

清華大學師資培育中心

申報中等學校師資職前教育
專門課程規劃書

(電機與電子群—資訊科)

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專門課程各科目課程大綱

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1. 電路學

課程說明	From this course, you will learn the basic concepts of electric circuits and the skills in analyzing these circuits. This is an elementary course, thus you must work hard to build a solid foundation in order to pass.
指定用書	“Electric Circuits”, 8th ed., by J. W. Nilsson and S. A. Riedel, Pearson.
教學方式	Lectures in English.
教學進度	(1) Circuit variables and elements. (2) Kirchhoff's Voltage Law and Kirchhoff's Current Law. (3) Basic analytical technique, the node analysis and the mesh analysis techniques. (4) Linear circuit theorems, superposition, Thevenin's and Norton's equivalent. (5) Operational amplifiers and Two-port circuits (6) Capacitance, Inductance, and Mutual Inductance (7) First-Order and Second-Order Circuit Analysis (8) Sinusoidal Steady-State Analysis (9) Sinusoidal Steady-State Power Calculations (10) Balanced Three-Phase Circuits (11) The Laplace Transform and its application in circuit analysis. (12) Fourier Series and its application in circuit analysis.
成績考核	Assignments and quizzes (40%) Midterm exam 1 (20%) Midterm exam 2 (20%) Final exam (20%)

2. 電路學一

課程說明	電源元件模式、科其荷夫定理、電路分析方法、電容、電感、低階動態電路，正弦波輸入之電路分析方法。
指定用書	C. K. Alexander and M. N. O. Sadiku, "Fundamentals of Electric Circuits", Concise Edition, 1st ed., McGraw-HILL 2004.
參考書籍	大一普通物理電學與磁學部份
教學方式	Oral lectures
教學進度	(1) Chap.1 (1 hr), Chap.2 (2 hrs), Chap.3 (4 hrs), Chap.4 (4 hrs), Midterm Exam. I(3hrs), (2) Chap.5 (2 hrs), Chap.6 (1 hrs), Chap.7 (3 hrs), Chap.8 (4 hrs), Midterm Exam(3 hrs). II, (3) Chap.9 (2 hrs), Chap.10 (3 hrs), Chap. 13 (3hr) Chap. 14 (5 hrs.) Final Exam.(3hrs)
成績考核	midterm exams. : 30% , 30 % Final exam. : 35% Homework : 5 %
講義位址	本課將列入清華大學遠距教學(非同步)課程

3. 電子電路學

課程說明	Part One: Basic Laws, Resistive Circuits, Inductance and Capacitance, Transients, Steady-State Sinusoidal Analysis, Frequency Response Part Two: Diodes, Amplifiers, Field Effect Transistors, Bipolar Junction Transistors, Operational-Amplifiers.
指定用書	ELECTRICAL ENGINEERING - Principles and Applications, 4th Ed. by ALLAN R. HAMBLEY ,2008, published By Pearson Prentice-Hall (高立)
參考書籍	Sedra/Smith, "Microelectronic Circuits", Oxford, 5th Ed
教學方式	This course will be taught through power point. The power-point printout can be accessed from E-learn system of NTHU.
教學進度	Part One: circuit theory -- 8 weeks (32 hours) Basic Laws Resistive Circuits Inductance and Capacitance Transients Steady-State Sinusoidal Analysis Frequency Response Part Two: microelectronics -- 7 weeks (28 hours) Diodes, Amplifiers Field Effect Transistors Bipolar Junction Transistors Operational Amplifiers
成績考核	Exam.1: 40% Exam.2: 40% Home Work: 15% Quizzes: 15%

4. 電路與電子學

課程說明	This course is intended for 2nd-year undergraduates in the computer science and other engineering department. In this course, we focus on two main topics, electronics and circuits. To give students better understanding of the models and circuits of the electronics devices, we will introduce the basic concepts of electric circuits first. It starts from the definition of current, voltage, power and energy. Then it covers the basic circuit components including resistor, capacitor, and inductor. We also discuss the basic circuit analysis, such as nodal analysis of resistive circuits, transients in electrical circuits and sinusoidal steady-state circuit behavior. For electronics section, we will present the diode and MOS field-effect transistor. We will use simple models to describe these electronic devices and their I-V characteristics. Since the majority of electronic circuits today are designed as integrated circuits (ICs), we will discuss how to analyze and design the basic elements of integrated circuits with the emphasis on digital logic designs.
指定用書	"Electrical Engineering - Principles and Applications", by Allan R. Hambley, fourth edition, (ISBN: 0-13-206692-0), Pearson, Prentice Hall.
參考書籍	"Electronic Circuit analysis and Design", by Donald A. Neamen, 3rd edition, (ISBN:007-125443-9), McGraw Hill.
教學方式	Lecture and discussion.
教學進度	1.Chapter 1. Introduction 2.Chapter 2. Resistive Circuits 3.Chapter 3. Inductance and Capacitance 4.Chapter 4. Transients 5.Chapter 5. Steady-State Sinusoidal Analysis 6.Chapter 6 Frequency Plots, Bode Plots, and Resonance 7.Chapter 10. Diodes 8.Chapter 12. Field-Effect Transistors 9.Chapter 11. Amplifiers : Specifications and External Characteristics
成績考核	Quizzes and In-class performance : 30% Exam I: 3/15/2010 (15%) Exam II: 4/26/2010 (20%) Exam III: 5/31/2010 (20%)

	Final exam: 6/21/2010 (20%)
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5. 電路學實驗

課程說明	This course is intended for EE students at the junior level who have already taken the basic circuit theory and microelectronics. Students will get hands-on experiences through experiments that help to complement the learning of circuit theories. Op-amps, passive elements (e.g. R, L, and C), and transistors will be used extensively to implement various circuits. Lab Policy: (1) 請勿持續使用實驗室電腦作與實驗非相關的上網。 (2) 請勿將飲料食物置於實驗桌面。 (3) 請將實驗桌面收拾乾淨後再行離開。
指定用書	Class Handout
教學方式	Powerpoint presentation and blackboard
教學進度	(1) Introduction to Lab Equipments (2) DC and AC Circuits (3) Time-Domain Responses of 1st- and 2nd-order Circuits (4) LC Resonance Circuits and Oscillator Circuits (5) Passive Filters (6) Active Filters (7) Parameter extraction of MOS Transistors and Single-Stage MOS Amplifiers (8) Mini Project
成績考核	Lab report: 65% Final exam: 35% 遲到早退扣總分1分,視出席情況該實驗最多可不予計分.
講義位址	http://www.ee.nthu.edu.tw/sclu/ee2240.htm

6. 電工實驗

課程說明	訓練學生實際動手的經驗，使其熟悉一些常用的電子儀器，課程內容及進度之安排與本系“電工原理”課程相配合。
指定用書	自編講義
參考書籍	坊間大專用的電路學或電工原理書籍。
教學方式	實驗前先由兼任助教講解實驗內容，然後指導學生現場實作。
教學進度	Sep. 10 Exp 0 分組、講解實驗室規則及評分方式 17 Exp 1 Instrumentation and elements, introduction to Pspice Oct. 1 Exp 2 Amp. Meter, Volt. Meter and KVL, KCL 15 Exp 3 Node, and Loop (Mesh) equations 29 Exp 4 Substitution theorem and Superposition theorem Nov. 12 Exp 5 Thevenin's theorem and Norton's theorem 26 Exp 6 RC, RL circuit response Dec. 10 Exp 7 Simple AC circuits, analysis and steady state response 24 Exp 8 變壓器與電感器模式參數量測 Jan. 7 期末考
成績考核	(1) 預習報告（包含表格與理論計算） 25% (2) 結果報告 25% (3) 期末考 35% (4) 實驗設備環境維護與清潔 15% 注意事項 (1) 預報以 2 頁為限，請略敘述實驗構想與實驗相關理論。每位學生在實驗當天繳交，由助教檢查評分，並於兩週後發回。 (2) 實驗報告(含實驗數據)於下次實驗時繳交，每位學生一份，由助教檢查評分，並於兩週後發回。 (3) 報告嚴禁抄襲，抄襲以零分計。 (4) 實驗室禁止攜帶食物飲料進入。 (5) 每週實驗室之值日生務必做好實驗室打掃工作。各組注意儀器維護。

7. 電子學

課程說明	This course is an introductory course of microelectronics. We will focus on the fundamental knowledge of microelectronic circuits and emphasize the design-oriented approach. This course introduces the most important concepts for design of analog circuits such as semiconductor transistors, and various amplifier configurations. The frequency response, differential pairs, multistage amplifiers, and operational amplifiers are also included. By developing solid understanding of basic knowledge, learning microelectronics could be enjoyable.
指定用書	B. Razavi, "Fundamentals of Microelectronics," Wiley, 2008.
參考書籍	A. Sedra and K. Smith, "Microelectronic circuits," 5th edition, Oxford university press, 2004
教學方式	Power point handouts are used in this class together with a tablet computer for equation derivation and additional materials. A quiz is held on a weekly or bi-weekly basis to help the student following the course schedule. The students also have the opportunity to use the CAD tool (Pspice) for circuit design and verify the materials learned in the class.
教學進度	1. Introduction to microelectronics (ch. 1) - Examples of electronic systems - Basic circuit theorems 2. Basic physics of semiconductors and diodes (ch. 2 and ch. 3) - Semiconductor material properties - PN junction and diodes - Diode circuits and applications 3. Basic physics of transistors and their equivalent circuit models (ch. 4 and ch. 6) - Basic structures and characteristics of MOSFETs and BJTs - Equivalent circuit model of MOSFETs and BJTs - Large-signal and small-signal operation 4. Single-stage (multi-stage) amplifiers and frequency response (ch. 5, ch. 7, ch. 9, and ch. 11) - Operating point analysis and design - MOSFET and BJT amplifier topologies (CS, CG, CD, and cascode) - Transfer function and Bode's plot

	- Frequency response of different amplifiers 5. Differential amplifiers (ch. 9 and ch. 10) - Basic MOS and BJT differential pairs - Large-signal and small-signal analysis - Current mirror and active load - Common-mode rejection and frequency response 6. Operational amplifiers (ch. 8) - OP-Amp-Based circuits - Two-stage Op amp and shunt-shunt feedback - Op amp nonidealities - Op amp with linear and nonlinear functions
成績考核	Homework: 20% Quiz: 30% Midterm: 25% Final: 25%
講義位址	E-learning system. http://elearn.nthu.edu.tw/

8. 電子學一

課程說明	The objective of this course is to develop in the students the ability to analyze and design electronic circuits, both analog and digital, discrete and integrated. The following is the outline of this course: 1. Introduction to the basic concepts of electronics. Signals, their frequency spectra, and their analog and digital forms are presented. Amplifiers are introduced as circuit building blocks and their various types and models are studied. 2. Introduction to operational amplifiers. Their terminal characteristics, simple applications, and limitations are presented. 3. Study of PN junction diode terminal characteristics. Its hierarchy of models and basic circuit applications are discussed. 4. Operation principle of MOS field-effect transistor (MOSFET). Study of the device structure and its physical operation are included. In addition, its applications are demonstrated through some circuit examples. 5. Operation principle of bipolar junction transistor (BJT). Device physics will be described and circuit models for transistor operation in different modes will be developed and utilized in the analysis and design of circuit.
指定用書	Sedra/Smith, "Microelectronic Circuits", Oxford, 5th Ed.
參考書籍	Neuman, "Electronic Circuit Analysis And Design", Irwin.
成績考核	Homework: 10% Midterm I: 30% Midterm II 30% Final: 30%
講義位址	http://mx.nthu.edu.tw/~yunhwu/Courses.htm

