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國立東華大學

教學計劃表　Syllabus

課程名稱(中文) Course Name in Chinese	奈米科技概論AB			學年/學期 Academic Year/Semester	113/2
課程名稱(英文) Course Name in English	Introduction to Nanotechnology				
科目代碼 Course Code	PHYS2100AB	系級 Department & Year	學三	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	/馬遠榮				
先修課程 Prerequisite					

課程描述　Course Description

介紹奈米科技與實際奈米相關技術與奈米材料，增進學生對奈米科技與技術的了解。

課程目標　Course Objectives

讓學生修習此一課程後，能對奈米科技對有深入了解，以利研究工作的進行。

	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	Introduction	
2	Nanotechnology & Nanostructures and nanomaterials: What is nanometer? Definition of nanotechnology and nanomaterials 0D, 1D, 2D nanostructures and bulk	
3	See nanoworld: Electron microscopy, Scanning electron microscopy. Transmission electron microscopy, Selected area electron diffraction	

4	Manipulate nanoworld: Scanning probe microscopy, scanning tunneling microscopy, Quantum mechanism, Atomic force microcopy, van der Waals force	
5	Electronic structures of nanomaterials: Atomic physics and photoelectrons, X-ray photoelectron spectroscopy	
6	第一次小考	
7	期中口試與書面報告	
8	春假	
9	Optical properties of nanomaterials: Raman scattering & photoluminescence spectroscopy	
10	Structural and crystalline determinations: X-ray diffraction of molecules and solids, crystal structures and crystallinity	
11	2D materials and their applications	
12	Hot-filament metal-oxide deposition technique: Introduction & Operation	
13	Hot-plate metal deposition technique: Introduction & Operation	
14	Tube furnace deposition technique: Introduction & Operation	
15	Field-emission scanning electron microscopy (FESEM) & Energy dispersive spectroscopy (EDS): Introduction & Operation	
16	期末口試與書面報告	
17	Raman spectroscopy & Photoluminescence spectroscopy: Introduction & Operation	
18	X-ray photoelectron spectroscopy (XPS): Introduction & Operation	

教 學 策 略 Teaching Strategies

- [x] 課堂講授 Lecture
- [x] 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)

- [x] 問題導向學習(PBL)
- [x] 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)	20%								點名
期中考成績 Midterm Exam	40%			✓					
期末考成績 Final Exam	40%			✓					
作業成績 Homework and/or Assignments									
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.)

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)