

國立勤益科技大學 111 學年度日間部四年制冷凍空調與能源系能源應用組學分計畫表

National Chin-Yi University of Technology

Curriculum Planning of 2022 Four-Year Degree in Energy Application Group of Department of Refrigeration, Air-Conditioning, and Energy Engineering

110.11.04.系課程會議及 110.11.11.系務會議審議通過  
 110.11.23.院課程會議審議通過  
 110.12.9.校課程委員會及 110.12.16.教務會議審議通過  
 111.04.12.系課程會議通過  
 111.04.14.系務會議通過  
 111.05.16-17.院課程會議審議通過  
 111.06.02.校課程委員會及 111.06.16.教務會議審議修訂通過  
 111.12.13.校課程會議及 111.12.22.臨時教務會議審議修正通過  
 112.06.14.系課程會議修訂通過  
 112.06.21.系務會議修訂通過  
 112.09.28.系務會議修訂通過  
 112.11.23.院課程會議審議通過  
 112.12.07.校課程委員會及 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 |
| <b>共同必修科目(28 學分) General Required Courses (28credits hours)</b>   |  |                    |            |               |                     |            |               |
| <b>第一學年 First Year</b>  |  |                    |            |               |                     |            |               |
| 國文(一)   | Chinese ( I )                                      | 2                  | 2          | 0             |                     |            |               |
| 大一英文(一)   | Freshman English ( I )                             | 2                  | 2          | 0             |                     |            |               |
| 英文聽講(一)   | Listening and Speaking ( I )                       | 1                  | 1          | 0             |                     |            |               |
| 歷史與文化(一)  | History and Culture ( I )                          | 2                  | 2          | 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)   | Listening and Speaking ( II )                      |                    |            |               | 1                   | 1          | 0             |
| 歷史與文化(二)  | History and Culture ( II )                         |                    |            |               | 2                   | 2          | 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             |
| <b>第二學年 Second Year</b>   |  |                    |            |               |                     |            |               |
| 憲法與民主   | Constitution and Democracy                         | 2                  | 2          | 0             |                     |            |               |
| 體育(三)   | Physical Education ( III )                         | 0                  | 2          | 0             |                     |            |               |
| 博雅通識課程  | Liberal Education                                  | 2                  | 2          | 0             |                     |            |               |
| 博雅通識課程  | Liberal Education                                  | 2                  | 2          | 0             |                     |            |               |
| 體育(四)   | Physical Education ( IV )                          |                    |            |               | 0                   | 2          | 0             |
| 博雅通識課程  | Liberal Education                                  |                    |            |               | 2                   | 2          | 0             |
| <b>第三學年 Third Year</b>  |  |                    |            |               |                     |            |               |
| 藝術鑑賞  | Art Appreciation                                   | 1                  | 1          | 0             |                     |            |               |
| 博雅通識課程  | Liberal Education                                  | 2                  | 2          | 0             |                     |            |               |
| 音樂鑑賞  | Music Appreciation                                 |                    |            |               | 1                   | 1          | 0             |
| 博雅通識課程  | Liberal Education                                  |                    |            |               | 2                   | 2          | 0             |
