

國立勤益科技大學日間部四年制 113 學年度 電子工程系(智慧機器人組)學分計畫表
National Chin-Yi University of Technology
Curriculum Planning of 2024 Four-Year Degree in
Department of Electronic Engineering: Intelligent Robotics

112.6.28 課程委員會及 112.11.23 院課程委員會審議通過
112.12.07. 校課程委員會議及 112.12.21. 臨時教務會議審議通過

| 科目 | Courses | 上學期 First Semester | | | 下學期 Second Semester | | |
|---|--|--------------------|---------------|------------------|---------------------|---------------|------------------|
| | | 學分 Credits | 正課 Lecture | 實習 Internship | 學分 Credits | 正課 Lecture | 實習 Internship |
| 共同必修科目(28 學分) General Required Courses (28 credits hours) | | | | | | | |
| 第一學年 First Year | | | | | | | |
| 國文(一) | Chinese (I) | 2 | 2 | 0 | | | |
| 大一英文(一) | Freshman English (I) | 2 | 2 | 0 | | | |
| 英文聽講(一) | English Listening and Speaking (I) | 1 | 1 | 0 | | | |
| 歷史與文化(一) | History and Culture (I) | 2 | 2 | 0 | | | |
| 藝術鑑賞 | Art Appreciation | 1 | 1 | 0 | | | |
| 體育(一) | Physical Education (I) | 0 | 2 | 0 | | | |
| 全民國防教育軍事訓練(一) | All-Out Defense Education Military Training (I) | 0 | 2 | 0 | | | |
| 國文(二) | Chinese (II) | | | | 2 | 2 | 0 |
| 大一英文(二) | Freshman English (II) | | | | 2 | 2 | 0 |
| 英文聽講(二) | English Listening and Speaking (II) | | | | 1 | 1 | 0 |
| 歷史與文化(二) | History and Culture (II) | | | | 2 | 2 | 0 |
| 音樂鑑賞 | Music Appreciation | | | | 1 | 1 | 0 |
| 體育(二) | Physical Education (II) | | | | 0 | 2 | 0 |
| 全民國防教育軍事訓練(二) | All-Out Defense Education Military Training (II) | | | | 0 | 2 | 0 |
| | | | | | | | |
| | | | | | | | |
| 第二學年 Second Year | | | | | | | |
| 博雅通識課程 | Liberal Education | 2 | 2 | 0 | | | |
| 體育(三) | Physical Education (III) | 0 | 2 | 0 | | | |
| 憲法與民主 | Constitution and Democracy | 2 | 2 | 0 | | | |
| 博雅通識課程 | Liberal Education | | | | 2 | 2 | 0 |
| 體育(四) | Physical Education (IV) | | | | 0 | 2 | 0 |
| | | | | | | | |
| 第三學年 Third Year | | | | | | | |
| 博雅通識課程 | Liberal Education | 2 | 2 | 0 | | | |
| 博雅通識課程 | Liberal Education | 2 | 2 | 0 | | | |
| 博雅通識課程 | Liberal Education | | | | 2 | 2 | 0 |
| 第四學年 Fourth Year (無必修課程 No General Required Courses) | | | | | | | |
| 專業必修科目(47 學分) Department Required Courses (47 credits hours) | | | | | | | |
| 第一學年 First Year | | | | | | | |
| 微積分(一) | Calculus (I) | 3 | 3 | 0 | | | |
| 物理(一) | Physics (I) | 3 | 3 | 0 | | | |
| 邏輯設計實務 | Practice of Digital Logic Design | 2 | 1 | 3 | | | |
| 微積分(二) | Calculus (II) | | | | 3 | 3 | 0 |
| 物理(二) | Physics (II) | | | | 3 | 3 | 0 |
| △計算機程式實習 | Computer Programming Practice | | | | 2 | 1 | 3 |
| 第二學年 Second Year | | | | | | | |
| 工程數學(一) | Engineering Mathematics (I) | 3 | 3 | 0 | | | |
| 電子學(一) | Electronics (I) | 3 | 3 | 0 | | | |
| 電路學(一) | Electric Circuit Analysis (I) | 3 | 3 | 0 | | | |
| 電子實習(一) | Electronic Experiment (I) | 2 | 1 | 3 | | | |
| △●微處理機實習 | Microprocessor Practice | 2 | 1 | 3 | | | |
| 工程數學(二) | Engineering Mathematics (II) | | | | 3 | 3 | 0 |
| 電子學(二) | Electronics (II) | | | | 3 | 3 | 0 |
| 電路學(二) | Electric Circuit Analysis (II) | | | | 3 | 3 | 0 |
| 電子實習(二) | Electronic Experiment (II) | | | | 2 | 1 | 3 |
| 信號與系統 | Signals and Systems | | | | 3 | 3 | 0 |
| 第三學年 Third Year | | | | | | | |
| 實務專題(一) | Project Study (I) | 2 | 0 | 6 | | | |
| 實務專題(二) | Project Study (II) | | | | 2 | 0 | 6 |
| | | | | | | | |
| 第四學年 Fourth Year (無必修課程 No Department Required Courses) | | | | | | | |

