國立東華大學

# 教學計劃表　Syllabus

| | | | | | |
|---|---|---|---|---|---|
| 課程名稱(中文)<br>Course Name in Chinese | Python 物理(二)AB | | | 學年/學期<br>Academic Year/Semester | 114/2 |
| 課程名稱(英文)<br>Course Name in English | Pysics (Python for Physics) II | | | | |
| 科目代碼<br>Course Code | PHYS2125AB | 系級<br>Department & Year | 學二 | 開課單位<br>Course-Offering Department | 物理學系 |
| 修別<br>Type | 學程 Program | 學分數/時間<br>Credit(s)/Hour(s) | 3.0/3.0 | | |
| 授課教師<br>Instructor | /葉旺奇 | | | | |
| 先修課程<br>Prerequisite | | | | | |

## 課程描述　Course Description

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.

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".

## 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<br>Basic Learning Outcomes | 課程目標與系專業能力相關性<br>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 | Course Introduction | |
| 2 | Single Static Charge – Electrostatics: Electric Field | |
| 3 | Single Static Charge – Electrostatics: Electric Potential | |
| 4 | Distribution of Static Charges: Electric Field Inside and Outside of the Distribution | |
| 5 | Distribution of Static Charges: Electric Flux – Gauss' Law | |
| 6 | Constant Velocity Moving Charges – Magnetostatics: A Thin Straight Wire With Steady Current – Magnetic Field | |
| 7 | Constant Velocity Moving Charges – Magnetostatics: A Thick Straight Wire With Steady Current – Magnetic Field Inside and Outside of a Wire | |
| 8 | Constant Velocity Moving Charges – Magnetostatics: Ampere's Law | |
| 9 | Current Loop and Bar Magnet: A Tiny Current Loop – Magnetic Dipole Moment | |
| 10 | Current Loop and Bar Magnet: A Tiny Bar Magnet – Magnetic Dipole Moment | |
| 11 | Current Loop and Bar Magnet: A Finite Size Bar Magnet – Magnetic Field Inside and Outside of a Magnet | |
| 12 | Final Project: Faraday's Law | |
| 13 | Final Project: Faraday's Law | |
| 14 | Final Project: Faraday's Law | |
| 15 | Final Project: Faraday's Law | |
| 16 | Final Project: Faraday's Law | |
| 17 | | |
| 18 | | |

## 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:

## 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<br>Items | 配分比例<br>Percentage | 多元評量方式 Assessments | | | | | | | |
| | | 測驗<br>會考 | 實作<br>觀察 | 口頭<br>發表 | 專題<br>研究 | 創作<br>展演 | 卷宗<br>評量 | 證照<br>檢定 | 其他 |
| 平時成績(含出缺席)<br>General Performance<br>(Attendance Record) | | | | | | | | | |
| 期中考成績 Midterm Exam | | | | | | | | | |
| 期末考成績 Final Exam | | | | | | | | | |
| 作業成績 Homework and/or Assignments | 100% | | ✓ | | | | | | |
| 其他 Miscellaneous<br>(_____) | | | | | | | | | |

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

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.)

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.)

http://faculty.ndhu.edu.tw/~wcy2/wcy2.Pysics102.html

其他補充說明 (Supplemental instructions)