9. 電子學二

課程說明	Having learned the major electronics devices (MOSFET and BJT) and their basic circuit applications in Electronics-I, more complex analog circuits and systems will be lectured in this course. Both MOSFET and BJT circuits will be studied and the emphasis will be put on MOSFET since it is used in most integrated circuit.
指定用書	Sedra/Smith, "Microelectronic Circuits", Oxford, 5th Ed.
參考書籍	Neuman, "Electronic Circuit Analysis And Design," Irwin.
教學方式	Powe-point handouts
教學進度	1. Single-stage integrated circuit amplifiers 2. Differential and multistage amplifiers 3. Feedback 4. Op-Amp and Data-Converter Circuits
成績考核	Homework: 10% Midterm I: 30% Midterm II 30% Final: 30%
講義位址	http://mx.nthu.edu.tw/~yunhwu/Electronics-2.htm

10. 應用電子學一

指定用書	Electronic Devices 7th , by Thomas Floyd
參考書籍	Microelectronic Circuits, Sedra / Smith The Art of Electronics, Paul Horowitz, Winfield Hill
教學進度	18-21 Introduction, Ch1 Semiconductor Basics Feb 25 Ch1-Ch2 Diode Applications Mar 3-6 Ch2 - Ch3 Special-Purpose Diodes Mar 10-13 Ch3 - Ch4 Bipolar Junction Transistors (BJTs) Mar 17-20 Ch4 Bipolar Junction Transistors (BJTs) Mar 24-27 Ch4, 3/27 Midterm exam I (Ch1 –Ch4) Mar 31 Ch5 Transistor Bias Circuits April 7-10 Ch6 BJT Amplifiers April 14-17 Ch6 BJT Amplifiers April 21-24 Ch6-Ch7 Field-Effect Transistors (FETs) April 28-May 1 Ch7 Field-Effect Transistors (FETs) May 5-8 Ch8 FET Amplifiers, 5/8 Midterm exam II (Ch4-Ch7) May 12-15 Ch8-Ch9 Power Amplifiers May 19-22 Ch9-Ch10 Amplifier Frequency Response May 26-29 Ch10 Amplifier Frequency Response June 2-5 Ch10-Ch11 Thyristors and Other Devices June 9-12 Ch11 Thyristors and Other Devices June 16 Final week Final Exam(Ch7-Ch11) The final exam date will be announced later. (1) A makeup exam will be given only in documented cases of illness or emergency. (2) Cheating is absolutely prohibitive. (3) I hope this class is inspiring and rewarding for you. If during the semester you have any suggestion for how I can improve the class, please let me know.
成績考核	Midterm $\times$ 2 (30%), Final Exam (40%) There will be weekly homework assignments throughout the course.

11. 應用電子學二

指定用書	Electronic Devices 8th , by Thomas Floyd Digital Fundamentals 5th, by Thomas Floyd
參考書籍	Microelectronic Circuits, Sedra / Smith The Art of Electronics, Paul Horowitz, Winfield Hill
教學進度	Dates Class Sep 14-17 Active load / Differential amplifier Sep 21-24 Differential amplifier / Ch12 The Operational Amplifier Oct 1 Ch12-3~12-9 / Ch 13 Basic Op-Amp Oct 5-8 Ch 13 Basic Op-Amp Oct 12-15 Ch14 Special-purpose OP-Amp circuit Oct 19-22 Oct 22 Mid Exam 30% Oct 26-29 Ch 15 Active Filter Nov 2-5 Ch16 Oscillators Nov 9-12 Ch17 Communications Circuit Nov 16-19 Ch18 Voltage regulators Nov 23-26 Nov 26 Mid Exam 30% Nov 30-Dec 3 Digital 1 Digital Circuit / Digital 2 Combination Digital System Dec 7-10 Digital 2 Combination Digital System Dec 14-17 Digital 3 Sequential Digital System Dec 21-24 Digital 4 Counter Dec 28-31 Digital 5 Shift Register Jan 4-7 Digital 6 Other Applications of Basic Gates Jan 11 or 14 Final Exam 40% / The final exam date will be announced later. (1) A makeup exam will be given only in documented cases of illness or emergency. (2) Cheating is absolutely prohibitive. (3) I hope this class is inspiring and rewarding for you. If during the semester you have any suggestion for how I can improve the class, please let me know.
成績考核	Midterm $\times$ 2 (30%), Final Exam (40%) Homework will be assigned and the solutions are included.

12. 電子學實驗一

課程說明	示波器與波型產生器操作, RC 電路, OP AMP 基本操作, 二極體電路, MOSFET 基本量測與放大電路.
指定用書	自編講義
參考書籍	Sedra/Smith, "Microelectronic Circuits", Oxford, 5th ed.
教學方式	十二個實驗
教學進度	每星期一個實驗
成績考核	Labs..... 30% Quiz.....30% Final Exam...20% Homework....20%
講義位址	http://mx.nthu.edu.tw/~yunhwu/Electronics-Lab1.htm

13. 電子學實驗二

課程說明	In this course you will learn about the basic principles of circuit design and operation in a practical, real-world laboratory setting. You will work both with discrete components such as resistors, capacitors, diodes, and transistors as well as with integrated components such as operational amplifiers and timer 555. In addition, you will become familiar with the operation of basic electronic test equipment (digital multi-meters, oscilloscopes, function generators, curve tracers, etc.). In addition, you will further understand the characteristics of transistors through the semiconductor analyzer which is very important for device development. There are 11 experiments this semester. Handout: Download from Web Site http://mx.nthu.edu.tw/~yunhwu/Electronics-Lab2.htm The schedule of this course can be found below. Preview: You are strongly encouraged to read ahead of the lectures. After each lecture, you should review the corresponding material in the textbook and then read the next section or two before the following lecture. This familiarization process will allow you to digest information from the lectures more easily. Policy on Cheating: Cheating is not tolerated. Getting the bad points in the exams may not fail in the course, but the failing grade in this course will be necessarily got once cheating is found.
教學進度	Exp-1 Electrical Characteristics Measurement for NMOS Circuit Exp-2 Electrical Characteristics Measurement for CMOS Circuit Exp-3 Electrical Characteristics Measurement for BJT Exp-4 Low Frequency Response for BJT Amplifier Exp-5 High Frequency Response for BJT Amplifier Exp-6 BJT Differential Amplifier Exp-7 Basic Operation of OP741 Exp-8 Digital to Analog Converter Exp-9 Analog to Digital Converter Exp-10 Analog Comparator Exp-11 555 Timer IC Application
成績考核	The final grade will depend on the items with relative weights shown below:

	Labs..... 30 % Quiz..... 30 % Homework20 % Final Exam.....20 %
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14. 電子電路實驗

課程說明	This course is intended for EE students at the junior level who have already taken the basic circuit theory and microelectronics. Students will get hands-on experiences through experiments that help to complement the learning of circuit theories. Op-amps, passive elements (e.g. R, L, and C), and transistors will be used extensively to implement various circuits. Lab Policy: (1) 請勿持續使用實驗室電腦作與實驗非相關的上網。 (2) 請勿將飲料食物置於實驗桌面。 (3) 請將實驗桌面收拾乾淨後再行離開。
指定用書	Class Handout
教學方式	Powerpoint presentation and blackboard
教學進度	Introduction to Lab Equipments (1 week: 2/22) Lab 1: DC and AC Circuits (2 weeks: 3/1, 3/8) Lab 2: Time-Domain Responses of 1st- and 2nd-order Circuits (2 weeks: 3/15, 3/22) Lab 3: Oscillator Circuits (2 weeks: 3/29, 4/12) Lab 4: Passive Filters (1 week: 4/19) Lab 5: Active Filters (2 weeks: 4/26, 5/3) Lab 6: Parameter extraction of MOS Transistors, Single-Stage and Multi-Stage MOS Amplifiers (5 weeks: 5/10, 5/17, 5/24, 5/31, 6/7)
成績考核	Lab report: 70% and Final exam: 30% 實驗報告及考試的評分標準與另一班完全一致 遲到（以十五分鐘為限）、早退扣總分 1 分。視出席狀況，該實驗最多可不予計分。 實驗報告需在實驗完成後之下一週上課一小時內繳交，逾時即算缺交。
講義位址	http://www.ee.nthu.edu.tw/sclu/ee2245.htm

15. 電子電路實驗一

課程說明	配合電子學（一）進度，進行實習課程，學習項目由助教解釋後進行，離開時由助教檢查結果，學期末進行筆試。
指定用書	1. 自編課程講義（一）、（二），Lab Notes from teacher. 2. PSpice A/D v9.0 電子電路分析，盧佑銘編著，台科大圖書，PSpice Manual.
教學方式	Lab room on the 3rd floor in Eng'n Hll #1, 2.5 hours per week. 於工程一館三樓電子學實驗室，操作每一實習項目，每週進行3小時課程。
教學進度	預備週 分組，實驗規則講解，電子儀表使用（電阻，電容量測） Exp1 基本電子元件與克希荷夫定律 Exp2 各種電路理論 Exp3 儲存元件與一、二階電路暫態響應 Exp4 交流電路分析 Exp5 運算放大器（一） Exp6 運算放大器（二） Exp7 PN 接合體的認識（二極體）及整流電路 Exp8 穩壓電路與定電流電路---稽納二極體 Exp9 場效電晶體 FET 放大器之認識 Exp10 場效電晶體 FET 的應用 Exp11 雙載子電晶體之直流偏壓 Exp12 共射極放大電路、串級放大電路、達靈頓電路 Exp13 共射極放大電路、共基極放大電路 期末考
成績考核	助教點名、實驗態度及課本問答（50%）、值日生表現（10%） 實作測驗（20%） 期末考試（20%）
講義位址	http://www.maps.pme.nthu.edu.tw/wang/pme320300

16. 計算機概論

課程說明	提供學生具備基本的電腦基礎知識，以及資通安全的概念。 教授基本的程式撰寫能力，以供日後研究過程中進行實驗模擬之用。 透過練習，提高學習成效。 由於此課程為選修課程，因此課程內容深度設定為初階、中階，而非單純基礎課程。 適合對象： 1.對於電腦系統有興趣者 2.對程式語言有興趣者
教學方式	1.課堂講授 2.上機實習 3.作業練習
教學進度	1. 認識個人電腦系統(硬體介紹) 2. 作業系統/應用軟體/電腦病毒(軟體介紹) 3. C 語言 或 網頁程式設計 (Apache + PHP + MySQL + HTML) PS:依學生興趣與需求做選擇。 4. Project demo
成績考核	作業成績：30% 期中考：30% 期末考：30% Project：10%

17. 資訊工程導論

課程說明	This course introduces computer science as the discipline that seeks a scientific foundation for topics such as computer design, computer programming, algorithmic processes, etc. It is an overview of the entire field of computer science. All work done in this class must be the individual work of the student. Any student caught engaging in academic misconduct (such as cheating and plagiarism) will be treated according to University policy and receive ZERO for the final grade of the course.
指定用書	J. Glenn BrookShear, Computer Science--An Overview, 10th edition, Addison Wesley
教學方式	Lectures
教學進度	Topics planned to be taught in this course are divided into three parts. (A) How computers work 1: Data representation 2: Data manipulation 3: Operating system 4: Computer network (B) How to make computers work 5: Algorithm 6: Programming language 7: Data structure 8: System development and software engineering (C) What computers can do 9: Database systems 10: Computer graphics and multimedia 11: Artificial intelligence 12: Computer aid design and scientific computation 13: Theory of computation
成績考核	Homework Project Midterm Final
講義位址	http://www.cs.nthu.edu.tw/~cherung

18. 邏輯設計

課程說明	This course introduces the basic theory of digital logic design and the implementation of logic circuit. In the beginning, binary number systems, simple boolean algebra, and switching functions are presented. The optimization method for combinational logic, which is the most important portion of the digital logic design, will be presented in detail in this section. Then, basic storage registers such as D-flip-flop, J-K-flip flop etc will be introduced in the section of the synchronous sequential logic, which will form a foundation for useful control technique - finite-state machine. After that combination logic and sequential circuits are combined to support number control in the digital system. The design for the registers and counters are taught in different types. Memory is the very traditional digital element in the IC circuit, and the basic operations of read, write, and error protection will be demonstrated. In the same section, the programmable devices such as PAL, PLA, PLD, CPLD, and FPGA will be introduced. Finally, the basic description of digital logic, Register Transfer Level, will be introduced, which will form the basic concept to develop the digital system through the hardware description language.
指定用書	Mano, "Digital Design", 4th ed., Prentice-Hall, 2007.
教學方式	Lectures
教學進度	1) Binary systems 2) Boolean algebra and logic gates 3) Gate-level minimization 4) Combinational logic 5) Synchronous sequential logic 6) Registers & counters 7) Memory & programmable logic 8) Register transfer level 9) Asynchronous sequential logic design
講義位址	Homeworks 30%, Midterm Exams 30%, Final Exam 40%

