

課程名稱 (course name)	(中) 材料界面科學 (M069)				
	(Eng.) Interfaces in Materials				
開課系所班級 (dept. & year)	材料系研究所	學分 (credits)	3	授課教師 (teacher)	張立信
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	開課學期 (semester)	下學期
課程簡述 (course description)	(中) 本課程目的是應用基礎物理與化學原理使學生了解材料界面，包括固-汽、固-液與固-固界面的能量、結構、成分等性質與界面現象，探討界面現象與性質間的關係。課程中將依序講解界面熱力學、界面能量與結構等理論基礎並介紹界面現象，包括擴散、偏析、成核成長、潤覆與遷移等。				
	(Eng.) Use basic physical and chemical principles to understand the energy, structure, composition and properties of interfaces in materials including solid-vapor, solid-liquid and solid-solid interfaces. The relationships between interfacial phenomena and properties are also discussed. The theoretical fundamentals of interface, thermodynamics, energy and structure, are taught and the interfacial phenomena including diffusion, segregation, nucleation and growth, wetting and migration are introduced				
先修課程名稱 (prerequisites)					
課程目標與核心能力關聯配比(%) (relevance of course objectives and core learning outcomes)				教學方法與評量方法 (teaching and assessment methods)	
課程目標(中/ Eng.)		核心能力	配比	教學方法	評量方法
1. 了解界面熱力學 (To understand the interfacial thermodynamics)		<input checked="" type="checkbox"/> 1.特定材料之專業知識	50%	講授	測驗 課後作業
2. 了解界面能量與結構 (To understand the interfacial energy and structure)		<input checked="" type="checkbox"/> 2.策劃及執行專題研究之能力	15%		
3. 了解界面擴散 (To understand the interfacial diffusion)		<input checked="" type="checkbox"/> 3.撰寫專業論文之能力	10%		
4. 了解界面吸附與偏析 (To understand the interfacial adsorption and segregation)		<input checked="" type="checkbox"/> 4.創新思考、解決問題與終身學習之能力	15%		
5. 了解界面成核與成長 (To understand the interfacial nucleation and growth)		<input type="checkbox"/> 5.跨領域協調整合之能力			
6. 了解界面潤覆現象 (To understand the wetting)		<input checked="" type="checkbox"/> 6.國際觀及綠色材料知識	5%		
7. 了解界面遷移與滑移 (To understand the interfacial migration and sliding)		<input type="checkbox"/> 7.領導、管理及規劃之能力			
		<input checked="" type="checkbox"/> 8.學術專業倫理	5		

授課內容(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 (Course content)	習作/考試進度 (Homework/tests schedule)
1.	課程簡介(Course Introduction)	
2.	界面熱力學(Interfacial Thermodynamics)	
3.	界面熱力學(Interfacial Thermodynamics)	
4.	界面熱力學(Interfacial Thermodynamics)	作業 1 (Homework 1)
5.	界面能量與結構(Interfacial Energy and Structure)	
6.	界面能量與結構(Interfacial Energy and Structure)	
7.	界面能量與結構(Interfacial Energy and Structure)	作業 2 (Homework 2)
8.	界面能量與結構(Interfacial Energy and Structure)	
9.	期中考(Midterm)	
10.	界面擴散(Interfacial Diffusion)	
11.	吸附與偏析(Adsorption and Segregation)	
12.	吸附與偏析(Adsorption and Segregation)	作業 3 (Homework 3)
13.	成核與成長(Nucleation and Growth)	
14.	成核與成長(Nucleation and Growth)	
15.	潤覆現象(Wetting)	
16.	潤覆現象(Wetting)	作業 4 (Homework 4)
17.	遷移與滑移(Migration and Sliding)	
18.	期末考(Final Exam)	

學習評量方式
(evaluation)

1. 學期成績依照以下比例計算 (The percentages for calculating the final score)
 - A. 期末考試(Final): 30%
 - B. 期中考試(Midterm): 30%
 - C. 課後作業(Homework): 40%
2. 考試(Examinations):

所有考試(期中、期末考)均配合學校考試時程舉辦。考試範圍包含所有上課講授內容。學生可於考試期間參考任何文獻(open book)。

(All exams (midterm, final exam) are carried out according to the semester schedule. The ranges of exams include all materials taught in the lecture. Students are allowed to refer to any literature (open book) during examination.)
3. 作業(Homework):

作業依照進度每次指定 10 題。學生需於一週內完成並於次週上課時繳交。作業問題將於課堂中討論。學生將被隨機指派上講台解釋其答案。

(10 problems are assigned in homework as scheduled each time. Students should finish the homework within one week and submit it in the next course. The problems in homework are discussed during the lecture. Students are occasionally designated to explain their answers on the platform.)

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)

上課教材為教師自編講義。

(Handouts edited by the teacher are the course textbooks.)

參考書(References)

1. Interfaces in Materials, J.M. Howe, John Wiley & Sons, NY, 1997

本書使用硬球與最近鄰斷鍵模型來描述固汽、固液和固固界面的原子結構和性質。目的在提供讀者界面在原子層級上的簡單物理詮釋並說明此與界面行為的巨觀描述的關聯性。

(The purpose of this book is to describe the atomic structure and properties of solid-vapor, solid-liquid and solid-solid interfaces using a hard-sphere, nearest-neighbor broken-bond model. The hope is to provide the reader with a simple physical understanding of interfaces at the atomic level, and show how this relates to macroscopic descriptions of interfacial behavior.)

2. Interfacial Phenomena In Metals and Alloys, L.E. Murr, Addison-Wesley, Publishing Comp., 1995
本書的目的在描述界面結構的特性並以之連結至決定金屬與合金性質的界面所扮演角色，同時提供學生與研究者研究界面結構與性質的參考。

(The purpose of this book is to produce a reasonably comprehensive text useful in conveying unifying characteristics of interfacial structure and the role played by interfaces in determining the properties of metals and alloys, and at the same time to provide a reference for students and researchers studying the structure and properties of interfaces.)

3. Fundamentals of Interfacial Engineering, R.J. Stokes and D.F. Evans, Wiley-VCH, 1997
4. Journal papers

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://www.mse.nchu.edu.tw/course/super_pages.php?ID=course2

課程輔導時間(office hours) 學期間每週二下午 04:00-05:00 (Tuesday, 04:00-05:00 pm in semester)