# Lab Report Template

Lab reports must be written using the LaTeX typesetting system. This is commonly used by science and engineering professionals to write reports and journal articles, especially in fields where mathematical symbols are often needed, so writing LaTeX documents is a useful skill to learn.

We have provided a template that will help you produce a professional-looking lab report without needing to know all of the ins and outs of LaTeX. The main thing is that you know how to add text, figures, and tables, and how to properly add references. We'll use an online document editor called **Overleaf** (www.overleaf.com) to write the document.

## Getting started with the template

To get started, you need to create a user account on Overleaf and upload a Zip file containing the lab report template.

1. First, download the **ProjectTemplate.zip** file from the PLab QMPlus page and save it somewhere on your computer (it doesn't matter where).
2. Now, go to www.overleaf.com and click the **Register** button on the top right. Follow the instructions to create a new account.
3. Once you've registered, log in to the Overleaf account and go to www.overleaf.com/project. Click the **New Project** button on the top left of the screen.
4. Select **Upload Project** from the list. Click the **Select a .zip file** button and find the **ProjectTemplate.zip** file that you downloaded previous.
5. The template should open up in a new document editor screen. The LaTeX code is shown in a panel on the left, and a preview of your report is shown in a panel on the right.

## Writing your report

The Overleaf website has some good tutorials that will show you the basics of how to write LaTeX documents: https://www.overleaf.com/learn

For most of the text, you can just type into the LaTeX text file directly. When you click **Recompile**, the preview will update and you'll see the text you write appear in the document. The Overleaf tutorial has some tips on how to add emphasis/bold/italics and so on.

The template also includes an example figure, an example table, an equation, and some references. We strongly suggest that you carefully study these examples, editing them as necessary when you write your own report. LaTeX expects figures etc. to be defined in a very particular way, so deviating from these examples could result in errors and confusion. Try modifying these things

**References:** To add a reference, first add a new `\bibitem` in the bibliography section right at the end of the document. A couple of examples are already included, and you should follow the same format. Make sure to change the reference in the curly braces though (e.g. `ref1`) – this is the "label" that lets you refer to a particular reference elsewhere in the document.

In the text itself, you can add a reference by including the command `\cite{ref}`, where `ref` is the label of the corresponding `\bibitem` in the bibliography. When you recompile, you'll see a number in square brackets appear that links back to your reference.

You can also refer to figures, sections, and equations using the `\ref` command. Check the example figures and equations to see how to do this – the important thing is that the block of code that defines the figure/equation also includes the `\label` command. You then need to add a `\ref` command with the right label somewhere in the text.

**Placing figures and tables:** An important difference between LaTeX and (e.g.) Microsoft Word is that LaTeX automatically deals with the layout of the document. You can't drag figures and tables around manually; LaTeX will put them where it thinks you want them.

Sometimes this doesn't give very satisfactory results. To give LaTeX a hint that a figure or table should be moved elsewhere, try cutting the entire block of code for the figure/table and pasting it further down the document.

## Submitting your report

Once you've finalised your report, click the Download PDF button that's second on the right from the **Recompile** button:



Then, check the PDF file to make sure it looks OK, and upload it to QMPlus according to the submission instructions you will have been given.

**Important Tip:** Make sure you finalise your report at least a **few days** in advance of the deadline! If you run into any last-minute LaTeX problems, we won't be able to help you if it's only a few hours before the deadline...

## Troubleshooting tips

LaTeX is quite similar to a programming language, in that if you don't structure the LaTeX code in the right way, you will get error messages and the document won't look right. We can help you with your LaTeX code in person, but here are some tips to help you avoid the most common problems.

A common issue is to ***miss off a curly brace*** ('{' or '}'). These are used to start and end LaTeX commands (called 'macros'), and so it will get confused if the braces aren't put in the right place. In general, you can just copy the examples in the LaTeX file, changing the text inside the braces as required. This should help you avoid errors due to losing or gaining braces in unwanted places.

Another thing to watch out for is ***deleting the macros*** (commands) that are already in the document. These serve a function, such as defining where the document title or abstract should be. Places where you should add your own text or commands are marked clearly in the template, so try to only make changes in those areas.

If you see a ***question mark instead of a reference***, e.g. **[?]**, you may have used the wrong label for a reference when you added a `\cite` command to the text. Check to make sure the label you included in the curly braces actually corresponds to a `\bibitem` in the bibliography!