19. 數位邏輯設計

課程說明	1. Introduction/ Number systems and Conversion 2. Boolean Algebra 3. K-Maps 4. Quine-Maclusky Method 5. Multi-Level Gate Circuits/ NAND and NOR Circuits 6. Combinational Circuit Design and Simulation using Gates 7. Multiplexers, Decoders and PLDs 8. Latches and Flip-Flops 9. Registers and Counters 10. Sequential Circuit Analysis and Design 11. State Assignments 12. Verilog HDL
指定用書	Fundamentals of Logic Design (5rd Edition) by Charles H. Roth, Jr. (Brooks/Cole-Thomson Learning)
參考書籍	Fundamentals of Digital Logic with Verilog Design by Stephen Brown and Zvonko Vranesic (McGraw-Hill)
教學方式	Lectures with slides
教學進度	Will be announced in the first class.
成績考核	Quiz: 15% Midterm exam 1: 25% Midterm exam 2: 25% Final exam: 35%
講義位址	Http://nthucad.cs.nthu.edu.tw/~wcyao/

20. 數位電路分析與設計

課程說明	Prerequisite courses: 電子學一, 二 Course Contents: Digital Electronics (1) DAC and ADC: (2) Inverters, CMOS Logic Circuits, (3) Multivibrator circuit (4) Memories: RAM、ROM、EEPROM (Flash) (5) Arithmetic Circuits (Adder)
指定用書	(1) Sedra/Smith, Microelectronic Circuits, 5th Ed., Oxford, 2004. (Ch 9.7-11) (2) D.A. Neamen, Electronic Circuits Analysis And Design, 2nd ed. (Ch 16) (3) J.M. Rabaey, A. Chandrakasan, B. Nikolic, "Digital Integrated Circuits, A design Perspective," 2nd Ed., Prentice Hall, 2003.
參考書籍	Hodges/Jackson/Saleh, "Analysis and Design of Digital Integrated Circuits," 3rd Ed., McGraw Hill, 2004, Chapter 9.
教學進度	(1) Introduction (2) Digital Number System (3) DAC/ADC; (4) NMOS Inverters; NMOS Logic HW#1 DA/AD (5) CMOS Inverters; (6) CMOS Logic ; HW#2 (7) Combinational circuits; (8) Combinational circuits; HW#3 (9) 期中考 (10) Combinational circuits; (11) Multi-vibrator ; HW#4 (12) Memory 7; (13) Memory 7 (14) Memories 8; 發還期中考; HW5 (15) Final ;; Research Example *4-page Report Due 3PM, June 18, 2010
成績考核	Homework (Best 4 out of 5) 30%, Midterm 20%, Final 30%, Term Project 20%. Term Project: Each student has to design a digital circuit using SPICE simulation with discussions A 4-page report is required (Due. Jun. 18, 2010)

21. 計算機網路

課程說明	本課程為研究所課程，期望學生對於計算機網路設計原理有深入瞭解。
指定用書	Computer Networks: A Systems Approach, by Larry L. Peterson & Bruce S. Davie, 4th Ed., Morgan Kaufmann, 2007.
參考書籍	(1) Computer Networking: A Top-Down Approach Featuring the Internet, by James F. Kurose and Keith W. Ross, 2nd Ed., Addison Wesley, 2003 (2) Network Systems Design using Network Processors, Douglas E. Comer, ISBN 0-13-141792-4, Pearson Prentice hall, 2004.
教學方式	以電腦單槍投影教學。
教學進度	網路簡介與參考模式 (OSI Model, one week) 擷取與區域網路 (Access and Local Area Networks, two weeks) 分封網路 (Packet Switching Technologies, two weeks) 網際網路通訊協定 (Internet Protocols and Multicast protocols, two weeks) 阻塞控制與資源配置 (Congestion Control and Resource management, two weeks) 新世代網際網路通訊協定 (Next Generation Protocols, Ipv6, two weeks)， 網路安全 (Network Security, firewall, IDS/IPS, pattern matching algorithms, three weeks), 期末程式作業設計(分組)討論 (two weeks)
成績考核	期中考 30%， 期末考 30%， 程式作業 20%， 課堂作業 10%， 課堂表現10%
講義位址	http://totoro.cs.nthu.edu.tw/~com53100/index.htm

22. 無線感測網路協定與應用

課程說明	1. Introduction - Applications of WSNs - Cyber-Physical Systems, Embedded System and Sensors 2. Single-node architecture - Hardware components (Octopus II, Octopus X) 3. MAC protocols - Fundamentals of (wireless) MAC protocols - Contention-based MAC protocols - 介紹著名的 Sensor MAC Protocols，如 S-MAC, T-MAC 等， - 介紹以 Schedule-based 的 MAC Protocols,如 LEACH 及 TRAMA 等 - The IEEE Zigbee/802.15.4 MAC protocol - 介紹 IEEE 802.15.4 之通訊協定 4. Routing protocols - Zigbee Protocol - 介紹 Zigbee 網路協定 - Geographic routing protocols - 介紹專為 WSN 設計之繞徑協定，如 GPSR、Face Routing - Dead-end aware routing protocols - 介紹 WSN 中克服空洞及障礙物之繞徑協定 - 介紹 Data-Centric 資料儲存方法 5.Topology control - Motivations and Goals - 介紹 Topology Control 之動機與目的 - Power control - 介紹 Power Control 對 Topology 的影響 6. Time synchronization - Introduction to the time synchronization problem - 介紹 Time Synchronization 的問題與挑戰 - Protocols based on sender/receiver synchronization - 介紹以 Sender/Receiver 為主的同步技術 - Protocols based on receiver/receiver synchronization - 介紹以 Receiver/Receiver 為主的同步技術 7.Localization and positioning - Single-hop approaches - 介紹諸如 APIT 等知名的單步定位技術 - Multi-hop approaches
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	介紹諸如 DV-hop 等知名的多步定位技術 Mobile anchor approaches 介紹諸如 Bounding box 等知名的定位技術 8.Coverage Coverage problem and voronoi diagram 介紹覆蓋問題、k-覆蓋問題與 voronoi diagram 工具 Target coverage 介紹 Target coverage 之省電與排程技術 Barrier coverage 介紹 Barrier coverage 之省電與排程技術 Area coverage 介紹 Area coverage 之省電與排程技術 Coverage with Probabilistic Model 介紹機率式的覆蓋技術 9. Advanced research papers 介紹其他有關WSN先進且具有研究議題的技術
參考書籍	1. Protocols and Architectures for Wireless Sensor Networks 作者: Holger Karl and Andreas Willig 出版商 : Wiley 2. Ad Hoc Wireless Networks: Architectures and Protocols 作者: C. Siva Ram Murthy, B. S. Manoj 出版商 : Prentice Hall
教學方式	1.課堂上課 2.專題實作 3.指定論文報告
成績考核	1. 期中考：20%～30% 2. 期末報告：10%～20% 3. 專題實作：20%～30% 4. 程式作業：20%～30% 6. 上課出席狀況: 5%～10% (以上成績百分比，將視課堂狀況調整)

23. 計算機網路概論

課程說明	This is a first course in computer networks. It introduces the basic concepts and buliding blocks in the current compter networks. Here is a list of lecture topics. Lecture topics: 1. Introduction - PD 1.1 - 1.2, 2.1 2. Implementation Issues - PD 1.3 3. Point-to-Point Links - PD 2.2 - 2.5 4. Shared Media Networks - PD 2.6 - 2.8 5. Switched Networks - PD 3.1 - 3.3 6. Router Construction - PD 3.1.4, 3.4 7. IP and the Internet - PD 4.1 8. Scalable Routing - PD 4.2 - 4.3 9. TCP and UDP - PD 5.1 - 5.2 10. Congestion Control - PD 6.1 - 6.4 11. Quality of Service - PD 6.5 12. Multimedia - PD 7.2, 9.3 13. Remote Procedure Call - PD 5.3, 7.1 14. Naming - PD 9.1 15. Security - PD 8 Prerequisites: Programming languages Instructor: Cheng-Shang CHANG Email: cschang@ee.nthu.edu.tw
指定用書	Computer Network by Larry L. Perterson & Bruce S. David, 4th Ed. , Morgan Kaufmann Publishers
參考書籍	(1) Computer Networks by Andrew S. Tanenbaum, 3rd Ed. , Prentice-Hall International, Inc. 1996 (2) Data and Computer Communications by William Stallings, 5th Ed. , Prentice-Hall International, Inc. 1997 (3) Computer Networking: A Top-Down Approach featuring the Internet by Keith Ross and Jim Kurose
教學進度	See lecture topics.
成績考核	5% Class participation 15% quiz 10% Homework 35% Midterm Exam 35% Final Exam

講義位址	http://gibbs.ee.nthu.edu.tw/~courses/EE3650.htm
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24. 寬頻行動通訊

課程說明	Prerequisites: Recommended for those with background in probability, communication systems (or communication theory), and mobile telecommunication networks. This course covers technologies aiming at providing high data rate in wireless networks, with an emphasis on WiMAX-, cellular-, and broadband-related techniques.
參考書籍	Fundamentals of WiMAX, Jeffrey G. Andrews, Arunabha Ghosh, and Rias Muhamed, Prentice Hall
教學方式	Lectures
教學進度	Basic topics: Communication systems Various wireless channel impairments (e.g., co-channel interference, path loss, shadowing, intersymbol interference, channel fading, noise) Microwave channel models Modulation and signal constellation Multiaccess (FDMA, TDMA, CDMA) Cellular network Core topics: OFDM OFDMA WiMAX network architecture (including security preservation, mobility management, power control, and quality of service mechanisms) Multicast
成績考核	Homework % Midterm % Final % Presentation and report %
講義位址	http://www.cs.nthu.edu.tw/~jungchuk

25. 行動電信網路

課程說明	(1) Learn the concept of Personal Communication Service Systems. Specially, study the operation of mobile systems and protocols used in Taiwan, e.g., SS7, GSM, GPRS, UMTS, etc. (2) Study how to implement mobile applications. Students will be asked to implement a SIP-based Voice over Internet Protocol (VoIP) service.
指定用書	(1) 個人通訊服務網路，賴薇如編，維科圖書有限公司。 (2) Wireless and Mobile Network Architectures，Yi-Bing Lin and Imrich Chlamtac，Wiley Computer Publishing。 (3) Wireless and Mobile All-IP Networks，Yi-Bing Lin and Ai-Chun Pang，Wiley Computer Publishing。
參考書籍	(1) Introduction to Mobile Network Management，Yi-Bing Lin，Wiley Computer Publishing。 (2) Wireless and Personal Communications Systems，Vijay K. Garg and Joseph E. Wiikes. Prentice Hall. (3) WCDMA for UMTS，Harri Holma and Antti Toskala. John Wiley & Sons. 4. UMTS Networks – Architecture, Mobility and Services. John Wiley & Sons.
教學方式	Lectures
教學進度	個人通訊服務簡介 (Introduction to Personal Communications Services) 無線電接取技術 (Radio Access Technologies) 蜂巢式通訊技術 (Fundamentals of Cellular Communications) 行動管理 (Mobility Management) 電信網路信令協定 (Telecommunication Signaling Protocol) GSM 系統 (GSM System) RTP, RTCP SIP GPRS 系統簡介 (GPRS System Overview) 多媒體應用無線網路技術 (Wireless Network Techniques for Multimedia Applications) 3G、B3G 與 4G 之簡介 (Introduction to 3G, B3G and 4G) UMTS 簡介 (Introduction to UMTS) 高速下行封包存取 (High Speed Downlink Packet Access) UMTS 之 All-IP 網路 (UMTS All IP Networks) 電信客戶服務與帳務系統 (Customer Care & Billing System for Telecommunication)

