



國立清華大學  
NATIONAL TSING HUA UNIVERSITY

11210PHYS290000

Introduction of Computational Physics  
計算物理概論

## Syllabus

### Instructor

Associate Prof. Kuo-Chuan Pan (潘國全)  
Office: General building II, R506  
Email: [kuochuan.pan@gapp.nthu.edu.tw](mailto:kuochuan.pan@gapp.nthu.edu.tw)  
Phone: 03-5742563  
Web: <https://kuochuanpan.github.io/>  
Office hours: by appointment

### Teaching assistant (TA)

Ms. Li-Ting Ma (馬麗婷)  
Office: General building II, R518  
Office hours: by appointment

### Class schedule

Lectures on Monday 15:30 - 18:20 (M7M8M9)  
Physics building, R501

### Preface

This course is designed for the **first computational course** for our physics students. All physics students without prior programming experience are highly encouraged to take this course. All advanced computational or numerical courses offered by the Physics department or Institute of Astronomy would rely on the material we covered in this course.

In this course, we will learn basic programming using Python. In particular, we will learn how to use numpy, scipy, numba, and matplotlib with jupyter notebook.

A Unix-like system (e.g. Linux, Mac OS X, or Windows 10 subsystem for Linux 2) is preferred but not required. You could also use the Google Colab or Windows. Students are **required** to bring a laptop to class.

### Mini-exams

In addition to the midterm and final exams, there will be a few mini-exams during the lectures to test if you understand the concept.



國立清華大學  
NATIONAL TSING HUA UNIVERSITY

## Evaluation

Grades will be determined by homework assignments (30%), in-class mini-exams (30%), midterm (20%) and final exam (20%). Extra bonus points from class participation will be added.

## Tentative topics

### Topics

---

1. Programming with Python (from beginner to a junior computational physicist)
2. Object-oriented programming with Python
3. Precisions and floating point numbers
4. Visual Studio Code, Jupyter notebook, and Google Colab
5. numpy and scipy for scientific computing
6. Data visualization with matplotlib
7. Speedup your codes
8. GitHub Copilot & ChatGPT for programming