國立中正大學機械工程學系 114 學年度第 2 學期教學大綱表

Syllabus – Computer-Aided Manufacturing and Application

<table>
<tr><td rowspan="2">課程名稱
Course Name</td><td colspan="4">(中文) 電腦輔助製造暨實務運用(全英授課)</td><td>開課單位
Offering unit</td><td>機械工程學系
Dept. of Mech. Eng.</td></tr>
<tr><td colspan="4">(英文) Computer-Aided Manufacturing and Application</td><td>課程代碼
Course code</td><td>4223153
4213557</td></tr>
<tr><td>授課教師
Techer</td><td>高永洲
Yung-Chou Kao</td><td>學分數
Credit</td><td>3</td><td>選修
Option</td><td>開課年級
Grades offered</td><td>大三 Junior</td></tr>
<tr><td>全英文授課
EMI</td><td colspan="6">■是 Yes　□否 No</td></tr>
<tr><td>課程類別
course type</td><td colspan="6">□人文關懷課程　□競賽專題課程　□問題導向課程
□專題導向課程　■總整課程　■實作課程
□實習　□其他</td></tr>
<tr><td colspan="7">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.</td></tr>
<tr><td colspan="7">Overview: This course introduces Computer-Aided Manufacturing (CAM) and its applications with an integrated Computer Numerical Control (CNC) machine tool. A review of CNC and machining operations will be conducted first, followed by an introduction to ISO Numerical Control (NC) codes format and a comprehensive interpretation of NC programs, including hands-on editing and writing practices. Shop floor operation will follow after the familiarity with 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. Talented students will be cultivated for online digital reality and smart machine tools in the manufacturing industry. Students can learn systematic thinking and solutions.

Objectives: To cultivate students to be familiar with not only the basic application of CAM but also simulation-based digital manufacturing application practice.</td></tr>
<tr><td>教科書
Textbook</td><td colspan="6">1. Handouts and other printed information will be provided.
2. Papers related to CAD/CAM, cutting mechanics, and stable cutting.</td></tr>
<tr><td colspan="7">教學要點概述Overview of key teaching points</td></tr>
<tr><td>教材編選
teaching materials</td><td colspan="6">■自製簡報(ppt)　■課程講義 Lecture note　□自編教科書 Self-compiled textbooks
□教學程式Program　■自製教學影片Videos　■其他Others</td></tr>
<tr><td>教學方法
teaching methods</td><td colspan="6">■講述 Narrative　■小組討論 Team　■學生口頭報告 Report
□問題導向學習 PBL　□個案研究 Case Study　■其他 Others</td></tr>
<tr><td>評量工具
Evaluation tools</td><td colspan="6">□期中考 Midterm Exams　□期末考 Final Exams　□隨堂測驗 Quiz
■隨堂作業 In-class assignments　■課後作業 Homework　■期中報告 Interim Report
■期末報告 End-of-term report　□專題報告 Special Report　□評量尺規 Evaluation　■其他 Others</td></tr>
<tr><td>教學資源
teaching resources</td><td colspan="6">■課程網站e-Course 2　■教材電子檔供下載Electronic Lecture Notes
□實習網站Internship website</td></tr>
<tr><td>教師相關訊息
instructor's information</td><td colspan="6">Professor Yung-Chou Kao</td></tr>
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課程大綱 Syllabus		分配時數 Hours				可達成核心能力 Achievable Core Capability
單元主題 Theme	內容綱要 Outline	講授 Class	示範 Demo	習作 Practice	其它 Other	
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 Achievable Core Capability		核心能力達成指標 Core capability achievement indicators
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	機械與光機電系統、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:

上課時間 Class Time	上課地點 Classroom	諮詢時間 Office hour	教學品質評量方式 Evaluation
Tuesday 13:10-16:00	Innovation Building Room 202	Wednesday 09:00~12:00 Room: 531A Tel: 2720411 # 33307 E-mail:imeyckao@ccu.edu.tw	Analyze the importance and achievement of core capabilities in a teaching opinion survey questionnaire.

週次 Weeks	教學與作業進度 Teaching and Homework Progress	備註 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: the GUI of CNC and Machine Tool	GUI, CNC, and Machine, HW#3
8	Introduction: 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 implementation	HW#7
16	Term project design, development, and implementation	3D GUI cutting application
17	Term project design, development, and implementation	I3DMT application
18	Term project report, presentation, and submission	Team-based final report

Others: 本課程之授課。English is the official language in this course