

<b>課程名稱 (course name)</b>	(中) 相變化 (N94011)				
	(Eng.) Phase Transformations				
<b>開課系所班級 (dept. &amp; year)</b>	材料系碩專班	<b>學分 (credits)</b>	3	<b>授課教師 (teacher)</b>	張立信
<b>課程類別 (course type)</b>	<input type="checkbox"/> 必修(Mandatory) <input checked="" type="checkbox"/> 選修(Elective)	<b>授課語言 (language)</b>	中文	<b>開課學期 (semester)</b>	下學期
<b>課程簡述 (course description)</b>	(中) 本課程分為兩部分，第一部分講述相變化的熱力學與動力學理論、晶體界面與微結構等了解相變化現象所需的基礎材料知識。第二部分則是針對各種相變化現象的理論進行授課。這些相變化理論包括固化之成核與成長機制、擴散相變以及無擴散相變等特殊之相變化型態。本課程之目的在使學生能建立相變化基本知識，可進一步將研究中所觀察之相變化行為與理論機制加以結合。				
	(Eng.) There are two parts in this course. In the first part, the basic knowledge including the thermodynamic and kinetic theories of phase transformation, crystal interface and microstructure are described. In the second part, phenomena and theories for various kinds of phase transformation are taught. These theories include nucleation and growth mechanism in solidification, diffusional and diffusionless phase transformation. The purpose of this course is help students establishing fundamental knowledge of phase transformation and relating the behavior of phase transformation observed in research work with theoretical mechanism.				
<b>先修課程名稱 (prerequisites)</b>					
<b>課程目標與核心能力關聯配比(%) (relevance of course objectives and core learning outcomes)</b>				<b>教學方法與評量方法 (teaching and assessment methods)</b>	
<b>課程目標(中/ Eng.)</b>		<b>核心能力</b>	<b>配比</b>	<b>教學方法</b>	<b>評量方法</b>
1. 了解相變化之熱力學理論 (To understand the thermodynamics of phase transformation)		<input checked="" type="checkbox"/> 1.特定材料之專業知識	30%	習作 講授	測驗 出席
2. 了解相變化之動力學理論 (To understand the kinetics of phase transformation)		<input checked="" type="checkbox"/> 2.精進專題研究之能力	30%		
3. 了解晶體界面與微結構 (To understand the crystal interface a)		<input checked="" type="checkbox"/> 3.撰寫專業論文之能力	20%		
4. 了解固化之成核成長理論 (To understand the the nucleation and growth of solidification)		<input checked="" type="checkbox"/> 4.創新思考、解決問題與終身學習之能力	20%		
5. 了解擴散相變化現象 (To understand the diffusional phase transformation)		<input type="checkbox"/> 5.跨領域協調整合之能力			
6. 了解無擴散相變化現象 (To understand the diffusionless phase transformation)		<input type="checkbox"/> 6.國際觀、產業發展及綠色材料知識			
		<input type="checkbox"/> 7.領導、管理及規劃之能力			
		<input type="checkbox"/> 8.學術專業倫理			

**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 (Introduction)	
2.	熱力學理論 (Thermodynamics)	
3.	熱力學理論 (Thermodynamics)	習作 1 (Homework 1)
4.	動力學理論 (Kinetics)	
5.	動力學理論 (Kinetics)	習作 2 (Homework 2)
6.	晶體界面 (Crystal Interfaces)	
7.	晶體界面 (Crystal Interfaces)	習作 3 (Homework 3)
8.	習作檢討 (Homework Review)	
9.	期中考 (Midterm)	
10.	固化 (Solidification)	
11.	固化 (Solidification)	
12.	固化 (Solidification)	習作 4 (Homework 4)
13.	擴散相變 (Diffusional Phase Transformation)	
14.	擴散相變 (Diffusional Phase Transformation)	習作 5 (Homework 5)
15.	無擴散相變 (Diffusionless Phase Transformation)	
16.	無擴散相變 (Diffusionless Phase Transformation)	習作 6 (Homework 6)
17.	習作檢討 (Homework Review)	
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. 期中考 30%
  - B. 期末考 30%
  - C. 課後作業 30%
  - D. 出席 10%
2. 考試 (Examinations): :  
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教科書中部分教材。  
(Midterm and final exam are carried out according to the semester schedule. The ranges of exams include all materials taught in the lecture.)
3. 課後作業 (Homework): :  
每一章節結束後，將勾選教科書之練習題數題 (約三~四題)，要求學生一週內完成。在上課時間內安排習題討論時間，抽派作業完成之同學上台講解。  
(3~4 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)

“Phase Transformations in Metals and Alloys”, D.A. Porter and K.E. Easterling, *Van Nostrand Reinold Co.*, 1981.

參考書目 (References)

1. “Phase Transformations in Materials”, A.K. Jena and M.C. Chaturvedi, *Prentice-Hall Inc.*, 1992.
2. “Phase Transitions in Solid”, C.N.R. Rao and K.J. Rao, *McGraw-Hill*, 1978.

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=course3](http://www.mse.nchu.edu.tw/course/super_pages.php?ID=course3)

課程輔導時間(office hours) 每週五晚間 07:30-08:30