



## 教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	材料熱力學(二)			學年/學期 Academic Year/Semester	114/2			
課程名稱(英文) Course Name in English	Thermodynamics of Materials (II)							
科目代碼 Course Code	MS_20800	系級 Department & Year	學二	開課單位 Course-Offering Department	材料科學與工程學系			
修別 Type	學程 Program	學分數/時間 Credit(s)/Hour(s)	3.0/3.0					
授課教師 Instructor	/ 田禮嘉							
先修課程 Prerequisite								

## 課程描述 Course Description

本課程分兩學期授課, 上學期先介紹熱力學三大定律及各種熱力學函數, 热容量、熵、焓及自由能, 並討論單相氣體及凝態系統之熱力學性質。接著從統計熱力學解釋熵之微觀意義, 以及配分函數與自由能之關係式, 舉例說明其應用於熱容量之理論推導。下學期則介紹氣體及溶液的行為, 理想與真實溶液之性質, 二元相圖與自由能之關係, 化學反應之平衡觀念, 以固態材料系統為對象, 探討其化學反應及相轉變所需考量之熱力學觀念。

## 課程目標 Course Objectives

熟悉熱力學於冶金方面之應用及相圖自由能之計算。

To be familiar with the application of thermodynamics to metallurgy and the calculation of phase diagram free energy.

系專業能力 Basic Learning Outcomes		課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives
A	具備材料科學所需的物理、化學及數學的知識。Acquire required basic physical, chemical, and mathematic knowledge for materials science and engineering.	<input type="circle"/>
B	具備材料科學的專業知識, 並能應用於解決工程上之問題。Acquire required professional knowledge for materials science and engineering, applicable in solving engineering problems.	<input checked="" type="circle"/>
C	具備邏輯思考、實驗執行、報告撰寫與數據解釋之能力。Equipped with capabilities of logic thinking, execution of experiment, and data interpretation.	
D	具備專業道德及責任感, 與良好的溝通及團隊合作的能力。Acquire professional morality and responsibility, and capability of quality communication and team cooperation	<input type="circle"/>
E	具備適當的英文能力, 應用於學習與交流。Acquire English capability used for learning and interaction.	<input type="circle"/>

圖示說明 Illustration : ● 高度相關 Highly correlated ○ 中度相關 Moderately correlated

## 授課進度表 Teaching Schedule &amp; Content

週次 Week	內容 Subject/Topics	備註 Remarks
1	Phase equilibrium in a one-component system	
2	Phase equilibrium in a one-component system	
3	Phase equilibrium in a one-component system	
4	Phase equilibrium in a one-component system	
5	Phase equilibrium in a one-component system	

6	The behavior of gases	
7	4/7 Spring Break	
8	The behavior of gases	
9	期中考試週 Midterm Exam 4/21 Midterm	
10	The behavior of solutions	
11	The behavior of solutions	
12	The behavior of solutions	
13	The behavior of solutions	
14	Gibbs free energy composition and phase diagrams of binary systems	
15	Gibbs free energy composition and phase diagrams of binary systems	
16	Gibbs free energy composition and phase diagrams of binary systems	
17	Gibbs free energy composition and phase diagrams of binary systems	
18	期末考試週 Final Exam 6/16 Final Exam	

#### 教 學 策 略 Teaching Strategies

課堂講授 Lecture       分組討論 Group Discussion       參觀實習 Field Trip  
 其他 Miscellaneous:

#### 教 學 創 新 自 評 Teaching Self-Evaluation

##### 創新教學 (Innovative Teaching)

問題導向學習 (PBL)       團體合作學習 (TBL)       解決導向學習 (SBL)  
 翻轉教室 Flipped Classroom       磨課師 Moocs

##### 社會責任 (Social Responsibility)

在地實踐 Community Practice       產學合作 Industry-Academia Cooperation  
 跨域合作 Transdisciplinary Projects       跨界教學 Transdisciplinary Teaching       跨院系教學 Inter-collegiate Teaching  
 業師合授 Courses Co-taught with Industry Practitioners

##### 其它 other:

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### 學期成績計算及多元評量方式 Grading & Assessments

配分項目 Items	配分比例 Percentage	多元評量方式 Assessments						
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定
平時成績(含出缺席) General Performance (Attendance Record)	30%	✓						
期中考成績 Midterm Exam	35%	✓						
期末考成績 Final Exam	35%	✓						
作業成績 Homework and/or Assignments								
其他 Miscellaneous (TBL)	25%		✓	✓				

#### 評量方式補充說明 Grading & Assessments Supplemental instructions

Lectures will be based on class notes. Students are strongly encouraged to take notes and attend the class. However, no attendance will be counted. Homework will be assigned by instructor in class. In order to help you prepare for the exams, review sessions will be provided before midterm and final exams.

#### 教科書與參考書目 (書名、作者、書局、代理商、說明)

Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

Introduction to the thermodynamics of materials, 6th Ed, David R. Gaskell and David E. Laughlin, Taylor & Francis, 2018, ISBN 978-1-4987-5700-3 偉明圖書代理

#### 課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)

Teaching Aids & Teacher's Website (Including online teaching information.

Personal website can be listed here.)

Microsoft Teams

#### 其他補充說明 (Supplemental instructions)