



國立中興大學教學大綱(Syllabus)-大學部

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

課程名稱 (course name)	(中) U008 材料分析(一)				
	(Eng.) U008 Materials Analysis (I)				
開課系所班級 (dept. & year)	材料科學與工程學 系大學部三年級 (Dept. of Mat. Sci. & Engr., Junior)	學分 (credits)	3	授課教師 (teacher)	吳宗明 教授 (Prof. Tzong-Ming Wu)
課程類別 (course type)	<input checked="" type="checkbox"/> 必修(Mandatory) <input type="checkbox"/> 選修(Elective)	授課語言 (language)	中文 (Chinese)	開課學期 (semester)	上學期 (Fall)
課程目標 (course objectives)	(中) 1. 了解 X-ray 之基本原理 2. 了解材料之晶體結構 3. 了解 X-ray 對材料晶體結構之繞射現象 4. 了解晶體結構對 X-ray 繞射強度之影響 5. 了解晶體結構對 X-ray 繞射寬度之影響 6. 了解 IR and Raman spectroscopy 對材料結構之分析 了解 DSC and TGA 對材料熱特性之分析				
	(Eng.) 1. Study the basic principle of X-ray spectrum and the design of X-ray tube 2. Study the crystalline structure of materials 3. Study the effect of X-ray radiation on the crystalline structure of materials 4. Determine the X-ray intensity of the crystalline materials 5. Determine the X-ray width of the crystalline materials 6. Determination of chemical structure using IR and Raman spectroscopy 7. Determination of the thermal properties of material using DSC and TGA				
課程簡述 (course description)	(中) 本課程主要講解材料特性分析主要針對材料結構特性包含 X-ray 之基本原理、材料之晶體結構、X-ray 對材料晶體結構之繞射現象、晶體結構對 X-ray 繞射強度之影響、晶體結構對 X-ray 繞射寬度之影響, 同時亦針對材料化學結構利用光譜分析包含 IR and Raman spectroscopy 與材料熱性質分析包含 DSC and TGA, 此課程以課堂講授為主, 並針對課程內容進行期中考與期末考來評量學生對於課堂講授資料之理解與思考判斷力				
	(Eng.) This course mainly describes the principle of X-ray diffraction, the structure of crystalline material and their related X-ray intensity and width. The crystal structure is related in terms of the occupancy of atomic sites and lattice parameter. The reciprocal lattice provides the key to our understanding of diffraction and its interpretation of X-ray diffraction pattern through the work of Laue, Braggs and Eward. Then the X-ray diffraction of real case will be discussed. This course also illustrates using FTIR, Raman spectroscopy to analyze the chemical characteristic as well as DSC and TGA to describe the thermal properties of materials.				
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	Properties of X-rays		
03	Geometry of crystals (I)		
04	Geometry of crystals (II)		
05	Diffraction I: Geometry (I)		
06	Diffraction I: Geometry (II)		
07	Diffraction II: Intensity (I)		
08	Diffraction II: Intensity (II)		
09	Diffraction II: Intensity (III)		
10	.	Mid-term Exam	
11	Diffraction III: Real samples (I)		
12	Diffraction III: Real samples (II)		
13	Analysis using IR spectroscopy		
14	Analysis using Raman spectroscopy		
15	Thermal analysis using DSC		
16	Thermal analysis using TGA		
17	Applications of analysis technique		
18		Final Exam.	
學習評量方式 (evaluation)			
(1) Mid-term Exam.: 50%			
(2) Final Exam.: 50%			
以期中考與期末考來判斷學生對於課堂講授資料之理解與評量學生對於課堂講授資料之理解與思考判斷力			
教科書&參考書目 (書名、作者、書局、代理商、說明) (textbook & other references)			
教科書			
Textbook: 1.Elements of X-ray Diffraction, 3 rd Ed., B. D. Cullity and S. R. Stock, Prentice Hall (2001) 課程有關 X-ray 基本原理、材料晶體結構與排列、X-ray 經材料晶體結構與排列產生繞射位置、強度與寬度之變化主要取自本教科書			
2.Polymer Analysis, B. Stuart, Wiely (2002) 課程有關 Raman, IR, DSC and TGA 主要取自本教科書			
3.詳細 X-ray 之結構決定方法可參考下列參考書目			
參考書目			
X-ray Structure Determination, 2 nd Ed., G. H. Stout and L. H. Jensen, John Wiley & Sons (1989)			
課程教材 (教師個人網址請列在本校內之網址。) (teaching aids & teacher's website)			
http://audi.nchu.edu.tw/~tmwu			



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) 運用數學、科學及材料工程知識能力
Ability to apply knowledge of mathematics, science, and materials engineering
- (B) 設計與執行材料實驗及分析數據之能力
Ability to design and conduct experiments, as well as analyze data
- (C) 執行材料工程實務所需之技術與能力
Ability to use techniques and skills for materials engineering practices
- (D) 製程整合及及元件實作之能力
Ability to integrate process and make devices
- (E) 溝通協調之能力與團隊合作之精神
Ability to communicate effectively and cultivate the spirit of teamwork
- (F) 獨立思考及解決問題之能力
Ability to think independently and solve problems
- (G) 培養國際觀及認識綠色材料對全球環境的影響
Cultivation of cosmopolitan worldview and understanding effects of eco-materials on global environment
- (H) 終身學習之習慣與能力
Ability to cultivate life-long learning habit
- (I) 瞭解材料工程人員的社會責任與專業倫理
Understanding materials engineers' social responsibility and professional ethics



課程內涵達成學系【核心能力】比對資料(大學部)

授課進度與內容	核心能力									
	A	B	C	D	E	F	G	H	I	
	運用數學、科學及材料工程知識能力	設計與執行材料實驗及分析數據之能力	執行材料工程實務之技術能力	製程整合及元件之製作力	整及實能	溝通協調之能力與團隊合作之精神	獨立思考及解決問題之能力	培養國際觀及認識綠色材料對全球環境的影響	終身學習之習慣與能力	瞭解材料工程師的社會責任與專業倫理
請勾選關聯性 <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Properties of X-rays	1	0	0	0	0	1	0	0	1	
Geometry of crystals	1	0	0	0	0	1	0	0	0	
Diffraction I: Geometry	1	0	0	0	0	1	0	0	0	
Diffraction II: Intensity	1	0	0	0	0	1	0	0	0	
Diffraction III: Real samples	1	0	0	0	0	1	0	0	0	
Analysis using IR and Raman spectroscopy	1	0	0	0	0	1	0	0	0	
Thermal analysis using DSC and TGA	1	0	0	0	0	1	0	0	0	
Application of analysis technique	1	0	0	0	0	1	0	0	1	
總計(%)	100%	0%	0%	0%	0%	100%	0%	0%	25%	

- 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。