**元智大學 工程學院英語學士班 必選修科目表**

**International Bachelor Program in Engineering at Yuan Ze University**

**List of Required Courses**

**（109學年度入學新生適用）**

**(Applicable to Students Admitted in Academic Year of 2020)**

109.05.06一○八學年度第六次教務會議通過

Passed by the 6th Academic Affairs Meeting, Academic Year 2019, on May 06, 2020

109.11.11 一○九學年度第二次教務會議修訂通過

Amended by the 2nd Academic Affairs Meeting, Academic Year 2019, on November 11, 2020

109.11.11 一○九學年度第二次教務會議修訂通過

Amended by the 2nd Academic Affairs Meeting, Academic Year 2020, on November 11, 2020

110.05.05 一○九學年度第五次教務會議修訂通過

Amended by the 5th Academic Affairs Meeting, Academic Year 2020, on May 05, 2021

111.04.20 一一○學年度第六次教務會議修訂通過

Amended by the 6th Academic Affairs Meeting, Academic Year 2021, on April 20, 2022

111.06.01 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 2021, on June 01, 2022

111.11.16 一一一學年度第二次教務會議修訂通過

Amended by the 2nd Academic Affairs Meeting, Academic Year 2022, on November 16, 2022

112.04.19 一一一學年度第六次教務會議修訂通過

Amended 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通過

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

112.11.22 一一二學年度第五次教務會議通過

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

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| --- | --- | --- | --- | --- |
| 學年Academic Year學期Semester科目Subject | 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University Compulsory（21） | 國文(一)Chinese (I)（2） | 國文(二)Chinese (II)（2） |  |  |  |  |  |  |
| 英語(一)English (I)（2） | 英語(二)English (II)（2） |  |  |  |  |  |  |
| 程式語言共4學分，依各院修課規則辦理。(開課名稱：基礎程式設計★)Fundamental Computer Programming is a four-credit course. For those who would like to registered “Fundamental computer programming”, he/she has to meet the college requirement.. (Course Name: Fundamental Computer Programming) |
| 外語課程應依「通識外語修課規定」修習，共計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，應修習主題式英語課程三學期5學分，畢業前需修畢三個不同英語課程，始取得畢業資格。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」，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。
3. 另開設「英語檢定」計一學期1學分，「英語檢定」之修課限制與注意事項，請參照「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「英語檢定」修課規定。凡本校大學部外國學生(不含交換生)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」、「華語五」、「華語六」，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」。The undergraduate students must complete 10 required credits of foreign language courses as follows:* English (I), (II): 4 credits
* English thematic course: 5 credits
* English Test: 1 credit

English (I) and (II) are 4 credits elementary courses for the freshmen who are grouped on English competence-based to complete within two semesters.English thematic courses are 5-credit of English courses; students are required to obtain 5 credits through 3 different thematic courses for graduation.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, exchange students excluded, must score 60 points or higher to pass Mandarin Chinese (I) and (II) before taking Mandarin Chinese (III), (IV), (V), and (VI). Students must score 60 points or higher in Mandarin Chinese (III) and (IV) before taking Mandarin Chinese (V) and (VI).英語檢定English Testing(1)、經典五十Fifty Canonized Books(2)、服務學習Service Learning(1) |
| 體育Physical Education(0) | 體育Physical Education(0) | 體育Physical Education(0) | 體育Physical Education(0) |  |  |  |  |
| 體育除修習大一至大二4個學期外，另需通過「游泳能力檢定」及「心肺適能檢定」等二項檢測，列為畢業門檻。Beside taking PE courses for 4 semesters (Year 1 to 2), students must pass both swimming and cardiopulmonary function tests. |
| 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：工程學院英語學士班學生仍須於四大領域中選課。Undergraduates of International Programs in the Colleges of Engineering are required to take a 2-credit course from the four categories. |
| 必修科目Department Compulsory (35)★ | 微積分(一)Calculus(I)DE101(3)★ | 微積分(二)Calculus(II)DE102 (3)★ | 數量方法Quantitative MethodsDE202 (3) ★ | 工程專題討論(一)Special Topics in Engineering (I) DE201(2)★ |  | 工程專題討論(二)Special Topics in Engineering (II)DE301(2)★ |  |  |
| 基礎程式設計實驗(一)Computer Programming Lab.(I)DE103(1)★ | 基礎程式設計實驗(二)Computer Programming Lab.(II)DE104(1)★ |  |  |  |  |  |  |
| 化工與材科概論Introduction to Chemical Engineering & Materials Science DE105(3)★ | 普通物理General PhysicsDE108(3)★ |  |  |  |  |  |  |
| 工業工程概論Introduction to Industrial EngineeringDE106(3)★ | 機械工程概論Introduction to Mechanical EngineeringDE110(3)★ |  |  |  |  |  |  |
| 普通化學General ChemistryDE107(3)★ | 生技與生醫概論Introduction to Biotechnology and Biomedicine DE111(3)★ |  |  |  |  |  |  |
| 工程圖學Engineering DrawingDE211 (2)★ |  |  |  |  |  |  |  |
| 學期學分小計Credit each semester | 15 | 13 | 3 | 2 | - | 2 |  |  |
| 備註Remarks | 1. 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。

