國立東華大學

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

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。

課程目標 Course Objectives

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.

	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 Industy-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)