



課 綱 Course Outline  
物理學系物理組

中文課程名稱 Course Name in Chinese	拍鬆物理 (一)				
英文課程名稱 Course Name in English	Physics (Python for Physics) I				
科目代碼 Course Code	PHYS21240	班 別 Degree	學士班 Bachelor' s		
修別 Type	學 程 Program	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite					
課程目標 Course Objectives					
<p>通過邏輯思考、討論以及3D數值模擬的方式認識基本物理觀念，學習解決實際問題的有效技術，熟悉解決實際問題的過程，體認科學精神，養成具有堅實基本物理科學素養的大學生。</p> <p>Understand fundamental physics concepts through logical thinking, discussions and 3D numerical simulations. Learn useful techniques to solve practical problems, get familiar with the process of solving practical problems. Experience the spirit of science, incubate college students with solid scientific literacy.</p>					
系教育目標 Dept.' s Education Objectives					
1	物理科學人才培育，奠定物理及相關科學領域專業知識 To provide integrated education programs in view of fundamental knowledge of physical sciences and associated fields				
2	培養高科技人才 To train the talent for knowledge-intensive industries.				
3	培養繼續進修的理工人才 To train the talent for taking higher educational program in physical sciences.				
系專業能力 Basic Learning Outcomes				課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.' s Education Objectives	
A	具備物理之基礎背景知識 Possessing fundamental knowledge in physical sciences.				●
B	能運用基本物理知識與邏輯推理，分析解決物理問題 Being able to analyze and solve physics problems based on basic knowledge in physics as well as logical reasoning.				●

C	對目前測量器材有基礎認識，且具有操作物理實驗儀器的能力 Being acquainted with modern equipment and being able to operate them for performing physics experiments.	
D	能使用基礎電腦程式語言解決物理問題 Being able to use basic computer programming for solving physics problems	●
E	善用各種資訊平台進行論文資料蒐集的能力 Being able to use various platforms for data collection benefiting a topical research.	○
F	具備科技發展的國際視野以及外語溝通的能力 Having an international view of the technology developments and being able to use a foreign language for communications.	○
G	能整合物理與其它領域知識 Being able to integrate the knowledge of physics with that of other fields.	○

圖示說明Illustration：● 高度相關 Highly correlated ○ 中度相關 Moderately correlated

### 課程大綱 Course Outline

1. Simple Motion in 3D
  - i. Vectors
  - ii. Projectile Motion
  - iii. Air Resistance
2. Oscillation in 3D
  - i. Runge-Kutta Method
  - ii. Not-so-simple Pendulum
3. Work and energy
  - i. Simple Data Visualization
  - ii. Spring Oscillation
4. Multi-object Motion
  - i. Keplers' Laws of Planetary Motion
  - ii. Solar System - One Planet (Two Object Motion)
  - iii. Solar System - Two Planets (Three Object Motion)
  - iv. Solar System - Multiple Planets and Satellites (Multiple Object Motion)

資源需求評估 (師資專長之聘任、儀器設備的配合 . . . 等)

Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)

需使用一間電腦教室 Need to use one of the computer rooms.

### 課程要求和教學方式之建議 Course Requirements and Suggested Teaching Methods

以主題式學習為原則，搭配翻轉式教學，學生需利用課前時間自行學習和各主題相關的基本物理原則以及所需之Python基本語法，課程進行則主要在【寫出程式模擬物理情境並寫成報告】。In principle this course is conducted in a theme-based learning with flipped teaching manner. Students are required to study basic physics principles related to the topic, and the Python syntax needed to implement the topic. In class activities are mainly “to implemente the program to simulate the physical situation and to complete a report” .

### 其他 Miscellaneous

課程評量以模擬程式以及相關報告的完成度為主。Course evaluation is mainly on the completeness of simulation programs and the corresponding reports.