	無線區域網路與新興發展趨勢 (WLAN and It's Development Trend)
成績考核	期中考 (25%) 3 Programming Projects (40%=10%+15%+15%) 期末口頭報告 (15%) 期末書面報告 (20%)
講義位址	http://wmnet.cs.nthu.edu.tw

26. 無線傳輸與網路

課程說明	This course will cover modern research topics and industry trends of wireless networks. It includes : 1. WiFi protocols and spec. 2. 3G Systems and (or) other wireless network systems 3. WiMax protocols and spec. 4. Cross-layer design of wireless networks.
指定用書	1. 802.11 Wireless Networks:The Definitive Guide, Second Edition (Paperback) , by Matthew S Gast 2. Wireless Communications and Networks, Second Edition (Paperback) , by William Stallings 3. Lecture notes and related papers (will be assigned with course schedule).
參考書籍	(1) The IEEE 802.11 Handbook: A Designer's Companion (Paperback) by Bob O'Hara, Al Petrick (2) Wireless Communication Standards: A Study of IEEE 802.11, 802.15, and 802.16 (Paperback) by Todor Cooklev (3) WiMAX Handbook (Hardcover) by Frank Ohrtman (4) Next Generation Mobile Systems: 3G & Beyond (Hardcover) by Minoru Etoh
教學方式	Lecture: 3 hours per week
教學進度	1 Introduction (Course syllabus and Why Wireless Network) 2 Transmission Fundamentals 3 Antenna and Propagation 4 Signal Encoding Techniques 5 Spread Spectrum 6 Error Control Techniques 7 80211 Intro 8 80211 MAC, PCF 9 Review Prob. and RP 10 Cross-layer design I 11 Cross-layer design II
成績考核	Midterm 50 % Project 30 % (2-3 students per team) Quiz: 20 %

27. 網路程式設計

課程說明	00_Intro. to UNIX Programming 01_network, OSI model, TCP, UDP & IP 02_Socket 03_WinSock_Examples 04_Other_Functions 05_TCP_Socket_Programming 06_UDP_Socket_Programming 07_Windows_SDK_Programming 08_WSAAsyncSelect 09_WSAAsyncSelect_Example 10_Windows_MFC_Programming 11_SDK_FTP 12_MFC_TELNET 13_P2P_IM 14_P2MP_IM 15_P2P_Skype 16_Simple_Browser 17_SMTP 18_POP3 實驗一：TCP-base網路程式設計 實驗二：UDP-base網路程式設計 實驗三：SDK-based視窗程式設計 實驗四：MFC-based視窗程式設計 實驗五：SDK-based ftp client程式設計 實驗六：MFC-based telnet client 程式設計 實驗七：簡易雙人對談模式IM系統設計 實驗八：簡易多人對談模式IM系統設計 實驗九：簡易Skype-like系統設計 實驗十：簡易Web browser程式設計 實驗十一：簡易SMTP client程式設計 實驗十二：簡易 POP3 client 程式設計
指定用書	投影片講義(Slides & Class Notes)
參考書籍	•Unix Network Programming, by W. R. Stevens •Internetworking with TCP/IP Vol I, II, III, by Comer and Stevens •Windows Sockets, http://www.sockets.com/winsock.htm •鳥哥的Linux私房菜 Windows Sockets: A Quick And Dirty Primer,

	http://www.frostbytes.com/~jimf/papers/sockets/winsock.html Winsock Programmer's FAQ, http://tangentsoft.net/wskfaq/ WinSock Development Tools, http://www.sockets.com/devtools.htm Windows Sockets Network Programming, by Bob Quinn and Dave Shute Winsock 網路程式設計, 張英超教授, http://www.csie.ncue.edu.tw/~icchang/course/97-nt/Winsock%20programming.pdf
成績考核	課堂練習(Practice in Class):(40%) (a)每週前半段18:20~19:40上課, 19:40~19:50休息, 後半段19:50~21:00練習, 或(b)每兩週練習一次 學期專題實作(Term Project):(60%) 共有12 個程式專題實作 你必須完成至少6個程式題, 完成越多分數越高
講義位址	http://totoro.cs.nthu.edu.tw/~cs4233/ http://www.csie.nctu.edu.tw/~kbchen/

28. 無線網路

課程說明	(1) Introduction (2) Wireless LANs and PANs (3) Wireless WANs and MANs (4) Wireless Internet (5) Ad Hoc Wireless Networks (6) MAC Protocols for Ad Hoc Wireless Networks (7) Routing Protocols for Ad Hoc Wireless Networks (8) Transport Layer and Security Protocols for Ad Hoc Wireless Networks (9) Quality of Service in Ad Hoc Wireless Networks
指定用書	Ad Hoc Wireless Networks: Architectures and Protocols 作者: C. Siva Ram Murthy, B. S. Manoj 出版商 : Prentice Hall
參考書籍	Wireless Communications & Networks 作者: William Stallings 出版商 : Pearson Prentice Hall
教學方式	1.課堂上課 2.專題實作 3.指定論文報告
成績考核	1. 考試 2. 論文報告 3. 專題實作 4. 作業 (以上成績百分比，將視課堂狀況決定)

29. 網路管理

課程說明	1. Overview of network management 2. Fault management 3. Configuration management 4. Performance management 5. Security management 6. Accounting management
參考書籍	1. Marshall T. Rose, The Simple Book - An intriduction to Internet Management Prentice Hall 2. William Stallings, SNMP, SNMPv2, SNMPv3, and RMON1 and 2 Addison-Wesley
教學方式	上課及討論
教學進度	1. Introcution to network management 2. Infomation Model 3. SNMP 4. MIB 5. RMON1 6. RMON2
成績考核	期中考 (35%) 期末 project 及報告 (40%) 課堂表現 (25%)

30. 微處理機系統

課程說明	Course Objectives: *To introduce basic microprocessor, microcomputer & embedded systems concept to students. *Emphasize and encourage hands-on practices on both software development and hardware board development. *Provide students with experience of experimenting on and actually building a microprocessor-based board.
指定用書	1. ARM System on Chip Architecture, Steve Furber, 2nd ed., Addison-Wesley, 2000.
參考書籍	(1) The 8051 Microcontroller, 4th ed., I. Scott MacKenzie & Raphael C.-W. Phan, Pearson International Ed., 2007. (2) ARM System Developer's Guide : Designing and Optimizing System Software, Andrew Sloss, Dominic Symes, Chris Wright, Morgan Kaufmann, 2004. (3) ARM 原理與實作--以網路 SoC 為例, 探矽工作室編著 宏友, 2003. (4) 2002 嵌入式系統開發聖經學貫, 2002. (5) 設計嵌入式硬體, John Catsoulis, 蔣大偉編譯, O'REILLY, 2004. (6) Using The MCS-51 Microcontroller, Han-Way Wang, Oxford, 2000. (7) Related data sheet & Websites.
教學方式	Classroom presentation with projection aid.
教學進度	Main Contents: (tentative) (1) Introduction (2) 8-bit 8051 microcontroller -----Software hardware summary -----Instruction set & assembly programming -----I/O peripherals & examples -----Microprocessor board/system development (3) 32-bit ARM microprocessor -----ARM hardware Architectures -----ARM Instruction Set Summary & Assembly Programming -----Exception Handling -----ISR

	-----I/O -----Serial Communication
成績考核	Tentative Grading Policy: About 5 homework assignments (50%), 1 small project (30%), and a final exam (20%). Homeworks include hardware projects and software design. (We will try to do all homework assignments if time allows.) Note: This course is hardware and software implementation intensive. It emphasizes hands-on and engineer problem solving practices, and is intended for those who would like to learn and practice microprocessor, microcontroller hardware/software seriously. You need to consider your interests and time management carefully before you decided to take this course. Moreover, all components should be self-provided. The Department is not responsible for providing free components to the students.

31. 微算機導論

課程說明	上課教室：工一210(上課) 與電控實驗室(工一323) 預修課程: C++ Programming 上課課程內容: 1. Introduction to Microprocessors and Embedded Systems 2. The ARM Architecture 3. ARM Instruction Set Architecture 4. C++ Programming 5. Operating Systems 6. ARM-Based Embedded Platforms 實驗部分 實驗項目： 一、 LED 實驗 二、 ADC 實驗 三、 期中專題演練 四、 UART 實驗 五、 DC Motor 控制實驗 六、 機械視覺實驗 七、 觸控式人機介面實驗 八、 期末專題實作
指定用書	實驗講義與實驗手冊
成績考核	期末考 10%，期中專題演練 10%，實驗報告 25%， 期末專題實作(包括投影報告,書面報告,海報) 50%，平時成績 5%

32. 程式設計

課程說明	In this course you will learn how to use the C/C++ computer language to write a program and let the computer do something for you. The course starts with the introduction of the development environment, which provides necessary tools for an efficient program design. Then we will face the data types and commands of the C language. It is good that the language offers some methods and commands to control the execution of a program, so that we can make millions of calculations through simple calling of functions. There are confusing and abstract things to understand and to handle, such as the Arrays and the Pointers. With the help of formatted file input and output we see how hard works are rewarded. The data structure is the most amazing one to conquer, since after that you can create a whole empire as you wish. Sadly, the exams come every week to make sure that you are still making progress.
指定用書	未定
參考書籍	K.N. King, C programming, 2Ed. Norton Co. 2008. P.J.Deitel, C How to program, fifth edition, Pearson International Edition, 2007. P.J.Deitel, C++ How to program, fifth edition, Pearson International Edition. P.J.Deitel, C How to program 中譯本 C 程式設計藝術第四版, 全華科技圖書 P.J.Deitel, C++ How to program 中譯本 C++程式設計藝術第五版, 全華科技圖書 Graham Seed "An Introduction to Object-Oriented Programming in C++", 2nd Edition, Springer Stanley B. Lippman, Josee Lajoie, "C++ Primer", Addison Wesley C++ Primer 中文版 侯捷 譯 基峰公司
教學方式	Lecture in class, programming on-site Tutored exercise in computer room: two hours/week Test every week

教學進度	0. Getting started, overview, development environment, 1. Data types, statements, first C program, 2. Program control, 3. Functions, 4. Arrays, 5. Pointers, 6. Case study 7. Characters and strings, formatted file I/O, 8. Structures, file processing, preprocessor 9. Case study 10. Data structures 11. Case study
成績考核	1. Exames $10 * 5P = 50P$ 3. Final Exam $1 * 40P = 40P$ 4. Others 10P

33. 程式語言

課程說明	本課程主要介紹程式分析與邏輯，並且透過實例來討論設計程式的架構，達到程式的可用性、邏輯性、功能性。主要的內容包含理論、分析、除錯、實作等部分。
指定用書	R. Sebesta, Concepts of Programming Languages, 10th Edition
參考書籍	* Kenneth C. Louden, Programming Languages: Principles and Practices, Second Edition, Thomson Brooks/Cole, 2003. (歐亞書局) * John C. Mitchell, Concepts in Programming Languages, Cambridge University, 2002, (新月書局)
教學方式	Lecture Problem Sheets
教學進度	Course Info (課程簡介) Foundational Concepts of Programming Languages (程式語言簡介) Syntax review; Syntactic ambiguity (語法誤謬) Semantics (語意概念) Names, Bindings, Type Checking, and Scopes (變數型態與範圍) Expression (程式表達) Control Structures (控制結構) subprogram (子程式) Exception handling (例外處理) Encapsulation (類型別) Functional Programming (功能性程式) Scheme programming (邏輯綱要程式)
成績考核	出席 作業(50%) 期中考(25%) 期末Project(25%)

