

2026.4 - 5 | Linear Algebra, QM 1 and Python

2026-04-03 – 2026-06-05

1: Weekly Learning

- Course study:
 - MITOCW 18.06 Linear Algebra by Professor Strang
 - MITOCW 8.04 Quantum Physics I
- Continue Python learning: Markdown writing, plotting, numerical analysis and basic data processing
- Review numerical methods, including Simpson's rule and curve fitting
- Practice using Python to process data, visualize results and connect computation with course learning

2: Weekly Highlights

- Completed the main structure of MIT 18.06 Linear Algebra, covering linear systems, matrix operations, Gaussian elimination, LU factorization, vector spaces, null space, column space, basis, dimension and the four fundamental subspaces
- Studied orthogonality, projection, least squares, Gram-Schmidt process, determinants, eigenvalues and eigenvectors, diagonalization, symmetric matrices and positive definite matrices
- Gained initial exposure to extended topics and applications, including Markov matrices, Fourier analysis, complex matrices, FFT, SVD, change of basis, image compression and the pseudoinverse
- Completed Quantum Physics I, focusing on core models including 1D harmonic oscillator, scattering in 1D and the quantization of the hydrogen atom
- Understood the basic meaning of the three quantum numbers of the hydrogen atom, n , l and m , and how they arise from quantization conditions and the structure of the solutions
- Built an initial understanding of the starting point of quantum quantization, and derived probability normalization and the time-independence of total probability
- Continued Python learning, including Markdown writing, plotting, Simpson's rule, curve fitting and basic data processing

3: Insights & Takeaways

- Linear Algebra helps further study of Hilbert space and operators in quantum mechanics
- Quantum Physics I helped build the transition from classical intuition to quantum models, especially the relationship among wavefunction, boundary conditions, normalization and quantization
- Python is becoming a practical research tool that can help me learning, connecting mathematical methods with plotting, fitting, numerical integration and data analysis

4: Challenges & Open Questions

- The abstract formalism of quantum mechanics still needs to be strengthened, especially the intuitive connection among wavefunctions, operators, eigenstates and physical observables
- The study of quantum mechanics is still in its early stages and requires further in-depth learning.
- Python data-processing skills are still at an early practical stage and need to be improved through more real datasets and small projects

5: Following Plan

- Continue studying Quantum Physics II
- Start to learn Probability