

# The L<sup>A</sup>T<sub>E</sub>X Document Preparation System and Its Use in CS115

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## 1 Introduction

In this course, you will learn to use the L<sup>A</sup>T<sub>E</sub>X document preparation system, which is widely used in academic computer science. When using L<sup>A</sup>T<sub>E</sub>X, the writer uses an ordinary text editor (e.g., Vim, Emacs or a web editor<sup>1</sup>) to create a description—in a special syntax—of the *structure* of their program, along with a choice of *document style*. The L<sup>A</sup>T<sub>E</sub>X software can then be run to turn this source file, with a `.tex` suffix, into a PDF file, formatting the document's source according to the given document style.

In Section 2, you will find a brief history of L<sup>A</sup>T<sub>E</sub>X. And in Section 3, you will find information about using L<sup>A</sup>T<sub>E</sub>X.

## 2 History

L<sup>A</sup>T<sub>E</sub>X is built on top of the program T<sub>E</sub>X, which was first introduced by Donald E. Knuth in 1986 [Knu86]. T<sub>E</sub>X made it easy to typeset complex mathematics, but was lacking in support for the higher-level structure of documents:

- sections and cross referencing,
- tables of contents,
- bibliographical citations.

Leslie Lamport responded [Lam94] to these deficiencies by creating L<sup>A</sup>T<sub>E</sub>X, which includes support for bibliographic citations—BIB<sub>T</sub>E<sub>X</sub>—which was contributed by Oren Patashnik. Subsequently, a very large number of people have made contributions to L<sup>A</sup>T<sub>E</sub>X.

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<sup>1</sup>E.g., Overleaf—see below.

### 3 Usage

When using BIBTEX, one’s bibliography is expressed in a formal syntax in a .bib file. Many document types are supported by BIBTEX, including books, and journal and conference articles. Each entry in a bibliography has an associated *tag*, and it is this tag that is used in a .tex file to cite that reference. The L<sup>A</sup>T<sub>E</sub>X file specifies which .bib file should be used, as well as what citation style should be used. E.g., here are example citations of a journal article [Knu89] and a conference article [MK22]. In this document, we are using a twelve point font and the “alpha” citation style—which is what you should use in your essays.

This document illustrates most of the L<sup>A</sup>T<sub>E</sub>X features that you will need for your essays, but one additional one is block quotes:

Most academic writing in computer science is produced using the L<sup>A</sup>T<sub>E</sub>X document preparation system. Unlike word processors, such as Microsoft Word, LaTeX (pronounced lay-tech) is a “markup language”, in which the writer uses special syntax to describe the structure of their document, rather than its formatting.

The L<sup>A</sup>T<sub>E</sub>X software can be downloaded to your personal computer from <https://www.latex-project.org>. But it is also possible—and you’ll probably find it more convenient—to use the website Overleaf to write documents in L<sup>A</sup>T<sub>E</sub>X. Visit <https://www.overleaf.com> for more information. The Overleaf tutorial on L<sup>A</sup>T<sub>E</sub>X can be found at [https://www.overleaf.com/learn/latex/Learn\\_LaTeX\\_in\\_30\\_minutes](https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes). Parts of our course’s class sessions will be devoted to helping you learn and use L<sup>A</sup>T<sub>E</sub>X using Overleaf.

### References

- [Knu86] Donald E. Knuth. *The TeXbook*. Addison-Wesley, 1986.
- [Knu89] Donald E. Knuth. The errors of TEX. *Softw. Pract. Exp.*, 19(7):607–685, 1989.
- [Lam94] Leslie Lamport. *LaTeX—A Document Preparation System: User’s Guide and Reference Manual, Second Edition*. Pearson / Prentice Hall, 1994.

- [MK22] Dennis Müller and Michael Kohlhase. Injecting formal mathematics into LaTeX. In Kevin Buzzard and Temur Kutsia, editors, *Intelligent Computer Mathematics—15th International Conference, CICM 2022, Tbilisi, Georgia, September 19-23, 2022, Proceedings*, volume 13467 of *Lecture Notes in Computer Science*, pages 168–183. Springer, 2022.