

中文課程名稱：類神經網路

Title	Artificial Neural Network
Textbook* and Reference book	S. Haykin, Neural Networks: a Comprehensive Foundation, 2nd edition, 1999 C.-T. Lin and C. S. G. Lee, Neural Fuzzy Systems: A Neural-Fuzzy Synergism to Intelligent Systems, Person Education Taiwan, 2003 S. Haykin, Neural Networks and Learning Machines, Pearson International Edition, 2009
Course Objectives and Description	This course mainly addresses the fundamental materials of artificial neural networks. Both the theoretical and application parts will be discussed. The contents of this course include: <ol style="list-style-type: none"> <li>1. Fundamentals of neural network</li> <li>2. Supervised learning</li> <li>3. Unsupervised learning</li> <li>4. Recurrent neural network</li> <li>5. Adaptive neural network</li> <li>6. Neural fuzzy system</li> </ol>
Remarks	3 Credits, Master and Ph.D. Programs

中文課程名稱：線性系統理論

Title	Linear System Theory
Textbook* and Reference book	J. P. Hespanha, Linear Systems Theory, Princeton University Press, 2009. C.-T. Chen, Linear Systems Theory and Design, Oxford University Press, 1999.
Course Objectives and Description	This course mainly addresses the essential analysis and design backgrounds of linear systems. In addition to time-invariant systems, linear time varying systems are also considered. This course includes the following topics: <ol style="list-style-type: none"> <li>1. State-space equations and solutions</li> <li>2. Stability analysis</li> <li>3. Controllability and observability</li> <li>4. State feedback and observer design</li> <li>5. LQR optimal control</li> </ol>

Remarks	3 Credits, Master Program
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中文課程名稱：模糊控制

Title	Fuzzy Control
Textbook* and Reference book	Fuzzy Control, K. Passon and S. Yurkovich, Addison-Wesley, 1998 Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems, G. Chen and T. T. Pham, CRC, 2000 Fuzzy Systems Engineering: Theory and Practice, M. Mourelle, Springer-Verlag, 2005 Uncertain Rule-Based Fuzzy Logic Systems, J. M. Mendel, Prentice Hall, 2001
Course Objectives and Description	This course mainly addresses the basic theorms and advanced applications of fuzzy logic control. In the stage of theorems, there are fuzzy set, fuzzy rule, fuzzy inference, and fuzzy control. T-S fuzzy modelling and adaptive fuzzy control will be also discussed in the advanced applications.
Remarks	3 Credits, Master and Ph.D. Programs

中文課程名稱：適應性控制

Title	Adaptive Control
Textbook* and Reference book	K. J. Astrom and B. Wittenmark, Adaptive Control, Addison-Wesley Publishing Co., 1995 G. Tao, Adaptive Control Design and Analysis, Wiley, 2003 K. S. Narendra and A. M. Annaswamy, Stable Adaptive Systems, Dover Publications, 2005 J. Zhou and C. Wen, Adaptive Backstepping Control of Uncertain Systems, Springer, 2008
Course Objectives and Description	This course mainly addresses the key ideas of adaptive control. The reasons of why an adaptive mechanism is crucial for systems will be discussed. Then some typical adaptive control schemes will be discussed in detail. The contents of this course include: 1. Self-tuning control 2. Model-reference control 3. Gain-scheduling control 4. Adaptive backstepping control 5. Adaptive observer 6. Stability of adaptive systems

Remarks	3 Credits, Master and Ph.D. Programs
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中文課程名稱：固態能量轉換

Title	Solid State Energy Conversion
Textbook* and Reference book	N. Mohan, T. M. Underland and W. P. Robbins, Power Electronics, Third Edition, Wiley. Inc. 1995.* A. I. Pressman, Switching Power Supply Design, Second Edition, McGraw-Hill, Inc. 1999.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the analysis and design capabilities of the advance power processing circuits. This course includes the following topics: 1) The basic power processor concepts, 2) Performances of power processor, 3) Applications of converters, 4) Dynamic analysis of power converters, 5) Control schemes of power converters, 6) Design examples.
Remarks	Master Program and Ph.D Program

中文課程名稱：高等電力電子學

Title	Advanced Power Electronics
Textbook* and Reference book	N. Mohan, T. M. Underland and W. P. Robbins, Power Electronics, Third Edition, Wiley. Inc. 1995.* A. I. Pressman, Switching Power Supply Design, Second Edition, McGraw-Hill, Inc. 1999.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the analysis and design capabilities of the basic electric circuits. This course includes the following topics: 1) The basic electric circuit concepts, 2) Switch components, 3) AC-DC converter, 4) switching power supply, 5) AC-AC inverter, 6) Power converter applications.