34. 平行程式

課程說明	熟悉平行程式語言及平行程式設計
指定用書	1. Parallel Programming – Techniques and applications Using Networked Workstations and Parallel Computers, Barry Wilkinson and Michael Allen, Prentice Hall, 1999. 2. Parallel Programming in C with MPI and OpenMP, Michael J. Quinn, McGraw-Hill, 2003. 3. Intel Multi-Core Programming
參考書籍	1. Documentation (PVM, MPI, Cilk, Pthread, TreadMark, SAM). 2. Designing and Building Parallel Programs, Ian Foster, Addison Wesley, 1995.
教學方式	上課
教學進度	Lectures: - Introduction to Parallel Computers - Message-Passing Computing and Programming - Shared Memory Programming (Pthread and OpenMP) - Distributed Shared Memory Programming - Embarrassingly Parallel Computations - Partitioning and Divide-and-Conquer Strategies - Pipelined Computations - Synchronous Computations - Load Balancing and Termination Detection - Google Cloud Computing Lab: - MPI Programming - Pthread Programming - OpenMP Programming - Distributed Shared Memory Programming
成績考核	Programs - 90% Class participation - 10%
講義位址	http://www.cs.nthu.edu.tw/~ychung/syllabus/para_programming.htm

35. 嵌入式系統程式設計

課程說明	本課程著重於嵌入式系統程式語言的特性介紹，使修課學生具備多種語言開發軟體的能力，並依應用及系統平台使用適合的語言開發軟體。課程並規畫實習使修課學生能得到理論與實務配合的經驗。
指定用書	講義
參考書籍	* Robert W. Sebesta, Concepts of Programming Languages, 6th ed., Addison-Wesley, Inc., 2004. * Bjarne Stroustrup, The C++ Programming Language, 3rd ed., Addison-Wesley, Inc., 1997. * Ken Arnold and James Gosling, The Java Programming Language, Addison-Wesley, Inc., 1996. * Anders Hejlsberg, The C# Programming Language, Addison-Wesley, Inc., 2003.
教學方式	課堂講授、實習
教學進度	1. 嵌入式系統簡介 硬體/軟體協同設計 (co-design) 嵌入式系統實例 介面技術 即時作業系統簡介：資源管理/排程方法、等待、不可預估性、中斷、快取 2. 嵌入式系統相關語言簡介。 硬體描述語言(VHDL、Verilog 簡介) 組合語言 C 語言 C++語言 java C# 資料流描述語言(如 Esterel、Kahn Process network、Synchronous Dataflow、SDL) 嵌入式系統編譯程式相關議題 3. 嵌入式程式語言特性 即時需求(含如何存取硬體、處理位元資料、輪詢及中斷) 中斷服務程式設計(含傳統功能式設計方式與類別式設計方式) 併行處理 (concurrency) (排程方式、資源共享方式、同步方式、產生多工作業方式、資料傳遞方式等)

	4. 嵌入式 C++ (or C) C++回顧 C++之低階支援 (存取硬體,處理位元資料等) 中斷服務程式設計 組合語言介面 設計可置於 ROM 之程式 併行處理 5. Java JVM 簡介 Java 語言特性簡介 Java 原生介面 (native interface) Java 中斷處理 併行處理 即時 java 6. C# 語言特性簡介 c#之低階支援 中斷處理 併行處理 即時處理
成績考核	實習、期中考、期末考

36. 高等程式設計實作

課程說明	本課程每週將針對 1~2 個主題，於課堂上講解該主題所需的演算法以及實作注意事項與技巧，然後要求同學完成 1~2 個程式作業，讓修課同學能夠在實作中更加了解演算法，提升實作能力。除了典型的問題外，每週也會講解1~2 個精彩的進階題目供同學討論與欣賞。期中與期末考都將採上機方式進行。由於課程重點是實作，將會略過大部分的證明，以實作技巧作為本課程的重心，方法(演算法與資料結構)優劣的評估也完全由實作觀點出發。
指定用書	課程中發給講義
參考書籍	[1] S. Anderson-Freed, E. Horowitz, and S. Sahni, Fundamentals of Data Structures in C, Computer Science Press [2] T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, Introduction to Algorithms, MIT Press, 2003. [3] ACM On-line Judge : http://acm.uva.es/problem/ [4] IOI 歷屆試題 : http://olympiads.win.tue.nl/ioi/
教學進度	以下課題將視時間做調整，較進階的課題時間夠才教。另外，由於課程重點是實作，將會略過大部分的證明，以實作技巧作為本課程的重心，方法的優劣也完全由實作觀點出發。 [1] Warm-up: 簡介課程所採用的實作環境、debugging 和 testing 的技巧，以及一些寫程式的好習慣 (如: top-down design、modularization、避免使用 pointers 與 dynamic memory allocation 等)。 [2] Sorting: 介紹兩個實作上最好的 sorting algorithms [3] Input processing and useful string functions: 當遇到複雜的 input 格式時，如何對 input 作 process，並介紹一些有用的 string functions 來幫助 text processing [4] Big numbers: 當運算的數字大小超過程式語言的表示範圍時，實作上該如何克服? [5] Prime numbers: 介紹質數的性質以及一些質數相關問題的實作方式，如因數分解、中國餘式定理、Goldbach's Conjecture 等。 [6] Binary search [7] Greedy method: 介紹利用 greedy method 可以解決的一系列經典問題 [8] Dynamic programming: 介紹利用 dynamic programming 可以

	解決的一系列經典問題，並講解實作上需要注意的技巧（如：填表順序的選取與利用 recursive call 完成 backtracking 等）。 [9] Branch and bound：透過一系列經典問題讓同學熟悉 Branch and bound 這個實作技巧。 [10] Representation of graphs：介紹在實作上 directed graph 與 undirected graph 的最有效表示法。 [11] Representation and recognition of trees：介紹在實作上 tree 的最有效表示法，以及如何判斷一個給定的 graph 是否為 tree。另外，也會介紹一些基本的 tree algorithms (如 traversal、計算 diameter 等)。 [12] Depth first search and breadth first search：介紹如何判斷 DFS 與 BFS 的使用時機，以及在實作上所須注意的問題。 [13] Shortest paths：介紹最經典的 shortest path algorithms，並教導同學在實作上該如何選擇對題目而言最簡單有效的實作方法以及資料結構。 [14] Disjoint sets and minimum spanning trees：介紹 disjoint set 以及 minimum spanning trees 等問題的最有效實作方法。 [15] Computational geometry and Euler tours：介紹幾個計算幾何上的經典問題以及最簡單有效的實作方法。 [16] Maximum flows：介紹 Ford-Fulkerson method 以及簡單實作技巧，並介紹 bipartite matching 與 minimum cost flow 等應用。 [17] Simulation：透過幾個經典問題讓同學熟悉撰寫 simulation 程式的技巧並說明一些設計時應注意的事項與可能掉入的陷阱。 [18] Mathematics problems：介紹如高斯消去法等有名的數學題目，以及實作時該注意的問題。
成績考核	(暫定) 1. 程式作業 50% 2. 上機期中考 20% 3. 上機期末考 30%
講義位址	開學後公布

37. 程式設計與應用

課程說明	使學生了解物件導向觀念的程式語言及如何撰寫Windows應用程式。本課程以學習VB.NET (Visual Basic 2008) 語言為主，針對語法規則及物件導向概念進行深入介紹，並進一步培養學生開發Windows應用程式及建置網路資料庫之實力。教學過程主要以程式實例進行解說，經由上機實作及作業專題的安排循序漸進地建立起正確的結構化程式設計概念。
參考書籍	古頤榛，Visual Basic 2008教學範本，基峯資訊，2009/07。
教學進度	(核心課程內容) 1. 簡介 VB.NET 及 VB 2008 環境 2. 資料處理與運算 3. 程式流程控制 4. 物件導向觀念 5. 偵錯處理 6. 標籤與表單 7. Windows Form 設計 8. 功能表與工具列設計 9. 框架與列表 10. 電腦週邊設備控制 11. 檔案存取與處理 12. Web 資料庫設計
成績考核	一次期中考(25%)、一次期末考(25%)、五次作業(30%)、期末專題(20%)

38. 計算機程式設計

課程說明	This is an introductory course to computer programming. The objective is to enable students to acquire the coding techniques and logical thinking to solve real world problems. In the course, we will introduce important constructs of the C and C++ language. Besides lectures, students will practice in class with the assistance from tutors for basic programming techniques. The learning will be reinforced through extensive after-class programming assignments.
指定用書	Starting Out with C++ Early Objects, 6th Edition, by Tony Gaddis, Judy Walters, Godfrey Muganda, Addison Wesley. (全華代理)
參考書籍	C++ Primer (4th Edition) by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo, Addison-Wesley Professional The C++ Programming Language by Bjarne Stroustrup, Addison-Wesley Professional Effective C++: 55 Specific Ways to Improve Your Programs and Designs, by Scott Meyers, Addison-Wesley Professional. Problem Solving with C++, 7/E, by Walter Savitch, Addison-Wesley. C++ How to Program (6th Edition), by Harvey & Paul) Deitel & Deitel, Prentice Hall; August 3, 2007.
教學方式	Lecture and in-class practice
教學進度	Chapter 0 Course introduction and programming environments Lecture 1 Jeroo introduction Lecture 2 Jeroo controls Chapter 1 Introduction to Computers and Programming Chapter 2 Introduction to C++ Chapter 3 Expressions and Interactivity Chapter 4 Making Decisions Chapter 5 Looping Chapter 6 Functions Chapter 7 Introduction to Classes and Objects Chapter 8 Arrays Chapter 9 Searching, Sorting, and Algorithm Analysis Chapter 10 Pointers Chapter 11 More About Classes and Object-Oriented Programming Chapter 14 Recursion Chapter 16 Exceptions, Templates, and the Standard Template

	Library (STL) Chapter 17 Linked Lists Chapter 18 Stacks and Queues
成績考核	Homework assignments 20% Programming assignments 40% In-class labs and quiz 10% Midterm 15% Final 15%
講義位址	lms.nthu.edu.tw

39. 系統整合實作一

課程說明	This course is to give the students an opportunity to work on a project with a small group of students supervised by the professor. The goal is to develop a small system of the topic discussed with the professor. Hopefully, this will give the students hand-on experiences and in-depth understanding of the problems in computer vision.
指定用書	Related papers will be distributed.
參考書籍	Some reference papers will be given.
教學方式	Regular weekly meetings.
成績考核	Final project: 100%.

40. 系統整合實作二

課程說明	Biometric recognition is to identify or verify an individual based on his or her biological or behavioral characteristics. This project aimsto develop a Biometric recognition system based on Fingerprints, face, handwritings, and/or iris patterns.
指定用書	[1] Julian Ashbourn, Biometrics: Advanced Identity Verification, Springer, 2000.
參考書籍	[1] cse.msu.edu.tw/rgroups [2] www.nist.gov [3] bias.csr.unibo.it/fvc2000
教學方式	Students are required to study and develop a biometric recognition system based on the training data provided by NTHU/PRIP-Lab and/or collected by themselves.
教學進度	Students are expected to report their progress at least once every other week via e-mail to an oral presentation.
成績考核	Based on the final report.
講義位址	[1] /user/prof/cchen/CS5540 [2] Web sites will be announced when the class begins.

41. 邏輯設計實驗

課程說明	本課程能讓學員深入了解邏輯電路之設計流程，親身體會數位電路之設計經驗。本實驗需先修過邏輯設計(EE2280)課程始能加選，本實驗幫助同學快速領悟邏輯設計理論，並能實際應用所學於硬體實驗電路，如此，能讓同學對數位邏輯設計有更深一層的體驗與認知。This is the first course for logic design lab.
參考書籍	Mano and Cilett, Digital Design, 4rd ed., Pearson Prentice-Hall, 2007
教學方式	課程前兩週講授數位邏輯電路實現之方法及流程，之後使用可程式元件(FPGA/CPLD)來進行邏輯設計之各項實驗，教學方式以實驗為主。學期末利用專題方式，讓學員動動腦筋，將其所學融會貫通。 Lectures, experiments, and term project.
教學進度	[1] Verilog 硬體描述語言撰寫 (Verilog Hardware Description Language writing) [2] Xilinx 軟體操作 (Xilinx Foundation Series Software usage) [3] 現場可程式陣列之使用 (Field Programmable Gate Arrays usage) [4] 高複雜可程式邏輯元件之使用 (Complex Programmable Logic Devices usage) [5] 邏輯設計之應用 (Logic design with HDL)
成績考核	實驗成績佔總成績 80%，期末考佔 20%。 Experiments 80%, final exam 20%.

