**元智大學電機工程學系(甲組)****必修科目表**

**Department of Electrical Engineering(Program A), Yuan Ze University**

**List of Required Courses**

**（112學年度入學新生適用）**

**(Applicable to Students Admitted in Academic Year of 2023)**

112.04.19 一一一學年度第六次教務會議通過

Passed by the 6th Academic Affairs Meeting, Academic Year 2022, on April 19, 2023

112.11.22 一一二學年度第五次教務會議修訂通過

Amended by the 5th Academic Affairs Meeting, Academic Year 2023, on November 22, 2023

113.11.20 一一三學年度第二次教務會議修訂通過

Amended by the 2nd Academic Affairs Meeting, Academic Year 2024, on November 20, 2024

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| --- | --- | --- | --- | --- |
| 學年 Academic Year學期 Semester科目Course | 第一學年 1st Academic Year | 第二學年 2nd Academic Year | 第三學年 3rd Academic Year | 第四學年 4th Academic Year |
| 上 Fall | 下 Spring | 上 Fall | 下 Spring | 上 Fall | 下 Spring | 上 Fall | 下 Spring |
| 共同必修科目Common Compulsory（17） | 國文（一）Chinese (I)（2） | 國文（二）Chinese (II)（2） |  |  |  |  |  |  |
| 英語（一）English (I)（2） | 英語（二）English (II)（2） |  |  |  |  |  |  |
| 外語課程應修習10學分。1. 「英語（一）」及「英語（二）」為基礎課程，採能力分級上課，共計二學期四學分。
2. 除了「英語（一）」及「英語（二）」外，畢業前應修畢三個不同主題式英語課程，共三學期5學分。
3. 大一英語能力後測「TOEIC模擬測驗」成績未達350分者，應修習「應試加強班」(EL260)。修習「應試加強班」期間之期末TOEIC模擬測驗成績未達350分者，則該科成績將「不及格」，並應再次修習「應試加強班」，直到取得TOEIC模擬測驗分數達350分(含)始得修習其他主題式英語課程。
4. 另開設「英語檢定」(EL360)計一學期1學分，「英語檢定」之修課限制與注意事項，請參照「通識外語『英語檢定』修課規定」，並由通識教學部公佈後施行。

外國學生改修華語須經國際語言文化中心審核通過始可改修華語課程10學分，其華語課程10學分應含「華語檢定」1學分，「華語檢定」修課限制與注意事項，請參照「通識外語『英語檢定』修課規定」。凡本校大學部外國學生修習「華語(一)」或「華語(二)」任一課程成績未達60分，不得修習「華語(三)」、「華語(四)」。若修習「華語(三)」、「華語(四)」任一課程成績未達60分，不得修習「華語(五)」或「華語檢定」(EL372)。The undergraduate students must complete 10 required credits of foreign language courses.1. English (I) & (II) for the total 4 credits: English (I) and (II) are 4 credit elementary courses for the freshmen who are grouped on English competence; to complete within two semesters.
2. English thematic course for the total 5 credits: English thematic courses are 5-credit English courses; students are required to obtain 5 credits through 3 different thematic courses for graduation.
3. Students who do not reach the 350-point threshold of TOEIC Mock Exam in the end of the freshman year must take “English Testing” (EL260) course. Students will fail the course if they do not score higher than 350 points in TOEIC Mock Exam by the end of the course, and must repeatedly take the course until they can score higher than 350 points.
4. “English Testing” (EL360) for the total 1 credit: For the requirements of registering “English Testing”, please refer to "the Regulation for Registering English Test" announced and implemented by the College of General Education.