Remarks	3 Credits, Master Program
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中文課程名稱：電力電子學實驗

Title	Power Electronics Lab.
Textbook* and Reference book	P.-R. Zheng, Power Electronics Analysis and Simulation, Chuan Hwa Book Co. 2004.* D.-S. Zheng, Design Center for power Electronics Applications, Chuan Hwa Book Co. 2003.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the design and implementation capabilities of the basic electric circuits. This course includes the following topics: 1) The basic electric circuit concepts, 2) Switch experiment, 3) Rectifier experiment, 4) Switching power supply experiment, 5) Motor driver experiment, 6) Power converter for Residential application experiment.
Remarks	3 Credits, Master Program

中文課程名稱：配電工程

Title	Electric Power Distribution System
Textbook* and Reference book	1. Walter A. Elmore, Protective Relaying Theory and Application, Marcel Dekker, Inc., 2005.* 2. IEEE/ANSI Standards.
Course Objectives and Description	This course introduces the issues of electric power distribution system engineering. With the course, student can establish the practical concepts of design and operation of power distribution systems. This course includes the following topics: 1) power distribution system structures, 2) voltage regulation and power factor correction, 3) short-circuit current calculation, 4) voltage flicker and compensation method,

	5) protection relays, 6) power quality issues.
Remarks	3 Credits, Master Program

中文課程名稱：電力系統分析

Title	Electric Power System Analysis
Textbook* and Reference book	1. A. R. Bergen, Power Systems Analysis, 2 <sup>nd</sup> Ed., Prentice-Hall, 2000.*
Course Objectives and Description	This course teaches advanced power systems analysis method. This course includes the following topics: 1) power system modeling and pu system, 2) power flow analysis, 3) unbalanced operations analysis, 4) modeling of generation unit, 5) dynamic and transient stabilities.
Remarks	3 Credits, Master Program

中文課程名稱：電力系統控制與穩定

Title	Power System Control and Stability
Textbook* and Reference book	1. P. Kundur, Power System Stability and Control, McGraw-Hill, Inc., 1996.* 2. IEEE/IET papers.
Course Objectives and Description	This course is concerned with understanding, modeling, analyzing, and mitigating power system stability and control problems. Students can learn important considerations in the planning, design, and operation of modern power systems. This course includes the following topics: 1) modeling of power system components, 2) modeling of generation units, 3) voltage stability, 4) voltage control, 5) frequency control,

	6) project study.
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：電力系統品質

Title	Electric Power System Quality
Textbook* and Reference book	1. M. H. J. Bollen, Understanding Power Quality Problems, IEEE Press, 2000.* 2. R. C. Dugan, et. al., Electrical Power Systems Quality, Mc-Draw Hill, 1996. 3. IEEE papers and standards.
Course Objectives and Description	This course introduces electric power quality related problems. The control standards, and compensation schemes of these power quality problems will also be discussed. This course includes the following topics: 1) voltage sag, 2) voltage flicker, 3) three-phase unbalance operation, 4) harmonics and filter design, 5) surge transients and protection.
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：電磁暫態分析

Title	Electromagnetic Transients Analysis
Textbook* and Reference book	1. Allen, Green Wood, Electrical Transients in Power Systems, John Wiley and Sons., 1991.* 2. IEEE/ANSI Standards. 3. IEEE/IET Transactions papers.
Course Objectives and Description	This course introduces the concepts about electrical transients in electrical power systems. This course includes the following topics: 1) system modeling, 2) switching transients, 3) lightning transients, 4) arrestors and insulation coordination,

	5) simulation method, 6) EMI/EMS.
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：數位控制

Title	Digital Control
Textbook* and Reference book	D. Ibrahim, Microcontroller Based Applied Digital Control, John Wiley & Sons, 2006. * G. F. Franklin, Digital Control of Dynamic Systems, Addison Wesley Longman Inc., 1998.
Course Objectives and Description	This course is about the use of digital computers to realize the real-time control of dynamic systems such as power electronics circuits, electric vehicles, and robots. This course includes the following topics: 1. Sampled Data Systems and the Z-Transform 2. System Time Response Characteristics 3. System Stability 4. Discrete Control Design 5. Controller Realization
Remarks	3 Credits, Master Program

中文課程名稱：電機機械理論

Title	Advanced Topics of Electric Machines and Drives
Textbook* and Reference book	D.W. Novotny and T.A. Lipo, Vector Control and Dynamics of AC Drives, Oxford, 1996.* A. M. Trzynadlowski, Control of Induction Motors, Academic Press, 2001.
Course Objectives and Description	The goal of this course is to let student understand the basic elements and the essentials of control such as feedback signal acquisition, sampling process, and controller design in motion-control systems. The course topics are as follows: 1. Speed Control 2. Parameter Setting for Analog Speed Controllers 3. Position Controller with Integral Action 4. Trajectory Generation and Tracking 5. Torsional Oscillations and the Antiresonant Controller

Remarks	3 Credits, Master and Ph.D Programs
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中文課程名稱：電機控制

