

Course Catalog (Required Subjects)

科目—中文名稱	Subjects—English Name
普通物理與實驗(一)	General Physics and Experiments (1)
普通物理與實驗(二)	General Physics and Experiments (2)
微積分(一)	Calculus (1)
微積分(二)	Calculus (2)
電路學(一)	Electric Circuit Theory (1)
電路學(二)	Electric Circuit Theory (2)
程式設計	Program Design
邏輯設計	Logic Circuits Design
邏輯設計實習	Logic Circuits Design Experiment
電子學(一)	Electronics (1)
電子學(二)	Electronics (2)
電子學實習(一)	Electronic Experiment (1)
電子學實習(二)	Electronic Experiment (2)
工程數學(一)	Engineering Mathematics (1)
工程數學(二)	Engineering Mathematics (2)
電機機械	Electric Machinery Fundamentals
電機機械實習	Electric Machinery Experiment
控制系統	Control systems
控制系統實習	Control System Experiment
電力電子學	Power Electronics
電力電子學實習	Experiments of Power Electronics
半導體元件	Semiconductor Devices
實務專題(一)	Practice project (1)
實務專題(二)	Practice project (2)
基礎量測及實習	The Fundamental of Measurement and Experiments

科目名稱：普通物理與實驗（一）

本課程教學目標是瞭解基本物理原理及未來科技的發展，以單元知識為基礎，培養解決問題的方法，具備科技工程人員應有的科學精神和應用能力，協助與新興科技知識的接軌。課程內容包括：
1. 物理量及向量 2. 基礎力學：含運動學，動力學，功與能，動量。3. 實驗：含自由落體實驗，力的合成及分解，摩擦係數測定，向心力實驗，牛頓運動定律，動量守恒，線膨脹係數測定。

Subject Name : General Physics and Experiments (1)

Goals:

1. Giving students a secure grasp of physical principles.
2. Training students their problem-solving abilities.
3. Enhancing students the basic knowledge of new technology.

Contents:

1. Physical quantities-measurements.
2. Mechanics :include Kinetics, Dynamics, Work and Energy, Linear Momentum.
3. Experiments: Free Body experiment, Force Components and Net Force experiment, Coefficient of Friction Measurement experiment, Centripetal force experiment, Conservation of Linear Momentum experiment, Coefficient of Linear Expansion Measurement experiment.

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科目名稱：普通物理與實驗（二）

本課程教學目標是瞭解基本物理原理及未來科技的發展，以單元知識為基礎，培養解決問題的方法，具備科技工程人員應有的科學精神和應用能力，協助與新興科技知識的接軌。課程內容包括：

1. 電、磁學及實驗：電場、電流與電池、電阻與電路、磁場、電磁感應、電磁波。
2. 光學： 反射、折射、面鏡、透鏡成像原理、干涉、繞射、光電效應。
3. 電子學概論：半導體之導電性、半導體中的雜質、二極體和電晶體概要。
4. 近代物理概論：量子物理概要、原子核物理概要。
5. 實驗：電力線實驗、電荷守恒及能量守恒(克希荷夫定律)、RC 迴路實驗、 e/m 荷質比實驗、
折射定律、光學透鏡成像、雙狹縫干涉、單狹縫繞射、光電效應。

Subject Name : General Physics and Experiments(2)

Goals:

1. Giving students a secure grasp of physical principles.
2. Training students their problem-solving abilities.
3. Enhancing students the basic knowledge of new technology.

4. Contents:

- 4-1. Electricity, Magnetism and experiments.
- 4-2. Optics and experiments.
- 4-3. Basic Modern Physics Description.
- 4-4. Basic Electronics Description.
- 4-5. Experiments: Electric Lines experiment, Kirchhoff's law experiment, RC loops experiment, e/m

charge-mass ratio experiment, Refraction of Light experiment, Image of Lenses experiment, Double Slit Interference experiment, Single Slit Diffraction experiment, Photoelectric Effect experiment.

