國立清華大學
NATIONAL TSING HUA UNIVERSITY

11310PHYS401200
Computational Physics
計算物理

Syllabus

Instructor

Associate Prof. Kuo-Chuan Pan (潘國全)
Office: Physics building, R501
Email: kuochuan.pan@gapp.nthu.edu.tw
Phone: 03-5742563
Web: https://kuochuanpan.github.io/
Office hours: by appointment

Teaching assistant (TA)

TBA

Class schedule

Lectures on Fridays from 13:20 - 16:20 (F5F6F7)
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)

Each Project will take 2-4 weeks and we will use AI-assist teaching during the semester.