Title	Linear System Theory
Textbook* and Reference book	Kwang Hee Nam, AC motor control and electric vehicle applications, CRC Press, 2010.* A. M. Trzynadlowski, Control of Induction Motors, Academic Press, 2001. D.W. Novotny and T.A. Lipo, Vector Control and Dynamics of AC Drives, Oxford, 1996
Course Objectives and Description	This course teaches advanced topics from electric machinery and prepares the students with the techniques of modeling and simulating electric motor for ac drives studies. This course includes the following topics: 1. Introduction to AC/DC drives 2. Three-Phase AC System and d-q Axis Conversion 3. Steady-State Model and Control of DC Machines 4. Dynamic Model of Induction Machines 5. Vector Control of Induction Machines 6. Flux Observer 7. Field Weakening Operation 8. Direct Torque Control
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：再生能源技術

Title	Renewable Energy
Textbook* and Reference book	G. Boyle, Renewable Energy, 2nd Ed., Oxford University Press, 2004.* J. Twidell and T. Weir, Renewable Energy Resources, Routledge, 2005.
Course Objectives and Description	The goal of this course is to let students have knowledge of the renewable energy sources and the associated design and control along with the power electronics circuit. This course includes the following topics: 1. The Scope and Historical Perspective of Renewable Energy Resources 2. Aerodynamics of Wind Energy 3. Wind Turbines

	<p>4. Wind Turbine-Driven Electrical Generators</p> <p>5. Wind Energy Store and Conversion</p> <p>6. Solar Radiation</p> <p>7. PV Systems for Electrical Generation</p>
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：數位影像處理

Title	Digital Image Processing
Textbook* and Reference book	<p>Rafael G. Gonzalez and Richard E. Woods, "Digital image processing", 3rd., Addison-Wesley,2010</p> <p>Alasdair McAndrew, "Introduction to Digital image processing with MATLAB", Thomson, 2005.</p>
<b>Course Objectives and Description</b>	<p>In this course, students will learn the basic relative theories and applications about Digital Image Processing. First, various image processing applications are introduced from human vision system to digital image system to illustrate the necessary modules of an image processing system. Many image processing algorithms including image enhancing skills, restoration skills, color-image processing skills, image compression and segmentation skills. The practical cases are performed to help students realize the important factors of different skills. This course includes the following topics:</p> <p>Session 1: Basic Image Processing Principles</p> <p>a. Image Content and Format.</p> <p>b. The Basic Cores of Image Processing.</p> <p>Session 2: Image Enhancement Skills</p> <p>a. Image Enhancing Algorithms in Spatial Domain.</p> <p>b. Image Enhancing Algorithms in Frequency Domain.</p> <p>Session 3: Image Processing Applications</p> <p>a. Color Image Processing.</p> <p>b. Image restoration Skills.</p> <p>c. Image Compression.</p> <p>d. Image Segmentation.</p> <p>Session 4: Case Study of Image Processing Applications</p>

Remarks	3 Credits, Master Program
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中文課程名稱：電腦視覺原理及應用

Title	Principle and Application of Computer Vision
Textbook* and Reference book	David Forsyth and Jean Ponce, "Computer Vision, A Modern Approach", Pearson Prentice Hall, 2011 McAndrew," Introduction to digital image processing with MATLAB", 2004
<b>Course Objectives and Description</b>	The goal of this course is to let students have essential backgrounds on theories and applications of computer vision. This course includes the following topics: 1. Introduction 2. Camera models 3. Noise and Image filter 4. Edge detection 5. Color and Texture 6. Curve fitting 7. Contour detection 8. Segmentation 9. Motion estimation 10. Stereopsis Vision 11. Case study
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：數位訊號處理

Title	Digital Signal Processing
Textbook* and Reference book	Alan V. Oppenheim and Ronald W. Schaffer, Discrete-Time Signal Processing, International Edition, Prentice Hall, 2010. * Digital signal processing: A computer-based approach, by Sanjit K. Mitra, third edition.
Course Objectives	The goal of this course is to teach student how to analyze digital signals and systems from time and frequency domain.

and Description	<p>In addition to digital filter design and structure, discrete and fast Fourier transform are also considered.</p> <p>This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1. Discrete-time signals and systems</li> <li>2. z-transform</li> <li>3. Sampling of continuous-time signal</li> <li>4. Transform analysis of linear time-invariant</li> <li>5. Structures for discrete-time systems</li> <li>6. Filter design techniques</li> <li>7. The discrete Fourier Transform</li> <li>8. Computatuin of the discrete Fourier Transform</li> </ol>
Remarks	3 Credits , Master Program

中文課程名稱：適應性濾波器原理

Title	Adaptive Filter Theory
Textbook* and Reference book	<p>B. Farhang-Boroujeny, "Adaptive Filters Theory and Applications", John Wiley &amp; Sons, 1999. *</p> <p>Simon Haykin, "Adaptive Filter Theory", Fourth Edition, Prentice Hall, 2013.</p>
Course Objectives and Description	<p>The aim of the course is to introduce techniques in adaptive signal processing and adaptive filter theory with applications on related fields.</p> <p>This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1. Wiener Filters</li> <li>2. Eigenanalysis and the Performance Surface</li> <li>3. Search Methods</li> <li>4. The LMS Algorithm</li> <li>5. Transform Domain Adaptive Filters</li> <li>6. Block Implementation of Adaptive Filters</li> <li>7. The RLS Algorithm</li> </ol>
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：高等數位訊號處理