Foreign students need approval by ILCC for taking 10 credits of Mandarin Chinese courses as alternative courses of English.The undergraduate foreign students must pass Mandarin Chinese (I) and (II) before taking Mandarin Chinese (III) and (IV). Students must pass Mandarin Chinese (III) and (IV) before taking Mandarin Chinese (V) and Chinese Proficiency Test (EL372).英語檢定English Testing（1）、經典選讀A Guide to Classics (2)、服務學習Service Learning（1） |
| 體育Physical Education（0） | 體育Physical Education（0） | 興趣選項體育optional physical education（0） | 興趣選項體育optional physical education（0） |  |  |  |  |
| 大學部必須修習4學期體育課程；其中2學期為大一體育課程原班級上課，另2學期為興趣選項體育課程。The undergraduate students must attend the physical education course for 4 semesters; 2 semesters for the freshman physical education courses, the other two semesters for the optional physical education courses. |
| 通識教育科目General Education（10） | 通識課程分為人文藝術、自然科學、社會科學及生命科學四大類。學生須於四大領域中各選修2學分課程，共計8學分。General Education program comprises four categories：Humanities, Natural Science, Social Science and Life Science. Students are required to take a 2-credit course from each category to get 8 credits before graduation.通識跨域課程General Education Interdisciplinary Course：此2學分學生可自由於通識講座課程、微課自主學習或在地多元文化課群中選課。惟外籍生與工程學院英語學士班、資訊學院英語學士班、人文社會學院英語學士班、電機通訊學院英語學士班學生仍須於四大領域中選課，依各院修課規定辦理。Students can select the 2 credits from a General Education Lecture course, Micro Credit courses, Self-Study courses, or Local-Multicultural courses. Only foreign students and undergraduates of International Programs in the Colleges of Engineering, Informatics, Humanities and Social Sciences, as well as Electrical and Communication Engineering are required to take a 2-credit course from the four categories according to each college’s policy before graduation. |
| 院必修科目CollegeCompulsory（4） | 基礎程式設計-CFundamental Computer Programming-C(2)EN003 | 基礎程式設計-C++Fundamental Computer Programming-C++(2)EN005 |  |  |  |  |  |  |
| 專業基礎共同必修科目Professional Basic Compulsory Courses (11) | 微積分(一)Calculus(I)(3)EEA120 | 微積分(二)Calculus(II)(3)EEA125 |  |  |  | 畢業專題Graduation Project(3)EEA496 | 畢業專題Graduation Project(3) EEA496 |  |
| 程式語言實驗(一)Programming Language Labs(I)(1)EEA129 | 程式語言實驗(二)Programming Language Labs(II)(1) EEA130 |  |  |  |  |  |  |
| 學期學分小計Credits each semester  | 6 | 6 | 0 | 0 | 0 | 3 or 0 | 0 or 3 |  |
| 電機甲組必修科目（53） | 普通物理(一)General Physics(I)(3)EEA121 | 普通物理(二)General Physics(II)(3)EEA122 | 工程數學(一)Engineering Mathematics(I)(3)EEA203 | 工程數學(二)Engineering Mathematics(II)(3)EEA204 | 自動控制(一) Automatic Control(I)(3)EEA351EEA | 控制實驗Control Laboratory(1)EEA378 |  |  |
| 普通物理實驗(一)General Physics Lab. (I)(1)EEA123 | 普通物理實驗(二)General Physics Lab. (II) (1)EEA124 | 電子學(一)Electronics(I)(3)EEA205 | 電子學(二)Electronics(II) (3)EEA206 | 數位信號處理實驗Digital Signal Processing Lab. (1)EEA387 |  |  |  |
| 計算機概論Introduction to Computer Science (3)EEA109 | 邏輯電路設計Digital Logic Design(3)EEA112 | 電路學Circuit Theory(3)EEA242 | 進階電路學 Advance in Electric Circuits(3)EEA243 |  |  |  |  |
|  | 邏輯電路設計實驗 Digital Logic Design Laboratory(1)EEA128 | 資料結構Data Structures(3) EEA216 | 電磁學(一)Electromagnetics (I) (3)EEA227 |  |  |  |  |
|  |  | 電子電路實驗(一)Electronic Circuits Experiments(I)(1)EEA221 | 電子電路實驗(二)Electronic Circuits Experiments(II)(1)EEA232 |  |  |  |  |
|  |  | 微電腦系統 Micro-Computer Systems (3)EEA224 | 訊號與系統 Signals and Systems (3)EEA305 |  |  |  |  |
|  |  | 微電腦實驗 Micro-Processor Lab. (1)EEA386 |  |  |  |  |  |
| 學期學分小計Credits each semester | 7 | 8 | 17 | 16 | 4 | 1 |  |  |
| 備註Remarks | 1. 括弧內數字為學分數The numbers in parentheses are referred as credit.
2. 必修科目計：**95**學分.The course requirement is 95 credits.
3. 選修科目計：33學分，電機系(甲組)專業科目至少選修15學分.(包含必選修學分)The minimum request for electrical engineering(Program A) major is 15 credits. Outside the Department of elective up to recognize the 18 credits.