Please refer to Yuan Ze University Common Required Course List for General Education course information and regulations.1. 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 maximum credits for general education courses are 10, the exceeding credits will not be counted.1. 英語授課課程以「★」表示，包含程式語言4學分、通識教育科目10學分、必修科目35學分及領域必修25-42學分。

「★」：The credits granted by English-taught courses include 4 credits from Computer Programming, 10 credits from General Education, 35 credits from the department required courses and 25 to 42 credits from the program required courses1. 本班必修課程初次修課須在本學程修讀始予承認。

The compulsory courses have to be taken from the International Bachelor Program in Engineering for the first time.1. 本班同學須自「機械工程」、「化學工程與材料科學」及「工業工程與管理」三個領域中選擇「主修學程」(三選一)或「雙專長學程」(三選二)，並修滿128學分方可畢業。

Students must choose one major as a「single major」from three fields (i.e., Department of Mechanical Engineering, Department of Chemical Engineering and Materials Science, and Department of Industrial Engineering and Management) or complete two sets of these three fields as a 「double major」. Minimum credits for graduation: 128 credits.* 「主修學程」領域必修/選修科目請參見附表一。(Annex I-「single major」List of Required and Elective Courses)
* 「雙專長學程」領域必修/選修科目請參見附表二。(Annex II-「double major」List of Required and Elective Courses)
1. 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), which courses and credits waiver and transference should be standardized by each department.7. 赴本班所簽訂境外大學修讀雙學位之學生，得申請非本班修讀之必修學分抵免，至多12學分，並於修課前提 出。 Students pursuing a dual degree program at an overseas university partnered with our program may apply for a  maximum of 12 credits of exemption for required courses taken outside our program, and submit an application before  enrolling in the courses |