| 科目 | Courses | 上學期 First Semester | | | 下學期 Second Semester | | |
|---|--|--------------------|---------------|------------------|---------------------|---------------|------------------|
| | | 學分 Credits | 正課 Lecture | 實習 Internship | 學分 Credits | 正課 Lecture | 實習 Internship |
| 共同選修科目 General Elective Courses | | | | | | | |
| 第一學年 First Year(無排定共同選修課程 No General Elective Courses) | | | | | | | |
| 第二學年 Second Year | | | | | | | |
| 全民國防教育軍事訓練(三) | All-Out Defense Education Military Training (III) | 1 | 2 | 0 | | | |
| 全民國防教育軍事訓練(四) | All-Out Defense Education Military Training (IV) | | | | 1 | 2 | 0 |
| 第三學年 Third Year | | | | | | | |
| 體育選修 | Physical Elective Course | 1 | 2 | 0 | 1 | 2 | 0 |
| 全民國防教育軍事訓練(五) | All-Out Defense Education Military Training (V) | 1 | 2 | 0 | | | |
| 第四學年 Fourth Year | | | | | | | |
| 體育選修 | Physical Elective Course | 1 | 2 | 0 | 1 | 2 | 0 |
| 專業選修科目 Department Elective Courses | | | | | | | |
| 第一學年 First Year | | | | | | | |
| 多媒體遊戲暨智慧運算 Network Multimedia and Intelligent Computing | | | | | | | |
| 機率與統計 | Probability and Statics | | | | 3 | 3 | 0 |
| 第二學年 Second Year | | | | | | | |
| 積體電路與系統應用 Integrated Circuit and System Application | | | | | | | |
| ※VLSI 概論 | Introduction to VLSI | 3 | 3 | | | | |
| ※半導體物理導論 | Introduction to Semiconductor Physics | 3 | 3 | | | | |
| ●3D 列印原理與實務 | Principle and Practice of 3D Printing | 3 | 3 | | | | |
| △※FPGA 系統設計 | FPGA System Design | 3 | 3 | | | | |
| 全客戶 IC 佈局 | Full Custom IC Layout | | | | 3 | 3 | |
| 半導體元件導論 | Introduction to Semiconductor Devices | | | | 3 | 3 | |
| 微控制器系統實務 | Practice of Microcontroller Based Embedded System | | | | 3 | 3 | |
| [AI]人工智慧晶片導論 | Introduction to AI on Chip | | | | 3 | 3 | |
| 多媒體遊戲暨智慧運算 Network Multimedia and Intelligent Computing | | | | | | | |
| △物件導向程式設計 | Object-Oriented Programming | 3 | 3 | | | | |
| △※工程軟體應用實作 | Engineering Software Practice | 2 | 1 | 3 | | | |
| 影像處理概論 | Introduction to Image Processing | 3 | 3 | | | | |
| 3D 物件建模技術 | 3D Modeling Technology | 3 | 3 | | | | |
| 遊戲製作 | Game Development | | | | 3 | 3 | |
| ※數位影像處理實作 | Practice of Digital Image Processing | | | | 2 | 1 | 3 |
| △※Python 程式語言 | Programming in Python | | | | 3 | 1 | 2 |
| ※電腦圖學 | Computer Graphics | | | | 3 | 3 | |
| △單晶片微電腦應用實務 | Microcomputer Application and Practice | | | | 2 | 1 | 3 |
| 資料結構 | Data Structures | | | | 3 | 3 | |
| 智慧機器人 Intelligent Robotics | | | | | | | |
| 工程圖學 | Engineering Drawing | 2 | 1 | 3 | | | |
| ※●工業機器人原理與應用 | Principle and Application of Industrial Robots | 3 | 3 | | | | |
| ※電腦機構繪圖 | Computer Aided Machine Drawing | | | | 3 | 3 | |
| 機構設計 | Mechanism Design | | | | 3 | 3 | |
| △單晶片微電腦應用實務 | Microcomputer Application and Practice | | | | 2 | 1 | 3 |
| 第三學年 Third Year | | | | | | | |
| 積體電路與系統應用 Integrated Circuit and System Application | | | | | | | |
| ※類比積體電路設計 | Analog IC Design | 3 | 3 | | | | |
| 積體電路製程 | Integrated Circuit Manufacturing Process | 3 | 3 | | | | |
| ※嵌入式系統應用 | Embedded System Application | 3 | 3 | | | | |
| ●電磁相容原理 | Principle of Electromagnetic Compatibility | 3 | 3 | | | | |
| 半導體設備概論 | Introduction to Semiconductor Equipment | 3 | 3 | | | | |
| 電路板製造與產業概論 | Introduction to Circuit Board Manufacturing and Industry | 3 | 3 | | | | |
| 數位 IC 導論 | Introduction to Digital IC | 3 | 3 | | | | |
| 半導體薄膜工程與元件 | Semiconductor Thin Film Engineering and Components | | | | 3 | 3 | |
| ※低功率積體電路設計 | Low Power IC Design | | | | 3 | 3 | |
| 光電轉換導論 | Introduction to Optical-Electrical Transfer | | | | 3 | 3 | |
| 高速 PCB 設計 | High-Speed Printed Circuit Board Design | | | | 3 | 3 | |
| 電能轉換電路設計 | Design of Power Conversion Circuits | | | | 3 | 3 | |
| 多媒體遊戲暨智慧運算 Network Multimedia and Intelligent Computing | | | | | | | |
| ※網路概論 | Introduction to Network | 3 | 3 | | | | |
| △視窗程式設計 | Windows Programming | 3 | 3 | | | | |
| 數位信號處理 | Digital Signal Processing | 3 | 3 | | | | |
| 遊戲企劃 | Game Design | 3 | 3 | | | | |
| ●△工業機器人程式設計 | Industrial Robot Programming | 3 | 3 | | | | |
| 機器學習 | Machine Learning | | | | 3 | 3 | |
| [AI]人工智慧 | Artificial Intelligence | | | | 3 | 3 | |

