry

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

Installing \LaTeX on 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

GradQuant:

- Website: <http://gradquant.ucr.edu>
- Hours: Monday Thursday, 9 am - 3 pm
- Location: Life Sciences Building, Room #1425

If you seek help with \LaTeX :

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

\LaTeX resources:

<http://gradquant.ucr.edu/gq-calendar/workshop-resources/>