教學大綱(Syllabus)-大學部

系務會議通過修訂日期：2007/9/12
updated: 2010/08/21

課程編碼 (course no.)	U009			**學分 (credits)**	3
課程名稱 (course name)	(中) 材料物理性質				
	(Eng.) Physical properties of materials				
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)			**授課教師 (teacher)**	呂福興 教授 (Prof. Fu-Hsing Lu)
課程類別 (course type)	必修 (Mandatory)	**授課語言 (language)**	中文 (Chinese)	**開課學期 (semester)**	上學期 (Fall)
課程簡述 (course description)	(中) 首先從基礎之電子理論介紹，進而瞭解材料物理性質的原理、特性及應用，並透過資料查詢與報告，使學生對材料物理性質有概括性之認識。				
	(Eng.) Firstly to introduce the electronic theory that leads to understand the basics of physical properties of materials. Secondly to introduce the characteristics of the physical constants and applications for each property. Finally to conduct literature search and oral report to have a broader knowledge of the subject.				
課程目標 (course objectives)	(中) 1. 對電子理論有基礎之瞭解 2. 瞭解材料物理性質的原理、特性及應用 3. 學習相關資料查詢				
	(Eng.) 1. Understand the basics of electron theory 2. Understand the principle, characteristics, and applications of material physical properties 3. Learn how to search data of physical properties				

先修課程(prerequisites)

課程編碼 (course no.)	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)	模式 (methodology)	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)	合計 (sum)
	學分分配 (credit distrib.)	3				3
	授課時數分配 (hour distrib.)	3				3

授課進度與內容（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	Syllabus/Introduction		Class begins
02	Introduction: data/literature search	Homework #1	
03	Electron theory: wave-particle duality		
04	Electron theory: Schrödinger Equation	Quiz #1	
05	Electron theory: Schrödinger Equation		
06	Electron theory: band theory	Homework #2	
07	Electron theory: band theory	Quiz #2	
08	Electrical properties: metals/alloys		
09	Electrical properties: semiconductor		
10	Prelim		
11	Electrical properties: superconductivity/thermoelectricity		Student oral report
12	Dielectric properties	Quiz #3	Student oral report
13	Optical properties		Student oral report
14	Optical properties		Student oral report
15	Optical properties/Thermal properties	Quiz #4	Student oral report
16	Thermal properties		Student oral report
17	Magnetic properties		class ends
18	Final exam	Final exam	

學習評量方式
(evaluation)

1. 小考/作業/平時成績 (30%) [Quiz/homework/others (30%)]
2. 期中考(30%) [Prelim (30%)]
3. 期末考(40%) [Final (40%)]
4. 加分 [Bonus]

小考(Quiz)：
為培養學生平日課後複習的習慣及思考問題的能力。
作業(Homework)：
作業目的在評估學生對課堂講授資料吸收程度，並增加學生資料搜尋及解決問題的能力。
平時成績(Others)：
出席記錄(attendance record)、講義修正(corrections of class notes)
加分(Bonus)：
上台報告 (Oral report)
期中考(Prelim)：
期末考(Final)：
範圍包括全部內容(cover all contents)

教科書（書名、作者、書局、代理商、說明） **(textbook)**
R.E. Hummel, *Electronic Properties of Materials*, 3rd Edition, Springer-Verlag, New York, 2001.
參考書目（書名、作者、書局、代理商、說明 (other references)
1. J.I. Gersten and F.W. Smith, *The Physics and Chemistry of Materials*, John Wiley& Sons, New York, 2001. *2. CRC Handbook of Chemistry and Physics*, CRC Press, Cleveland, Ohio, 200X. 3. 補充資料 (supplements)
課程教材（教師個人網址請列在本校內之網址。） (teaching aids & teacher's website)
1. Class notes **2. http://web.nchu.edu.tw/~fhlu**

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	執行材料工程實務所需之技術與能力	製程整合及元件作能之力	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	瞭解材料工程人員的社會責任與專業倫理
請勾選關聯性☑	☑	☑	☑	☐	☑	☑	☑	☑	☑
Introduction: data/literature search	1	1	1	0	0	1	1	1	1
Electron theory: wave-particle duality	1	1	0	0	0	1	0	1	0
Electron theory: Schrödinger Equation	1	1	0	0	0	1	0	1	0
Electron theory: band theory	1	1	0	0	0	1	0	1	0
Electrical properties: metals/alloys	1	0	1	0	0	1	1	0	0
Electrical properties: semiconductor	1	0	1	0	0	1	1	0	0
Electrical properties: superconductivity/thermoelectricity	1	0	1	0	0	1	1	0	0
Dielectric properties	1	0	1	0	0	1	0	0	0
Optical properties	1	0	1	0	0	1	1	0	0
Thermal properties	1	0	1	0	0	1	1	0	0
Magnetic properties	1	0	1	0	0	1	0	0	0
(Oral report)	1	0	0	0	1	1	0	1	0
總計(%)	100%	29%	57%	0%	7%	100%	43%	36%	7%

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。
3. 學系教育目標項次請依據表1填寫。