4. 畢業學分：共128學分.(通識教育科目學分只採計至多10學分，超修之學分將不列入畢業學分)The minimum credits requirement for graduation is 128 credit. (The maximum credits for general education courses is 10, the exceeding credits will not be counted.)
5. 有關共同必修及通識教育科目之詳細規定，另依據「元智大學共同必修科目表」之規定辦理，共同必修超修學分不得列入畢業學分數。Please refer to Yuan Ze University Common Required Course List for General Education courses information and regulations.
6. 本組學生修習電通學院各組專業課程，皆予承認；但必修課程初次修課須在本組修讀始予承認。一年級下學期程式語言課程(EEA130程式語言實驗（二）及EN005基礎程式設計-C ++)，重修需為C++相關內容課程，修習外系組課程需申請並經組上審核通過方可抵免。Students are permitted to take courses offered in College of Electrical and Communication Engineering, however the first compulsory courses has to be taken in department of electrical engineering(Program A).
7. 終端學習課程：畢業專題。三下與四上對開，學生在其修課的學期完成作品，重複選課只採計一學期之學分。The experiential learning courses: Graduation project.
8. 至少須修畢一項本院組制訂之學程(院級學程或組級學程皆可，不包含微學程)，始得畢業，若修課期間已申請「不列入大學畢業學分數」之課程，將不可再申請列為學程課程。Students need to take at least one course package offered by the department or the college to fulfill the graduation requirement.
9. 修習普通物理實驗(一)／(二)、電子電路實驗(一)／(二)等4門課程者，必須通過該課程所規定之儀器檢定項目。Those who take courses of EEA123 General Physics Lab.(I), EEA124 General Physics Lab.(II), EEA221 Electronic Circuits Experiments(I), or EEA232 Electronic Circuits Experiments(II) are required to pass the corresponding certification exams.
10. 議題導向實作專題課程：畢業專題。Topic and Implementation-oriented courses: Graduation project.
11. 本組「數位應用相關課程」如下列，畢業前須通過至少2門「數位應用相關課程」(可至本系或外系修習)。EA333多媒體概論、EEA350超大型積體電路設計導論、EEA385高階數位ＩＣ設計、EEA479人機互動概論、EEA481行動終端之相機Apps程式開發、EEA483微感測器及感測電路設計、EEA490醫學輔助系統、EEA491無人載具控制、EEA507影像處理、EEA531ＶＬＳＩ信號處理、EEA547機器人學、EEA563飛行控制實務設計、EEA623生醫信號處理、EEA625計算機視覺、EEA632醫學影像處理、EEA652電腦視覺於家庭保全之應用、EEA653無線射頻辨識系統原理與應用、EEA656影像處理演算法開發及應用、EEA659應用導向之即時多媒體人機互動理論與實作、EEA672雲端計算原理與實作、EEA675行動巨量資料分析與機器學習、EEA677資料科學、EEA694機器人學習、EEA695深度學習與視覺應用、EEA696多媒體深度學習、EEA697機器學習及其深層結構。Digital application courses： Students require passing at least two 'digital application courses'. (Student may take 'digital application courses' from another department.)EEA333 Introduction to Multimedia Information System、EEA350 Introduction to VLSI、EEA385 High-Level IC Design、EEA479 Human-Computer Interaction、EEA481 Camera-based Apps Development for Smart Phone、EEA483 Design on Micro-Sensor and Sensor Circuits、EEA490 Medical Devices、EEA491 Control of Unmanned Vehicles、EEA507 Image Processing、EEA531 VLSI Signal Processing、EEA547 Robotics、EEA563 Practical Design of Fly Control、EEA623 Biomedical Signal Processing、EEA625 Computer Vision、EEA632 Medical Image Processing、EEA652 Computer Vision and Its Application to Home Care Services、EEA653 Radio Signal Recognition: Theory and Application、EEA656 Algorithms of Image Processing: Development and Applications、EEA659 Application-oriented Real-time Multimedia Human-computer Interaction:Theory and Development、EEA672 Cloud Computing Principle and Practice、EEA675 Mobile Big Data Analysis and Machine Learning、EEA677 Data Science、EEA694 Robot Learning、EEA695 Deep Learning and its Vision Applications、EEA696 Deep Learning for Multimedia、EEA697 Machine Learning and its Deep Structure.
12. 為增進學生英文能力，鼓勵選修英語授課課程(含英專班)，其修習之課程科目及學分數之認抵需依學系規定辦理。To improve students’ English, we encourage students to take the courses in English (including English Bachelor’s students), which courses and credits waiver and transference should be standardized by each department.
13. 自106學年度起軍訓課程由必修改為選修，該學分納入當學期修課學分數計算，但不納入畢業總學分計算。The military education courses are no longer compulsory starting the 106 academic year. The military education courses will not be accumulated to the graduation requirements, but they can be counted as taken credits for each semester.