| <b>第四學年 Fourth Year(無必修課程 No General Required Courses)</b>        |  |                    |            |               |                     |            |               |
| <b>專業必修科目(58 學分) Department Required Courses(58credits hours)</b> |  |                    |            |               |                     |            |               |
| <b>第一學年 First Year</b>  |  |                    |            |               |                     |            |               |
| 微積分(一)  | Calculus ( I )                                     | 3                  | 3          | 0             |                     |            |               |
| 物理(一)   | Physics ( I )                                      | 3                  | 3          | 0             |                     |            |               |
| 電子學及實習(一)   | Electronics and Lab. ( I )                         | 1                  | 1          | 2             |                     |            |               |
| 電路學   | Electric Circuit Analysis                          | 3                  | 3          | 0             |                     |            |               |
| 工程倫理  | Ethics in Engineering                              | 1                  | 1          | 0             |                     |            |               |
| 微積分(二)  | Calculus ( II )                                    |                    |            |               | 3                   | 3          | 0             |
| 熱力學   | Thermodynamics                                     |                    |            |               | 3                   | 3          | 0             |
| 電腦輔助繪圖  | Computer Aided Drawing                             |                    |            |               | 1                   | 3          | 0             |
| 電子學及實習(二)   | Electronics and Lab. ( II )                        |                    |            |               | 1                   | 1          | 2             |
| 能源概論  | Introduction to Energy                             |                    |            |               | 1                   | 1          | 0             |
| <b>第二學年 Second Year</b>   |  |                    |            |               |                     |            |               |
| 工程數學(一)   | Engineering Mathematics ( I )                      | 3                  | 3          | 0             |                     |            |               |
| 流體力學  | Fluid Mechanics                                    | 3                  | 3          | 0             |                     |            |               |
| 電機應用及實習   | Electrical Application and Practices               | 1                  | 1          | 2             |                     |            |               |
| 冷凍空調原理  | Principle of Refrigeration and Air-Conditioning    | 3                  | 3          | 0             |                     |            |               |
| △計算機程式  | Computer Program                                   | 1                  | 1          | 2             |                     |            |               |
| 工程數學(二)   | Engineering Mathematics ( II )                     |                    |            |               | 3                   | 3          | 0             |
| 自動控制  | Automatic Control                                  |                    |            |               | 3                   | 3          | 0             |
| 能源應用  | Energy Application                                 |                    |            |               | 3                   | 3          | 0             |
| 熱傳學   | Heat Transfer                                      |                    |            |               | 3                   | 3          | 0             |
| <b>第三學年 Third Year</b>  |  |                    |            |               |                     |            |               |