AA-CP-04-CF02 (1.3 版)／102.04.19 修訂

AA-CP-04-CF05 (1.2 版)／101.11.15 修訂

**【附表一】：「主修學程」領域必修/選修科目表**

**主修學程：機械工程**

**Single major: Mechanical Engineering**

| 學年Academic Year學期Semester科目Subject | 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 |
| 必修科目CompulsoryCourses(32) |  |  | 工程數學(一)Engineering Mathematics(I)DE212 (3)★ | 工程數學(二)Engineering Mathematics(II)DE217 (3)★ | 機械設計(一)Mechanical Design(I)DE311(3)★ | 機動學MechanismsDE313 (3)★ | 專業實習課程3選1註3Internship Courses(Remarks #3) |  |
|  |  | 熱力學(一)Thermodynamics (I)DE213 (3)★ | 材料力學Mechanics of MaterialsDE218 (3)★ | 流體力學Fluid MechanicsDE312 (3)★ | 自動控制Automatic ControlDE314 (3)★ |  |
|  |  | 應用力學-靜力Applied Mechanics StaticsDE216 (3)★ | 機械畫Mechanical DrawingDE214(2)★ |  |  | 議題導向實作專題課程註5Topic and Implementation-oriented courses(3) (Remarks #5) |  |
| 學期學分小計Credit each semester | - | - | 9 | 8 | 6 | 6 | 3 | - |
| 選修科目Elective Courses(13) |  |  | 機械製造Introduction to Manufacturing ProcessesME303 (3) | 工程材料Engineering MaterialsME115(3) | 應用力學-動力Applied Mechanics DynamicsME214(3)  | 機械設計(二)Mechanical Design(II)ME310(3)★ | 可程式控制Sequential Programmable ControlME415 (3) | 太陽能電池Solar CellME486 (3) |
|  |  | 科技英文閱讀與報告Technical Reading and ReportDE302(3)★ | 熱力學(二)Thermodynamics(II)ME209(3) | 電路及電子學Introduction to Electric Circuits and ElectronicsME224(3)  | 熱傳學Heat TransferME322(3) ★ | 半年專業實習Advanced Field StudyME453 (6) | 電子冷卻技術Electronic Cooling TechniquesME608(3) ★ |
|  |  | 學術英文Academic EnglishDE205(3) ★ | 材料科學Materials ScienceDE121(3)★ME205(2) | 數值分析Numerical Analysis ME345(3) | 機械系統分析Analysis of Mechanical SystemME386 (3) | 專利分析Patent AnalysisME478 (3) | 機電整合Mechatronics IntegrationME411(3) |
|  |  |  | 綠色人因工程Green ErgonomicsDE203(3)★ | 綠色能源專題實作Projects for Green EnergyME387(3) ★ | 電腦輔助分析Computer-Aided Engineering AnalysisME318(3) | 感測器原理與應用Sensor Principles and ApplicationsME385 (3) | 應力分析實務Practice of Stress Analysis ME476(3) |
|  |  |  | 實驗設計Experimental DesignDE204(3)★ | 電腦機械繪圖Computer-Aided DraftingME444(3)  |  | 可壓縮流學Compressible FlowME601(3)★ | 微機電製程與設備概論Introduction of the Micro Electro Mechanical Systems: Processes and FacilitiesME471(3) |
|  |  |  |  |  |  | 自動化機械設計Machine Design PracticeME441(3) |  |
| 備註Remarks | 1. 英語授課課程以「★」表示。「★」shows the course is taught in English.
2. 選修應至少修畢本專長選修科目表課程共計13學分。Students must complete 13 credits for professional elective courses of the Mechanical Engineering program.
3. 專業實習課程需3選1。【暑期專業實習(0)、學士論文(0)、半年專業實習(6)，不限年級皆可修課】。For three courses of “Summer Internship (0) ” ; “Bachelor Thesis (0)” and “Advanced Field Study (6)”, please choose one of the three courses for the required course credits. It’s not required for a grade.
4. 本專長終端學習課程：「機械設計(一)」(DE311)。

The experiential learning course：“Mechanical Design I “ (DE311).1. 本專長「議題導向實作專題課程」必修3學分(需6選1)【機械系統分析(ME386)、綠色能源專題實作(ME387)、機電整合(ME411)、可程式控制(ME415)、專利分析(ME478) 及自動化機械設計(ME441)】

Analysis of Mechanical System ME386(3), Projects for Green Energy ME387(3), Mechatronics Integration ME411(3), Sequential Programmable Control ME415(3), Patent Analysis ME478(3), Machine Design Practice ME441(3) are courses of 'Topic and Implementation-oriented courses'. Please choose one course for the required course credits.1. 本專長「數位應用相關課程｣包括：機械畫(DE214)、電腦輔助分析(ME318)、電腦機械繪圖(ME444)、數值分析(ME345)及應力分析實務(ME476)，畢業前須修習至少2門「數位應用相關課程」(可至本班或外系修習)。

Mechanical Drawing DE214 (2)**,** Computer-Aided Engineering Analysis (ME318),Computer-Aided Drafting ME444(3), Numerical Analysis ME345 (3~~) ,~~ Practice of Stress Analysis ME476 (3)  are courses of 'digital application courses'. Students are required to take at least two 'digital application courses'. (Student may take 'digital application courses' from another department.) |

