國立中正大學機械工程學系 113 學年度第 1 學期教學大綱表

Syllabus – CNC Machine Tool Machining Application and Value-adding Integration Technology

課程名稱：(中文) 工具機加工應用與加值整合技術 (英文) CNC Machine Tool Machining Application and Value-adding Integration Technology				開課單位	機械系 前瞻製造系統頂尖研究中心	
				課程代碼	4205114	
授課教師	Yung-Chou Kao 高永洲	學分數	3	選修	開課年級	研究所、大三、四
先修科目或先備能力：CNC, CAD, CAM, Microsoft Visual Studio IDE, etc. Pre-requisites: CNC, CAD, CAM, Microsoft Visual Studio IDE, etc.						
全英文授課 EMI	■是 □否					

Overview: This course will introduce the general machining application technology of a CNC machine tool. Fundamental functional modules will be introduced at the beginning, these include CNC controller, operation panel, linear and rotational axes, tools, fixtures, machining processes and roles of a CAD/CAM system, cutting simulation and learning system, virtual reality technology, networking and monitoring, etc. Existing and potential value-adding functions, methodologies, and modules will also be introduced. Students could learn the scope of an industrial machine tool application centric overview so as to inspire their talent for futuristic creative innovations.

Objectives: To cultivate students to be familiar with the basic and advanced value-adding application technology of a CNC machine tool towards both smart machine and smart machining..

Text book	1. Handout and other printed information will post on web Site. 2. Papers related to HMI, CNC Controllers, smart machine, smart machining, etc..
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

課程大綱 Syllabus		分配時數 Hours				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 Machine Tool Precision machinery	9				D1, D2, D4, D8
CNC structure	Industrial CNC machining application and system structure	9				D1, D2, D4, D8
HMI	Essentials of CAD/CAM basics and customization system	9				D1, D2, D4, D8
Networking	CNC communication and networking with PCs	3	3	9		D1, D2, D4, D8

Case Study	3D machining emulation system Industrial networking case study		3			D1, D2, D4, D5
Team work	Team-based project Development and Implementation			9		D1, D2, D3, D4, D5, D8

可達成核心能力		核心能力達成指標
D1	具機械領域之專業知識	具備機械加工所使用之 CNC 工具機架構基本知識
D2	策劃及執行機械及其相關領域專題研究之能力	瞭解 CNC 工具機操作之人機介面並具備團隊合作規劃友善 CNC 人機介面之專業領域研究之能力
D3	撰寫機械專業論文之能力	透過分組以團隊運作方式探討 CNC 智慧切削加工系統架構以及智慧加值功能並整理與撰寫專題報告，培養專業論文之撰寫能力。
D4	創新思考及獨立解決機械問題之能力	藉由團隊會議腦力激盪思考 CNC 創新加值功能應用人機介面、3D 輔助加工模擬技術並尋求可行之解決方案與完備解決機械加工之加值功能的能力。
D5	與不同領域人員協調整合之能力	經由團隊之運作培養與不同專業領域人員的溝通能力與協調合作統合能力。
D8	終身自我學習成長之能力	透過學習各式 CNC 工具機加工應用之系統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
Monday 17:30~20:20	Innovation Building 201	Homework and quiz 30% Interactivity & Attendance 10% Personal report 30% Team report 30%	Wednesday 9:0~12:00 Room: 531A Tel: 2720411 # 33307 E-mail:imeyckao@ccu.edu.tw	Questionnaire is used to investigate the lecturing and student learning outcomes

Weeks	Course Outlines	Remarks
1-9/9	Introduction of machine tool and precision machinery **Explain how to run this course**	
2-9/16	Introduction of Virtual Machine Tool **Paper review on "Virtual Machine Tool"**	HW#1
3-9/23	Introduction of industrial CNC machining application & system structure **Lecture on CNC machine tool structure**	HW#2
4-9/30	Introduction of CAD/CAM basics and customization system - I **Demo of CAD/CAM system functions**	Visit AMTS 2019 on 4 Oct 2019
5-10/7	Introduction of CAD/CAM basics and customization system - II **Demo of CAD/CAM customization system**	HW#3
6-10/14	Introduction of CNC communication applications such as FOCAS 2 for FANUC CNC	Understand industrial CNC communication
7-10/21	Networking CNC machine tool via PCs with examples on VMX, SkyMars, iMAVEN, etc.	Networking between PCs and CNCs.
8-10/28	Toolpath verification and 3D emulation system and application	Safety first emulation HW#4
9-11/4	Team project starts **Form teams and guide students on what can be done to add value**	HMI & structures
10-11/11	Mid-term exam and/or report **Review of Hands-On practice and Term project idea presentation**	Personal report
11-11/18	Sensors – principles, data, analysis, feature, decision, etc. **Introduce sensors and applications**	Visual Studio C#

12-11/25	Practices on a machine tool operation simulation system	HW#5
13-12/2	Introduction of stable machining – cutting test	
14-12/9	Introduction of stable machining – tapping test and SLDs	HW#6
15-12/16	Term project design, development and implementation	HMI design and system development
16-12/23	Term project design, development and implementation	Structure design and system development
17-12/30	Term project design, development and implementation	HMI design and system development
18-1/6	Term project report, presentation and submission Final report	Team-based final report
Others: 本課程以全英文授課。English is the official language in this course		