# *Week 0 Theory*

*MnP Club*

*July 2023*

There are a lot of references hidden as hyperlinks on the pdf, so just hover on the text for the references :)

Let's start Week 0 with some essential theory for the course.

We'll start off with the Linear Algebra that you need to know for Quantum Mechanics. There are many good guides out there, but this guide (https://link.springer.com/content/pdf/bbm:978-1-4614-6336-8/1.pdf) summarises everything we need to move on.

If you find any content from the above reference confusing, try looking into this guide (https://learn.qiskit.org/v1/course/ch-appendix/linear_algebra) for perhaps a simpler explanation, this is from the Qiskit textbook.

If you want a more rigorous introduction to the Math (maybe a few of you do) the place for it is usually the standard textbook "Quantum Computation and Quantum Information" by Nielsen and Chuang http://mmrc.amss.cas.cn/tlb/201702/W020170224608149940643.pdf. Section 2.1 here is a more rigorous introduction to Linear Algebra.

Now that the Linear Algebra is done, let's move on to some Quantum Fundamentals.

There are two options here, the first being to follow this set of tutorials (again on the qiskit site). This tutorial deals with Python and Jupyter Notebook fundamentals, This one deals with the notion of a qubit and what quantum states are and what sort of operations (Quantum Gates) can be performed on these Quantum states.

This tutorial introduces the concept of multiple qubits and touches upon entanglement between those qubits.

For people who'd like to read content from a textbook, the textbook above (Nielsen and Chuang) covers this material in Chapters 1, sections 1.2 and 1.3.

That's all the theory for this week and the assignment will be released on Wednesday.

I'll repeat this, but feel free to ask doubts on the Teams Chat or on the WA group. Happy Learning!