**主修學程：化學工程與材料科學**

**Single major: Chemical Engineering and Materials Science**

| 學年Academic Year學期Semester科目Subject | 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 |
| 必修科目CompulsoryCourses(30) |  |  | 普通物理(一)General Physics (I)DE231 (3)★ | 輸送現象與單元操作(一)Transport Phenomena and Unit Operations (I) DE235 (3)★ | 輸送現象與單元操作(二)Transport Phenomena and Unit Operations (II) DE331 (3)★ | 化學反應工程Chemical Reaction Engineering DE332 (3)★ | 創新工程系統與元件設計Innovative Engineering System and Component DesignDE431 (3)★ |  |
|  |  | 有機化學(一)Organic Chemistry (I)DE232 (3)★ | 材料科學Materials ScienceDE121 (3)★ |  |  |  |  |
|  |  | 物理化學(一)Physical Chemistry (I)DE233 (3)★ | 物理化學(二)Physical Chemistry (II)DE236 (3)★ |  |  |  |  |
|  |  | 質能均衡Material & Energy BalanceDE234 (3)★ |  |  |  |  |  |
| 學期學分小計Credit each semester |  |  | 12 | 9 | 3 | 3 | **3** |  |
| 選修科目Elective Courses(15) |  |  | 工程數學(一)Engineering Mathematics(I)DE212 (3)★ | 有機化學(二)Organic Chemistry (II)CH231(3) | 應用生物化學Applied Biochemistry CH344(3)  | 高等輸送現象Advanced Transport PhenomenaCH501 (3) ★ | 高等化工熱力學Advanced Chemical Engineering ThermodynamicsCH514 (3) ★ |
|  |  | 科技英文閱讀與報告Technical Reading and ReportDE302(3)★ | 工程數學(二)Engineering Mathematics (II)DE217 (3)★CH233(3) | 化工熱力學Chemical Engineering Thermodynamics CH304(3)  | 複合材料Composite MaterialsCH421(3) | 高等化工動力學Advanced Chemical Engineering KineticsCH503 (3) ★ | 高分子物理Polymer PhysicsCH527 (3) ★ |
|  |  | 學術英文Academic EnglishDE205(3) ★ | 計算機程式(一)Computer Programming (1)CH115 (3)  | 高分子物性Polymer PhysicsCH 336(3) | 輸送現象與單元操作（三）Transport Phenomena and Unit Operations(III) CH302(3) | 實驗設計Design for ExperimentalCH511 (3) ★ | 物理冶金Physical MetallurgyCH617 (3) ★ |
|  |  |  | 電子材料概論Introduction to Electronic MaterialCH222(3) | 光電概論Introduction to Opto-ElectronicsCH346(3) | 生物材料BiomaterialsCH461(3) | 高等儀器分析Advanced Instrumental AnalysisCH525 (3) ★ | 無機奈米材料Inorganic NanomaterialsCH568 (3) ★ |
|  |  |  | 無機化學Inorganic ChemistryCH345(3) | 尖端能源技術Sustainable Energy TechnologiesCH465 (3) | 無機材料Inorganic MaterialsCH448 (3) | 藥物制放特論Special Topics on Controlled Drug ReleaseCH535 (3) ★ | 鋰電池材料與製程技術Materials and Processing of Lithium BatteryCH701 (3) ★ |
|  |  | 普通化學暨分析實驗General Chemistry & Analysis LaboratoryCH105 (1) | 專題研究(一)Research Project (I)CH335(1) ★ | 生物技術與基因工程Biotechnology and Genetic EngineeringBI554(3) | 材料分析技術與應用Technique and Applications of Material AnalysisCH451(3) |
|  |  |  | 綠色人因工程Green ErgonomicsDE203(3)★ | 物理化學與材料實驗Physical Chemistry & Materials LaboratoryCH227 (1) | 高分子加工Polymer ProcessingCH420(3) | 應用電化學Applied ElectrochemistryCH456(3) |
|  |  |  | 實驗設計Experimental DesignDE204(3)★ | 微生物學特論Special Topics in MicrobiologyBI507(3) ★ |  |   | 產品與程序設計Product and process designCH402 (3) |
|  |  |  |  | 細胞生物學Cell BiologyBI509(3)★ |  |  |  |
|  |  |  |  |  | 分子生物學Molecular Biology BI506(3) ★ |  |  |
| 備註Remarks | * + - 1. 選修科目至少應選修15學分(含)以上，且此15學分均要求及格。

Complete (Pass) a minimum of 15 credit hours of the elective courses. * + - 1. 英語授課課程以「★」表示。「★」shows the course is taught in English.
			2. 終端學習課程：「創新工程系統與元件設計」(DE431)。

The experiential learning course：“Innovative Engineering System and Component Design” (DE431)* + - 1. 「創新工程系統與元件設計」課程(DE431)為本專長必修「議題導向實作專題課程」3學分。

“Innovative Engineering System and Component Design” (DE431) is a compulsory three-credit course of "Topic and Implementation-oriented courses".1. 「材料科學」課程(DE121)、「創新工程系統與元件設計」課程(DE431)為本專長「數位應用相關課程｣，畢業前須通

過至少2門「數位應用相關課程」(可至本班或外系修習)。“Materials Science” (DE121) and “Innovative Engineering System and Component Design” (DE431) are courses of 'digital application courses'. Students require passing at least two 'digital application courses'. (Student may take 'digital application courses' from another department.) |