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科目名稱：微積分(一)

本課程教學目標是著重微積分的基本概念，培養學生推理能力，熟練微分與積分的演算技巧，使學生具備解決電機工程問題之數學基礎與能力。課程內容包括：極限、導函數、連鎖法則、極大值與極小值、均值定理、羅必達定理、正反三角導函數、指數對數導函數。

Subject Name : Subject name: Calculus (1)

The purpose of this course is to let students possess the fundamental ability of mathematics in solving the electrical engineering problems. The contents of the course include limit, derivatives, chain rules, maximum and minimum, mean-value theory, L'Hôpital's Rule, derivative of trigonometric functions, derivative of inverse trigonometric functions, derivatives of exponential and logarithmic functions.

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科目名稱：微積分(二)

本課程教學目標是著重微積分的基本概念，培養學生推理能力，熟練微分與積分的演算技巧，使學生具備解決電機工程問題之數學基礎與能力。課程內容包括：不定積分的基本公式、分部積分法、三角代換法、配方法、部分分式法、面積、體積、瑕積分、重積分。

Subject Name : Subject name: Calculus (2)

The purpose of this course is to let students possess the fundamental ability of mathematics in solving the electrical engineering problems. The contents of the course include indefinite integration, integration-by-parts method, trigonometry substitution rule, method of interpolation, method of rational function, area, volume, improper integral, double integral.

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科目名稱：電路學(一)(二)

在本課程中，學生可學習到應用電路的解析技巧。除了基本直流與交流電路分析外，亦包含電路之暫態響應分析。本課程學習可幫助建立在電路理論與電子學等相關工程應用之設計與分析能力。本課程包括：(一)電路變數、電路元件、簡單電阻電路、電路分析技巧、運算放大器、電感，電容和互感、一階 RL 和 RC 電路響應、 RLC 電路自然響應與階梯響應。(二)交流穩態分析、交流穩態功率計算、平衡三相電路、拉普拉斯轉換簡介等。

Subject Name : Electric Circuit Theory (1)(2)

In the course, you will learn various analytical techniques of circuit theory applications for describing the behavior of a circuit. It is also the transient response of electric circuit contained except the

theory and applications of basic DC & AC circuit. The aim is to establish your backgrounds on the design and analysis of the advanced electrical/microelectronic circuits in all possible engineering applications. This course included: (I)Circuit Variables、Circuit Elements、Simple Resistive Circuits、Techniques of Circuit Analysis、The Operational Amplifier、Inductance, Capacitance, and Mutual Inductance、Response of First-Order RL and RC Circuits、Natural and Step Responses of RLC Circuits. (II) Sinusoidal Steady-State Analysis、Sinusoidal Steady-State Power Calculations、Balanced Three-Phase Circuits、Introduction to the Laplace Transform.

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科目名稱：程式設計

本課程以 C/C++程式語言為主，藉由指令講解、實際範例演練及指定作業之練習，培養學生程式設計之能力，進而能利用電腦解決問題。課程內容包括：(一) C/C++開發工具、除錯器，(二) 基本運算、輸出入、選擇結構、重複結構等指令及應用，(三) 陣列、結構(struct)等資料結構及應用，(四) 常用標準函式庫及自訂函式的應用等。

Subject Name : Program Design

The primary goal of this course is to teach students how to program by C/C++ programming language. The contents of this course includes : (1) Development tools and Debugger (2) Usage and applications of Expressions, Input/Output instructions, Selection instructions, Loop instructions (3) Usage and applications of data structures like Arrays and Structures (4) Usage and applications of ANSI Functions and User Defined Functions.

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科目名稱：邏輯設計

本課程教學目標教導學生各種邏輯電路之基本理論，以提昇數位系統之分析與設計能力。課程內容包括數字系統與數碼、布林代數與基本邏輯閘、布林代數之化簡、組合邏輯電路設計、算術運算電路、資料處理電路、正反器、序向邏輯電路設計、計數器、暫存器與可規劃邏輯裝置。

Subject Name : Logic Circuits Design

The purpose of this course is to let students possess the fundamental ability of logic circuits in solving the digital circuits design problems. The contents of the course include Number system and code, Boolean Algebra and Logic Gate, Boolean Algebra simplification, Combinational Logic, Arithmetic Circuits, Combinational Logic Function, Flip-Flops, Sequential Logic, Counters, Shift Registers and Programmable Logic Devices.