Title	Advanced Digital Signal Processing
Textbook* and Reference book	Saeed V. Vaseghi, Advanced digital signal processing and noise reduction, John Wiley and Sons, 2009. * Simon Haykin, “Adaptive Filter Theory”, Fourth Edition, Prentice Hall, 2013. Alan V. Oppenheim and Ronald W. Schaffer, “Discrete-Time Signal Processing”, International Edition, Prentice Hall, 2010
Course Objectives and Description	This course will introduce various analysis and method for digital signals processing, and with some examples to learn how to apply these methods in a practical system. This course includes the following topics: 1.Introduction 2.Noise and Probability Models 3.Bayesian Estimation 4.Wiener Filters 5.Adaptive Filters 6.Linear Prediction Models 7.Power Spectrum and Correlation 8.Interpolation 9.Cepstrum Analysis 10.NTSC System 11.Independent Component Analysis 12.Electroencephalogram Analysis
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：微感測器及感測電路設計

Title	Design of Micro-sensors and Sensing Circuit Systems
Textbook* and Reference book	Microsensors: Principles and Applications, 2nd Edition, Julian W. Gardner, Florin Udrea, John Wiley & Sons Inc., 2015. Course database provided by MOE ATP Alliance
Course Objectives	Students will learn about the essential background of micro-sensors. We also use Arduino-compatible FPGA

and Description	<p>development platform and simulation software (such as Cadence and HSPICE) to let students actually design sensing circuits and learn how to apply it to IoT uses.</p> <p>This course includes following topics:</p> <p>Micro-sensors and sensing circuit systems overview</p> <p>Signal processing and circuit application of resistive pressure sensing circuit</p> <p>Signal filtering, transform, processing and circuit application of impedance sensing circuit</p> <p>Signal processing and circuit application of light sensing circuit</p> <p>Signal processing and circuit application of gas sensing circuit</p> <p>The design of environment energy harvesting circuit and circuit application</p> <p>The design of sensing circuit amplifier and application</p> <p>The design of machine vision sensing circuit and application</p> <p>The design of micro-sensors and sensing circuit systems</p> <p>Final project presentation</p>
Remarks	3 Credits, Master Program

中文課程名稱: VLSI 系統設計

Title	VLSI System Design
Textbook* and Reference book	<ol style="list-style-type: none"> <li>1. J. Rabaey, A. Chandrakasan, B. Nikolic, Digital Integrated Circuits: A Design Perspective , 2nd Edition, Prentice Hall, 2003.</li> <li>2. Weste / Harris, CMOS VLSI Design, A Circuits and Systems Perspective, Third Edition, Addison Wesley, 3rd Edition.</li> <li>3. K.K. Parhi, VLSI Digital Signal Processing Systems: Design and Implementation, Wiley, NY 1999</li> <li>4. IEEE Papers</li> </ol>
Course Objectives and Description	<p>This course offers a profound understanding of the design of complex digital circuit from the sub-micro processes. It also offers understanding perspective on how the VLSI circuit technology might evolve in the future. During this course, students will know how to use software to develop the digital integrated circuit design circuits. At end of course, each student is able to use the software and develop their own circuit.</p>
Remarks	3 Credits, Master Program

中文課程名稱: 生醫應用晶片設計與實驗

Title	Biomedical Chip Design and Application
Textbook* and Reference book	<ol style="list-style-type: none"> <li>1. John Enderle, Susan Blanchard, Joseph Bronzino, "Introduction to Biomedical Engineering", Academic Press, 2000.</li> <li>2. NPIE teaching materials</li> <li>3. IEEE Papers</li> <li>4. Manual Slides</li> </ol>
Course Objectives and Description	<p>Students of this course will learn the background and application of medical electronics. We also use FPGA development platform to let students learn how to design, fabricate and apply it to health care.</p> <p>This course includes following topics:</p> <p>Healthy aging Health Care System Overview</p> <p>Biomedical Signal Sensing and Biomedical Chip Applications</p> <p>Cloud Remote Medical Care System Architecture Design</p> <p>ECG Analysis, Healthy-Aging and Early Warning Application</p> <p>EMG analysis, Healthy-Aging and Early Warning Application</p> <p>EEG Analysis, Healthy-Aging and Early Warning Application</p> <p>NIRS Analysis, Healthy-Aging and Early Warning Application</p> <p>Ultra-Sound Medical and Healthy-Care Applications</p> <p>BioMedical SoC Application</p> <p>Digital/ Analog BioMedical IP Module</p> <p>Final Project: BioMedical SoC Design and Application</p> <p>Final project presentation</p>
Remarks	3 Credits, Ph.D Program