**主修學程：工業工程與管理**

**Single major: Industrial Engineering and Management**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 學年Academic Year學期Semester科目Subject | 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 |
| 必修科目CompulsoryCourses (25) |  |  | 人因工程(一) Human Factors(I)DE251(3)★ | 線性代數(含演習) Linear AlgebraDE252(4)★ | 作業研究(一) Operations Research(I)DE351 (3)★ | 作業研究(二) Operations Research(II)DE352 (3)★ | 畢業專題(一)Graduation Project(I)DE451(3)★ | 畢業專題(二) Graduation Project(II)DE452(3)★ |
|  |  | 生產計劃與管制(一) Production Planning and Control(I)DE353 (3)★ | 生產計劃與管制(含實驗)(二) Production Planning and Control(II)DE354 (3)★ |  |  |  |  |
| 學期學分小計Credit each semester | - | - | 6 | 7 | 3 | 3 | 3 | 3 |
| 選修科目Elective Courses(20) | 問題創意思解Creative Problem SolvingIE232 (2) | 工作研究Work StudyIE211 (3) | 科技英文閱讀與報告Technical Reading and ReportDE302(3)★ | 網路資訊應用Network Information ApplicationIE212 (3) | 機率分析Probabilistic AnalysisIE533 (3)★ | 研究方法Research MethodologyIE233 (2) | 全球運籌管理Global Logistics ManagementIE576 (3)★ | 資料視覺Data VisualizationIE574 (3)★ |
|  |  | 學術英文Academic EnglishDE205(3) ★ | 工程溝通Engineering CommunicationsIE231 (2) | 品質管制(含實驗) Quality Control (Lab)IE350 (3) | 設施規劃(含實驗) Facilities PlanningIE349 (3) | 實驗設計Experimental Design and ApplicationsIE538 (3) | 虛擬實境系統設計與建構Design and Construction of Virtual Reality SystemsIE619 (3)★ |
|  |   |  | 工程統計（二）Engineering StatisticsIE204 (3) | 卓越經營管理Managing for Business Excellence IE622(3) ★ | 應用統計分析Applied Statistical AnalysisIE304 (3) | 服務系統設計Service Systems DesignIE581 (3)★ | 存貨系統與管制Inventory Systems and ControlIE517 (3)★ |
|  |  |  | 系統模擬與應用System Simulation and ApplicationsIE247(3) | 3D視覺模擬和虛擬實境3D Visual Simulation and Virtual RealityIE562 (3) ★ | 優使性工程Usability EngineeringIE624 (3)★ | 啟發式最佳化Heuristic OptimizationIE607 (3)★ |  |
|  |  |  | 服務工程Service EngineeringIE245(3) | 專案管理Project ManagementIE375 (3) | 數學規劃（一）Mathematical Programming (I)IE507 (3)★ | 模擬學SimulationIE503(3)★ |  |
|  |  |  | 綠色人因工程Green ErgonomicsDE203(3)★ |  | 物料管理Material ManagementIE322 (3) | 生產排程Production SchedulingIE534(3)★ |  |
|  |  |  | 實驗設計Experimental DesignDE204(3)★ |  |  |  |  |
| 備註Remarks | 1. 選修應至少修畢本專長選修科目表課程共計20學分。

Elective courses should be completed the professional elective courses at least of 20 credits. 1. 英語授課課程以「★」表示。「★」shows the course is taught in English.
2. 終端學習課程：畢業專題(一)、畢業專題(二) 。

The experiential learning courses：”Graduation Project(I)、(II)".1. 人因工程(一) (DE251)課程為本專長必修「議題導向實作專題課程」3學分。

“Human Factors (I) “(DE251) is a compulsory three-credit course of "Topic and Implementation-oriented courses".1. 網路資訊應用課程(IE212)、系統模擬與應用(IE247)、模擬學(IE503)、3D視覺模擬和虛擬實境(IE562)、資料視覺 (IE574)及虛擬實境系統設計與建構 (IE619) 課程為本專長「數位應用相關課程｣，畢業前須通過至少2門「數位應用相關課程」(可至本班或外系修習)。

Network Information Application (IE212), System Simulation and Applications (IE247), Simulation (IE503), 3D Visual Simulation and Virtual Reality(IE562), Data Visualization (IE574) and Design and Construction of Virtual Reality Systems (IE619) are courses of 'digital application courses'. Students require passing at least two 'digital application courses'. (Student may take 'digital application courses' from another department.) |