|  |   |                    |            |               |                     |            |               |
|--|---|--------------------|------------|---------------|---------------------|------------|---------------|
| ●空調工程及實習   | Air- Condition Engineering and Practices                                    | 1                  | 1          | 2             |                     |            |               |
| ●冷凍工程及實習   | Refrigeration Engineering and Practices                                     | 1                  | 1          | 2             |                     |            |               |
| ●太陽能工程   | Solar Energy Engineering  | 3                  | 3          | 0             |                     |            |               |
| ●冷凍空調節能技術及實習   | Refrigeration and Air-Conditioning Energy Saving Technique and Practices    |                    |            |               | 1                   | 1          | 2             |
| ●能源工程原理及實習   | Energy Engineering Principle and Practices                                  |                    |            |               | 1                   | 1          | 2             |
| ●冷凍空調設計與實習   | Refrigeration and Air-Conditioning Design and Practices                     |                    |            |               | 1                   | 1          | 2             |
| 實務專題(一)  | Project Study ( I )   |                    |            |               | 2                   | 0          | 6             |
| <b>第四學年 Fourth Year</b>  |   |                    |            |               |                     |            |               |
| 實務專題(二)  | Project Study ( II )  | 2                  | 0          | 6             |                     |            |               |
| ●能源管理技術  | Energy Management Technique   | 3                  | 3          | 0             |                     |            |               |
| 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 |
| <b>共同選修科目 General Electives Courses</b>                        |   |                    |            |               |                     |            |               |
| <b>第一學年 First Year(無排定共同選修課程 No General Electives Courses)</b> |   |                    |            |               |                     |            |               |
| <b>第二學年 Second Year</b>  |   |                    |            |               |                     |            |               |
| 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             |
| <b>第三學年 Third Year</b>   |   |                    |            |               |                     |            |               |
| 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             |                     |            |               |
| <b>第四學年 Fourth Year</b>  |   |                    |            |               |                     |            |               |
| 體育選修   | Physical Elective Course  | 1                  | 2          | 0             | 1                   | 2          | 0             |
| <b>專業選修科目 Department Electives Courses</b>                     |   |                    |            |               |                     |            |               |
| <b>第一學年 First Year(無排定 No Department Required Courses)</b>     |   |                    |            |               |                     |            |               |
| <b>第二學年 Second Year</b>  |   |                    |            |               |                     |            |               |
| 工業儀表   | Industrial Instrument   | 3                  | 3          | 0             |                     |            |               |
| 網路分析   | Network Analysis  | 3                  | 3          | 0             |                     |            |               |
| △工程軟體應用及實習   | Application and Practices of Engineering Software                           | 3                  | 2          | 2             |                     |            |               |
| 用電設備檢驗   | Power Electricity Equipment Inspection                                      | 3                  | 2          | 2             |                     |            |               |
| △PC-Base PLC 應用及實習   | Application and Practices of PC-Based PLC                                   | 3                  | 2          | 2             |                     |            |               |
| ●冷凍空調基礎裝修實務  | Basic Practices of Refrigeration and Air-Conditioning                       | 3                  | 2          | 2             |                     |            |               |
| ●變頻空調實務(一)   | Variable Frequency Air-Conditioning Practices( I )                          | 3                  | 2          | 2             |                     |            |               |
| 低溫工程   | Cryogenic Engineering   |                    |            |               | 3                   | 3          | 0             |
| 電工學理論與分析   | Theory and Analysis of Basic Electric Machines                              |                    |            |               | 3                   | 3          | 0             |
| 電力電子學  | Power Electronics   |                    |            |               | 3                   | 3          | 0             |
| 冷凍冷藏應用技術   | Application Technique of Freezing and Cold Storage                          |                    |            |               | 3                   | 3          | 0             |
| 線性電路   | Linear Circuits   |                    |            |               | 3                   | 3          | 0             |
| 電腦軟體應用及實習  | Application and Practices of Computer Software                              |                    |            |               | 3                   | 2          | 2             |
| 校外實習(暑期)   | Intern Practice ( outside-school ) on summer session                        |                    |            |               | 3                   | 0          | 3             |
| 流體機械   | Fluid Machinery   |                    |            |               | 3                   | 3          | 0             |
| ●變頻空調實務(二)   | Variable Frequency Air-Conditioning Practices ( II )                        |                    |            |               | 3                   | 2          | 2             |
| 物理(二)  | Physics ( II )  |                    |            |               | 3                   | 3          | 0             |
| <b>第三學年 Third Year</b>   |   |                    |            |               |                     |            |               |
| 高等工程數學   | Advanced Engineering Mathematics  | 3                  | 3          | 0             |                     |            |               |
| 現代控制   | Modern Control  | 3                  | 3          | 0             |                     |            |               |
| 虛擬儀控軟體應用   | Virtual Instrument Applications   | 3                  | 3          | 0             |                     |            |               |
| 燃料電池概論   | Introduction to Fuel Cells  | 3                  | 3          | 0             |                     |            |               |
| 變頻節能控制   | Variable Frequency Energy-Saving Control                                    | 3                  | 3          | 0             |                     |            |               |
| 創意發明   | Creative Invention  | 3                  | 3          | 0             |                     |            |               |
| ●冷凍空調裝修實務  | Practice of Refrigeration and Air-Conditioning Installation and Maintenance | 3                  | 2          | 2             |                     |            |               |

