國立中山大學機械與機電工程學系碩博士班課程結構圖

National Sun Yat-sen University, Department of Mechanical and Electro-Mechanical Engineering, Curriculum Structure for Graduate Program

●108.12.18 經機電系 10805 系務會議通過第四次課程結構外審；109.3.3 經 1083 校課程委員會通過；109.3.11 第 163 次教務會議通過
●109.5.11 經 1084 校課程委員會通過；109.5.28 第 164 次教務會議通過
●109.11.24 經 1092 校課程委員會通過；109.12.15 第 166 次教務會議通過
●110.5.11 經 1094 校課程委員會通過；110.6.2 第 168 次教務會議通過
●110.12.7 經 1102 校課程委員會通過；110.12.28 第 170 次教務會議通過
●111.5.3 經 1104 校課程委員會通過；111.5.20 第 172 次教務會議通過
●112.5.9 經 11104 校課程委員會會議通過；112.5.24 第 176 教務會議通過
●113.5.7 經 11204 校課程委員會會議通過；113.5.30 第 180 教務會議通過
●114.3.12 經機電系 113-10 系務會議通過第五次課程結構外審
●114.04.24 經 113 學年度第 4 次校課程委員會會議審議通過
●114.05.12 經第 184 教務會議審議通過

必修 Compulsory	書　報　討　論 Seminar Session		
選修 Elective	專業科目 Professional Subjects		進階科目 Advanced Subjects
共同科目 Common Elective Courses	有限元素法 Finite Element Methods、實驗設計與分析 Design And Analysis of Experiments、最佳化理論 Optimization Theory、工程英文寫作 English Writing For Engineers		
熱流組 Thermofliuid Division	材料加工之運送現象 Transport Phenomena In Materials Processing 熱對流、固化過程 Heat Convection, Solidification Processing 數值分析 Numerical Analysis 微系統熱流模擬及設計 Microsystem Thermal hydraulics Simulation And Design 太陽能工程 Solar Energy Engineering 吸收式空調系統原理與分析 Absorption Cooling System Theories And Analysis 太陽能空調系統設計 Solar Cooling System Design 黏性流體、高等熱力學 Viscous Flow, Advanced Thermodynamics	計算流體力學及熱傳學 Computational Fluid Dynamics & Heat Transfer 可壓縮流 Compressible Flows 熱輻射導論 Introduction To Heat Radiation 燃燒理論 Combustion Theory 氫能與燃料電池原理與應用 Principles And Applications Of Hydrogen And Fuel Cells 流體進程之數學建模 Mathematical Modeling Of Fluid Processes 微機電系統熱傳 Micro-Electromechanical systems heat transfer 煉鋼製程設備技術導論 Introduction To The Facilities For Steel Making Process 能源工程與節能技術 Energy Engineering And Energy-Saving Techniques	銲接熱傳專題（一、二） Special Topics Welding Heat Transfer (I) (II) 能源系統暫態模擬方法專題（一、二） Independent Studies In Transient Simulation For Energy Systems (I) (II) 燃料電池系統專題（一、二） Special Topics In The Development Of Fuel Cell (I) (II) 燃燒與防火安全專題（一、二） Independent Studies In Combustion And Fire Safety (I) (II) 動力系統與能量管理專題（一、二） Independent Studies In Powertrain And Energy Management (I) (II) 熱流數值模擬應用專題 Independent Studies In Applications In Numerical Simulations To The Thermal-Fluid Problems 數值計算之工程運用專題 Independent studies In Engineering Applications By numerical computation 熱流與能源技術專題(一、二) Independent Studies in Thermal Fluids and Energy Research (I) (II)
固力組 Solid Mechanics Division	高等振動學、最佳化理論 Advanced Vibration, Optimization Theory 破壞力學、疲勞力學 Fracture Mechanics, Mechanics Of Fatigue 複合材料力學 Mechanics Of Composite Materials 彈性力學、實驗應力分析 Elasticity, Experimental Stress Analysis 塑性力學、塑性加工學 Plasticity, Plastic Working Technology 彈性波、超音波探傷 Elastic Waves, Ultrosonic Testing	有限元素法、計算結構力學 Finite Element Methods, Computation Structural Mechanics 微系統封裝與可靠度分析 Microsystems Packaging And Reliability Analysis 可靠度工程與應用 Reliability Engineering And Applications 微電子封裝之失效模式與效應分析 Failure Modes And Effect Analysis In Microelectronic Packages 仿生工程 Mimicking Nature In Engineering 進階仿生工程 Advanced Biomimicry Engineering 實驗設計與分析 Design And Analysis of Experiments	顯微力學 Micromechanics 數值解析加工學專題研討（一、二） Special Topics In Num. Anal. At Method (I) (II) 新近吸隔音材料之研製及聲學量測（一、二） The Recent Developments And Measurements Of Acoustic Materials (I) (II) 高階電子封裝專題（一、二） Special Topics In Advanced Electronic (I) (II) 仿生機械專題（一、二） Special Topics In Biomimetic Machines (I) (II) 先進複材結構設計專題（一、二） Independent Research On Advanced Composite Structure Design (I) (II) 微系統力學設計與分析專題(一、二) Independent Studies in Microsystem Mechanical Design and Analysis (I) (II) 虛實整合最佳化設計專題（一、二） Independent Studies in Cyber-Physical Optimization (I) (II)

