

Ph77 - Creating an e-Notebook

Why use an e-notebook?

In any group activity (including all areas of science and technology), you need to communicate your work with others. In STEM, this usually includes a mix of equations, graphs, and text. There are many possible platforms you might use: MS Word (used to write this and most of the Ph77 handouts), Google Docs, and LaTeX are some popular examples.

Strengths and Weaknesses of Word and LaTeX

You probably use both these platforms already, so you know this...

Word

WYSIWYG, so Word is easy and intuitive to use.

You can insert almost anything using simple cut and paste.

Equations are clumsy, but easy to learn with drop-down lists.

For example:

$$\int_{-\infty}^{\infty} e^{-x^2/\sigma^2} dx = \sigma\sqrt{\pi}$$

LaTeX

LaTeX is often the platform of choice in physics theory, as it works well handling complex mathematical calculations.

Not WYSIWYG, so not intuitive to use, and it has to be compiled.

Requires considerable syntax for equations, so it takes time to become proficient.

For example, you must type:

```
\int\limits_{-\infty}^{\infty} e^{-x^2/\sigma^2} dx = \sigma\sqrt{\pi}
```

to get

$$\int_{-\infty}^{\infty} e^{-x^2/\sigma^2} dx = \sigma\sqrt{\pi}$$

Handwritten Content

Handwritten notes are fine when you are alone and tinkering with various ideas, but they are terrible for communicating. Even good penmanship does not look professional, and poor penmanship will simply be ignored by your colleagues.

A good strategy is to scribble all you want when you are brainstorming but then switch to a professional platform for communication.

If your documents are mostly equations, skip the scribbles from the outset and use LaTeX. You are far less likely to make mistakes this way, and mistakes are easier to correct. Mathematica is also good for documenting theoretical work.

For mixed documents (text, graphs, photos, light equations, etc.), Word is an excellent platform.

Screen Captures

Want to pull something off the web? Use a screen capture and paste it into Word (this example from Wikipedia):

Named after the German mathematician [Carl Friedrich Gauss](#), the integral is

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}.$$

[Abraham de Moivre](#) originally discovered this type of integral in 1733, while Gauss published the precise integral in 1809.^[1]

Of course, you need to crop (which can be done inside Word), and a bit of image processing goes a long way. If you are a Windows user, the *Snipping Tool* can be used for doing partial screen captures. An image processing program (e.g. Photoshop, PaintShopPro, Inkscape, etc.) is also useful when you are working with any kind of imaging or graphical information.

Want to include some content you generated in Mathematica? A snippet of your Python code? A bunch of equations from LaTeX? A photo of your lab setup? Literally anything that appears on your computer screen? ... Try using a (suitably cropped) screen capture.

And yes, you can insert photos of your handwritten prelab problems. But you really should get into the habit of doing calculations using LaTeX (or perhaps in Mathematica or some other platform, depending on the nature of the calculation). As you begin working on complex calculations, often with other people, handwriting soon becomes unsuitable.

For Ph77 e-notebooks, we recommend MS Word with lots of screen captures. Word is hard to beat for ease-of-use and flexibility, and it is already a professional standard. Plus you can get Word for free at IMSS.

Before you come to the lab, it is helpful to read through the lab handout and do the prelab problems; that will make your lab work go faster. When working in the lab, it also helps to jot down notes as you work. And it is especially beneficial to do some data analysis in the lab, as soon as you collect your data. This way you can see and correct mistakes while your hardware is still set up.

For your *Assignment* submissions in Canvas, make a document that summarizes your work in a (reasonably) tidy fashion, like something you would use to communicate your results to others. It needn't be a beautifully formatted document, but it should be clear.