|                         |   |   |   |   |   |   |   |
|-------------------------|---|---|---|---|---|---|---|
| 數位控制                    | Digital Control   | 3 | 3 | 0 |   |   |   |
| ●變頻空調實務(三)              | Variable Frequency Air-Conditioning Practices (III)                       | 3 | 2 | 2 |   |   |   |
| 綠建築評估技術                 | Green Building Evaluation Technique                                       | 3 | 3 | 0 |   |   |   |
| 材料力學                    | Mechanics of Materials  | 3 | 3 | 0 |   |   |   |
| 電腦輔助機械設計                | Computer-Aided Mechanical Design  | 3 | 3 | 0 |   |   |   |
| 模糊控制概論                  | Introduction to Fuzzy Control   |   |   |   | 3 | 3 | 0 |
| 消防工程概論                  | Introduction to Fire Fighting Engineering                                 |   |   |   | 3 | 3 | 0 |
| 電子設備冷卻技術                | Cooling Technique of Electronic Equipment                                 |   |   |   | 3 | 3 | 0 |
| ●冷凍空調設備與實習              | Equipment and Practices of Refrigeration and Air-Conditioning             |   |   |   | 3 | 2 | 2 |
| 線性代數                    | Linear Algebra  |   |   |   | 3 | 3 | 0 |
| 智慧財產權                   | Intellectual Property Rights  |   |   |   | 3 | 3 | 0 |
| 氫能技術概論                  | Introduction to Hydrogen Energy Technology                                |   |   |   | 3 | 3 | 0 |
| 冷凍空調管路系統設計              | Air-Conditioning Piping and Duct System Design                            |   |   |   | 3 | 3 | 0 |
| ●變頻空調實務(四)              | Variable Frequency Air-Conditioning Practices (IV)                        |   |   |   | 3 | 2 | 2 |
| 節能技術概論                  | Introduction to Energy-Saving Technique                                   |   |   |   | 3 | 3 | 0 |
| 能源與永續發展                 | Energy and sustainable development  |   |   |   | 3 | 3 | 0 |
| ●太陽光電安裝實習               | Solar Photoelectricity Installation Practice                              |   |   |   | 3 | 3 | 0 |
| 機械製造                    | Machinery Manufacturing   |   |   |   | 3 | 3 | 0 |
| <b>第四學年 Fourth Year</b> |   |   |   |   |   |   |   |
| 工業安全                    | Industry Safety   | 3 | 3 | 0 |   |   |   |
| 冷凍空調系統故障分析              | Refrigeration and Air-Conditioning System Diagnostic                      | 3 | 3 | 0 |   |   |   |
| 振動與噪音控制                 | Vibration and Noise Control.  | 3 | 3 | 0 |   |   |   |
| △單晶片應用及實習               | Application and Practices of Single Chip Controller                       | 3 | 2 | 2 |   |   |   |
| 熱交換器設計                  | Heat Exchanger Design and Analysis  | 3 | 3 | 0 |   |   |   |
| 無塵室技術                   | Cleanroom Technology  | 3 | 3 | 0 |   |   |   |
| 科技日文                    | Japanese for Science and Technology                                       | 3 | 3 | 0 |   |   |   |
| 風力發電                    | Wind Power Generation   | 3 | 3 | 0 |   |   |   |
| 工具機冷卻系統設計與開發            | Design and Development of Machine Tool Cooling System                     | 3 | 3 | 0 |   |   |   |
| 太陽光電系統檢測實習              | Solar PV Technique  | 3 | 3 | 0 |   |   |   |
| ●壓縮機設計實務                | Compressor Design Practice  | 3 | 3 | 0 |   |   |   |
| 智慧型微控制器應用               | Intelligent Microcontroller Application                                   | 3 | 3 | 0 |   |   |   |
| 流場分析專業軟體應用              | Applications of Computational Fluid Dynamics Package                      |   |   |   | 3 | 3 | 0 |
| 特殊空調系統                  | Distinctive Air-Conditioning System                                       |   |   |   | 3 | 3 | 0 |
| 通風工程                    | Ventilation Engineering   |   |   |   | 3 | 3 | 0 |
| 工商應用文書                  | Business Application Documents  |   |   |   | 3 | 3 | 0 |
| 綠建築與照明節能                | Energy Saving of Green Building and Lighting                              |   |   |   | 3 | 3 | 0 |
| 工具機組裝技術與實習              | Technique and Practices of Machine Tool Assembling                        |   |   |   | 3 | 2 | 2 |
| 校外實習(一)                 | Practical Training (I)  |   |   |   | 9 | 0 | 9 |
| ●冷凍空調工程規劃與管理            | Planning and Management of Refrigeration and Air-Conditioning Engineering |   |   |   | 3 | 3 | 0 |
| 綠建築評估                   | Green Building Evaluation   |   |   |   | 3 | 3 | 0 |