| | | | | | | | |
|---|--|---|---|---|---|---|---|
| 虛擬實境 | Virtual Reality | | | | 3 | 3 | |
| ※嵌入式微處理器系統與實習 | Embedded Microprocessor System and Practice | | | | 2 | 1 | 3 |
| 智慧機器人 Intelligent Robotics | | | | | | | |
| ※●自動化系統整合與應用 | Automation System Integration and Applications | 2 | 1 | 3 | | | |
| ※●△機器人程式設計(1)-初階工程師 | Robot Software Programming (1) - Junior Engineer | 3 | 3 | | | | |
| 嵌入式微處理器系統與實習 | Embedded Microprocessor System and Practice | 2 | 1 | 3 | | | |
| 控制系統 | Control System | 3 | 3 | | | | |
| ※機器視覺 | Machine Vision | | | | 3 | 3 | |
| 自動化光學檢測概論 | Introduction to Automatic Optical Inspection | | | | 3 | 3 | |
| ※智慧感測與監控實務 | Smart Sensor and Supervisory Control Practice | | | | 2 | 1 | 3 |
| 電力電子學 | Power Electronics | | | | 3 | 3 | |
| 第四學年 Fourth Year | | | | | | | |
| 積體電路與系統應用 Integrated Circuit and System Application | | | | | | | |
| 材料科學概論 | Introduction to Material Science | 3 | 3 | | | | |
| 射頻積體電路導論 | Introduction to RFIC Design | 3 | 3 | | | | |
| ※電力電子積體電路設計 | Power Electronics IC Design | 3 | 3 | | | | |
| 太陽能系統與應用 | Solar Cell System and Application | 3 | 3 | | | | |
| △※嵌入式軟體設計實務 | Embedded Software Design and Practice | 3 | 3 | | | | |
| ●電磁相容之標準與測試 | Electromagnetic Compatibility of Standards and Test | 3 | 3 | | | | |
| 生醫感測器概論 | Introduction to Biosensor Devices | | | | 3 | 3 | |
| 半導體元件模擬 | Semiconductor Device Simulation | | | | 3 | 3 | |
| 電磁相容實務 | Practice of Electromagnetic Compatibility | | | | 3 | 3 | |
| 記憶體元件 | Memory Devices | | | | 3 | 3 | |
| 微波工程導論 | Introduction to Microwave Engineering | | | | 3 | 3 | |
| IC 測試技術 | IC Testing Technology | | | | 3 | 3 | |
| IC 封裝技術 | IC Package Technology | | | | 3 | 3 | |
| 運算放大器設計實務 | Practical Design of Operational Amplifiers | | | | 3 | 3 | |
| 多媒體遊戲暨智慧運算 Network Multimedia and Intelligent Computing | | | | | | | |
| 資料庫系統應用 | Database System Application | 3 | 3 | | | | |
| 作業系統 | Operating System | 3 | 3 | | | | |
| 計算機結構 | Computer Architecture | 3 | 3 | | | | |
| 遊戲物理導論 | Introduction to Game Physics | 3 | 3 | | | | |
| 虛實整合製作 | Extended Reality Development | 3 | 1 | 2 | | | |
| 深度學習應用 | Applied Deep Learning | 3 | 3 | | | | |
| ●數位成音(一) | Digital Audio (I) | 3 | 3 | | | | |
| ●數位成音(二) | Digital Audio (II) | | | | 3 | 3 | |
| 演算法 | Algorithms | | | | 3 | 3 | |
| 3D 動畫技術 | 3D Animation Technology | | | | 3 | 3 | |
| 物聯網概論 | Introduction to Internet of Things | | | | 3 | 3 | |
| △雲端科技應用 | Applied Cloud Computing | | | | 3 | 3 | |
| △※嵌入式系統開發實習 | Embedded System Development and Practice | | | | 2 | 1 | 3 |
| 智慧機器人 Intelligent Robotics | | | | | | | |
| 機器學習 | Machine Learning | 3 | 3 | | | | |
| 自動化圖控介面 | Automatic Graphical Control Interface | 3 | 3 | | | | |
| 可攜式電源設計 | Portable Power Supply Design | 3 | 3 | | | | |
| [AI]深度學習 | Deep Learning | | | | 3 | 3 | |
| 工業無線通訊技術 | Industrial Wireless Communication Technology | | | | 3 | 3 | |
| ※●△機器人程式設計(2)-中階工程師 | Robot Software Programming (2) - Intermediate Engineer | | | | 3 | 3 | |