中文課程名稱: VLSI 信號處理設計

Title	VLSI Digital Signal Processing Design
Textbook* and Reference book	<ol style="list-style-type: none"> <li>1. K. Parhi, "VLSI Digital Signal Processing Systems," John Wiley &amp; Sons, 1999.</li> <li>2. J. Rabaey, A. Chandrakasan, B. Nikolic, Digital Integrated Circuits: A Design Perspective, 2nd Edition, Prentice Hall, 2003.</li> </ol>

	3. Course Slides 4. IEEE Papers (Low Power Related, Soft-Error Tolerant Related.)
Course Objectives and Description	This course offers a profound understanding of VLSI circuits design, and VLSI/DSP architecture designs. It also offers understanding perspective on how the digital circuit technology might evolve in the future. During this course, students will know how to use software to develop the digital integrated circuit design and its DSP applications. At end of course, each student is able to use the software and develop their own circuit.
Remarks	3 Credits, Master Program

中文課程名稱: 數位矽智產設計

Title	Digital Silicon IP Design
Textbook* and Reference book	1. Michael Keating, Russell John Rickford, Pierre Bricaud , "Reuse Methodology Manual for System-On-A-Chip Designs", Kluwer Academic Publisher, 3rd Edition, 2002. 2. SoC consortium teaching materials 3. Class slides and notes 4. IEEE Papers
Course Objectives and Description	SIP design course includes the overview of SoC design and SIP design; synthesis, verification, and integration of IP; introduction to SystemC; and case study of reusable IP design. We will also run a project example to practice how to build a silicon IP design in the SIP design course.
Remarks	3 Credits, Ph.D Program

中文課程名稱: 生醫電子學

Title	Biomedical Electronics
Textbook* and Reference book	John G. Webster, "Medical Instrumentation, application and design", 3rd Ed., Houghton Mifflin, 2000.* John Enderle, Susan Blanchard, Joseph Bronzino, "Introduction to Biomedical Engineering", Academic Press, 2000.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the medical instrumentation and clinical applications. This course includes the following topics: 1) state-space equations and solutions, 2) stability analysis,

	<ul style="list-style-type: none"> <li>3) controllability and observability,</li> <li>4) state feedback and observer design,</li> <li>5) LQR optimal control.</li> <li>1) Biomedical signals and device development</li> <li>2) Principle of medical instrumentation</li> <li>3) Electrical safety of medical instrumentation</li> <li>4) Clinical EMG and experiment &amp; electrical stimulation and experiment</li> <li>5) Rehabilitation engineering and prosthesis technology</li> <li>6) Clinical ECG and experiment and peripheral vessel examination</li> </ul>
Remarks	3 Credits, Master and Ph.D Program

中文課程名稱: 生醫訊號分析

Title	Biomedical Signal Analysis
Textbook* and Reference book	R. Rangayyan, "Biomedical Signal Analysis", John Wiley & Sons, 2002.* WJ. Tompkins, "Biomedical Digital Signal Processing", Prentice-Hall, 1993.
Course Objectives and Description	<p>The goal of this course is to let students have essential backgrounds on digital signal processing for biomedical signal analysis, applications of bioelectrical signals, and classifications. All signal processing is performed using MATLAB. This course includes the following topics:</p> <ul style="list-style-type: none"> <li>1) Sampling theorem</li> <li>2) Spectral analysis</li> <li>3) Filter design and applications</li> <li>4) Electrocardiography signal analysis</li> <li>5) Electroencephalography signal analysis</li> <li>6) Electromyography signal analysis</li> <li>7) Feature extraction and pattern recognition</li> </ul>
Remarks	3 Credits, Master and Ph.D Program

中文課程名稱: 嵌入式系統及實驗

Title	Embedded System and Experiment
Textbook* and Reference book	AN. Sloss, D. Symes, C. Wright, ARM System Developer's Guide, Designing and Optimizing System Software, Morgan Kaufmann, 2004.*
Course Objectives and Description	<p>The goal of this course is to let students have essential backgrounds on embedded system architecture, programming and experiments based on the ARM-based platform. This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1) Introduction to embedded systems</li> <li>2) ARM processors</li> <li>3) ARM instruction sets</li> <li>4) Embedded Linux</li> <li>5) Android and Java Programming</li> </ol>
Remarks	Master Program

中文課程名稱: 隨機過程

Title	Random Process
Textbook* and Reference book	<p>Roy D. Yates, David J. Goodman, "Probability and Stochastic Processes," 2nd Edition.  Athanasios Papoulis, S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes," 4th Edition.</p>
Course Objectives and Description	<p>Random Processes are widely used in communications scope, especially in the signal processing and computer network analysis. The goal of this course is to let students have the basic capability of performance analysis on the communication and network systems. The topics of this course include:</p> <ol style="list-style-type: none"> <li>1. Overview of Probability Theory</li> <li>2. Definition of Stochastic Processes</li> <li>3. Statistics of Stochastic Processes</li> <li>4. Random Signal Processing</li> <li>5. Markov Chains &amp; Queueing Analysis</li> </ol>
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：排隊理論

