



國立中興大學教學大綱(Syllabus)-研究所

系務會議通過修訂日期：2010/1/13
updated: (year)/(month)/(day)

課程名稱 (course name)	(中) M062 奈米科技導論				
	(Eng.) M062 Introduction to Nanotechnology				
開課系所班級 (dept. & year)	材料工程學系碩士 班一年級 (Dept. of Mat. Sci. & Engr., Master)	學分 (credits)	3	授課教師 (teacher)	許薰丰 助理教授 (Assistant Prof. Hsun-Feng Hsu)
課程類別 (course type)	<input type="checkbox"/> 必修(Mandatory) <input checked="" type="checkbox"/> 選修(Elective)	授課語言 (language)	中文 (Chinese)	開課學期 (semester)	下學期(Spring)
課程目標 (course objectives)	(中) 1. 了解表面物理化學與奈米材料之關係 2. 了解零維奈料結構之合成與製作 3. 了解一維奈料結構之合成與製作 4. 了解二維奈料結構之合成與製作 5. 了解特殊奈料結構之合成與製作 6. 了解以物理方式製作奈米結構 8. 培養同學書面和口頭報告的能力				
	(Eng.) 1. To understand the relation between the physical chemistry of solid surfaces and the nanostructures. 2. To understand synthesize of 0D nanostructures. 3. To understand synthesize of 1D nanostructures. 4. To understand synthesize of 2D nanostructures. 5. To understand special nanomaterials. 6. To understand nanostructures fabricated by physical techniques. To train student to have the ability of presentation.				
課程簡述 (course description)	(中) 本課程以表面物理化學為出發點，講述零維、一維及二維之奈米結構的合成與製備，以物理方式製作奈米結構及特殊奈米材料的介紹。				
	(Eng.) The aim of this course is to introduce the fundamentals and technical approaches in synthesis, fabrication and processing of 0D, 1D and 2D nanostructure. Then, discusses various physical techniques for the fabrication of nanostructures. At last, the synthesis of various special nanomaterials is discussed.				
先修課程(prerequisites)					
課程名稱 (course name)		與課程銜接的重要概念、原理與技能 (relation to the current course)			



教學模式 (teaching methodology) 【請勾選】	講授 (teaching)	討論/報告 (discussion & report)	實驗/參訪 (exp./fab visit)	遠距/網路教學 (remote/web teaching)
	●	●		



授課內容 (週次、單元名稱與內容、習作/考試進度、備註) (course content and homework/tests schedule)			
週次 (week)	單元名稱與內容 (subject and content)	習作/考試進度 (homework and tests)	備註 (remark)
01	Introduction		
02	Surface energy		
03	Chemical potential as a function of surface curvature		
04	Electrostatic stabilization		
05	Steric stabilization		
06	Nanoparticles through homogeneous nucleation		
07	Nanoparticles through heterogeneous nucleation	Midterm presentation Group #1	
08	Kinetically confined synthesis of nanoparticles	Midterm presentation Group #2	
09	Epitaxial core-shell nanoparticles	Midterm presentation Group #3	
10	Spontaneous growth	Midterm presentation Group #4	
11	Template-base synthesis	Midterm presentation Group #5	
12	Fundamentals of film growth	Midterm presentation Group #6	
13	Vacuum science	Midterm presentation Group #7	
14	Physical vapor deposition		
15	Chemical vapor deposition		
16	Atomic layer deposition		
17	Special nanomaterials		
18	Nanostructures fabricated by physical techniques	Final presentation	
學習評量方式 (evaluation)			
(1) 期中報告 30%			
(2) 期末報告 45%			
(3) 平時成績 25%			
教科書&參考書目 (書名、作者、書局、代理商、說明) (textbook& other references)			



Guozhong Cao, Nanostructures & nanomaterials - Synthesis, properties & application, Imperial College Press (2004).

課程教材 (教師個人網址請列在本校內之網址。)
(teaching aids & teacher's website)

Power point files

課程輔導時間
(office hours)



與學系教育目標之關聯性(材料系)
(relation to educational objective of materials engineering department)

1. 提供材料性質、製程與應用及跨領域知識與訓練
To provide interdisciplinary know-how and training on materials properties, processing, and applications
2. 培育具獨立思考、創新與實作能力之材料科技人才
To train materials technology students for independent thinking, innovation, and practical skills
3. 培養團隊合作精神與溝通協調整合能力
To cultivate the spirit of teamwork and the capacity of integrated cooperation
4. 建立多元價值與國際觀
To inculcate multifarious values and cosmopolitan worldview
5. 強化綠色材料科技教育
To implement educational programs in eco-materials technology

與學系教育核心能力之關聯性(材料系)
(relation to educational core abilities for materials engineering department)

- (A) 特定材料之專業知識
Specialized knowledge in Materials science and Engineering
- (B) 策劃及執行專題研究之能力
Ability to plan and execute a research project
- (C) 撰寫專業論文之能力
Ability to write journal articles
- (D) 創新思考及獨立解決問題之能力
Ability to do innovative thinking and independent problem solving
- (E) 跨領域協調整合之能力
Ability to work in an interdisciplinary setting
- (F) 國際觀及綠色材料意識
A fine international scope and general concept of eco-material
- (G) 領導、管理及規劃之能力
Ability in leadership, management, and organization
- (H) 終身自我學習成長之能力
Ability for life-long learning
- (I) 學術專業倫理
Professional ethics in Science and Engineering



課程內涵達成學系【核心能力】比對資料(研究所)

授課進度與內容	核心能力								
	A 特定材料之專業知識	B 策劃及執行專題研究之能力	C 撰寫專業論文之能力	D 創新思考及獨立解決問題之能力	E 跨領域協調整合之能力	F 國際觀及綠色材料意識	G 領導、管理及規劃之能力	H 終身自我學習成長之能力	I 學術專業倫理
請勾選關聯性 <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Introduction	0	0	0	0	1	1	0	1	0
Surface energy	1	0	0	0	0	1	0	1	0
Chemical potential as a function of surface curvature	1	0	0	0	0	1	0	1	0
Electrostatic stabilization	1	0	0	0	0	1	0	1	0
Steric stabilization	1	0	0	0	0	1	0	1	0
Nanoparticles through homogeneous nucleation	1	0	0	0	0	1	0	1	0
Nanoparticles through heterogeneous nucleation	1	0	0	0	1	1	0	1	0
Kinetically confined synthesis of nanoparticles	1	0	0	0	1	1	0	1	0
Epitaxial core-shell nanoparticles	1	0	0	0	1	1	0	1	0
Spontaneous growth	1	0	0	0	1	1	0	1	0
Template-base synthesis	1	0	0	0	1	1	0	1	0
Fundamentals of film growth	1	0	0	0	1	1	0	1	0
Vacuum science	1	0	0	0	1	1	0	1	0
Physical vapor deposition	1	0	0	0	0	1	0	1	0
Chemical vapor deposition	1	0	0	0	0	1	0	1	0
Atomic layer deposition	1	0	0	0	0	1	0	1	0
Special nanomaterials	1	0	0	0	0	1	0	1	0
Nanostructures fabricated by physical techniques	1	0	0	0	0	1	0	1	0
總計(%)	94%	0%	0%	0%	44%	100%	0%	100%	0%

- 註：
1. 所有必修課均須填寫此表。
 2. 矩陣中請填入關聯性； 1 表示相關，0 表示無相關。