

國立中正大學機械工程學系 115 學年度第 1 學期教學大綱表

Syllabus – Computer-Aided Manufacturing and Application

課程名稱：(中文) 電腦輔助製造暨實務運用(全英授課) (英文) Computer-Aided Manufacturing and Application					開課單位	機械工程學系
					課程代碼	4223102 4213557
授課教師/Teacher	高永洲 Yung-Chou Kao	學分數 Credit	3	選修 Option	開課年級	大三 Junior
先修科目或先備能力：電腦輔助機械製圖、CAD、工廠實務實習、CNC、視窗程式設計等。 Pre-requisites: CAD, Shop Floor Practices, CNC, Windows Programming, etc.						
全英文授課 EMI	☒ 是 ☐ 否					
Overview: This course will introduce Computer-aided manufacturing (CAM) and applications extending the Computer Numerical Control (CNC) integrated machine tool application. A review of CNC and machining operations will be conducted first and followed by an ISO Numerical Control (NC) codes format introduction and a complete NC program interpretation and hands-on edit/writing practices. Shop floor operation will follow after the familiarity of an interactive 3D machine tool (I3DMT) software system. A worry-free last-mile integration application scenario will be introduced and practiced for online collision-free operation through an asynchronous collision detection algorithm. Talent students will be cultivated for online digital reality smart machine tools and the manufacturing industry. Systematic thinking and solutions with the innovative digital reality could be learned by the students. Objectives: To cultivate students to be familiar with not only the basic application of CAM but also networked digital reality application practice.						
Textbook	1. Handouts and other printed information will be posted on eCourse 2. 2. Papers related to CAD/CAM, cutting mechanics, and stable cutting.					
課程大綱 Syllabus		分配時數 Hours		可達成核心能力		
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	Professor Yung-Chou Kao					
單元主題	內容綱要	講授	示範	習作	其它	
Introduction	Introduction of Computer Numerical Control (CNC) and Machine Center application	9				B2, B6
CAM	Introduction of Computer-Aided Manufacturing – Geometry, Workpiece, Tool, Fixturing, etc.	9				B4, B5
GUI	Graphic User Interface, Microsoft Visual Studio IDE	3				B4, B7

I3DMT	Interactive 3D, CAD, Machine Tool Emulation	6	6	9		B2, B4, B6
Case Study	Shop floor case application		3			B5, B7
Teamwork	Team-based Project Development and Implementation			9		B8, B9
可達成核心能力		核心能力達成指標				
B2	吸收與整合跨領域知識的能力	具備 CNC 控制系統與 CAM 跨域整合基礎知識				
B4	撰寫程式語言與電腦輔助設計的能力	瞭解 CAD/CAM 操作之人機介面並具備理解 NC 程式碼之專業領域研究之能力				
B5	機械系統、元件設計與製程規劃的能力	透過分組演練建立加工製程規劃的能力。				
B6	發掘、分析及解決專業問題的能力	藉由團隊會議腦力激盪思考創新人機介面以及優化機械製程的能力。				
B7	具備實作與創新的能力	藉由透過分組加工實務運用培養製程實作的能力。				
B8	從事科技寫作和報告展演的能力	經由團隊之運作培養與不同專業興趣人員之間的溝通能力與協調合作統合能力。				
B9	團隊合作、有效溝通及計畫管理的能力	透過學習國內外各式 CAM 之應用架構，培養主動學習態度建立終身自我學習成長之能力。				

Notes:					
Class Time		Classroom	Scoring	Office hour	Evaluation
Wednesday 13:10-16:00		Innovation Building 202	Homework and quiz 30% Interactivity & Attendance 10% Personal practice/report 30% Team reports 30%	Wednesday 09:00~12:00 Room: 531A Tel: 2720411 # 33307 E-mail:imeyckao@ccu.edu.tw	A questionnaire is used to investigate the lecturing and student learning outcomes
Weeks	Course Outlines				Remarks
1	Introduction of CNC and Machine Tool				
2	Introduction of NC, etc.				HW#1
3	Interpretation of NC				
4	Introduction of computer-aided manufacturing (CAM)				CAM, HW#2
5	Introduction - workpiece and fixture – material and geometry				Workpiece, fixture, and material
6	Introduction - Cutter and magazine – material and geometry				Cutter/tool/Magazine
7	Introduction - GUI of CNC and Machine Tool				GUI, CNC, and Machine, HW#3
8	Introduction of Interactive 3D and CAD				Interactive 3D
9	Mid-term exam and/or report				Personal report
10	Interactive 3D Machine Tool (I3DMT) simulation system				I3DMT
11	CAD-based Machine Tool Emulation				HW#4
12	CAD/CAM Application – Toolpath creation and G-code generation				
13	Experiencing I3DMT, cutting forces, and power consumption				HW#5
14	NC program optimization				HW#6
15	Term project design, development, and inter-team discussion I				Intra-group
16	Term project design, development, and inter-team discussion II				Intra-group
17	Term project – prototypical idea implementation				Inter-group
18	Term project report, presentation, and report				Team-based final report
Others: 本課程之授課。English is the official language in this course					