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科目名稱：邏輯設計實習

本課程教學目標教導學生實現數位電路積體化之技術，進而提昇設計數位電路之能力。課程內容包括可規劃邏輯裝置與 QuartusII 簡介、基本邏輯閘與組合邏輯電路設計、算術運算電路、資料處理電路、計數器、暫存器與專題電路設計。

Subject Name : Logic Circuits Design Experiment

The purpose of this course is to let students implementation integrated of the digital circuits to promote the ability to design digital circuit. The contents of the course include Introduction PLDs and QuartusII, Logic Gate and Combinational Logic, Arithmetic Curcuits, Combinational Logic Function, Counters, Shift Registers and Project Circuits Design.

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科目名稱：電子學(一)

本課程教學目標是使學生瞭解電子電路之基本原理與相關應用電路之設計(知識)；本課程內容包括半導體材料、PN 二極體、雙接面電晶體 (BJT) 及放大器 (AMP) 之原理與應用，使學生能具備類比電路設計能力(技能)，能具備電機從業人員之專業態度(態度)，能瞭解類比電路設計相關產業未來發展之方向(其他)。

Subject Name : Electronics (1)

The purpose of this course is to equip the students with fundamental knowledge of electronic circuits and related field applications. The contents of the course include the principles and applications of Semiconductor materials, PN diodes, Bipolar Junction Transistors (BJT) and Amplifier (AMP). This course is also to enable the students to possess the ability of designing analog circuits, to have the professional attitude toward electrician, and to know the direction of future development for analog circuits design and related fields.

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科目名稱：電子學(二)

本課程教學目標是使學生瞭解電子電路之基本原理與相關應用電路之設計(知識)；本課程內容包括接面場效電晶體、金氧半場效電晶體、運算放大器與功率電晶體之原理與應用，使學生能具備類比電路設計能力(技能)，能具備電機從業人員之專業態度(態度)，能瞭解類比電路設計相關產業未來發展之方向(其他)。

Subject Name : Electronics (2)

The purpose of this course is to equip the students with fundamental knowledge of electronic circuits and application in related field. The contents of the course include the principles and applications of Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor Field Effect Transistor (MOSFET), Operational Amplifier (OP AMP) and the power transistors. This course is also to enable the students to possess the ability of designing analog circuits, to have the professional attitude toward electrician, and to know the direction of future development for analog circuits design and related fields.

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科目名稱：電子學實習(一)

本課程教學目標是使學生具備電子電路裝置與理論之基本分析與設計能力暨除錯與維護技巧。課程內容包括：學習示波器、三用電表、電源供應器及訊號產生器等基礎電子儀器之使用方法； pn 接面二極體電路—元件特性分析、整流電路、截波電路；齊那二極體電路—元件特性分析、電壓調節電路；雙載子接面電晶體放大電路—元件特性分析、偏壓電路分析、交流小訊號分析；單極性場效電晶體放大電路—元件特性分析、偏壓電路分析、交流小訊號分析。

Subject Name : Electronic Experiment (1)

The purpose of this course is to let students possess the fundamental analysis and design ability and the troubleshooting skill of electronic devices and circuit theory. The contents of the course include part I : learning the using methods of various fundamental electronic devices, e.g., oscilloscope, multimeter, DC power supply, and signal generator ; part II : pn junction diode circuits—fundamental characteristic analysis, rectifier circuits, clipper circuits ; part III : Zener diode circuits—fundamental characteristic analysis, voltage regulator circuits ; part IV : bipolar junction transistor amplifier circuits—fundamental characteristic analysis, analysis of bias-voltage circuits, analysis of AC small signals ; and part V : unipolar field-effect transistor amplifier circuits—fundamental characteristic analysis, analysis of bias-voltage circuits, analysis of AC small signals.

