



## 教學大綱(Syllabus)-研究所

系務會議通過修訂日期：2008/01/03

updated: 2011/08/26

課程編碼 (course no.)	N94008			學分 (credits)	3	
課程名稱 (course name)	(中) 固態熱力學					
	(Eng.) Thermodynamics of Solids					
開課系所班級 (dept. & year)	材料科學與工程學系碩士在職專班 (Dept. of Materials Science and Engineering, Master-Professional Program)			授課教師 (teacher)	薛顯宗 教授 (Prof. Sham-Tsong Shiue)	
課程類別 (course type)	選修 (Elective)	授課語言 (language)	中文 (Chinese)	開課學期 (semester)	下學期 (Spring)	
課程簡述 (course description)	(中) 課程的目的是介紹熱力學之基本觀念，並進一步強調熱力學在材料科學上之應用。讓學生充分了解熱力學三大定律、統計熱力學、溶液之本質特性與相平衡。					
	(Eng.) The objective of this course is to introduce the fundamental concepts of thermodynamics and further applications in Material sciences. Students are expected to study the laws of thermodynamics, statistical thermodynamics, the behavior of solutions, and phase equilibrium.					
課程目標 (course objectives)	(中)					
	1. 了解固態熱力學的基本理論與應用。 2. 了解固態熱力學對材料科學與工程的影響及重要性。 3. 熟悉固態熱力學之數學模式與工程應用。					
	(Eng.)					
	1. To understand the basic theories and applications of thermodynamics. 2. To understand the effects of thermodynamics on Materials sciences and Engineering. 3. To know the mathematical thermodynamic models and how to apply to the engineering field.					
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	0	0	0	3
	授課時數分配 (hour distrib.)	3	0	0	0	3

<b>授課進度與內容 (週次、單元名稱與內容、習作/考試進度、備註)</b> <b>(course content and homework/tests schedule)</b>			
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	The First Law of Thermodynamics		
02	The Second Law of Thermodynamics		
03	Statistical Thermodynamics		
04	Auxiliary Function		
05	The Third Law of Thermodynamics		
06	Heat Capacity, Enthalpy, Entropy		
07	Heat Capacity, Enthalpy, Entropy		
08	Some Relations Between Thermodynamic Quantities		
09	Some Relations Between Thermodynamic Quantities		
10	Midterm Exam	Midterm Exam	
11	Free Energy of Heterogeneous Reactions		
12	Free Energy of Heterogeneous Reactions		
13	Solutions		
14	The Quasichemical Approach to Solutions		
15	Equilibrium Between Phases of Variable Composition		
16	Equilibrium Between Phases of Variable Composition		
17	Free Energy of Binary Systems		
18	Final Exam	Final Exam	
<b>學習評量方式</b> <b>(evaluation)</b>			
<p>學期成績計算項目及權重標準如下：</p> <p>(1) Ordinary score: 30%</p> <p>(2) Midterm examination: 30%</p> <p>(3) Final examination: 40%</p> <p>1. 平時分數(Ordinary score): 包含出缺席、課堂指派作業與課堂小考表現之綜合成績的平均值。小考共三次，目的在培養學生平時複習的學習習慣。</p> <p>2. 考試部分(Midterm examination, Final examination): 期中、期末考均配合學校考試時程。內容包含所有講授內容與參考書中部分教材。</p>			

**教科書 (書名、作者、書局、代理商、說明)****(textbook)**

David R. Gaskell, "Introduction to the Thermodynamics of Material" Third edition, 2003. (偉明)

Richard A. Swalin, "Thermodynamics of Solids", Second edition, John Wiley & Sons, New York, 1962.

**參考書目 (書名、作者、書局、代理商、說明)****(other references)**

R.E.Sonntag and G.J.Van Wylen, "Introduction to Thermodynamics", John Wiley & Sons, 1991.

**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://web.nchu.edu.tw/~stshiue/>



**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【教育目標】比對資料

授課進度與內容	教育目標				
	目標一	目標二	目標三	目標四	目標五
	提供材料性質、製程與應用及跨領域知識與訓練	培育具獨立思考、創新與實作能力之材料科技人才	培養團隊合作精神與溝通協調整合能力	建立多元價值與國際觀	強調綠色材料科技教育
請勾選關聯性 <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The First Law of Thermodynamics	1	1	0	0	0
The Second Law of Thermodynamics	1	1	0	0	0
Statistical Thermodynamics	1	1	0	0	0
Auxiliary Function	1	1	0	0	0
The Third Law of Thermodynamics	1	1	0	0	0
Heat Capacity, Enthalpy, Entropy	1	1	0	0	0
Some Relations Between Thermodynamic Quantities	1	1	0	0	0
Free Energy of Heterogeneous Reactions	1	1	0	0	0
Solutions	1	1	0	0	0
The Quasichemical Approach to Solutions	1	1	0	0	0
Equilibrium Between Phases of Variable Composition	1	1	0	0	0
Free Energy of Binary Systems	1	1	0	0	0
總計(%)	100	100	0	0	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。
  3. 學系教育目標項次請依據表1填寫。

**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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The First Law of Thermodynamics	1	1	0	0	1	0	0	1	0
The Second Law of Thermodynamics	1	1	0	0	1	0	0	1	0
Statistical Thermodynamics	1	1	0	0	1	0	0	1	0
Auxiliary Function	1	1	0	0	1	0	0	1	0
The Third Law of Thermodynamics	1	1	0	0	1	0	0	1	0
Heat Capacity, Enthalpy, Entropy	1	1	0	0	1	0	0	1	0
Some Relations Between Thermodynamic Quantities	1	1	0	0	1	0	0	1	0
Free Energy of Heterogeneous Reactions	1	1	0	0	1	0	0	1	0
Solutions	1	1	0	0	1	0	0	1	0
The Quasichemical Approach to Solutions	1	1	0	0	1	0	0	1	0
Equilibrium Between Phases of Variable Composition	1	1	0	0	1	0	0	1	0
Free Energy of Binary Systems	1	1	0	0	1	0	0	1	0
總計(%)	100	100	0	0	100	0	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。
  3. 學系教育目標項次請依據表1填寫。