| 共同專業選修科目 Department General Elective Courses | | | | | | | |
|--|---|---|---|---|---|---|---|
| 第一學年 First Year | | | | | | | |
| 電子工程概論 | Introduction to Electronic Engineering | 3 | 3 | 0 | | | |
| 產業概論 | Introduction to Industrial | | | | 3 | 3 | 0 |
| 第二學年 Second Year | | | | | | | |
| 校外實習(寒假)一 | Internship on Winter Vacation (I) | 1 | 0 | 1 | | | |
| 校外實習(暑期)一 | Internship on Summer Vacation (I) | 3 | 0 | 3 | | | |
| 監控系統設計及實習 | SCADA Design and Practice | 3 | 2 | 2 | | | |
| 通信電子學 | Fundamentals of Electronic Communication | | | | 3 | 3 | 0 |
| 師徒實務專題(一) | Mentor-Apprentice Project Study (I) | | | | 3 | 0 | 3 |
| 第三學年 Third Year | | | | | | | |
| 產業論壇 | Industry Forum | 3 | 3 | 0 | | | |
| 電磁學 | Electromagnetics | 3 | 3 | 0 | | | |
| 校外實習(寒假)二 | Internship on Winter Vacation (II) | 1 | 0 | 1 | | | |
| 校外實習(暑期)二 | Internship on Summer Vacation (II) | 3 | 0 | 3 | | | |
| 智慧電能儲存技術 | Smart Technologies for Electrical Energy Storage System | 3 | 3 | 0 | | | |
| 高頻電路設計 | RF Circuit Design | | | | 3 | 3 | 0 |
| 電磁波 | Electromagnetic Waves | | | | 3 | 3 | 0 |
| 職場倫理論壇 | Workplace Ethics Forum | | | | 3 | 3 | 0 |
| 第四學年 Fourth Year | | | | | | | |
| 師徒實務專題(二) | Mentor-Apprentice Project Study (II) | 3 | 0 | 3 | | | |
| RFID 技術 | RFID Technology | 3 | 3 | 0 | | | |
| 專業倫理與社會責任 | Professional Ethics and Social Responsibility | 3 | 3 | 0 | | | |
| 校外實習(寒假)三 | Internship on Winter Vacation (III) | 1 | 0 | 1 | | | |
| 校外實習(暑期)三 | Internship on Summer Vacation (III) | 3 | 0 | 3 | | | |
| 職場倫理實習(一) | Workplace Ethics Practice (I) | 3 | 0 | 3 | | | |
| 資訊技術實習(一) | Computer Application Practice (I) | 3 | 0 | 3 | | | |
| 電子技術實習(一) | Electronic Skill Practice (I) | 3 | 0 | 3 | | | |
| 產業實務實習(一) | Industrial Practice Internship (I) | 3 | 0 | 3 | | | |
| 信號完整性 | Signal Integrity | | | | 3 | 3 | 0 |
| 職場倫理實習(二) | Workplace Ethics Practice (II) | | | | 3 | 0 | 3 |
| 資訊技術實習(二) | Computer Application Practice (II) | | | | 3 | 0 | 3 |
| 電子技術實習(二) | Electronic Skill Practice (II) | | | | 3 | 0 | 3 |
| 產業實務實習(二) | Industrial Practice Internship (II) | | | | 3 | 0 | 3 |