Title	Queueing Theory
Textbook* and Reference book	Donald Gross & Carl M. Harris, "Fundamentals of Queueing Theory," Wiley. Roy D. Yates, David J. Goodman, "Probability and Stochastic Processes," 2nd Edition.
Course Objectives and Description	Queueing theory is widely used in the performance analysis of computer networks. The goal of this course is to let students have the basic capability of performance analysis on the computer networks. The topics of this course include: 1.Introduction to Queueing Model 2.Stochastic Process and Poisson Process 3.Markov Chains and Markov Processes 4.Markovian Birth-Death Queueing Model 5.Advanced Markovian Queueing Models 6. Models with General Arrival or Service Pattern
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：高等計算機結構

Title	Advanced Computer Architecture
Textbook* and Reference book	John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, 4/E, Morgan Kaufmann, 2007* David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 4/E , Morgan Kaufmann, 2012 Ahmed Amine Jerraya & Wayne Wolf, Multiprocessor Systems-On-Chips, Morgan Kaufmann, 2005
Course Objectives and Description	To Learn about styles of computer implementation and organization from a historical and modern perspective. Through the class discussion, to understand the broad array of factors that influence architecture including technology, applications, and software systems. Also, learn wide range of architectural mechanisms arised as technology and application change. The materials taught in the class will cover from traditional foundations to contemporary developments as in current state of the art computer architectures.

	<p>Topics of advanced computer architectures from fundamentals to modern mechanisms will be covered in the class</p> <p>These topics include:</p> <ol style="list-style-type: none"> <li>(1) Review of fundamental technologies: ISAs, Pipelining, and Memory Hierarchy.</li> <li>(2) Instruction-Level Parallelism</li> <li>(3) Multiprocessors and Thread-Level Parallelism</li> <li>(4) Memory Systems in Parallel Processing</li> <li>(5) I/O Systems</li> <li>(6) Embedded Computing</li> <li>(7) Interconnection Networks</li> </ol>
Remarks	3 Credits, Master and Ph.D Program

中文課程名稱：軟硬體共同設計

Title	Software-Hardware Co-design
Textbook* and Reference book	<p>Steve Furber, ARM SoC Architecture, 2nd Ed.</p> <p>Giovanni De Micheli, Rolf Ernst, and Wayne Wolf: Readings in Hardware/Software Co-Design. Morgan Kaufman, 2001</p>
Course Objectives and Description	<p>This course is to have the students with the idea of how the software design and development can be started before the hardware prototype is ready in embedded system or SoC design. The course also leads the students for Matlab and Labview learning with the example of medical imaging system to enhance their understanding about HW/SW Co-design as well as provides students the concepts of cross fields project design focusing on Medical Applications.</p> <p>The course contents include :</p> <ol style="list-style-type: none"> <li>1. Course Introduction: including embedded and SoC system design concept.</li> <li>2. Introduction to hardware architecture design and considerations for performance trade-off.</li> <li>3. ARM core architecture &amp; DS-5 design platform.</li> <li>4. ESL design concept, platform-based &amp; virtual platform based HW/SW Co-design</li> <li>5. Introduction of Matlab and its cross-platform software design and development</li> <li>6. Android application basics and design using ADT &amp; App Inventor II.</li> <li>7. Labview programming design and instrument control with Labview language</li> </ol>

Remarks	3 Credits, Master Program
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中文課程名稱：系統晶片設計概論

Title	Introduction to System-on-Chip Design
Textbook* and Reference book	王駿發等，系統單晶片概論 SOC Design Overview，高立圖書有限公司* Chris Rowen, "Engineering the Complex SOC: Fast, Flexible Design with Configurable Processors", Prentice Hall* Ahmed Amine Jerraya & Wayne Wolf, Multiprocessor Systems-On-Chips, Morgan Kaufmann, 2005
Course Objectives and Description	To understand what SoC is. Learn how to design an SoC, and know the SoC design challenges, and understand how to solve these problems.  There are some SoC design related skills and topics will be introduced in this course. In the meantime, the course will be assisted with the introduction of design tools and labs.  These topics include: (1) Introduction to SoC Design (2) SoC Design Flow (3) System-Level Design of Complex SoCs (4) Platform-based SoC Design (5) Configurable Processors (6) Multiprocessor SoC (7) Advanced Topics in SoC Design (8) The Future of SoC Design (9) Embedded Real-Time Operating Systems (10) Case Studies
Remarks	3 Credits, Master and Ph.D Program

中文課程名稱：混合訊號式積體電路設計與應用

Title	Design and application of mixed-signal integrated circuits
Textbook* and	Behzad Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-hill International Edition 2001. *

