



# 課 綱 Course Outline

## 物理學系應用物理博士班一般組

|  |  |                  |               |   |     |
|--|--|------------------|---------------|---|-----|
| 中文課程名稱<br>Course Name in Chinese   | 電動力學(一)  |                  |               |   |     |
| 英文課程名稱<br>Course Name in English   | Electrodynamics (I)  |                  |               |   |     |
| 科目代碼<br>Course Code  | APH_70800  | 班 別<br>Degree    | 博士班<br>Ph. D. |   |     |
| 修別<br>Type   | 必修<br>Required   | 學分數<br>Credit(s) | 3.0           | 時 數<br>Hour(s)  | 3.0 |
| 先修課程<br>Prerequisite   |  |                  |               |   |     |
| 課程目標<br>Course Objectives  |  |                  |               |   |     |
| 1. 延續電磁學的理論基礎，介紹靜電學，邊界值問題，多極問題，介質，靜磁學，時間變化場，馬克士威方程式，守恆定律，磁單極問題，對稱性，平面波等。導波管與共振腔，簡單輻射系統，散射與折射，狹義相對論，電磁場中的帶電粒子，物體內能量損耗，運動電荷的輻射，多極場，輻射阻尼，導波管與共振腔等問題。<br>2. 於理論的形成及解題的運算技巧給予必要的訓練。 |  |                  |               |   |     |
| 系教育目標<br>Dept.'s Education Objectives  |  |                  |               |   |     |
| 1  | 培養具有研發能力的高科技人才<br>Essential training of professionals for research and development knowledge-intensive industries. |                  |               |   |     |
| 2  | 培養大學物理師資<br>Professional training for college physics teaching.  |                  |               |   |     |
| 3  | 厚植本系所及理工學院之教學研究水準<br>Promoting the teaching and researching potential of the department and the college.           |                  |               |   |     |
| 4  | 培養物理專業研究人才<br>Professional training in physics research.   |                  |               |   |     |
| 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  | 具備物理與相關應用領域之專業知識<br>Possessing professional knowledge in physics and related application fields.                   |                  |               | ●   |     |

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|---|---|---|
| B | 能以物理知識與邏輯推理，分析解決物理問題<br>Being able to analyze and solve physics problems based on basic knowledge in physics as well as logical reasoning.          | ● |
| C | 瞭解當代實驗儀器之原理，並具備操作實驗儀器之能力<br>Understanding the principles of up-to-date equipment and being able to operate them for performing physics experiments. |   |
| D | 能利用電腦處理各類物理問題<br>Being able to use computers for solving various physics problems.  |   |
| E | 對學術倫理有清楚正確之認知<br>Properly and clearly acknowledging the academic ethics.  |   |
| F | 具備以口頭報告及論文寫作發表研究成果之能力<br>Possessing the skills of oral presentation and scientific writing for publishing research findings.                        |   |
| G | 具備科技發展之國際觀及外語溝通能力<br>Having an international view of the technology developments and being able to use a foreign language for communications.       |   |

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

### 課程大綱 Course Outline

1. Introduction to Electrostatics
2. Boundary-Value Problems in Electrostatics: I
3. Boundary-Value Problems in Electrostatics: II
4. Multipoles, Electrostatics of Macroscopic Media, Dielectrics
5. Magnetostatics
6. Time-Varying Fields, Maxwell Equations, Conservation Laws
7. Plane Electromagnetic Waves and Wave Propagation
8. Wave Guides and Resonant Cavities

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.)

具有各領域之專業師資、相關期刊及圖書、影印機、投影機、幻燈機。

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

講授、討論、作業、小考、期中及期末考。

### 其他 Miscellaneous