

國立中正大學機械工程學系 113 學年度第一學期教學大綱表

課程名稱：(中文) 特論:電子封裝可靠度與力學分析 (英文) Special Topics on Reliability and Mechanical Analysis of Electronic Packaging					開課單位	前瞻製造系統碩士學位學程
					課程代碼	
授課教師	莊鎮瑋	學分數	3	選修	開課年級	碩博士班
先修科目或先備能力：有限元素法、高等電腦輔助工程分析方法、彈性力學、高等材料力學 Pre-requirement: Finite Element Method, Advanced Computer Aided Engineering Analysis, Elasticity, Advanced Mechanics of Materials, Matlab Programming Skills, Mathematica Programming Skills						
課程概述：本課程主要探討電子封裝的可靠度與力學分析。課程將涵蓋電子元件在不同環境條件下的性能和可靠性評估，以及相關的力學概念和工具在電子封裝設計中的應用。學生將學習分析和評估封裝設計的可靠性，探討材料特性、機械結構、熱特性和環境因素對封裝可靠性的影響。課程可能涵蓋失效分析、模擬技術、可靠度測試方法以及提高封裝可靠性的策略和技術。學生將透過理論知識和實際案例深入瞭解電子封裝可靠度和力學分析的核心概念和實際應用。 Course Introduction： This course primarily focuses on the reliability and mechanical analysis of electronic packaging. It covers the performance and reliability assessment of electronic components under various environmental conditions, along with the application of relevant mechanical concepts and tools in electronic packaging design. Students will learn to analyze and evaluate the reliability of packaging designs, exploring the impact of material properties, mechanical structures, thermal characteristics, and environmental factors on packaging reliability. The course may encompass failure analysis, simulation techniques, reliability testing methods, as well as strategies and technologies to enhance packaging reliability. Through theoretical knowledge and real case studies, students will gain a comprehensive understanding of the core concepts and practical applications of electronic packaging reliability and mechanical analysis. 目標：本課程的目標是希望培養學生有關電子封裝可靠度分析之計算力學的原理和技巧，同時培養學生實務工程分析的能力、科技報告寫作、和程式撰寫的能力。 Learning Goals：The goal of this course is to cultivate students' principles and skills in the reliability and mechanical analysis of electronic packaging, as well as their ability to practice engineering analysis and to write programming languages and scientific reports.						
教科書	1.Handout and other printed information will post on web Site. 2.蕭宏，半導體製程技術導論，全華圖書出版社 3."Reliability of Electronic Packages and Semiconductor Devices" by John H. Lau					

教學要點概述：				
上課時間	上課地點	學習成果評量方式	Office hour	教學品質評量方式
星期二 789	-	作業 40% 期末報告 30%(含電腦程式和報告) 期中報告 30%(in-class test)	星期三: 10:10-12:00 星期四: 10:10-12:00 Rm. 202 Tel:2720411ext.23347 E-mail:amczwz@ccu.ed	教學意見調查核心能力重要性及達成度分析問卷

		和報告)	u.tw	
週次	教 學 與 作 業 進 度			備 註
Week 1-4: Introduction and Fundamental Concepts				
1	● Introduction to electronic packaging, its significance, and scope			
2	● Fundamentals of reliability and mechanical analysis in electronic packaging ● Overview of relevant tools and methodologies			
3	● Properties of packaging materials and their impact ● Thermal, mechanical, and electrical properties analysis			
4	● Thermal, mechanical, and electrical properties analysis ● Material selection criteria and methodologies			
Week 5-8: Packaging Design and Structural Analysis				
5	● Structural design considerations and principles			
6	● Thermal management in packaging design			
7	● Stress and strain analysis in packaging			
8	● Failure mechanisms and analysis techniques			
9	Mid-term Test			Test
Week 10-13: Environmental Effects and Reliability Testing				
10	● Effects of environmental factors on packaging reliability			
11	● Aging, degradation, and reliability assessment			
12	● Reliability testing methodologies			
13	● Failure analysis tools and techniques			
Week 14-17: Simulation Tools and Techniques				
14	Application of FEA in electronic packaging design			
15	Simulation tools and their application			
16	Hands-on exercises using simulation software			
17	Analysis of real-life case studies			
18	Final Project Report			Final report