



教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	材料動力學概論		學年/學期 Academic Year/Semester	113/1	
課程名稱(英文) Course Name in English	Introduction to Kinetics in Materials				
科目代碼 Course Code	MS_31300	系級 Department & Year	學三	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	/陳怡嘉				
先修課程 Prerequisite					
課程描述 Course Description					
<p>理解材料的化學反應在某種反應機制下的進行速度，由此可操作化學反應的路徑與反應完成時間。首先要介紹基元反應(Elementary reaction)的反應速率與反應級數，其次介紹複合反應(Composite reaction)的反應速率與反應級數。藉由對反應的了解可設計如何讓我們所期待的反應能在可預測的時間內完成。最後要介紹固態的擴散，以不同的起始及邊界條件來闡述材料動力學在材料上的應用實例。</p>					
課程目標 Course Objectives					
<p>材料動力學是解釋各種材料形成與製造所需要的基本知識。目的是使修習者獲得這些基本知識後，能夠有基礎而對各種材料現象能提出動力學上的理論基礎。</p> <p>Introduction to Kinetics in Materials is the basic knowledge needed to explain the formation and manufacture of various materials. The goal is to provide a foundation for students to acquire this basic knowledge and to develop a theoretical basis of dynamics for various material phenomena.</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 (09/ 11, 12)				
2	Rate Equations (09/18, 19)				
3	Molecular Kinetics (09/25, 26)				

4	Arrhenius Equation and Potential-Energy Surface (10/02, 03)	
5	Pre-exponential Factor (10/9) 10/10國慶日	
6	Reaction in Solution ((10/16, 17)	
7	Reaction Dynamics (10/23, 24)	
8	Composite Reaction (10/30, 31)	TACT2021 (11/04-05)
9	期中評量週 Midterm Exam (11/06)	
10	Free-Radical Reactions (11/14) (11/13 NDHU day)	11/16 全校運動會(停課一天) MRS-T 2022 (11/18-19)
11	Diffusion Equation (11/20, 21)	
12	Atomic Theory of Diffusion (11/27, 28)	
13	Experimental Determination of diffusive enthalpy and entropy (12/04, 05)	
14	Diffusion in Dilute Alloys (12/11, 12)	
15	Diffusion with traps (12/18, 19)	
16	Diffusion in a Concentration Gradient (12/25, 26)	
17	期末評量週 Final Exam (2024 01/03)	期末評量
18	第18週-教師彈性補充教學 (01/08, 09)	教師彈性補充教學

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:

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	15%	✓							作業+小考 (共30%)
期中考成績 Midterm Exam	30%	✓							
期末考成績 Final Exam	40%	✓							
作業成績 Homework and/or Assignments	15 %	✓							作業+小考 (共30%)
其他 Miscellaneous (_____)	10%	✓							

評量方式補充說明

Grading & Assessments Supplemental instructions

任課教授有依學生與課程高度相關之其他表現調整學期總分數約10 %之權線

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.)

Physical Chemistry 4th Edition by Keith J. Laidler (Author), John H. Meiser (Author), Bryan C. Sanctuary (Author) Boston : Houghton Mifflin, ©2003. (Chapter 9,10).

PHYSICAL CHEMISTRY IN BRIEF by Prof. Ing. Anatol Malijevský, CSc., et al.
(<https://old.vscht.cz/fch/en/tools/breviary-online.pdf>) (Chapter 9).

Diffusion in Solids Editors: Shewmon, Paul (Ed.)© 2016

<https://link.springer.com/book/10.1007/978-3-319-48206-4>

<https://link.springer.com/content/pdf/10.1007%2F978-3-319-48206-4.pdf>

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.)

每天上課前請查閱本網站之教學計畫表。線上教學網址將會於此處每天上課前更新。

其他補充說明 (Supplemental instructions)