# Introduction to Computational and Modeling Tools

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# Content

The basics about CPU, GPU and their applications in high performance computing; introduction of the operating systems; introduction of the parallel program design, implementation and applications in physics and other areas; basics about quantum computation: the concept, algorithm and future hardware.

On successful completion of the course, students will be able to:

1. Identify hardware requirement for high performance computing.
2. Explain the basic structure of CPU and GPU.
3. Use basic algorithms for some of the numerical problems.
4. Explain the basics about parallel computing.
5. Explain the main ideas about quantum computation.

Note: this is not a hardware course, but share some fundamental knowledge for computing applications.

# Course schedule

- Section 1, Week 1-3: Ding Pan (hardware, computer architecture, OS, shell, git...)
- Section 2, Week 4-6: Rui Zhang (multi-processing, MPI, GPU programming)
- Section 3, Week 7-8: Junwei Liu (applications to numerical and non-numerical problems)
- Section 4, Week 9: Erwin Huang (data privacy)
- Section 5, Week 10: Michael Wong (quantum annealing)
- Section 6, Week 11-12: Yi Wang (quantum computing, wrap up)

Office hours:
Appointment by Canvas

## Course grading:

- Assignments+Projects:95%
- Attendance: 5%

Any feedback?
Your comments and/or suggestions are more than welcome!