控制組 **Control Division**	隨機過程與模式 Stochastic Processes And Modelling 模糊邏輯與控制 Fuzzy Logic And Control 機器視覺 Machine Vision 數位訊號處理 Digital Signal Processing 類神經網路概論 Introduction To Neural Networks 科技產業分析 Analysis Of Technological Industry 數位控制 Digital Control	非線性系統及控制 Nonlinear Systems And Control 強韌控制 Robust Control 機電整合實務 Mechatronic Dractice 人工智慧於臨床醫學照護實務 Artificial Intelligence In Clinical Medical Care Practice 深度學習理論與應用 Deep Learning Theory And Applications 感測器原理與應用 Sensor Principles And Applications 訊號與系統 Signals and Systems	非線性控制專題（一）、人機系統專題 Special Topics In Nonlinear Control (I), Special Topics In Manmachine Systems 類神經網路專題（一）、類神經網路專題（二） Special Topics In Neural Networks (I) (II) 人工智慧實務專題研討（一、二） Special Topics In Ai Practice (I) (II) 自動控制專題（一、二） Special Topics In Automatical Control (I) (II) 遙測影像專題、機器學習專題 Independent Studies In Remote Sensing Imaging, Independent Studies In Machine Learning 智慧感測專題、穿戴裝置專題 Independent Studies In Intelligent Sensing, Independent Studies In Wearable Devices
設計製造組 **Design And Manufacturing Division**	平面機構運動學 Kinematics Of Planar Mechanisms 電腦輔助幾何設計 Computer Aided Geometric Design 創造性機構設計 Creative Mechanism Design 工程設計方法 Engineering Design Methods 摩潤學 Tribology 奈米加工學 Nano Machining Technology 潤滑理論與應用 Theory And Application Of Lubrication 智慧機械設計 Smart Machine Design 精密機械設計 Precision Machine Design	機電傳動系統 Electro-Mechanical Transmission Systems 空間機構運動學 Kinematics Of Spatial Mechanisms 智慧製造與監測技術 Smart Manufacturing And Monitoring Technology 物聯網與大數據於智慧製造應用 Iot And Big Data Applications Of Smart Manufacturing Process 材料選擇與設計 Material Selection And Design 半導體微影設備概論 Introduction To Lithography Equipment And Systems For Semiconductor Manufacturing 產品生命週期評估 Product Lifecycle Assessment	系統化設計專題（一、二） Special Topics In Systematic Design (I) (II) 潤滑專題（一、二） Special Topics In Lubrication (I) (II) 幾何設計與製造專題（一、二） Special Topics In Computer-Aided Geometric Design (I) (II) 摩耗專題（一、二） Special Topics In Wear (I) (II) 機械動態分析專題 Independent Studies In Dynamic Analysis Of Machines 智慧致動系統專題 Independent Studies In Intelligent Actuator Systems 電化學技術專題 Independent Studies In Electrochemical Technology 薄膜製造專題 Independent Studies In Thin Film 智慧製造專題 Independent Studies In Intelligent Manufacturing 最佳化分析與應用專題 Independent Studies In Optimization Analysis and Application 奈米力學與材料設計專題（二） Independent Studies in Materials Design by Nanomechanics (II) **先進製造技術專題（一、二）** **Independent Studies In Advanced Manufacturing Techniques (I) (II)**
微奈米系統組 **Micro-Nano Systems Division**	薄膜製程技術、固態物理學 Thin Films Technology, Introduction To Solid State Physics 微奈米分析及檢測 Characterization And Sensing For Nano Technology 微致動器實務 Introduction To Microactuator Process 微奈米壓印設計製作 Nano-Imprint Technique 微機電系統設計、微奈米材料 Mems Design, Micro/Nano Materials 奈米元件原理及製程實務 Principle And Processing Practice Of Nano-Devices 微流體生物晶片系統 Microfluidic Biochip System	CMOS 微系統技術與應用 Cmos-Mems Technology And Its Applications 自發式微奈米獵能器 Micro/Nano-Scale Self-Generating Energy Harvesters 雷射微加工、微奈米傳感器 Laser Micro-Machining, Micro/Nano-Scale Transducers 計算機程式與應用 Computer Programming And Applications 工程英文寫作 English Writing For Engineers 微奈米生醫系統工程 Micro/Nano Biomedical Systems Engineering 先進功能材料於生命科學應用 Advanced Functional Materials For Life Science Applications 半導體製程設備與技術	生物晶片實務 Experiments In Biochip Technology 奈米科技專題（一、二） Special Topics In Nanotechnology (I) (II) 微流體系統專題 Special Topics In Microfluidic System 平行處理及計算（一、二） Parallel Processing And Computing (I) (II) CMOS 微系統設計專題（一、二） Independent Studies In Design And Fabrication Of Cmos-Mems (I) (II) 應用微奈米技術專題（一、二） Independent Studies In Applied Micro And Nano Technology (I) (II)