備註 Note:

一、 畢業至少應修滿131學分【必修86學分，選修至少45學分(須含本系專業選修至少36學分)】

Students should complete at least 131 credits before graduation, including 86 required credits, 45 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、本系訂有「專業證照畢業門檻實施辦法」相關規定依法辦理。

Students should meet the requirement in "The Regulation of Professional Licenses for Graduation" of the department.

五、能源應用組應修習下列專業共同選修至少3門課程(8選3)：燃料電池概論、氫能技術概論、風力發電、綠建築與照明節能、變頻節能控制、節能技術概論、流體機械、冷凍空調基礎裝修實務或冷凍空調裝修實務。

The Environmental Control Group should complete the following department required courses and at least 3 elective courses (3 out of 8): Introduction to Fuel Cells, Introduction to Hydrogen Technology, Wind Power, Energy Saving of Green Building and Lighting, Variable Frequency Energy-Saving Control, Introduction to Energy-Saving Technique, Fluid Machinery, Basic Practices of Refrigeration and Air-Conditioning or Practice of Refrigeration and Air-Conditioning Installation and Maintenance.

六、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.

七、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.

八、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

## 國立勤益科技大學111學年度日間部四年制冷凍空調與能源系 跨領域學程

| 『永續環境』跨領域學分學程 |    |                              |             |             |            |    |                              |        |        |
|---------------|----|------------------------------|-------------|-------------|------------|----|------------------------------|--------|--------|
| 本系            |    |                              |             |             | 外系         |    |                              |        |        |
| 課程選別          | 學年 | 科目名稱                         | 學分          | 學時          | 課程選別       | 學年 | 科目名稱                         | 學分     | 學時     |
| 必修            | 一  | 物理(一)                        | 3           | 3           |            |    |                              |        |        |
|               | 三  | 太陽能工程                        | 3           | 3           |            |    |                              |        |        |
| 專業選修(任選二門)    | 二  | 低溫工程                         | 3           | 3           | 外系選修(任選二門) | 二  | 化材系-環境科學概論                   | 3      | 3      |
|               |    |                              |             |             |            |    | 化材系-環境工程                     | 3      | 3      |
|               |    |                              |             |             |            |    | 電機系-電能儲存技術                   | 3      | 3      |
|               | 三  | 綠建築評估技術<br>能源與永續發展<br>節能技術概論 | 3<br>3<br>3 | 3<br>3<br>3 |            | 三  | 化材系-空氣污染防治                   | 3      | 3      |
|               |    |                              |             |             |            |    | 化材系-資源回收工程                   | 3      | 3      |
|               |    |                              |             |             |            |    | 化材系-污染監測與分析                  | 3      | 3      |
|               | 四  | 風力發電                         | 3           | 3           |            | 四  | 化材系-污水工程                     | 3      | 3      |
|               |    |                              |             |             |            |    | 化材系-水處理工程與設計<br>電機系-電動車設計與製作 | 3<br>3 | 3<br>3 |

| 『智慧節能』跨領域學分學程 |    |                          |             |             |            |    |                                 |        |        |
|---------------|----|--------------------------|-------------|-------------|------------|----|---------------------------------|--------|--------|
| 本系            |    |                          |             |             | 外系         |    |                                 |        |        |
| 課程選別          | 學年 | 科目名稱                     | 學分          | 學時          | 課程選別       | 學年 | 科目名稱                            | 學分     | 學時     |
| 必修            | 一  | 物理(一)                    | 3           | 3           |            |    |                                 |        |        |
|               | 二  | 自動控制                     | 3           | 3           |            |    |                                 |        |        |
| 專業選修(任選二門)    | 二  | PC-Base PLC 應用<br>及實習    | 3           | 4           | 外系選修(任選二門) | 二  | 電機系-智慧感測與計算                     | 3      | 3      |
|               |    |                          |             |             |            |    | 電機系-信號與系統                       | 3      | 3      |
|               |    |                          |             |             |            |    | 機械系-AI 智慧機械概論                   | 3      | 3      |
|               | 三  | 變頻節能控制<br>數位控制<br>模糊控制概論 | 3<br>3<br>3 | 3<br>3<br>3 |            | 三  | 電機系-物聯網電子系統應用與設計                | 3      | 3      |
|               |    |                          |             |             |            |    | 化材系-AI 人工智慧入門                   | 3      | 3      |
|               |    |                          |             |             |            |    | 化材系- AI 智慧控制與預測模型               | 3      | 3      |
|               | 四  | 智慧型微控器應用                 | 3           | 3           |            | 四  | 電機系-智慧機電實務                      | 3      | 3      |
|               |    |                          |             |             |            |    | 電機系-雲端運算技術<br>機械系-AI 智慧機械聯網整合技術 | 3<br>3 | 3<br>3 |