**【附表二】：「雙專長」領域必修/選修科目表**

**雙專長：機械工程**

**Double major: Mechanical Engineering**

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| --- | --- | --- | --- | --- |
| 學年Academic Year學期Semester科目Subject | 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 |
| 必修科目CompulsoryCourses(24) |  |  | 熱力學(一)Thermodynamics (I)DE213 (3)★ |  | 機械設計(一)Mechanical Design(I)DE311 (3)★ | 機動學MechanismsDE33 (3)★ | 議題導向實作專題課程註3Topic and Implementation-oriented courses(3) (Remarks #3) |  |
|  |  | 工程數學(一)Engineering Mathematics(I)DE212 (3)★ |  | 流體力學Fluid MechanicsDE312 (3)★ | 自動控制Automatic ControlDE314 (3)★ |  |
|  |  | 應用力學-靜力Applied Mechanics Statics DE216 (3)★ |  |  |  |  |
| 學期學分小計Credit each semester | - | - | 9 | - | 6 | 6 | 3 | - |
| 選修科目Elective Courses (4) |  |  | 機械製造Introduction to Manufacturing ProcessesME303 (3) | 工程材料Engineering MaterialsME115(3) | 應用力學-動力Applied Mechanics DynamicsME214(3) | 機械設計(二)Mechanical Design(II)ME310(3)★ | 半年專業實習Advanced Field StudyME453(6) | 應力分析實務Practice of Stress Analysis ME476(3) |
|  |  | 科技英文閱讀與報告Technical Reading and ReportDE302(3)★ | 熱力學(二)Thermodynamics(II)ME209(3) | 電路及電子學Introduction to Electric Circuits and ElectronicsME224(3) | 機械系統分析Analysis of Mechanical SystemME386 (3) | 可程式控制Sequential Programmable ControlME415 (3) | 機電整合Mechatronics IntegrationME411(3) |
|  |  | 學術英文Academic EnglishDE205(3) ★ | 材料力學Mechanics of MaterialsDE218 (3)★ME309 (3) | 數值分析Numerical AnalysisME345(3) | 電腦輔助分析Computer-Aided Engineering AnalysisME318(3) | 自動化機械設計Machine Design PracticeME441(3) |  |
|  |  |  | 機械畫Mechanical DrawingDE214 (2)★ME475 (2) | 綠色能源專題實作Projects for Green EnergyME387(3) ★ |  | 專利分析Patent AnalysisME478 (3) |  |
|  |  |  | 綠色人因工程Green ErgonomicsDE203(3)★ | 電腦機械繪圖Computer-Aided DraftingME444(3)  |  |  |  |
|  |  |  | 實驗設計Experimental DesignDE204(3)★ |  |  |  |  |
| 備註Remarks | 1. 選修應至少修畢本專長選修科目表課程共計4學分。

Students must complete 4 credits for professional elective courses of the Mechanical Engineering program. 1. ~~選修~~英語授課課程以「★」表示。「★」shows the course is taught in English.
2. 本專長終端學習課程：「機械設計(一)」(DE311)。

The experiential learning course：“Mechanical Design I“ (DE311).1. 本專長「議題導向實作專題課程」必修3學分(需6選1)【機械系統分析(ME386)、綠色能源專題實作(ME387)、機電整合(ME411)、可程式控制(ME415)、專利分析(ME478) 及自動化機械設計(ME441) 】。

Analysis of Mechanical System ME386(3), Projects for Green Energy ME387(3), Mechatronics Integration ME411(3), Sequential Programmable Control ME415(3), Patent Analysis ME478(3), Machine Design Practice ME441(3) are courses of 'Topic and Implementation-oriented courses'. Please choose one course for the required course credits.1. 本專長「數位應用相關課程｣包括：機械畫(DE214)、電腦輔助分析(ME318)、電腦機械繪圖(ME444)、數值分析(ME345)及應力分析實務(ME476)，畢業前須修習至少2門「數位應用相關課程」(可至本班或外系修習)。

Mechanical Drawing DE214 (2)**,** Computer-Aided Engineering Analysis (ME318),Computer-Aided Drafting ME444(3), Numerical Analysis ME345 (3) , Practice of Stress Analysis ME476 (3)  are courses of 'digital application courses'. Students are required to take at least two 'digital application courses'. (Student may take 'digital application courses' from another department.) |

