國立中正大學機械工程學系 114 學年度第 1 學期教學大綱表

Syllabus for the first semester of the 114th academic year of the Department of Mechanical Engineering, National Chung Cheng University

課程名稱：(中文) 有限元素分析 (英文) Finite Element Analysis					開課單位	Mechanical Eng. Dept.
					課程代碼	4205004
Professor	劉德騏 Liu, De-Shin	credits	3	選修	開課年級	MS/PhD
全英文授課 EMI	■是 □否					
Prerequisites or Prerequisites: Engineering Mathematics, Basic MATLAB Programming Language						
Course Overview: This course mainly introduces the finite element method. The content includes the basic concepts of computer-aided engineering analysis, the mathematical knowledge of the weighted residue method, the weak formula, the Master Element integral principle, and application of heat transfer and stress analysis.						
Textbook	1. Young W. Kwon, The Finite Element Method Using MATLAB, 2rd Ed. CRC. 「請尊重智慧財產權，不得非法影印教師指定之教科書籍」					
教學要點概述						
教材編選 teaching materials	■ 自製簡報(ppt) □課程講義 □自編教科書 ■ 教學程式 □自製教學影片 □其他					
教學方法 teaching methods	■講述 □小組討論 □學生口頭報告 □問題導向學習 □個案研究 □其他					
評量工具 Evaluation tools	■期中考 ■期末考 □隨堂測驗 □隨堂作業 ■課後作業 □期中報告 □期末報告 □專題報告 □評量尺規 □其他					
教學資源 teaching resources	■課程網站 ■教材電子檔供下載 □實習網站					
教師相關訊息 instructor's information	劉德騏老師為機械系教授，在力學分析住值計算較學經驗超過 30 年					

Course Outline		分配時數				可達成核心能力
Unit Topic	Content	講授	示範	習作	其他[1]	
Introduction & Math	1. Introduction of CAE/FEM 2. Weight residual Methods 3. Galerkin Method	9				D1, D2, D3, D4

Weak formulation	1. FEM Weak formulation 2. Shape Functions	6				D1, D2, D3, D4
FEM Solving Process	1. Matrix Equations 2. Assembly 3. Apply Boundary Conditions	9				D1, D2, D3, D4
FEM Programming	1. Basic Structure 2. MATLIB Programming	9				D1, D2, D3, D4
Master Element	1. Master Element Shape function 2. Gauss Integration Method	6				D1, D2, D3, D4
Engineering Cases Study	1. Application in Statics problem 2. Application in Dynamic Problem	6	3			D1, D2, D3, D4

可達成核心能力		核心能力達成指標
D1	具機械與光機電整合工程領域之專業知識	養成電腦分析模擬所需之基礎學理
D2	策劃及執行機械及光機電整合工程領域專題研究之能力	養成應用有限元素法於各領域與跨領域的能力
D3	撰寫科技論文與簡報之能力	能撰寫並展演有限元素法期中與期末報告
D4	創新思考與獨立解決機械與光機電整合工程問題之能力	建立以有限元素法為工具開發新產品的實作能力

教學要點概述:

Class Time	Class Location	Evaluation method	Office hour	Teaching quality evaluation method
Friday 1:10-4:00 PM	(創新大樓 202 電腦教室)	Homework 50% Mid-term 20% (In class test) Final 30 % (In class test)	Tuesday: 10:10-12:00 AM Thursday:14:10-16:00 PM Rm. 425 Tel:2720411ext.33305 E-mail:imedsl@ccu.edu.tw	Teaching opinions survey

週次	教 學 與 作 業 進 度	備 註
1	Concept of Computer Aided Engineering (CAE)	
2	Trial Solution Method	
3	weighted Residual and Galerkin Method	HW#1 due in 1th week
4	Week Formulation	
5	Shape functions	HW#2 due in 1th week
6	FEM Matrix Solving Process	
7	Assembly Technique	HW#3 due in 1th week

8	Apply to Heat Transfer Problems	HW#4 due in 1th week
9	Mid-term examine	
10	Master Element shape function	HW#5 due in 1th week
11	Gauss Integration Method	HW#6 due in 1th week
12	Transformation Mapping	
13	Stress Analysis Problems	HW#7 due in 1th week
14	Time dependent Problems	
15	Eigenvalue Problems	HW#8 due in 1th week
16	Engineering Case Study-I	Start Select Topics for final Project
17, 18	Final examine	