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科目名稱：電子學實習(二)

本課程教學目標是使學生具備電子電路裝置與理論之基本分析與設計能力暨除錯與維護技巧。課程內容包括：運算放大器之認識—運算放大器基本特性介紹、反相放大器、非反相放大器；線性運算放大器電路—線性組合電路、電源轉換電路、積分與微分電路、全通相位移轉電路、精密整流器；非線性運算放大器電路—開迴路比較器、閉迴路比較器、波形產生器。

Subject Name : Electronic Experiment (2)

The purpose of this course is to let students possess the fundamental analysis and design ability and the troubleshooting skill of electronic devices and circuit theory. The contents of the course include part I : operational amplifiers—introduction of fundamental characteristics, inverting operational amplifier circuits, noninverting operational amplifier circuits ; part II : linear operational amplifier circuits—linear combination circuits, source transformation circuits, integrator circuits, differentiator circuits, all-pass phase-shifter circuits, precision rectifier circuits ; and part III : nonlinear operational amplifier circuits—open-loop comparator circuits, closed-loop comparator circuits, wave generator circuits.

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科目名稱：工程數學(一)

本課程教學目標是使學生具備解決電機工程問題之數學基礎與能力。課程內容包括：可分離微分方程式、正合微分方程式、積分因子、線性微分方程式、一階微分方程式應用、二階常係數齊性微分方程式、降階法、二階常係數非齊性微分方程式、Euler-Cauchy 方程式、二階微分方程式應用，Laplace 轉換基本性質，部分分式展開法，利用 Laplace 轉換解微分方程式，摺積定理，Laplace 轉換在工程上之應用。

Subject Name : Engineering Mathematics (1)

The purpose of this course is to let students possess the fundamental ability of mathematics in solving the electrical engineering problems. The contents of the course include separable equations, exact differential equations, integrating factors, linear differential equations, applications of first-order differential equations, second-order constant coefficient homogeneous linear equations, reduction of order, second-order constant coefficient nonhomogeneous equations, Euler-Cauchy equations, applications of second-order differential equations, definition and basic properties of the Laplace transform, partial fractions decomposition, solution of initial value problems using the Laplace transform, convolution, applications of the Laplace transform.

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科目名稱：工程數學(二)

本課程教學目標是使學生具備解決電機工程問題之數學基礎與能力。課程內容包括：矩陣、線性方程式、行列式、特徵值、特徵向量、對角化、向量和向量空間、向量微分、向量積分、週期函數與傅力葉級數、傅立葉積分、傅立葉轉換與應用。

Subject Name : Engineering Mathematics (2)

The purpose of this course is to let students possess the fundamental ability of mathematics in solving the electrical engineering problems. The contents of the course include matrices, linear equations, determinants, eigenvalues, eigenvectors and diagonalization, vectors and vector spaces, vector differential calculus, vector integral calculus, periodic functions and Fourier series, Fourier integration, Fourier transforms and applications.

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科目名稱：電機機械

本課程教學目標包含知識、技能、態度、其他等四項，使學生瞭解電機機械之基本架構及其穩態原理（知識），具備電機機械分析能力與技巧（技能），具備電機從業人員之專業態度（態度），以及瞭解電機相關產業未來發展之方向（其他）。單元主題則包含電機機械分析簡介、變壓器、同步機、感應機及直流機。

Subject Name : Electric Machinery Fundamentals

The purpose of this course is to let students possess the fundamental ability of electric machinery in electrical engineering. The contents of the course include introduction to machinery principles, transformers, synchronous machines, induction machines and DC machines.

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科目名稱：電機機械實習

本課程教學目標包含知識、技能、態度、其他等四項，使學生瞭解電機機械之基本架構及其穩態原理（知識），具備電機機械分析能力與技巧（技能），具備電機從業人員之專業態度（態度），瞭解電機相關產業未來發展之方向（其他）。單元主題則包含電機機械簡介、變壓器、同步機、感應機及直流機。

Subject Name : Electric Machinery Experiment

The purpose of this course is to let students possess the fundamental ability of electric machinery in practical experiences. The contents of the course include introduction to machinery principles, transformers, synchronous machines, induction machines and DC machines.

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科目名稱：控制系統

本課程教學目標是使學生瞭解控制工程的理論與實務控制設計能力。課程內容包括：系統的頻域及時域模型得數學模型、時間響應分析、信號方塊圖及信號流程、穩定度分析及穩態誤差、根軌跡技術、頻域分析及控制系統設計。

Subject Name : Control systems

The purpose of this course is to let students understand the theory of the control systems engineering and the practice of control system design. The contents of the course include modeling in the frequency and time domain, time response analysis, block diagram and signal-flow graphs, stability and steady-state errors, root locus techniques, frequency response techniques, design of control systems.

