



教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	材料熱力學(一)		學年/學期 Academic Year/Semester	113/1	
課程名稱(英文) Course Name in English	Thermodynamics of Materials (I)				
科目代碼 Course Code	MS_20500	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					
<p>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, 熱容量、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。</p>					
課程目標 Course Objectives					
<p>熟悉熱力學的基本原理, 與其在材料反應、製程上的應用。 To be familiar with the basic principles of thermodynamics and its application to material reactions and processes.</p>					
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.			○	
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.			●	
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			○	
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.			○	
圖示說明 Illustration : ● 高度相關 Highly correlated ○ 中度相關 Moderately correlated					
授課進度表 Teaching Schedule & Content					
週次 Week	內容 Subject/Topics				備註 Remarks
1	Introduction and definition of terms				Ch1
2	Introduction and definition of terms				Ch1
3	The first law of thermodynamics				Ch2

4	The first law of thermodynamics 10/1 (Tue) TBL1 10/3 (Thurs) Quiz 1	Ch2
5	The first law of thermodynamics	Ch2
6	The second law of thermodynamics	Ch3
7	The second law of thermodynamics	Ch3
8	The second law of thermodynamics 10/29 (Tue) TBL2	Ch3
9	期中考試週 Midterm Exam 11/5 (Tue) Midterm Ch1-3	Ch1-3
10	The statistical interpretation of entropy	Ch4
11	The statistical interpretation of entropy	Ch4
12	Auxiliary functions	Ch5
13	Auxiliary functions 12/3 (Tue) TBL3 12/5 (Thurs) Quiz 2	Ch5
14	Auxiliary functions 12/14 (Thurs) Quiz 2	Ch5
15	Heat capacity, enthalpy, entropy and the third law of thermodynamics	Ch6
16	Heat capacity, enthalpy, entropy and the third law of thermodynamics 12/24 (Tue) TBL4	Ch6
17	期末考試週 Final Exam 12/31 (Tue) Final Ch4-6	Ch6
18	期末考卷討論	Ch4-6

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: counted. Homework will be assigned by the instructor in class. In order

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:

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	其他
平時成績 General Performance	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(Extra))	25%		✓	✓	✓				

評量方式補充說明

Grading & Assessments Supplemental instructions

TBL額外加分提供學期成績不及格同學加分用，如無參與TBL活動則無法加分。
TBL計分方式：依照四次TBL表現，分組互評10分、同儕互評10分、依照表現調整5分。

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.)

課程補充教材、資訊統一公布於 MS Teams.

Microsoft Teams 團隊代碼：idgpqka 請使用ndhu gms 登入後加入團隊

課程錄影影片：<https://youtube.com/@user-rr4nk9nd4f>

其他補充說明 (Supplemental instructions)