國立東華大學

教學計劃表　Syllabus

課程名稱(中文) Course Name in Chinese	Python 物理(一)AA			學年/學期 Academic Year/Semester	114/1
課程名稱(英文) Course Name in English	Pysics (Python for Physics) I				
科目代碼 Course Code	PHYS2124AA	系級 Department & Year	學二	開課單位 Course-Offering Department	物理學系
修別 Type	學程 Program	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/葉旺奇				
先修課程 Prerequisite					

課程描述　Course Description

透過思考、討論以及【數值模擬】實作的方式認識基本物理觀念，學習解決問題的方法，體認科學精神，藉以養成能獨立思考、明辨是非的學生。
Through thinking, discussion and hands-on numerical simulation projects to understand the fundamental physics concepts, to learn problem solving strategies, to experience scientific spirit, to gain the students capabilities of independent and logical thinking.

每週三堂課，講課與實作混和，講課針對課本內容，【實作則為電腦模擬】物理狀況。
Three classes per week, mixing lectures and hands-on projects. Lectures go with the textbook, while projects are computer simulation of physical situations.

作業全部以【電子檔】繳交，可使用 OpenOffice.org、MS Office、LaTeX 或任何可以正常顯示數學式的軟體。
All assignments are submitted electronically, can be done using OpenOffice.org, MS Office, LaTex or any other software that displays mathematical expressions correctly.

同學若對評量方式有問題或意見，歡迎隨時與教師討論
Suggestions/Questions/Comments about the grading scheme are welcome for discussion any time.

課程目標　Course Objectives

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。

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.

	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

授 課 進 度 表 Teaching Schedule & Content

週次Week	內容 Subject/Topics	備註Remarks
1	課程介紹、Python 基礎介紹	
2	拋體運動（一）：忽略空氣阻力 Projectile Motion (I): ignoring the air resistance	
3	中秋節 拋體運動（二）：一次方空氣阻力 Projectile Motion (II): Linear air resistance	
4	拋體運動（三）：二次方空氣阻力 Projectile Motion (III): Quadratic air resistance	
5	拋體運動（四）：綜合討論 Projectile Motion (IV): Overall discussions	
6	單擺運動（一）：歐拉法 -- 簡單而不精準 Pendulum Motion (I): Euler's method -- simple and low accuracy	
7	單擺運動（二）：四階榮格-庫塔法 -- 簡單而精準 Pendulum Motion (II): Fourth order Runge-Kutta method -- simple and high accuracy	
8	單擺運動（二）：四階榮格-庫塔法 -- 簡單而精準 Pendulum Motion (II): Fourth order Runge-Kutta method -- simple and high accuracy	
9	期中考週 單擺運動（三）：三維擺動 Pendulum Motion (III): Three dimensional motion	
10	單擺運動（四）：綜合討論 Pendulum Motion (IV): Overall discussions	
11	彈簧運動（一）：水平無摩擦 Motion with spring (I): Horizontal without friction	
12	彈簧運動（二）：水平有摩擦 Motion with spring (II): Horizontal with friction	
13	專題：介紹、分組、選題、初步規劃 Project: introduction, grouping, topic selection, priliminary planning	
14	專題：選題、規劃、執行 Project: topic selection, planning, execution	
15	專題：執行、調整、討論 Project: execution, modification, discussion	
16	專題：執行、調整、討論 Project: execution, modification, discussion	
17	專題：執行、調整、討論 Project: execution, modification, discussion	
18	期末考週 專題：討論、完成 Finals week Project: discussion, complition	

教 學 策 略 Teaching Strategies

☑ 課堂講授 Lecture ☑ 分組討論Group Discussion ☐ 參觀實習 Field Trip

☑ 其他Miscellaneous: 以數值方法模擬較為實際的物理情況來輔助物理學習

教 學 創 新 自 評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

☑ 問題導向學習(PBL) ☑ 團體合作學習(TBL) ☐ 解決導向學習(SBL)

☐ 翻轉教室 Flipped Classroom ☐ 磨課師 Moocs

社會責任(Social Responsibility)

☐ 在地實踐Community Practice ☐ 產學合作 Industy-Academia Cooperation

跨域合作(Transdisciplinary Projects)

☐ 跨界教學Transdisciplinary Teaching ☐ 跨院系教學Inter-collegiate Teaching

☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

學期成績計算及多元評量方式 Grading & Assessments

配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗會考	實作觀察	口頭發表	專題研究	創作展演	卷宗評量	證照檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)	0%								
期中考成績 Midterm Exam	0%								
期末考成績 Final Exam	0%								
作業成績 Homework and/or Assignments	100%		✓		✓				
其他 Miscellaneous (_____)	0%								

評量方式補充說明
Grading & Assessments Supplemental instructions

沒有考試，原則上每週一次作業，作業內容為【模擬物理】，可以使用 VPython 或是 Unity 或是自己熟悉的開發工具，將作業指定的物理情況模擬出來，並寫出一份【短報告】。
No exams. In principle one assignment a week. Assignments are "short reports" of "physics simulations", which can be done by VPython or Unity or any familiar development tool.

原則上作業於給定後的下個週四午夜 23:59 以前繳交，若有適當理由可以申請延長期限。
In principle assignments are due midnight 23:59 of the next Thursday after the assignments are given. You may request an extension with a proper reason.

教科書與參考書目（書名、作者、書局、代理商、說明）
Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

參考書目（References）：
Title: Physics For Scientists and Engineers
Author: Debora M. Katz
Publisher: Cengage Learning
Agent: 歐亞

Online documents of VPython or Unity

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)
Teaching Aids & Teacher's Website(Including online teaching information. Personal website can be listed here.)

線上課程：Google Classroom
課程代碼：uxuzmxf
url: https://classroom.google.com/c/NTQ3ODYwMDM1OTA1?cjc=uxuzmxf

教材：http://faculty.ndhu.edu.tw/~wcy2/wcy2.Pysics101.html

其他補充說明 (Supplemental instructions)