



國立清華大學  
NATIONAL TSING HUA UNIVERSITY

11220PHYS401200  
Computational Physics  
計算物理

## Syllabus

### Instructor

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### Teaching assistant (TA)

TBA

### Class schedule

Lectures on Monday from 13:20 - 16:20 (M5M6M7)  
General building II, R521

### Preface

The goal of this course is to let undergraduate students know how to solve common physical problems numerically. Students will learn basic numerical algorithms through a few projects during the semester. Basic knowledge of classical mechanics, quantum physics, electrodynamics, and thermal physics are required. Previous experience with Python or other computing languages is preferred. A Unix-like system (e.g. Linux, Mac OS X, or Windows 10 subsystem for Linux) is required. Students must bring their own laptop to class. AI-assisted softwares (chatGPT or Github copilot ) are encouraged to use in the class.

### Tentative topics

Topics
1 Command Line Interface / Editors / Shell / Version control
2 Basic programming with Python
3 Data Visualization
4 Project 1: Simple Harmonic Oscillator (damped systems / forced oscillations)
5 Project 2: N-body systems (Stars / Molecular dynamics)
6 Project 3: Laplace & Poisson equation (EM potential / Gravitational potential)
7 Project 4: Gas dynamics (Explosions / Shock / Turbulence)