



教學計劃表 Syllabus

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| 課程名稱(中文) Course Name in Chinese | 高等熱動力學 | | 學年/學期 Academic Year/Semester | 112/1 | |
| 課程名稱(英文) Course Name in English | Advanced Thermodynamics and Kinetics | | | | |
| 科目代碼 Course Code | MS_60100 | 系級 Department & Year | 碩士 | 開課單位 Course-Offering Department | 材料科學與工程學系 |
| 修別 Type | 選修 Elective | 學分數/時間 Credit(s)/Hour(s) | 3.0/3.0 | | |
| 授課教師 Instructor | /紀渥德 | | | | |
| 先修課程 Prerequisite | | | | | |
| 課程描述 Course Description | | | | | |
| The course will help to understand theoretical background of materials science as well as explain some phenomena based on thermodynamic description. | | | | | |
| 課程目標 Course Objectives | | | | | |
| 讓學生在修習此一課程後，能對冶金熱力學、統計熱力學與固態擴散有深入的了解，以利研究工作的進行。 | | | | | |
| 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進階物理、化學及數學的知識。Acquire required advanced physical, chemical, and mathematic knowledge for materials science and engineering. | | | | ● |
| B | 具備材料科學的進階專業知識，並能應用於解決工程上之問題。Acquire required advanced professional knowledge for materials science and engineering, applicable in solving engineering problems. | | | | ● |
| C | 具備獨立研究之能力。Equipped with capabilities of independent research. | | | | ○ |
| 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 | Review of fundamentals. Thermodynamics of unary systems. | | | | |
| 2 | Calculation of thermodynamic properties of unary system. Phase equilibria in unary system. | | | | |
| 3 | Thermodynamics of binary solutions, part I. | | | | |
| 4 | Thermodynamics of binary solutions, part II. | | | | |
| 5 | Binary phase diagrams: temperature-composition, temperature-chemical potential. | | | | |

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|----|--|--|
| 6 | Phase diagrams topology. | |
| 7 | Solution phase models, part I | |
| 8 | Solution phase models, part II. | |
| 9 | 期中考試週 Midterm Exam | |
| 10 | Chemical equilibria, part I. | |
| 11 | Chemical equilibria, part II. | |
| 12 | Chemical equilibria, part III. | |
| 13 | Phase diagrams for Ternary systems. | |
| 14 | Diffusion and self-diffusion. | |
| 15 | Diffusion in ternary systems. | |
| 16 | Application of computer software in material thermodynamics, part I. | |
| 17 | Application of computer software in material thermodynamics, part II | |
| 18 | 期末考試週 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: calculations

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 | 25% | | | ✓ | | ✓ | | | |
| 期中考成績 Midterm Exam | 20% | ✓ | | | | | | | |
| 期末考成績 Final Exam | 30% | ✓ | | | | | | | |
| 作業成績 Homework and/or Assignments | 25% | | | | | | | | homework |
| 其他 Miscellaneous (_____) | | | | | | | | | |

評量方式補充說明

Grading & Assessments Supplemental instructions

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.)

Y. Austin Chang, W. Alan Oates, Materials Thermodynamics, Willey 2010 (pdf available online)
David R. Gaskell, Introduction to the Thermodynamics of Materials, Taylor & Francis 2008

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.)

其他補充說明 (Supplemental instructions)

Please, bring calculators to the classroom, we will resolve some problems during lectures.