42. 硬體實驗

課程說明	硬體實驗主要目的與內容： 1. 了解現代數位電路設計的系統方法，可與邏輯設計學到的互相參照，並與未來會學到的積體電路設計相銜接。 2. 實做有趣的期末 Project. 有關課程的說明請直接參考課程網頁： http://www.cs.nthu.edu.tw/~cthuang/ 或直接進入 http://nthucad.cs.nthu.edu.tw/~cthuang/courses/cs2104/ 有興趣的同學也可以參考網頁上去年 Final Project 的選輯影片： http://www.cs.nthu.edu.tw/~cthuang/ 或直接進入 http://nthucad.cs.nthu.edu.tw/~cthuang/courses/cs2104/ The purpose of this class is to let students perform hand on experiments on several logic design learned in the previous year. Students are required to run 6-7 experiments and a final project. An experiment is succeeded after demonstration to the TAs or me. In the Logic Design course, you have learned the basics of digital logic design. In this laboratory class, we will move on from theory to practice and actually implement some interesting and useful designs. We will make use of computer-aided design (CAD) tools and field-programmable gate array (FPGA) development boards to implement and test our designs. After taking this course, you will 1. acquire hands-on design experience with a complete CAD tool suite, 2. learn digital logic design with HDL, and 4. learn rapid prototyping using FPGAs Some of the major topics are listed in the following. Logic Design and test bench design with HDL Xilinx ISE Software Field Programmable Gate Arrays (FPGA) Modular design concept and skills
參考書籍	Mano and Kime, Logic and Computer Design Fundamentals, 2nd Edition Updated, Prentice-Hall, 2001

	Programmable Logic Design Quick Start Handbook, Xilinx Inc. http://www.xilinx.com ISE Quick Start Tutorial http://toolbox.xilinx.com/docsan/xilinx6/books/docs/qst/qst.pdf
教學方式	Lecture for 1 hours. Experiments for 2 hours

43. 嵌入式系統與實驗

課程說明	In this course, we will use an ARM single board computer to perform embedded software programming and hardware interfacing design. Goal of this course * Understand the basics of microprocessor system hardware * Understand the design of both hardware and software system * Familiar with techniques of computer interfacing * Learn basics of device driver programming * Familiar with Linux and GNU tools
參考書籍	Linux Device Drivers 2nd Ed. By Alessandro Rubini and Jonathan Corbet, Oreilly Building Embedded Linux Systems by Karim Yaghmour, Oreilly Embedded Linux: Hardware, Software, and Interfacing by Craig, Ph.D. Hollabaugh, Addison Wesley Professional; 1st edition (March 7, 2002) (中譯本)內嵌式 Linux 系統---硬體、軟體與介面 陳清豪 譯，培生教育出版集團
教學方式	Two hour lecture and two hour lab per week (plus assignments)
教學進度	1. Introduction to embedded systems 2. Build development workstation 3. Install cross-compiling tools and kernel recompile 4. Boot embedded Linux on local MTD devices and remote systems 5. Debug remote systems 6. Build root file system for an embedded system 7. 3-axis sensors and RS-232 interface 7. Device drivers 8. FPGA and Memory-mapped IO interface 9. interrupt-driven IO 10. System integration and final projects
講義位址	http://larc.ee.nthu.edu.tw/~jjliou/courses/ell/index.html

44. 微處理機系統實驗

課程說明	In this course, we will use an Xscale single board computer to perform embedded software programming and hardware interfacing design. Goal of this course * Understand the basics of microprocessor system hardware * Understand the design of both hardware and software system * Familiar with techniques of computer interfacing * Learn basics of device driver programming * Familiar with Linux and GNU tools
參考書籍	(Not required) Embedded Linux: Hardware, Software, and Interfacing by Craig, Ph.D. Hollabaugh, Addison Wesley Professional; 1st edition (March 7, 2002) (中譯本)內嵌式 Linux 系統---硬體、軟體與介面 陳清豪 譯，培生教育出版集團 Linux Device Drivers 2nd Ed. By Alessandro Rubini and Jonathan Corbet, Oreilly Building Embedded Linux Systems by Karim Yaghmour, Oreilly
教學方式	One hour lecture and two hour lab per week (plus assignments)
教學進度	1. Introduction to embedded systems 2. Build development workstation 3. Build cross-compiling tool sets 4. Boot embedded Linux on remote system 5. Debug remote system 6. Build toolchains and root for an embedded system 7. Device drivers and RS-232 interface 8. Memory-mapped IO interface 9. interrupt-driven IO 10. System integration and final projects
成績考核	* Lab Demo 60% * Lab Reports 40%
講義位址	http://larc.ee.nthu.edu.tw/~jjliou/courses/ee2405/index.html

45. 資料庫系統概論

課程說明	CS 4710: Introduction to Database Systems Course Summary This course is intended to cover the fundamental concept in database systems. The introduced concepts are: 1) conceptual, logic, and physical organization of data; 2) data manipulation languages; 3) indexing techniques; 4) transaction management. These concepts are exercised further by four exercises and a final project.
教學進度	- Introduction (C1, AR1, AR5) - E-R Data Model (C2-3, AR3, AR4) - Extended ER Data Model (C3-4) - Relational Data Model (C5) - SQL (C8) - Relational Algebra and Calculus (C6, C8-9) - Storage and Indexing (C13-14, AR6-7) - Query Evaluation (C15, AR8,9) - Transaction Management (C17-19) - Project Demonstration
成績考核	Assignment: 20% Project: 20% Midterm Exam: 25% Final Exam: 35% Participation: 5%

46. 資料庫管理系統

課程說明	本課程之目的以網際網路資料庫為核心，並提供一個建構線上虛擬世界或電子商務網站的能力與技術，使修課同學能瞭解 Web 資料庫、Web 動態網頁語言及應用程式開發之關連，進一步熟悉以 web 來存取資料庫之應用。 課程重點在於透過 Web 資料庫設計及動態網頁語言，來發揮電子商務網站的魅力，強調資料內容豐富、功能完整、具主題與定位的網站才能真正吸引人潮，達到電子商務網站的目標。
指定用書	PHP 5 & MySQL 5 入門學習指南 凱文瑞克 著
參考書籍	[1] 資料庫系統之理論與實務 曾守正、周韻寰 著 [2] 實戰 PHP 5&MySQL 5 Luke Welling & Laura Thomson 著 MySQL 參考手冊 余宗恩 著 MySQL 學習手札 Luke Welling & Laura Thomson 著 [3] 資料庫實務(使用 PostgreSQL) 林世傑/林金微/蔡修偉 著 PHP+MySQL Web 應用實務 邱智詠 著 [4] MySQL 5 資料庫實務 梁仁楷/嚴楓琪 著 [5] Windwos XP 真·架站王 施威銘工作室 著 [6] Fedora 9 Linux 實務應用 施威銘研究室 著
教學方式	1.針對每次上課主題進行講解與示範。 2.接著由學生練習、測試。 3.最後，指定實習(作業)題目，由學生在課堂(回家)完成。
教學進度	1.資料庫概論 2.AMP 的意義與建置 3.MySQL 簡介 4.SQL 語法 5.資料庫的管理與安全性 6.PHP 入門 7.MySQL 與 PHP 之應用 8.實務範例之研究與製作
成績考核	學期成績=(作業+實習)成績*30%+期中考成績*30%+期末考成績*40%
講義位址	『資料庫管理系統』教學網站 (本網站內容僅提供修課同學使用，並於開學時開放!)

47. 高等資料庫系統

課程說明	This course covers the essential concepts, principles, techniques, and mechanisms associated with database systems. The state-of-the-art techniques, including traditional approaches as well as recent research developments, would be introduced in this course. The course is intended to provide basic understanding of the issues involved in database systems, knowledge of currently practical techniques for satisfying such needs, and the current research approaches that are likely to provide a basis for tomorrow's solutions.
指定用書	DATABASE MANAGEMENT SYSTEMS, Third Edition by Raghu Ramakrishnan and Johannes Gehrke
參考書籍	Jim Gray. "Evolution of Data Management." Computer v29 n10 (October 1996):38-46. Alin Deutsch et. al. "Querying XML Data" Bulletin of Data Engineering, v22, n3, Sep. 1999 Ralf Hartmut Guting. "An Introduction to Spatial Database Systems." VLDB Journal 3(4): 357-399, 1994. Antomn Guttman. "R-TREES. A DYNAMIC INDEX STRUCTURE FOR SPATIAL SEARCHING." Proceedings of ACM SIGMOD, pp.47-57, 1984. Hanan Samet. "Spatial Data Structures." Appears in Modern Database Systems: The Object Model, Interoperability, and Beyond, W.Kim, ed., Addison Wesley/ACM Press, Reading, MA, 1995, 361-385. Timos Sellis, Nick Roussopoulos and Chrishtos Faloutsos. "THE R+-TREE: A DYNAMIC INDEX FOR MULTI-DIMENSIONAL OBJECTS." Proceedings of the 13th VLDB Conference, Brighton 1987. XML 1.0 (http://www.w3.org/TR/REC-xml) XQuery 1.0: An XML Query Language (http://www.w3.org/TR/NOTE-xml-ql/) S. S. Chawathe "Describing and Manipulating XML Data" Bulletin of Data Engineering, v22, n3, Sep. 1999 Storing a Collection of Polygons Using Quadtrees. Hanan Samet, Rober E. Webber. ACM Transactions on Graphics (TOG) ,pages 182-222, 1995
教學方式	90% Lectures

	10% Student Presentations
教學進度	Introduction and overview ER data model and Relational data model (review) SQL (review) OR-DBMS Spatial Databases Database Connectivity Spatial Index structures XML XQuery Multimedia Databases Multidimensional Databases Data Mining Continuous Data Stream Management
成績考核	There will be two exams in this course: a midterm and a final. There will be three assignments and one oral presentation. Grading scheme: Assignments 30% Presentation 20% Exam 1 20% Exam 2 25% Participation 10%
講義位址	http://www.cs.nthu.edu.tw/~yishin/Courses/CS6710/

48. 資料庫設計

課程說明	How to use a database management system to computerize an application is a practical problem. In this course, we will first show you how to analyze the rules and properties of an application, and then design a logical database for some selected application, translate the logical database schema into a physical database, To achieve such a goal, the following database design methods that are mostly system-independent will be covered: ◆ Information collection and analysis ◆ Entity-Relationship model/Extended Entity-Relationship Model ◆ Relational Model ◆ Logical database Design ◆ Translating Extended Entity-Relationship Model into Relational Model ◆ Physical Database Design
指定用書	Fundamental of Database systems. Fifth Edition. By Elmasri and Navathe. Pearson/Addison Wesley Publishing Comp., 2007. ISBN 0-321-41506-X.
成績考核	Your final grade will be based on the following results: 1. First Quiz – 20% 9:00 – 9:50am, October 25, 2007 2. Second Quiz – 35% 9:00 – 9:50am, December 6, 2007 3. Final Project2 – 45% No later than December 31, 2007 You should know or self-learn how to use a commercial database management system to design an application-oriented database and write a project report that should content the following information: ◆ The characteristics of a selected application. ◆ Schema structures and constraints of the application described in EER model.. ◆ A friendly user interfaces for creating and accessing the database.

49. 資料庫系統專題一

課程說明	Discuss current research issues of data stream management and data mining. Students present papers from most recent conference proceedings or journals.
指定用書	IEEE Transactions on Knowledge and Data Engineering IEEE Transactions on Multimedia.
教學方式	Paper presentation and discussion; report writing.