須通過大學程式能力檢定 (Collegiate Programming Examination, 簡稱CPE) 累計二題始得畢業。或取得Amazon (AWS)、Google、Microsoft雲端證照者，「基礎級」證照（無論張數）僅能折抵一題，其餘進階證照一張折抵一題。There are two avenues to meet the graduation requirements on programming skill.1. The students could take the Collegiate Programming Examination (CPE) and pass at least two CPE questions in a cumulative manner during their undergraduate study.2. The students could earn Amazon (AWS), Google, or Microsoft cloud certifications. The foundational certifications (regardless of the number of certifications the student owns) can be applied in equivalence to only a single CPE question while other advanced certifications can be applied in a one-to-one equivalence to the CPE questions. |

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**元智大學電機工程學系(甲組) 選修科目表**

**Department of Electrical Engineering(Program A), Yuan Ze University**

**List of Elective Courses**

**（112學年度入學新生適用）**

**(Applicable to Students Admitted in Academic Year of 2023)**

112.04.19 一一一學年度第六次教務會議通過

Passed by the 6th Academic Affairs Meeting, Academic Year 2022, on April 19, 2023

112.05.31 一一一學年度第七次教務會議修訂通過

Amended by the 7th Academic Affairs Meeting, Academic Year 2022, on May 31, 2023

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| --- | --- | --- | --- | --- |
| 學年Year學期Semester科目Course | 第一學年 1st Academic Year | 第二學年 2nd Academic Year | 第三學年3rd Academic Year | 第四學年4th Academic Year |
| 上Fall | 下Spring | 上Fall | 下Spring | 上Fall | 下Spring | 上Fall | 下Spring |
| 選修科目Department Elective | 線性代數Linear AlgebraEEA126 |  |  | 電機專題(2) Electrical TopicsEEA478 | 工程數學(三) EnginEEAring Mathematics(III) EEA328 | 計算機組織(一) Computer Structure(I) EEA335 | 高階數位IC設計High-Level IC Design EEA385 | 高科技產業介紹Introduction of High-Technology Industries EEA451 |
|  |  |  |  | 電子學(三) Electronics(III)EEA301 | 自動控制(二) Automatic Control(II) EEA353 | 智慧控制概論Introduction of Intelligent Control EEA379 |  |
|  |  |  |  | 電磁學(二) Electromagnetics(II) EEA303 | 專業實習（一）Field Study(I)EEA458 | 專業實習（二）Field Study(II)EEA459 | 電腦網路Computer NetworkEEA464 |
|  |  |  |  | Python程式設計Python ProgrammingEEA497 | 半導體元件物理Semiconductor Devices Physics EEA391 | 電腦輔助控制系統設計Computer-Aided Design of Control SystemEEA384 | 機器人實務Practice of RoboticsEEA477 |
|  |  |  |  | 超大型積體電路設計導論Introduction to VLSI EEA350 | 數位系統設計Numerical Analysis EEA339 | 機器人概論Fundamentals of Robotics EEA476 | 節能技術與實務Implementation of Energy Saving Technology EEA486 |
|  |  |  |  | 數位信號處理概論(2) Introduction to Digital Signal Processing EEA244 | 多媒體概論Introduction to Multimedia Information System EEA333 | 智慧電網實驗(2) Smart Grid Experiments EEA480 |  |