**雙專長：化學工程與材料科學**

**Double major: Chemical Engineering and Materials Science**

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| --- | --- | --- | --- | --- |
| 學年Academic Year學期Semester科目Subject | 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 |
| 必修科目CompulsoryCourses (18) |  |  | 物理化學(一)Physical Chemistry (I)DE233 (3)★ | 物理化學(二)Physical Chemistry (II)DE236 (3)★ |  | 化學反應工程Chemical Reaction Engineering DE332 (3)★ | 創新工程系統與元件設計Innovative Engineering System and Component DesignDE431 (3)★ |  |
|  |  | 質能均衡Material & Energy BalanceDE234 (3)★ | 材料科學Materials ScienceDE121 (3)★ |  |  |  |  |
| 學期學分小計Credit each semester | - | - | **6** | **6** |  | **3** | **3** | **-** |
| 選修科目Elective Courses (9) |  |  | 有機化學(一)Organic Chemistry (I)DE232 (3)★CH230 (3) | 有機化學(二)Organic Chemistry (II)CH231(3)★ | 應用生物化學Applied Biochemistry CH344(3)  | 高等輸送現象Advanced Transport PhenomenaCH501 (3) ★ | 高等化工熱力學Advanced Chemical Engineering ThermodynamicsCH514 (3) ★ |
|  |  | 工程數學(一)Engineering Mathematics (I)DE212 (3)★CH232(3) | 工程數學(二)Engineering Mathematics (II)DE217 (3)★CH232(3) | 化工熱力學Chemical Engineering Thermodynamics CH304(3)  | 複合材料Composite MaterialsCH421(3) | 高等化工動力學Advanced Chemical Engineering KineticsCH503 (3) ★ | 高分子物理Polymer PhysicsCH527 (3) ★ |
|  |  | 科技英文閱讀與報告Technical Reading and ReportDE302(3)★ | 輸送現象與單元操作(一)Transport Phenomena and Unit Operations (I) DE235 (3)★CH218 (3) | 輸送現象與單元操作(二)Transport Phenomena and Unit Operations (II) DE331 (3)★CH301 (3) | 輸送現象與單元操作（三）Transport Phenomena and Unit Operations(III) CH302(3) | 實驗設計Design for ExperimentalCH511 (3) ★ | 物理冶金Physical MetallurgyCH617 (3) ★ |
|  |  | 學術英文Academic EnglishDE205(3) ★ | 計算機程式(一)Computer Programming (1)CH115 (3) ~~★~~ | 高分子物性Polymer PhysicsCH 336(3) | 生物材料BiomaterialsCH461(3) | 高等儀器分析Advanced Instrumental AnalysisCH525 (3) ★ | 無機奈米材料Inorganic NanomaterialsCH568 (3) ★ |
|  |  |  | 電子材料概論Introduction to Electronic MaterialCH222(3) | 光電概論Introduction to Opto-ElectronicsCH346(3) | 無機材料Inorganic MaterialsCH448 (3) | 藥物制放特論Special Topics on Controlled Drug ReleaseCH535 (3) ★ | 鋰電池材料與製程技術Materials and Processing of Lithium BatteryCH701 (3) ★ |
|  |  |  | 無機化學Inorganic ChemistryCH345(3) | 尖端能源技術Sustainable Energy TechnologiesCH465 (3) |  | 生物技術與基因工程Biotechnology and Genetic EngineeringBI554(3) | 材料分析技術與應用Technique and Applications of Material AnalysisCH451(3) |
|  |  |  | 綠色人因工程Green ErgonomicsDE203(3)★ | 專題研究(一)Research Project (I)CH335(1) ★ | 高分子加工Polymer ProcessingCH420(3) | 應用電化學Applied ElectrochemistryCH456(3) |
|  |  |  | 實驗設計Experimental DesignDE204(3)★ | 微生物學特論Special Topics in MicrobiologyBI507(3) ★ |  |   | 產品與程序設計Product and process designCH402 (3) |
|  |  |  |  | 細胞生物學Cell BiologyBI509(3)★ |  |  |  |
|  |  |  |  |  | 分子生物學Molecular Biology BI506(3) ★ |  |  |
| 備註Remarks | 1. 選修科目至少應選修9學分(含)以上，且此9學分均要求及格。

Complete (Pass) a minimum of 9 credit hours of the elective courses. 1. 英語授課課程以「★」表示。「★」shows the course is taught in English.
2. 終端學習課程：「創新工程系統與元件設計」(DE431)。

The experiential learning courses：“Innovative Engineering System and Component Design” (DE431)1. 「創新工程系統與元件設計」課程(DE431)為本專長必修「議題導向實作專題課程」3學分.