50. 資料庫系統專題二

課程說明	Discuss current research issues of data stream management and data mining. Students present papers from most recent conference proceedings or journals.
指定用書	IEEE Transactions on Knowledge and Data Engineering IEEE Transactions on Multimedia.
教學方式	Paper presentation and discussion; report writing.

51. 資料結構

指定用書	Fundamentals of Data Structure in C, E. Horowitz, S. Sahni and S. Anderson-Freed.
教學進度	We will cover Chapters 1-7 and selected topics of Chapter 8 of the text book. This course will proceed along the following subjects : 1. Introduction to Algorithms, 2. Array and Structures, 3. Stacks and Queues, 4. Lists, 5. Trees, 6. Sets, 7. Graphs, 8. Hashing, 9. Sorting.

52. 演算法的數學分析

課程說明	Concrete mathematics is a blending of continuous and discrete mathematics. It introduces the mathematics that supports advanced computer programming and the analysis of algorithms. Upon completing the study of concrete mathematics, the student will have mathematical skills to solve complex problems, to evaluate horrendous sums, and to discover subtle patterns in data. The major topics treated in the course include sums, recurrences, elementary number theory, binomial coefficients, generating functions, and asymptotic methods. The emphasis is on manipulative technique rather than on existence theorems or combinatorial reasoning; the goal is for the student to become as familiar with discrete operations as a student of calculus is familiar with continuous operation.
指定用書	“Concrete Mathematics—A foundation For Computer Science”, GRAHAM, KNUTH, PATASHNIK, ADDISON WESLEY
教學方式	Lecture
教學進度	1. Recurrent Problems (2 weeks) 2. Sums (2 weeks) 3. Integer Functions (2 weeks) 4. Number Theory (6 weeks) 5. Binomial Coefficients (2 weeks) 6. Generating Functions (2 weeks)
成績考核	6 Quizzes (60%) 1 Final (40%)

53. 計算方法設計

課程說明	1. Introduction I. Mathematical Foundations 2. Growth of Functions 3. Summations 4. Recurrences II. Sorting and Order Statistics 7. Heapsort 8. Quicksort 9. Sorting In Linear Time 10. Medians and Order Statistics IV. Advanced Design and Analysis Techniques 16. Dynamic Programming 17. Greedy Algorithms 18. Amortized Analysis V. Advanced Data Structures 20. Binomial Heaps 21. Fibonacci Heaps 22. Data Structures for Disjoint Sets VI. Graph Algorithms 23. Elementary Graph Algorithms 24. Minimum Spanning Trees 25. Single-Source Shortest Paths 26. All-Pairs Shortest Paths 27. Maximin Flow VII. Selected Topics 31. Matrix Operations 34. String Matching 36. NP-Completeness 37. Approximation Algorithms **. Branch-and-Bound Self-educated: Chapters 11~15, 19
指定用書	T. Cormen, C. E. Leiserson, and R. L. Rivest, Introduction to algorithms, 2nd edition, the MIT press, 2001.
參考書籍	R. C. T. Lee, R. C. Chang, S. S. Tseng, and Y. T. Tsai, Introduction to the Design and Analysis of Algorithms, 松崗, 1999.
成績考核	作業: 10% 期中考: 40%

	期末考：50 %
講義位址	課程中發給

54. 離散數學

課程說明	This course introduces selected topics from set theory, combinatorics, graph theory and algebra, which are an integral part of the computer science curriculum.
指定用書	C.L. Liu, Elements of Discrete Mathematics, 2nd Ed, McGraw-Hill, 1998
參考書籍	TBD
教學方式	Lectures Exercises Exams
教學進度	Chapter 1. Sets and Propositions Chapter 3. Permutations, Combinations, and Discrete Probability Chapter 4. Relations and Functions Chapter 5. Graphs and Planar Graphs Chapter 6. Trees and Cut-Sets Chapter 9. Discrete Numeric Functions and Generating Functions Chapter 11. Groups and Rings
成績考核	Homework assignments 20-30% Exams 70-80%
講義位址	TBD

55. 作業系統

課程說明	1. Overview 2. Processes and Threads 3. Multithreaded Programming 4. Process Scheduling 5. Process Synchronization 6. Deadlocks 7. Memory Management Strategies 8. Virtual-Memory Management 9. File System 10. Implementing File Systems 11. Secondary-Storage Structure 12. I/O Systems Case Studies: Linux
指定用書	A. Silberschatz, P. Galvin, and G. Gangne, Operating System Concepts, 8th Edition (International Student Version), John Wiley & Sons, Inc.
教學方式	* 本課程備有完整講義。 * 上課採用投影片與電腦教材。 * 本課程理論與實作經驗並重，學生必須熟悉與演練至少一種商用 OS 軟體。
教學進度	每一章教材約需一～二週授畢。 期中應完成一項 Project, Nachos 作業一 (Multiprogramming) 期末應完成一項 Project, Nachos 作業二 (System Call, CPU Scheduling and Page Swapping) 詳見網頁 http://vc.cs.nthu.edu.tw/home/courses/CS342301/95/
成績考核	學習成績評定 * Midterm Exam (32%) * Final Exam (36%) * Term Project (12%) * Homeworks and Quiz (20%)
講義位址	http://vc.cs.nthu.edu.tw/home/courses/CS342301/95/

56. 高等作業系統

課程說明	The study and implementation of advanced operating systems 1. Introduction 2. hardware issues 3. software issues 4. trace linux 5. trace real-time linux 6. trace embedded OS
指定用書	reference paper public software
教學方式	lecture presentation project

57. 軟體工程

課程說明	軟體工程主要內容包括：軟體生命週期、軟體發展方法、品質管理、組態管理、專案管理、軟體度量、軟體再用等基本理論之簡介，以及如常見軟體系統架構、物件導向式軟體發展方法、多堆式(N-Tier)架構、Web Service 等現代網際網路應用軟體設計趨勢之討論等等。(詳見教學進度之說明) 因為這個課是大班制，選修學生人數很多，而且幾乎各個年級的同學都有，所以可能不容易滿足所有選修同學的期望。基本上，課程對像是以大四同學為主，內容較偏實務應用。
參考書籍	Roger S. Pressman Software Engineering: A Practitioner's Approach, seventh Edition McGraw-Hill International Edition 2010
教學方式	主要仍以課堂講解方式進行，課堂可能會有點名；平時有 2~4 個作業(交報告)，記錄均列入平時成績。另有期末報告(必交)。不舉行期中、期末考。 今年教學方式計劃會有大幅度改變(參考前幾年學長姐的提出建議)，原則上會加速課堂講解，然後空出約 1/4 的時間(約四星期)讓同學感受大型軟體專案(至少數十人規模)進行的境界模擬，雖然不會有實際的分析、設計、製作、測試等作業，但過程會完整，包括技術面與管理面，而且會由電腦依機率製造狀況，看看要怎麼辦。 第一次嘗試，可能會有點混亂，擬選課同學請先知悉才是。
教學進度	(以下以週別及上課節次表示，如 3.2 表示第三週第二節課之進度內容) 1.軟體工程概述 1.1 軟體的特質 1.2 軟體開發程序與工具 1.3 軟體工程探討模型 2.軟體開發方法概述 2.1 傳統的軟體開發方法 2.2 物件導向軟體開發方法 2.3 軟體再用 3.其他基本觀念概述 3.1 文件的重要性 3.2 軟體度量 3.3 電腦輔助軟體工程工具 4.需求分析 4.1 功能需求

	4.2 非功能需求
	4.3 需求分析文件
	5.設計製作
	5.1 架構設計
	5.2 程式設計
	5.3 設計製作文件
	6.測試與維護
	6.1 測試的意義
	6.2 測試文件
	6.3 軟體交付與維護
	7.品質管理
	7.1 品質管制與品質保證
	7.2 軟體品質指數
	7.3 由測試記錄推算品質指數
	8.組態管理
	8.1 組態的意義
	8.2 基線訂定
	8.3 版本管制
	9.專案管理
	9.1 甘特圖
	9.2 軟體生產力指數
	9.3 資源與成本估算
	10.正規化軟體開發
	10.1 軟體型態轉換模式
	10.2 有數學理論依據的方法
	10.3 軟體的正確性
	11.現代資訊應用系統設計概要
	11.1 多堆式系統架構
	11.2 資料庫正規化
	11.3 多國語言需求
	12.物件的相關討論
	12.1 物件式資料結構
	12.2 物件的意義
	12.3 物件的儲存與佈署
	13.大型軟體專案開發模擬(一)
	13.1 預估
	13.2 分工
	13.3 組態規劃

	14.大型軟體專案開發模擬(二) 14.1 需求分析 14.2 驗證 14.3 改變 15.大型軟體專案開發模擬(三) 15.1 設計製作 15.2 測試 15.3 文件整理 16.大型軟體專案開發模擬(四) 16.1 品質度量 16.2 生產力度量 16.3檢討分析
成績考核	以平時成績佔40%、期末報告成績佔60%合計方式給予總成績。 如果狀況許可，將加如同學自評成績供老師參考。(每年都有學長姐覺得成績考核好像不很公平，所以除了作業、點名、期末報告之外，考慮把同學自評甚或互評成績都列入，看是否能改善不公平度。)

58. 計算機結構

課程說明	1. Computer Abstractions and Technology 2. Instructions: Language of the Computer 3. Arithmetic for Computers 4. The Processor 5. Large and Fast: Exploiting Memory Hierarchy 6. Storage and Other IO Topics 7. Multicores, Multiprocessors, and Clusters
指定用書	David A. Patterson and John L. Hennessy, Computer Organization and Design, Fourth Edition, 2008
參考書籍	David A. Patterson and John L. Hennessy, Computer Architecture: A Quantitative Approach, 4th Edition, 2006
教學方式	Lecture and projects
成績考核	Attendance: 5% Quiz: 25% Projects: 70% Bonus project: 10%
講義位址	http://logos.cs.nthu.edu.tw/blog/rstsay/

59. 高等計算機結構

課程說明	This course teaches many advanced techniques used in the design of modern processors. Architectural features of modern microprocessors, including advanced pipeline designs, instruction level parallelism(ILP), various branch prediction techniques, cache memory, and virtual memory subsystem will be studied. In addition, superscalar design, Tomasulo Algorithm with re-order buffer, VLIW processors, code optimization for such systems will be also described. Multi-core and multi-processor design will also be covered. Interconnection network and I/O may be covered if time allows. Quantitative evaluation of architectural features is emphasized throughout the course.
指定用書	1. J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, 4th Edition, Morgan Kaufmann Publishing Co., Menlo Park, CA 2. John Shen, Mikko Lipasti, Modern Processor Design, McGraw Hill
參考書籍	1. Hennesey and Patterson, "Computer organization and design" 2. Brayant and O'Hallaron, "Computer Systems" 3. Dandamudi, "fundamentals of computer organization and design"
教學方式	The course will be conducted orally. Course materials including slides will be available to all students.
教學進度	1. Fundamentals of Computer Design 2. Instruction Set Principles and Examples 3. Pipelining, superscalar, branch predictions 4. Advanced Pipelining, Tomasulo Algorithm, reorder buffer, Register Renaming, VLIW 5. Memory Hierarchy Design 6. Multicore and multiprocessor 7. On-Chip Interconnection network 8. I/O
成績考核	Homework and class participation 10%. There will be about 10 homeworks, each requires students to fully understand the course materials before attempting to solve these problems. Homeworks are designed to help students understand the most important issues in each chapter. Students are expected to work hard on these homeworks.

