# 國立中正大學前瞻製造系統頂尖研究中心 110 學年度第 1 學期教學大綱表

**Syllabus – Special Topic on the Computational Geometry Supported Analysis and Manufacturing Application**

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| 課程名稱：(中文) 計算機幾何輔助之分析與製造應用特論<br>(英文) Special Topic on Computational Geometry Supported Analysis and Manufacturing Application | | | | | 開課單位 | 前瞻製造系統頂尖研究中心 AIM-HI |
| | | | | | 課程代碼 | |
| 授課教師 | 高永洲 | 學分數 | 3 | 選修 | 開課年級 | 博、碩、大四 |

先修科目或先備能力：電腦輔助機械製圖、CAD、CAM、CNC、視窗程式設計等。
Pre-requisites: CADD, CAM, CNC, Windows Programming, etc.

Overview: This course will introduce standard mechanical application based on computational geometry supported analysis and manufacturing application, and especially on value-added extended application such as structural analysis, computer-aided manufacturing, metal forming processing and mold design, virtual reality, augmented reality, mixed reality, networked manufacturing, and smart manufacturing., etc. Talent students will be cultivated for smart machine tool and manufacturing industry. Systematic thinking and solution with the synergies of artificial intelligence could be learned by the students.

Objectives: To cultivate students to be familiar with not only the basic application based on computational geometry supported analysis, but also extended industrial application practice.

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| Text book | 1. Handout and other printed information will post on web Site.<br>2. Papers related to AI and smart manufacturing. |

| 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 computer-aided drawing, drafting, design, analysis, and manufacturing | 9 | | | | D1, D2, D4, D8 |
| CAE | Introduction of Computer-Aided Engineering – Finite Element Analysis and Practice | 9 | | | | D1, D2, D4, D8 |
| HMI | Human Machine Interface, Graphic User Interface, Microsoft Visual Studio IDE | 9 | | | | D1, D2, D4, D8 |
| 3D/VR/AR | Interactive 3D, Virtual Reality, Augmented Reality | 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 | | 核心能力達成指標 |
|---|---|---|
| D1 | 具機械領域之專業知識 | 具備機械工程之 CAD/CAM/CAE 基礎知識 |
| D2 | 策劃及執行機械及其相關領域專題研究之能力 | 瞭解 CAD/CAM 操作之人機介面並具備團隊合作規劃友善互動式 3D 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 GUI 架構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創新人機介面並尋求可行解決方案與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 | 透過學習國內外各式 CAD 基礎之應用架構，培養主動學習態度建立終身自我學習成長之能力。 |

| Notes: | | | | |
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| Class Time | Classroom | Scoring | Office hour | Evaluation |
| Wednesday 16:10~19:00 | Innovation Building 201 | Homework and quiz 30%<br>Interactivity & Attendance 10%<br>Personal report 30%<br>Team report 30% | Wednesday 9:0~12:00<br>Room: 531A<br>Tel: 2720411 # 3307<br>E-mail:imeyckao@ccu.edu.tw | Questionnaire is used to investigate the lecturing and student learning outcomes |

| Weeks | Course Outlines | Remarks |
|---|---|---|
| 1 | Introduction of computational geometry | |
| 2 | Introduction of computer-aided drawing, drafting, and design, etc. | HW#1 |
| 3 | Introduction of computer-aided manufacturing | |
| 4 | Introduction of computer-aided engineering | Computer-aided engineering, HW#2 |
| 5 | Introduction of computer-aided engineering in manufacturing<br>Team project starts | Computer-aided manufacturing |
| 6 | Case studies of computer-aided engineering - CFD | Computational Fluid Dynamics. |
| 7 | Introduction of human machine interface | Microsoft Visual Studio IDE<br>HW#3 |
| 8 | Introduction of graphic user interface and programming environment | GUI layouts |
| 9 | Mid-term exam and/or report | Personal report |
| 10 | 3D and Interactive 3D | Visual Studio C# |
| 11 | Introduction of Virtual Reality | HW#4 |
| 12 | Introduction of Augmented Reality | |
| 13 | Experiencing VR/AR | HW#5 |
| 14 | Making of Hologram | HMI design and development |
| 15 | Term project design, development and implementation | HW#6 |
| 16 | Term project design, development and implementation | 3D HMI design and development |
| 17 | Term project design, development and implementation | 3D 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