“Innovative Engineering System and Component Design” (DE431) is a compulsory three-credit course of "Topic and Implementation-oriented courses".1. 「材料科學」課程(DE121)、「創新工程系統與元件設計」課程(DE431)為本專長「數位應用相關課程｣，畢業前須通過至少2門「數位應用相關課程」(可至本班或外系修習)。

“Materials Science” (DE121) and “Innovative Engineering System and Component Design” (DE431) are courses of 'digital application courses'. Students require passing at least two 'digital application courses'. (Student may take 'digital application courses' from another department.) |

**雙專長：工業工程與管理**

**Double major: Industrial Engineering and Management**

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| 學年Academic Year學期Semester科目Subject | 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 |
| 必修科目CompulsoryCourses(16) |  |  | 人因工程(一) Human Factors(I)DE251 (3)★ | 線性代數(含演習)Linear AlgebraDE252 (4)★ | 作業研究(一)Operations Research(I)DE351 (3)★ |  | 畢業專題(一) Graduation Project(I)DE451 (3)★ |  |
|  |  | 生產計劃與管制(一) Production Planning and Control(I)DE353 (3)★ |  |  |  |  |  |
| 學期學分小計Credit each semester | - | - | 6 | 4 | 3 | - | 3 | - |
| 選修科目Elective Courses(12) | 問題創意思解Creative Problem SolvingIE232 (2) | 工作研究Work StudyIE211 (3) | 科技英文閱讀與報告Technical Reading and ReportDE302(3)★ | 網路資訊應用Network Information ApplicationIE212 (3) | 機率分析Probabilistic AnalysisIE533 (3) ★ | 作業研究(二) Operations Research(II)DE352 (3) ★IE329(3) | 全球運籌管理Global Logistics ManagementIE576 (3)★ |  |
|  |  | 學術英文Academic EnglishDE205(3) ★ | 生產計劃與管制(含實驗)(二) Production Planning and Control(II)IE354 (3) ★ | 品質管制(含實驗) Quality Control (Lab)IE350 (3) | 研究方法Research MethodologyIE233 (2) | 實驗設計Experimental Design and ApplicationsIE538 (3) |  |
|  |  |  | 工程溝通Engineering CommunicationsIE231 (2) | 卓越經營管理Managing for Business ExcellenceIE622(3) ★ | 設施規劃(含實驗) Facilities PlanningIE349 (3) | 服務系統設計Service Systems DesignIE581 (3)★ | 資料視覺Data VisualizationIE574 (3)★ |
|  |  |  | 工程統計（二）Engineering StatisticsIE204 (3) | 3D視覺模擬和虛擬實境3D Visual Simulation and Virtual RealityIE562 (3) ★ | 應用統計分析Applied Statistical AnalysisIE304 (3) | 啟發式最佳化Heuristic OptimizationIE607 (3)★ | 虛擬實境系統設計與建構Design and Construction of Virtual Reality SystemsIE619 (3)★ |
|  |  |  | 系統模擬與應用System Simulation and ApplicationsIE247(3) | 專案管理Project ManagementIE375 (3) | 優使性工程Usability EngineeringIE624 (3)★ | 模擬學SimulationIE503(3)★ | 存貨系統與管制Inventory Systems and ControlIE517 (3)★ |
|  |  |  | 服務工程Service EngineeringIE245(3) |  | 數學規劃（一）Mathematical Programming (I)IE507 (3)★ | 生產排程Production SchedulingIE534(3)★ |  |
|  |  |  | 綠色人因工程Green ErgonomicsDE203(3)★ |  | 物料管理Material ManagementIE322(3) |  |  |
|  |  |  | 實驗設計Experimental DesignDE204(3)★ |  |  |  |  |
| 備註Remarks | 1. 選修應至少修畢本專長選修科目表課程共計12學分。

Elective courses should be completed the professional elective courses at least of 12 credits. 1. 英語授課課程以「★」表示。「★」shows the course is taught in English.
2. 終端學習課程：畢業專題(一)

The experiential learning course：”Graduation Project(I)、(II)"1. 人因工程(一) (DE251)為本專長必修「議題導向實作專題課程」3學分。

“Human Factors (I) “(DE251), is a compulsory three-credit course of "Topic and Implementation-oriented courses".1. 網路資訊應用課程(IE212)、系統模擬與應用(IE247)、模擬學(IE503)、3D視覺模擬和虛擬實境(IE562)、資料視覺 (IE574)及虛擬實境系統設計與建構 (IE619) 課程為本專長「數位應用相關課程｣，畢業前須通過至少2門「數位應用相關課程」(可至本班或外系修習)。

Network Information Application (IE212), System Simulation and Applications (IE247), Simulation (IE503), 3D Visual Simulation and Virtual Reality (IE562), Data Visualization (IE574) and Design and Construction of Virtual Reality Systems (IE619) are courses of 'digital application courses'. Students require passing at least two 'digital application courses'. (Student may take 'digital application courses' from another department.) |