	奈米元件電腦輔助設計 Computer-Aided Design At Nano-Device 奈米尺度數值模擬理論介紹 Introduction To Numerical Simulation Method In Nano-Scale	Semiconductor Process Equipment And Technology 煉鋼製程設備技術導論 Introduction To The Facility For Steel Making Process	

◎**本系各組教師於所屬組別研究生畢業前，研究生在須修畢之最低畢業學分數中應包含依各組規定上述之組內講授類專業科目。**
熱流組：至少二科目 6 學分。
固力、控制組：至少三科目 9 學分。
設計製造組：至少三科目 9 學分或二科目 6 學分+一共同科目 3 學分。
微奈米系統組：至少四科目 12 學分。
◎碩士班最低畢業學分數：27，不含書報討論 2 學分。
◎博士班最低畢業學分數：18/學士班應屆畢業逕修讀博士學位者學分數：36/修業一年（含）以上碩士班在學研究生逕修讀博士學位者學分數：30，以上均不含書報討論 2 學分。
◎修畢各組規定之應修核心課程（包含基礎科目及專業科目）。

◎ **Before graduation, graduate students must complete the required number of lecture sessions as stipulated by their respective division. The minimum graduation credits for each division are as follows:**
Thermofluid Division: At least two subjects, 6 credits each.
Solid Mechanics Division/ Control Division: At least three subjects, 9 credits each.
Design and Manufacturing Division: At least three subjects, 9 credits each; or two subjects, 6 credits each, plus one common subject, 3 credits each.
Micro-Nano Systems Division: At least four subjects, 12 credits each.
◎ Minimum graduation credits for master’s degree: 27 credits, excluding 2 credits for Seminar session.
◎ Minimum graduation credits for doctoral programs: 18 credits. Bachelor's students who are graduating this year and pursuing a doctoral degree: 36 credits. Those who have completed one year (inclusive) or more of master’s courses and are studying for a doctoral degree: 30 credits. The above does not include 2 credits for Seminar session.
◎ Students should complete the required core courses (including basic subjects and professional subjects) stipulated by each division.