國立中正大學工學院前瞻工程全英語碩士學位學程 114 學年度第 2 學期教學大綱表

Master Program in Advanced Engineering, College of Engineering, CCU

Syllabus - CNC Machine Tool Human Machine Interface Design and Application for PC NC Structure

課程名稱 Course Name	工具機 PC NC 架構之 CNC 人機介面設計與應用		開課單位 Offering unit	前瞻工程全英語碩士學位學程 Master Program in Advanced Engineering		
	CNC Machine Tool Human Machine Interface Design and Application for PC NC Structure		課程代碼 Course code	4465061		
授課教師 Techer	高永洲 Yung-Chou Kao 朴佑敘 Ayush Pratap	學分數 Credit	3	選修 Option	開課年級 Grades offered	研究所(碩博) Master/PhD Students
全英文授課 EMI	■是 Yes □否 No					
先修科目或先備能力：CNC、CAD、機械設計、Microsoft Visual Studio C#、視窗程式設計等。 Pre-requisites: CNC, CAD, Machine Design, Microsoft Visual Studio C#, Windows Programming, etc.						
Overview: This course introduces the industrial CNC controller's system structure, its application principle, operation, human-machine interface (HMI) design tool, and development methods. Students can become familiar with the value-adding system development technology of industrial CNC controllers through this course, as they learn CNC HMI technology and understand the Microsoft Visual Studio integrated development environment. AI methods in machining, with case studies, will be utilized, with a special emphasis on trustworthiness, transparency, and alignment with engineering standards and physical laws. Talented students will be cultivated for the precision machine tool industry. Students can understand networking, HMI design, AI enhancement, and development methodologies. Objectives: To cultivate students to be familiar with the design and development of industrial CNC value-adding systems, and also PC NC controller structures.						
Textbook	1. Handouts and other printed information will be posted to eCourse 2. 2. Papers related to HMI and CNC Controllers.					
教學要點概述						
教材編選 teaching materials	■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					
教學方法 teaching methods	■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					
評量工具 Evaluation tools	□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					
教學資源 teaching resources	■課程網站e-Course 2 ■教材電子檔供下載Electronic Lecture Notes □實習網站Internship website					
教師相關訊息 instructor's information	Professor Yung-Chou Kao and Dr. Ayush Pratap					

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 Practi	其它 Other	
Introduction	Introduction of Machine Tool Precision machinery	9				D1, D2, D4, D8

CNC structure	Industrial CNC PC NC structure	9				D1, D2, D4, D8
Human Machine Interface	Essentials of Colors and Beauty Basics on Human Machine Interface	9				D1, D2, D4, D8
Networking	Network Programming Networking with CNCs	3	3	9		D1, D2, D4, D8
Case Study	Industrial 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 Achievable Core Capability		核心能力達成指標 Core capability achievement indicators
D1	具機械與光機電整合工領域之專業知識	具備機械加工所使用之 CNC 工具機架構基本知識。(Possess basic knowledge of CNC machine tool architecture used in machining.)
D2	策劃及執行機械及光機電整合工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。(Understand the human-machine interface of CNC machine tool operation and possess the ability to collaboratively plan and conduct research in the professional field of user-friendly CNC human-machine interfaces.)
D3	撰寫科技論文與簡報之能力	透過分組以團隊運作方式探討 PC NC 系統架構並整理與撰寫專題報告，培養專業論文之撰寫能力。(By working in groups to explore the PC NC system architecture and compile and write special reports, students can develop their professional paper writing skills.)
D4	創新思考及獨立解決機械與光機電整合工程問題之能力	藉由團隊會議腦力激盪思考 CNC 創新人機介面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。(Through team meetings, brainstorm innovative human-machine interfaces for CNC machining and seek feasible solutions and the ability to fully address the value-added functions of machining.)
D5	跨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。(Through teamwork, cultivate communication, coordination, and integration skills with people from different professional fields.)
D8	終身自我學習成長之能力	透過學習國內外各式 CNC 控制器之架構培養主動學習態度建立終身自我學習成長之能力。(By studying the architecture of various CNC controllers from both domestic and international sources, we cultivate a proactive learning attitude and build lifelong self-learning and growth capabilities.)

研究所核心能力

D1 具機械與光機電整合工程領域之專業知識(Possesses professional knowledge in the fields of mechanical and opto-mechatronics engineering)

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(The ability to plan and execute special research projects in the fields of mechanical and opto-mechatronics engineering.)

D3 撰寫科技論文與簡報之能力(The ability to write scientific papers and briefings)

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(The ability to think creatively and independently solve engineering problems integrating mechanics and optoelectronics)

D5 跨領域人員協調整合之能力(The ability to coordinate and integrate personnel across disciplines)

D6 良好的國際觀(A good international perspective)

D7 具備團隊合作精神及領導、管理、規劃、溝通之能力(Possesses teamwork spirit and leadership, management, planning, and communication skills.)

D8 終身自我學習成長之能力(The ability to learn and grow throughout life)

D9 瞭解工程倫理、社會責任與永續發展之重要性(Understanding the importance of engineering ethics, social responsibility, and sustainability)

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
Monday 14:10~17:00	Innovation Building Room 202	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

週次 Weeks	教學與作業進度 Teaching and Homework Progress	備註 Remarks
1	Introduction of precision machinery	
2	Introduction of industrial CNC such as A-LNC, SYNTEC, DELTA, FANUC, etc.	HW#1
3	Introduction of the CNC operating system	
4	Introduction of the CNC framework and principle	HW#2
5	Team project starts	Understand industrial CNC Operation practice
6	Introduction of HMI applications	Colors, principles of beauty, etc.
7	Introduction of HMI design tools - iHMI	Microsoft Visual Studio IDE HW#3
8	Introduction of HMI design tools – CNCs in general	HMI layouts
9	Mid-term exam and/or report	Personal report
10	Practices on HMI – CNCs, such as Syntec	Visual Studio C#
11	Practices on HMI – CNCs, such as Fanuc	HW#4
12	Introduction of networked applications - CNCs	
13	Introduction of tools – CNCs, in general	HW#5
14	Term project design, development, and implementation	HMI design and development
15	Term project design, development, and implementation	HW#6
16	Term project design, development, and implementation	HMI design and development
17	Term project design, development, and implementation	HMI design and development
18	Term project report, presentation, and submission	Team-based final report

Others: 本課程以全英文授課。English is the official language in this course