



教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	穿透式電子顯微鏡		學年/學期 Academic Year/Semester	114/2	
課程名稱(英文) Course Name in English	Transmission Electron Microscopy				
科目代碼 Course Code	MS_52700	系級 Department & Year	碩士	開課單位 Course-Offering Department	材料科學與工程學系
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/黃常寧				
先修課程 Prerequisite					
課程描述 Course Description					
介紹穿透式電子顯微鏡的基本原理與相關分析技術。					
課程目標 Course Objectives					
介紹掃描式電子顯微鏡、穿透式電子顯微鏡的原理，並應用於材料組織、成份、與結構分析研究工作上。					
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	具備材料科學所需的進階物理、化學及數學的知識。Acquire required advanced physical, chemical, and mathematic knowledge for materials science and engineering.				○
B	具備材料科學的進階專業知識，並能應用於解決工程上之問題。Acquire required advanced professional knowledge for materials science and engineering, applicable in solving engineering problems.				●
C	具備獨立研究之能力。Equipped with capabilities of independent research.				●
D	具備專業道德及責任感，與良好的溝通及團隊合作的能力。Acquire professional morality and responsibility, and capability of quality communication and team cooperation.				●
E	具備進階的英文能力，應用於學習與交流。Acquire English capability used for learning and interaction.				○
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	Overview of TEM				
2	Electron Optics (I)				
3	Electron Optics (II)				
4	Diffraction Theory				
5	Kinematic and Dynamic Theory (I)				
6	Kinematic and Dynamic Theory (II)				

7	Analysis of Diffraction Pattern and Kikuchi Pattern (I)	
8	Analysis of Diffraction Pattern and Kikuchi Pattern (II)	
9	Midterm Exam	
10	Fourier Optics and High-Resolution TEM (I)	
11	Fourier Optics and High-Resolution TEM (II)	
12	Atomic Structure and Strain Analysis	
13	Energy Dispersive X-ray spectrometer (EDX)	
14	Practical Application and Quantitative Analysis of EDX spectrometer	
15	Scanning Transmission Electron Microscopy (STEM)	
16	Electron Energy-Loss Spectroscopy	
17	Final Exam	
18	學期成績登錄 彈性補充教學	

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 Industry-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)	15%								出席率與課堂表現
期中考成績 Midterm Exam	30%	✓							
期末考成績 Final Exam	40%	✓							
作業成績 Homework and/or Assignments	15%						✓		
其他 Miscellaneous (_____)									

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.)

- D. B. Williams and C. B. Carter, Transmission Electron Microscopy, Plenum, 1996.
 B. Fultz and J. Howe, Transmission Electron Microscopy and Diffractometry of Materials, 3rd edition, Springer, 2007.
 M. De Graef, Introduction to Conventional Transmission Electron Microscopy, Cambridge, 2012.
 S. L. Hwang (黃士龍教授), TEM Lecture Note
 F. R. Chen (陳福榮教授), TEM Lecture Note
 鮑忠興、劉思謙, 近代穿透式電子顯微鏡實務, 第二版, 滄海書局, 2012.

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.)

其他補充說明 (Supplemental instructions)