A Quick Introduction to LaTeX

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What?

LaTeX is an exceptionally powerful and customizable typesetting program. In the 1970's, highly-respected computer science pioneer Donald Knuth completed the third volume of his book series, "The Art of Computer Programming". He was very frustrated with the state of publishing tools at the time, so he decided to create his own. With such a beginning, you may be surprised to know that LaTeX is now arguably the most important and widely-used document preparation tool in academic computer science and mathematics. It is also increasingly used in other disciplines, such as various sciences and philosophy. Some aspects of its syntax are used in other contexts as well. For example, the "MathJax" syntax for writing equations is used on many websites, listed here:

https://meta.stackexchange.com/questions/216606/which-stack-exchange-sites-use-mathjax

What's so special about LaTeX? You could kind of think of it as "compiling your papers," which sounds a bit like a nightmare straight from computer science hades. But also think about how much incredible flexibility you have in writing programs. You have that same flexibility in LaTeX.

So yes, LaTeX is essentially a special-purpose programming language. The beauty of it, though, is that you don't have to master very much of it to be able to make amazing, professional documents. You need to learn a few key ideas, including how to leverage others' templates, and now and then you may need to Google something. This introduction to LaTeX is intended to get you started, so that you can make use of anything you find online.

First things first: what's with that name, LaTeX? It's not pronounced like the material (like, "latex gloves", for example). Probably the most correct pronunciation is "lah-tecchh", where the "tecchh" is described as a guttural sound, "the 'ch' sound in Scottish words like *loch* or German words like *ach*; it's a Spanish 'j' and a Russian 'kh'". Alternatively, "lah-teck", or maybe "lay-teck"… You can read more about the pronunciation at this link if you want:

https://tex.stackexchange.com/questions/17502/what-is-the-correct-pronunciation-of-tex-and-latex

Technically, I'm not even writing "LaTeX" the ideal way. It's supposed to be:

LaTeX

but for convenience, people often write "LaTeX", or maybe even "Latex". I guess the somewhat fancy writing is meant to represent the fact that LaTeX lets you do all kinds of customization to your text.

Why?

Is LaTeX really better than just, say, Word? First, I'll share some anecdotes from my own experience:

- It's much faster to write equations in LaTeX than in Word.
- Pseudocode style can be changed very easily, programmatically, in LaTeX, but in Word, you just have to type what you want.

- LaTeX handles automatic placement of figures (e.g. graphs, images) far, far, far better than Word. I tried writing an academic paper in Word once and ended up changing everything over to LaTeX for this very reason.
- I think LaTeX is easier to use for automatically handling of various citation formats, but maybe that's just because it's what I'm used to.

These are just my personal reasons. You can find much more online if you'd like, where people debate pros and cons.

Ultimately, it's an important tool that a lot of professionals use. You don't have to be an expert in it, but you should know some basic ideas.

How?

It's easiest to learn LaTeX by example. To be able to run an example, we need to have a LaTeX environment set up, in the same way you might install an IDE to start programming in a programming language. There are many options for this. You can download and install programs like TeXworks and MiKTeX, for example. Configuration is not always simple, but if you're going to work with LaTeX a lot in the future, I'd recommend working through this. For our purposes this semester, though, let's use a nice cloud-based approach:

https://www.overleaf.com/

Please make an account. Once you log in, click "New Project", and choose "Blank Project" and give it a name. In the upper-left area of the resulting project, click the upload button (the symbol with an arrow pointing up). Drag the latexIntro.tex, latexIntro.bib, carsnumepochs.dat, and neuralnetwork.png files from the I: drive to the website. You may also need to delete the automatically provided main.tex file, so that latexIntro.tex is correctly identified as your main project file.

Above the right pane, hit the "Recompile" button to generate the pdf for the paper.

At the top of the middle panel, please make sure you've selected "Source", and not "Rich Text". At first glance, "Rich Text" might seem nicer to work with, as a more visual representation, but you already have the complete visual representation in the right panel. What you need in the middle panel is the plaintext source, so you can write precisely the code you need.

Read through the latexIntro.tex source, while looking at the corresponding pdf preview. I created latexIntro.tex for you to walk you through the key ideas of LaTeX.

Anytime you want to download the generated pdf, click "Menu" in the top-left, and choose "PDF". It'll also be higher resolution than the preview image on the website, which is nice.

Soon you'll be writing your own documents in LaTeX! I recommend, at the end of each editing session, that you save a local copy of all your files by clicking "Menu" and then "Source". This will be good to have in case there's a problem with the cloud storage or access at some point. Please be sure you do this every time at the end of an editing session, so you don't lose anything if something goes wrong!