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科目名稱：控制系統實習

本課程的教學目標是為了使學生藉由類比式控制系統的操作，瞭解各種控制系統的運用原理，包括直流伺服馬達系統、閉回路控制、PID 控制、狀態回受控制、頻率響應、相位超前控制、相位落後控制、穩態誤差分析等。

Subject Name : Control System Experiment

The purpose of this course is to let students through the operation of analog control system to understand the principle of various control system. The contents of the course include DC servo system, closed-loop control, PID control, state feedback control, frequency response, phase-lag control and phase-lead control, analysis of steady-state error etc.

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科目名稱：電力電子學

本課程教學目標是使學生瞭解電力電子轉換器之基本原理、架構及其應用。課程內容包括：電力電子基礎介紹、二極體整流器、可控制式整流器、直流至直流轉換器、直流至交流轉換器及交流至交流轉換器等。

Subject Name : Power Electronics

The purpose of this course is to let students understand the basic theory, topologies and applications for the power electronic based power conversion system. The contents of the course include diode rectifiers, controllable rectifiers, DC/DC converters, DC/AC inverters and AC/AC converters.

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科目名稱：電力電子學實習

本課程教學目標是使學生藉由實習瞭解電力電子轉換器電路之基本架構及其操作原理。課程內容包括：實驗室安全及二極體整流器、可控制式整流器、直流至直流轉換器、直流至交流轉換器及交流至交流轉換器等實習。

Subject Name : Experiments of Power Electronics

The purpose of this course is to let students understand the basic topologies and operation principle of the power electronic based power conversion system by practical experiments. The contents of the course include safety of laboratory and the experiments of diode rectifiers, controllable rectifiers, DC/DC converters, DC/AC inverters and AC/AC converters.

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科目名稱：半導體元件

本課程教學目標是使學生瞭解最重要半導體元件之物理特性及其操作原理，使學生能具備分析半導體元件特性之能力。課程內容包括：固體的晶體結構、量子力學簡介、平衡半導體、載子傳輸現象、PN 接面二極體、雙極性電晶體。

Subject Name : Semiconductor Devices

The purposes of this course are: (1) introducing the physical properties and operation principles of semiconductor devices, (2) to let students possess the ability to analysis semiconductor devices. The contents of the course include crystal structure, introduction to quantum mechanics, equilibrium semiconductor, transport properties, PN junction and bipolar junction transistors.

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科目名稱：實務專題(一)

本課程教學目標是使學生具備解決電機工程問題之基礎與能力。課程內容包括：專題的重要性、專題的目的、選擇題目的原則、選擇題目的步驟、參考的題目、資料蒐集的方法、資料蒐集的原則、資料的分析與整理、內容的規劃、預定的進度。

Subject Name : Practice project (1)

The purpose of this course is to let students possess the fundamental ability in solving the electrical engineering problems. The contents of the course include importance of project practice, objectives of project practice, criteria of choosing a topic, steps of deciding on a topic, sample topics, method for collecting data, criteria of data collection, data analysis, making outlines for the projects, and laying out schedules for the projects.

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科目名稱：實務專題(二)

本課程教學目標是使學生具備解決電機工程問題之基礎與能力。課程內容包括：專題的實施、分工與合作、進度的掌控、檢討與修改、參考文獻的寫法、報告的撰寫、經費核銷、投影片製作原則、口頭報告、成果展示。

Subject Name : Practice project (2)

The purpose of this course is to let students possess the fundamental ability in solving the electrical engineering problems. The contents of the course include setting out to implement the projects, division of work and cooperation, maintaining the schedule, self-evaluation and modification, format for reference listing, format for report writing, cancel after verification for outlay, production of OHP sheets, oral presentation, and project exhibition.

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科目名稱：基礎量測及實習

本課程教學目標是培養學生具備基礎量測的能力。

Subject Name : The Fundamental of Measurement and Experiments

The purpose of this course is to train students with the Fundamental of Measurement methods and Experimental ability.

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