備註 Note:

- 一、畢業至少應修滿 128 學分【必修 75 學分，選修至少 53 學分(須含本系專業選修至少 36 學分)】
Students should complete at least 128 credits before graduation, includes 75 required credits, 53 elective credits (elective credits should have at least 36 credits from department elective courses).
- 二、本校訂有「國立勤益科技大學學生畢業門檻辦法」，畢業門檻條件：英文能力及自主學習，請依規定辦理。
Our school has established the "National Chin-yi University of Science and Technology Student Graduation Threshold Measures", Graduation threshold: English proficiency and independent study, please follow the regulations.
- 三、通識教育學院所開設之「博雅通識課程」學分數(時)為 2 學分 2 學時或 3 學分 3 學時，經 101 學年度第二學期校課程委員會會議通過。
Liberal Education courses opened by College of General Education, are divided into 2 hours course with 2 credits or 3 hours course with 3 credits, ratified by Course Committee in 2012.
- 四、本系畢業門檻一：學生要修讀智慧機器人領域「※必選課程」其中的三門，為其畢業之基本條件。
Three of the required courses(※) offered in the Intelligent Robotics Field must be taken for satisfying the first graduation criteria.
- 五、本系畢業門檻二：學生要取得本系開設之下述「領域」至少一個，為其畢業之基本條件。學生至少要獲得 21 學分、或獲得 7 門課的學分，才能視為取得此領域證明。「※必選課程」，須至少選二門。
(一)積體電路與系統應用領域
(二)多媒體遊戲暨智慧運算領域
(三)智慧機器人領域
At least one of the following fields must be fulfilled for satisfying the second graduation criteria. Students taking this field are requested to obtain a minimum of 21 credits, including at least 2 required courses to be taken for this field certificate.
(1) Integrated Circuit and System Application Field
(2) Network Multimedia and Intelligent Computing Field
(3) Intelligent Robotics Field
- 六、必選課程為選修，不及格者不必重修、或補修。
Every required course is elective. Failure of these courses is not necessary to re-take for graduation.
- 七、課程名稱前有標示「●」符號者，為「職能專業課程」。
Courses with a "●" refer to a professional competence course.
- 八、課程名稱前有標示「AI」符號者，為「人工智慧相關課程」。
Courses with an "AI" refer to an artificial intelligence related course.
- 九、課程名稱前有標示「△」符號者，為程式設計課程。
Courses with a "△" refers to an application design course.

十、學生須選讀本系所訂跨領域學程課程，並有成績登錄。

Students need to register for the course of inter-disciplinary program set by this department and have a record of grades

| 智慧製造 | | | 半導體 | | |
|------|----|-----------------|------|----|---------------|
| 課程選別 | 學年 | 課程名稱(學分/學時) | 課程選別 | 學年 | 課程名稱(學分/學時) |
| 必修 | 二上 | 微處理機實習 2/4 | 必修 | 二上 | 電子學(一) 3/3 |
| 必修 | 二下 | 信號與系統 3/3 | 必修 | 二下 | 電子學(二) 3/3 |
| 選修 | 二下 | Python 程式設計 3/3 | 選修 | 二上 | VLSI 概論 3/3 |
| 選修 | 三上 | 機器人控制 3/3 | 選修 | 二上 | 半導體物理導論 3/3 |
| 外系選修 | 四上 | 智慧機電實務 3/3 | 外系選修 | 二下 | 全客戶 IC 佈局 3/3 |
| 外系選修 | 四下 | 物聯網概論 3/3 | 外系選修 | 三上 | 半導體設備概論 3/3 |