	Mid-term 45%
	Final 45%
講義位址	http://cluster.ee.nthu.edu.tw

60. 組合語言與系統程式

課程說明	This course introduces the basic concepts of assembly language and system software. The topics covered include Intel X86 architecture, using MASM and debuggers, X86 assembly programming (memory addressing, program structure, I/O processing, macro writing, and linking to high level languages), concepts of assembler and linking loader, and developing simplified assembler and linking loader.
指定用書	1. Assembly Language for Intel-Based Computers (4th Edition) by Kip R. Irvine 2. System Software: An Introduction to Systems Programming by Leland L. Beck (Chapters 1-4 will be used.)
教學方式	1. Lectures and Quiz 2. Writing Three Assembly Language Programs 3. Mid-term Exam. 4. Writing a SIC/XE Simulator [See Beck's System Software] 5. Writing a Simplified Assembler 6. Writing a Simplified Linking Loader 7. Final Exam.
教學進度	Overview and Introduction (1 week) Typical Organization of Personal Computers (0.5 week) Programming Environment (1 week) Data Declaration, Addressing Modes (0.5 week) Interrupt and I/O Processing (0.5 week) Branch and Loop (1 week) Stack and Procedures (1 week) Macros (1 week) Arithmetic, Bit Operators, Floating Points (0.5 weeks) The Evolution and Legacy of x86 Microprocessors (0.5 week) The Role of Operating System and the BIOS Boot Process (0.5 week) Disk Storage (1 weeks) Assembler, Loader, and Linker (5-7 weeks)
成績考核	(Subject to change. It will be finalized at the syllabus that is to be distributed at the first class meeting.) 1. Assembly Programs: 20-30% 2. Quiz: 0-10% 3. Mid-term Exam: 20%

	4. System Programs: 20-30% 5. Final Exam: 20%
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61. 多媒體編碼技術導論

課程說明	先修科目：無 •Provide undergraduate students with a global overview of state-of-the-art in the area of VIDEO and VOICE COMPRESSION. •Video: current standards, JPEG-2000, MPEG-4 and H.264. •Audio and Speech: current standards, MP3, AAC, G.729 and iLBC (for VoIP). 課程大綱： Introduction Video Formats and Quality Video/Image Coding Concept Audio/Voice Coding Concept The MPEG-4 and H.264 Standards MPEG-4 Visual H.264/MPEG-4 Part 10 Image Coding Standard: JPEG-2000 Audio/Voice Coding Standards: MP3, AAC, G.729 and iLBC Hardware architecture design for block matching, DCT, etc. Video streaming techniques Applications and Directions
指定用書	Iain E.G. Richardson, H.264 and MPEG-4 Video Compression, John Wiley & Sons, 2003.
參考書籍	Recent Documents for Video Coding Standards: JPEG-2000, MPEG-4 and H.264 Recent Documents for Audio/Voice Coding Standards: MP3, AAC, G.729 and iLBC
教學方式	上課內容：投影片、電腦畫面與白板交錯使用 實習與討論：分組 Trace 程式與討論
教學進度	Introduction 2 hrs Video Formats and Quality 2 hrs Video/Image Coding Concept 6 hrs Audio/Voice Coding Concept 6 hrs The MPEG-4 and H.264 Standards MPEG-4 Visual 4 hrs H.264/MPEG-4 Part 10 4 hrs Image Coding Standard: JPEG-2000 Audio/Voice Coding Standards: MP3, AAC, G.729 and iLBC 9 hrs

	Hardware architecture design for block matching, DCT, etc. 4 hrs Video streaming techniques 3 hrs Applications and Directions 2 hrs
成績考核	Midterm Exam.: 30% Homework: 20% H.264 program trace, Report: 20% Presentation and Discussion: 30%
講義位址	http://vc.cs.nthu.edu.tw/home/courses/CS553300/97/

62. 多媒體通訊

課程說明	This course introduces technologies for multimedia processing, coding and communications. We will address how to efficiently represent multimedia data and how to deliver them over a variety of networks. In the coding aspect, state-of-the-art compression technologies will be presented. Emphasis will be given to a number of state-of-the-art multimedia coding standards, including JPEG/JPEG-2000, H.26x, MPEG, and scalable video coding (SVC). Besides, considerations for constructing as well as optimizing a video codec system will also be discussed. In the aspect of multimedia networking, special considerations for sending multimedia over the Internet and wireless networks, such as video adaptation, error resilience, error concealment, and quality of service will be discussed.
指定用書	Standard Codecs: Image Communication to Advanced Video coding, Mohammed Ghanbari, IEE, UK, 2003
參考書籍	Video Processing and Communications, by Yao Wang, Joern Ostermann, and Ya-Qin Zhang. Prentice Hall, Sep. 2001. John W. Woods, Multidimensional Signal, Image, and Video Processing and Coding, Academic Press, 2006 Multimedia over IP & Wireless Networks, edited by Mihaela van der Schaar and Philip A. chou, Academic Press, USA, 2007. Special Issue on Advances in Video Coding & Delivery of Proceedings of the IEEE (January 2005)
教學方式	This course will be taught mostly by the lecturer using slides. Lecture notes will be made available on the course webpage before each class. Part of the class time will be assigned to selected students to present their project results. In-class questions and answers, homework (written and computer assignments), and examinations will be used to help the students to understand the course contents
教學進度	Part I: Overview of Multimedia Processing & Coding (6 weeks) •Overview of Multimedia Services and Applications •Video coding fundamentals •Lossless Compression & Lossy Compression •Transform Coding •Motion Compensated Predictive Coding

	Part II: Multimedia Coding Standards (6 weeks) •JPEG/JPEG-2000 •H.26x, MPEG-1/4/7/21, AVC •Scalable Video Coding Part III: Multimedia Networking (6 weeks) •End-to-end QoS for Video Delivery •Wireless Video Transport •Error Control in Video Streaming •Cross-Layer Video Adaptation
成績考核	Course grading includes the following: •Homework (25%) •Exam (2~3 times) (45%) •Course Project (midterm & final project reports) (30%)
講義位址	http://www.ee.nthu.edu.tw/~cwlin/courses/

63. 視訊處理

課程說明	本課程的目的在講述數位視訊的基本處理方法，最新視訊編碼方法與標準以及多媒體通訊應用。主要內容包括： [1] Representation of Digital Video [2] Two-D Motion Estimation [3] Three-D Motion Estimation [4] Video Coding (JPEG, MPEG, H.26X, Wavelet T., Fractal, Model-based,... [5] Multimedia Applications(Content-based Retrieval, Multimedia over IP Networks) 先修課程：影像與視訊處理概論 銜接課程：小波轉換與應用
指定用書	Yao Wang, Jorn Ostermann, Ya-Qin Zhang, "Video processing and communications"
參考書籍	Sonka, Hlavac, Boyle: Image Processing, Analysis, and Machine Vision,1999 ITP
教學方式	Lecture + Demo + programs + term paper
教學進度	1.Representations of Digital Video and Conversion 3 週 2.Two-D Motion Estimation 3 週 3.Three-D Motion Estimation 3 週 4.Video Coding and Standards 3 週 5.Multimedia Applications 3週
成績考核	Homework + Exam + Term paper
講義位址	http://vsp.ee.nthu.edu.tw/EE6650/index.htm

64. 影像與視訊處理概論

課程說明	Digital Image Processing course will introduce two subjects: improvement of pictorial information for human interpretation and processing of image data for storage, transmission, and representation for automatic machine perception.
指定用書	R. Gonzaleez and R. Woods, "Digital Image Processing," Prentice Hall 3rd Ed. 2008.
參考書籍	It is a three hour lecture course. We will have several simple take-home project assignments and a mid-term exam. You also need to turn in a final report at the end of the semester.
教學進度	1. Introduction 2. Digital Image Fundamentals 3. Image Enhancement in Spatial Domain 4. Image Enhancement in Frequency Domain 5. Image Restoration 6. Color Image Processing 7. Wavelet and Multiresolution Processing 8. Image Compression 9. Morphological Image Processing 10. Image Segmentation 11. Representation and Description
成績考核	projects 30% attendance 10% mid-term 30% final report 30%

65. 電子商務網站管理

課程說明	透過各種媒體、每天都能聽到或看到電子商務相關的各種消息，而隨著網路的進步與WWW的盛行，網站的架設實務與管理正是企業、機構所面臨且亟需之技術。有鑑於此，本課程的目的針對電子商務網站架設與管理所需之觀念與相關的軟、硬體，提供一個完整的訓練課程，並引導學生建立一個電子商務網站且使他們具備管理的技術與實務。																										
指定用書	本書以最新 Fedora 12 為操作平台，從建立 Linux 基本觀念、安裝系統、X Window 環境、文字模式指令、中文系統、Internet 上網、OpenOffice.org 辦公室軟體、各種應用程式、帳號管理、檔案權限設定到架設伺服器，全部完整介紹！ Fedora 12 Linux 實務應用 施威銘研究室 著 【旗標】																										
參考書籍	[1] Fedora Linux 架站實務 施威銘研究室 著 【旗標】 [2] Linux Fedora 11 系統與伺服器管理 鄧士昌，余俊杰著 【文魁】 [3] Linux 人氣網站架設實務 PCuSER研究室 【PCUSER】 [4] Windows XP 架站王 施威銘研究室 著 【旗標】 [5] Webmin 完全攻略（第二版） 李蔚澤 著 【博碩】 [6] 如何通過 LINUX 認證 楊偉龍等 著 【上奇】 [7] PHP 5 + MySQL 入門與實務應用 楊智宇 著 【基峰】																										
教學方式	針對每次上課主題先加以講解與示範！ 接著由學生(每4人為一組)，一起練習、測試與完成指定之主題(作業或實習)。 最後，再由各組逐一報告，並共同討論。																										
教學進度	<table border="1"> <thead> <tr> <th>日期</th> <th>課程主題</th> </tr> </thead> <tbody> <tr> <td>2/22</td> <td>課程說明</td> </tr> <tr> <td>4/5</td> <td>放假</td> </tr> <tr> <td>5/17</td> <td>FTP 伺服器</td> </tr> <tr> <td>3/1</td> <td>系統安裝</td> </tr> <tr> <td>4/12</td> <td>Mail 伺服器</td> </tr> <tr> <td>5/24</td> <td>電子商務應用</td> </tr> <tr> <td>3/8</td> <td>基本操作</td> </tr> <tr> <td>4/19</td> <td>WEB 伺服器</td> </tr> <tr> <td>5/31</td> <td>電子商務應用</td> </tr> <tr> <td>3/15</td> <td>系統管理</td> </tr> <tr> <td>4/26</td> <td>MySQL 伺服器</td> </tr> <tr> <td>6/7</td> <td>入口網站</td> </tr> </tbody> </table>	日期	課程主題	2/22	課程說明	4/5	放假	5/17	FTP 伺服器	3/1	系統安裝	4/12	Mail 伺服器	5/24	電子商務應用	3/8	基本操作	4/19	WEB 伺服器	5/31	電子商務應用	3/15	系統管理	4/26	MySQL 伺服器	6/7	入口網站
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	3 / 22 安全考量 5 / 3 其它伺服器 6 / 14 入口網站 3 / 29 平時測驗 5 / 10 期中考試 6 / 21 期末考試
成績考核	學期成績＝(作業+平時/測驗)成績 *30%＋期中考成績*30%＋期末專題成績*40%
講義位址	「電子商務網站管理」教學站 (本網站於開學時開放，且內容 僅提供修課同學使用)

66. 編譯器設計

課程說明	1. Introduction 2. A Simple Compiler 3. Scanning 4. Lex 軟體使用 5. Grammars and Parsing 6. LL(1) Grammars and Parsing 7. LR Parsing 8. Yacc 軟體使用 9. Semantic Processing 10. Symbol Tables
指定用書	Crafting A Compiler With C, 1991, Richard J. LeBlanc, Jr., Benjamin/Cummings Publishing Company, Inc., ISBN 0-8053-2166-7, 總代理：開發圖書有限公司 (02)82423988
參考書籍	Lex & yacc, John R. Levine, Tony Mason and Doug Brown, O'Reilly & Associates, ISBN 1-56592-000-7
成績考核	Exercises, midterm, final, and software project.
講義位址	http://www.csie.ntnu.edu.tw/~ghhwang/course.html