Reference book	R. Baker, "CMOS circuit design, layout and simulation," John Wiley & Sons, Inc. 2nd edition
Course Objectives and Description	This course offers an understanding of operational amplifier and phase-locked loop. Circuit simulation and design is included with the system down to the sub-circuit. This course includes the following topics: 1) HSPICE, 2) models for analog design, 3) models for digital design, 4) operational amplifier, 5) phase-locked loop.
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：類比積體電路設計

Title	Analog integrated circuits design
Textbook* and Reference book	Behzad Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-hill International Edition 2001.* Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits, sixth Edition ", Oxford University Press 2011
Course Objectives and Description	The technology used in this course is CMOS which is most rapidly growth technology. Analog circuit covers from the noise of MOS device up to the operational amplifier. The course also describes with more advance topic such as bandgap reference and elementary switched-capacitor circuits and the effect of nonlinearity and mismatch. The student is able to analysis and design the analog integrated circuit at end of this course. This course includes the following topics: 1) Operational amplifiers 2) Stability and frequency compensation, 3) Bandgap references, 4) Switch capacitor circuit.
Remarks	3 Credits, Master Program

中文課程名稱：VLSI 計算機輔助電路設計

Title	VLSI Computer-aided Design
Textbook* and	Weste / Harris, "CMOS VLSI Design, A Circuits and Systems Perspective", Third Edition, Addison Wesley. *

Reference book	J. Rabaey, A. Chandrakasan, B. Nikolic, <i>Digital Integrated Circuits: A Design Perspective</i> , 2nd Edition, Prentice Hall, 2003
Course Objectives and Description	This course will teach students how to use software to develop the integrated circuit design circuits. Each student is able to use the software and develop their own circuit at end of this course. This course includes the following topics: 1) deep submicron CMOS process 2) layout, 3) HSPICE, 4) full-custom design.
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：高等錯誤控制編碼及應用

Title	Advanced error control coding and applications
Textbook* and Reference book	1. S. Lin and D. J. Costello, Jr, <i>Error Control Coding</i> , Pearson Education, Inc., 2004. 2. L. Hanzo, T. H. Liew, and B. L. Yeap, <i>Turbo Coding, Turbo Equalisation and Space-Time Coding fo Transmission over Fading Channels</i> , John Wiley & Son Lid., 2002.
Course Objectives and Description	1. Convolutional turbo codes. 2. Convolutional turbo codes for communications. 3. Block turbo codes. 4. Block turbo codes for communications and memory. 5. Low density parity-check codes and applications. 6. Decoding of block turbo codes and low density parity-check codes.
Remarks	3. Master Program and Ph.D Program

中文課程名稱：錯誤控制編碼

Title	Error control coding
Textbook* and Reference book	1. S. Lin and D. J. Costello, Jr, <i>Error Control Coding</i> , Pearson Education, Inc., 2004. 2. R. E. Blahut, <i>Theory and Practice of Error Control Codind</i> , Addison-Wesley Publish Company, 1983.
Course Objectives	1. Introduction to algebra.

and Description	<ol style="list-style-type: none"> <li>2. Linear block codes.</li> <li>3. BCH codes.</li> <li>4. Reed-Solomon codes</li> <li>5. Convolutional codes.</li> <li>6. Automatic-repeat-request (ARQ) Schemes.</li> </ol>
Remarks	Credits: 3. Master Program

中文課程名稱：行動通訊

Title	Wireless Communication
Textbook* and Reference book	<p>Theodore S. Rappaport, Wireless Communications: Principles and Practice, 2nd ed., Prentice Hall, 2002</p> <p>Ha H. Nguyen and Ed Shwedyk, A First Course in Digital Communications, Cambridge, 2009</p> <p>Gordon L. Stuber, Principles of mobile communication, 2nd ed., Kluwer Academic Publishers, 2001</p>
Course Objectives and Description	<p>The goal of this course is to let students have essential backgrounds on the Modern Wireless Communication Systems.</p> <p>This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1. Modern Wireless Communication Systems</li> <li>2. Cellular System Design Concepts</li> <li>3. Mobile Radio Propagation: Large-Scale Path Loss</li> <li>4. Mobile Radio Propagation: Small-Scale Fading and Multipath</li> <li>5. Modulation Techniques for Mobile Radio</li> <li>6. Diversity and Channel Coding</li> <li>7. Multiple Access Techniques</li> <li>8. Wireless Networking and Standards</li> </ol>
Remarks	3 Credits, Master Program

中文課程名稱：數位通訊

Title	Digital Communications
Textbook* and Reference book	<p>Ha H. Nguyen and Ed Shwedyk, A First Course in Digital Communications, Cambridge, 2009</p> <p>John G. Proakis, Digital Communications, McGraw-Hill, 5th ed., 2008</p>

	Simon Haykin, Communication Systems, John Wiley & sons, Inc., 3rd ed., 1994
Course Objectives and Description	Communication technology has become pervasive in the modern world, and ever more complex. This course introduces the most basic ideas of modern digital communication. Examples with step-by-step solutions help students to assimilate theoretical ideas, and MATLAB exercises develop confidence in applying mathematical concepts to real-world problems. Right from the start we use the signal space approach to give students an intuitive feel for the modulation/demodulation process. After a review of signals and random processes, we describe core topics and techniques such as source coding, baseband transmission, modulation, and synchronization. This course closes with coverage of advanced topics such as trellis-coding, CMDA, and space-time codes to stimulate further study.
Remarks	3 Credits, Master Program

