**國立中正大學工學院114學年度第1學期教學大綱表**

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| 課程名稱：(中文) 高分子物性學  (英文) Polymer Physics | | | | | | | | | | 開課單位 | | | 化工系 |
| 課程代碼 | | | 4255540 |
| 授課教師 | | 鄭朝鴻 | | 學分數 | | 3 | | 選修 | | 開課年級 | | | 碩博 |
| 先修科目或先備能力：無 | | | | | | | | | | | | | |
| 課程概述：  本課程旨在介紹高分子之物理性質與其原理的科學。藉由熱力學和動力學探討高分子鏈在微觀上的結構和動態行為如何決定高分子之物理性質。本課程是針對對高分子有興趣的學生開設的基礎課程，對原理的了解有助於掌握對高分子材料的工程設計。  目標：  1.能了解何謂高分子及其分子構像和結構，並認識生活中常用高分子的種類及應用。  2.能了解高分子於不同狀態下(如：溶液態、不定型態、結晶態、液晶態)之結構與特性，且能夠描述測量之原理與方法。  3.能了解高分子材料之基本機械、黏彈性、與熱力學性質，且能夠描述其原理及其在工業上的應用。 | | | | | | | | | | | | | |
| 教科書 | | | L. H. Sperling, “Introduction to Physical Polymer Science”, John Wiley & Sons, Inc., 2006, 4th edition | | | | | | | | | | |
| 課程大綱 | | | | | 分配時數 | | | | | | | 可達成核心能力 | |
| 單元主題 | | | 內容綱要 | | 講授 | | 示範 | | 習作 | | 其它 |
| Introduction | | | Introduction of Polymer Science | | 3 | |  | |  | |  | D1、D2、D4、D6 | |
| Polymer Chain Structure and Configuration | | | -Configuration & Conformation  -Stereochemistry  -Repeating Unit Isomerism  -Copolymers | | 6 | |  | |  | |  | D1、D2、D4、D6 | |
| Polymer Solution and Phase Separation | | | -Dilute Solution Thermodynamics, Molecular Weights,  and Sizes  -Concentrated Solutions, Phase Separation Behavior, and Diffusion | | 6 | |  | |  | |  | D1、D2、D4、D6 | |
| Amorphous and Crystalline States | | | -The Amorphous State  -The Crystalline State  -Glass–Rubber Transition Behavior | | 9 | |  | |  | |  | D1、D2、D4、D6 | |
| Cross-Linked Polymers | | | -Crosslinks and Networks  -Rubber Elasticity Concept  -Thermodynamic Equation of State | | 6 | |  | |  | |  | D1、D2、D4、D6 | |
| Viscoelastic Properties of Polymers | | | -Stress Relaxation and Creep  -Polymer Melt Viscosity  -Polymer Rheology | | 6 | |  | |  | |  | D1、D2、D4、D6 | |
| Mechanical Behavior of Polymers | | | -Deformation and Fracture in Polymers  -Crack Growth  -Cyclic Deformations  -Molecular Aspects of Fracture and Healing in Polymers | | 6 | |  | |  | |  | D1、D2、D4、D6 | |
| Surface and Interface of Polymers | | | -Polymer Surfaces  -Thermodynamics of Surfaces and Interfaces  -Instrumental Methods of Characterization  -Polymer Blend Interphase and Polymer Solution Interfaces | | 6 | |  | |  | |  | D1、D2、D4、D6 | |
| Classwork | | | 1. classwork 2. group report | |  | |  | | 6 | |  | D3、D4、D5 | |
| 可達成核心能力 | | | | | 核心能力達成指標 | | | | | | | | |
| D1 | 具有化工領域專業知識及問題解析能力。 | | | | 了解何謂高分子及其分子結構，並認識生活中常用高分子之種類及應用。 | | | | | | | | |
| D2 | 具備研究規劃、計畫執行、儀器分析、數據處理之能力。 | | | | 了解高分子材料之基本物理性質，且能夠描述其原理及其量測分析方法。 | | | | | | | | |
| D3 | 熟練文獻蒐集，具備書面及口頭報告之能力。 | | | | 搜集並進行書面及口頭報告高分子材料相關專業論文之能力 | | | | | | | | |
| D4 | 具備獨立思考、創新研發、終身學習以及國際思維之能力。 | | | | 培養創新及獨立思考關於高分子材料分析與研發相關問題之能力 | | | | | | | | |
| D5 | 具備領導、溝通與團隊合作之能力。 | | | | 培養與不同領域人員協調整合、管理及規劃之能力 | | | | | | | | |
| D6 | 理解專業倫理及社會責任，重視作業安全與環保永續。 | | | | 了解關於高分子材料在環保永續上之課題 | | | | | | | | |

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| 教學要點概述: 高分子物性 | | | | | |
| 上課時間 | | 上課地點 | 評量方式 | Office hour | 教學品質評量方式 |
| 週五 E-F節  (13:15-16:00) | | 化工館201教室 | 期中考35%  期末考35%  出席與課堂作業30%  「教師得視授課實際狀況，對課程評分標準有保留、修改、變更細節之權利。」 | 每週三 14:00~17:00  Tel:  E-mail: | 教學意見調查核心能力重要性及達成度分析問卷 |
| 週次 | 教 學 與 作 業 進 度 | | | | 備 註 |
| 1 | Introduction | | | |  |
| 2 | Polymer Chain Structure and Configuration | | | |  |
| 3 | Polymer Chain Structure and Configuration | | | |  |
| 4 | Polymer Solution and Phase Separation | | | |  |
| 5 | Polymer Solution and Phase Separation | | | |  |
| 6 | Amorphous and Crystalline States | | | |  |
| 7 | Amorphous and Crystalline States | | | |  |
| 8 | Amorphous and Crystalline States | | | |  |
| 9 | 期中考週 | | | |  |
| 10 | Cross-Linked Polymers | | | |  |
| 11 | Cross-Linked Polymers | | | |  |
| 12 | Viscoelastic Properties of Polymers | | | |  |
| 13 | Viscoelastic Properties of Polymers | | | |  |
| 14 | Mechanical Behavior of Polymers | | | |  |
| 15 | Mechanical Behavior of Polymers | | | |  |
| 16 | Surface and Interface of Polymers | | | |  |
| 17 | Surface and Interface of Polymers | | | |  |
| 18 | 期末考週 | | | |  |
| 其他: | | | | | |