|  |  |  |  | 數位控制系統概論Introduction to Digital Control SystemEEA498 | 通訊系統Communication SystemsEEA313 | 電源轉換器設計實驗(2) Power Converter Design Lab.EEA482 |  |
|  |  |  |  | 工程機率Probability for EnginEEArsEEA223 | 電力系統Power SystemsEEA317 | 工業配電Electrical Power Distribution for IndustryEEA485 |  |
|  |  |  |  | 電機機械Electrical MachineryEEA323 | 人機互動概論Human-Computer Interaction EEA479 |  |  |
|  |  |  |  | 行動終端之相機Apps程式開發EEA481 | 電力電子Power Electronics EEA344 | 物聯網應用技術與實作(二)IoT Ecosystem and applications(II)EEA495 |  |
|  |  |  |  | 智慧系統設計與開發Design and Development of Smart Systems EEA488 | 微感測器及感測電路設計Design on Micro-Sensor and Sensor Circuits EEA483 |  |  |
|  |  |  |  | 生物醫學工程概論Biomedical EnginEEAringEEA489 | 次系統實作System Design and ImplementationEEA487 |  |  |
|  |  |  |  | 工程應用生理學BioenginEEAring PhysiologyEEA492 | 醫學輔助系統Medical DevicesEEA490 |  |  |
|  |  |  |  | 無人載具控制Control of Unmanned VehiclesEEA491 | 醫學電機概論Introduction to Medical Electrical EnginEEAringEEA493 |  |  |
|  |  |  |  |  | 物聯網應用技術與實作(一)IoT Ecosystem and applications( I)EEA494 |  |  |
| 備註Remarks | 1. 必選修課程：線性代數、電機專題(2)、數位信號處理概論(2)

Course requirement: Linear Algebra、Electrical Topics (2)、Introduction to Digital Signal Processing (2)1. 未特別註明學分數之科目皆為3學分

Those courses without specific marking are worth 3 credit hours.1. 研究所基礎專業課程，大學部大三以上學生可以修習，若超過選課人數，則以研究生優先選課。可選修科目如下

控制組：EEA505線性系統理論、EEA532模糊控制、EEA600類神經網路、EEA636信號偵測、EEA641汽車電子、EEA661進階電力系統、EEA662輸配電系統、EEA663配電系統模擬、EEA668電源轉換器設計、EEA669多目標控制。數位科技組：EEA507影像處理、EEA647家庭網路傳輸標準、EEA655高等計算機數學、EEA658次世代網路專題與應用實作。電子組：EEA531VLSI信號處理、EEA580類比積體電路設計、EEA588數位VLSI設計。Courses of master’s level are opened to junior and senior year of undergraduates. When the number of registrations students exceeds the capacity of the class, the priority will be given to the graduate student.Control Group：EEA505 Linear System Theory,EEA532 Fuzzy Control,EEA600 Neural Network,EEA636 Signal Detection,EEA641 Vechicular Electronic System,EEA661 Advanced Power Systems,EEA662 Electric Power Transmission and Distribution Systems,EEA663 Modeling and Simulation of Power Distribution Systems,EEA668 Power Conversion Design,EEA669 Multiobjective Control.Digital Technology Group：EEA507 Image Processing,EEA647 Transmission Standards of Digital Home Network,EEA655 Advanced Computer Mathematics,EEA658 Special topics on next generation network and network implementation.Electronic Group：EEA531 VLSI Signal Processing,EEA580 Analog IC Design,EEA588 Digital VLSI Design. |

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