中文課程名稱：光纖通訊

Title	Optical Fiber Communications
Textbook* and Reference book	Gerd Keiser, "Optical Fiber Communications, 4rd Ed.," McGraw-Hill Companies. John Powers, "Fiber Optic Systems, 2nd Ed.," 1997, 1993 by R.D. Irwin, Inc.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the analysis and design of Optical Fiber Communications. In addition to optical fiber, LED, laser diode, photodiode, and EDFA amplify are also considered. This course includes the following topics: 1) 1. Overview of optical fiber communications 2) Optical fibers: structures, waveguiding, fabrication 3) Signal degradation in optical fibers 4) Optical sources: Laser diodes and LEDs 5) Power launching and coupling 6) Photodetectors 7) Optical Receiver Operation 8) Coherent Lightwave Transmission 9) Analog Systems 10) WDM Concepts and Components 11) Optical Amplifiers

	12) Optical Network
Remarks	3 Credits, Master Program

中文課程名稱：光電子學

Title	Optoelectronics
Textbook* and Reference book	Amnon Yariv, and Pochi Yeh, "Photonics-Optical electronics in modern communications", sixth edition. S.O Kasap, "Optoelectronics And Photonics Principles and Practices"
Course Objectives and Description	<p>The goal of this course is to let students have essential backgrounds on the analysis and design of Optoelectronics. In addition to Optoelectronics and communications are also considered. This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1) Electromagnetic Fields and Waves</li> <li>2) Rays and Optical Beams</li> <li>3) Guided Waves in Dielectric Slabs and Fibers</li> <li>4) Optical Resonators</li> <li>5) Interaction of Radiation and Atomic Systems</li> <li>6) Theory of Laser Oscillation and Some Specific Laser Systems</li> <li>7) Chromatic Dispersion and Polarization Mode Dispersion in Fibers</li> <li>8) Nonlinear Optics</li> <li>9) Electro-optic Modulation of Laser Beams</li> <li>10) Noise in Optical Detection and Generation</li> <li>11) Detection of Optical Radiation</li> <li>12) Wave Propagation in Periodic Media</li> <li>13) Waveguide Coupling</li> <li>14) Nonlinear Optical Effects in Fibers</li> <li>15) Semiconductor Lasers, Theory and Applications</li> <li>16) Advanced Semiconductor Lasers</li> <li>17) Optical Amplifiers</li> <li>18) Classical Treatment of Quantum Noise and Squeezed States</li> </ol>
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：網路安全

Title	Network Security
Textbook* and Reference book	Network Security Essentials, Applications and Standards, 3rd Edition, William Stallings, Pearson Education Cryptography and Network Security, Principle and Practice, 4th Edition, William Stallings, Prentice Hall
Course Objectives and Description	<p>This course is devoted to the concept of network security. The purposes are to understand cryptography technology, to learn cryptography software and, moreover, to enhance the protection ability of network security. This course includes Symmetric Cryptosystems, Public-Key Cryptosystems, Authentication and Digital Signature, Network Security Applications, Computer Viruses and Data Security, and Security Attacks and Protections. This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1) Symmetric Encryption and Message Confidentiality,</li> <li>2) Public-Key Cryptography and Message Authentication,</li> <li>3) Authentication Applications,</li> <li>4) Electronic mail security,</li> <li>5) IP Security,</li> <li>6) WEB Security,</li> <li>7) Network Management Security,</li> <li>8) Intruders,</li> <li>9) Malicious Software,</li> <li>10) Firewall.</li> </ol>
Remarks	Master Program and Ph.D Program

中文課程名稱：數論

Title	Number Theory
Textbook* and Reference book	Kenneth H. Rosen, Elementary Number Theory and its applications, Addison-Wesley Joseph H. Silverman, A Friendly Introduction to Number Theory, Pearson Education
Course Objectives and Description	<p>This course is devoted to the concept of number theory and its applications. The purposes are to understand the mathematical concepts and evaluating technology. The course materials include the Integers, Primes and Greatest Common Divisors, Congruence, Multiplicative functions, Primitive roots, and Quadratic residues. Moreover, the</p>

	<p>mathematical concepts can be applied to researches on specialized fields. This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1) Primes and Greatest Common Divisors,</li> <li>2) Congruence,</li> <li>3) Multiplicative functions,</li> <li>4) Primitive roots,</li> <li>5) Quadratic residues.</li> </ol>
Remarks	Master Program and Ph.D Program

中文課程名稱：低功率系統設計

Title	Low Power System Design
Textbook* and Reference book	<p>Self-made course materials and handouts*</p> <p>Behzad Razavi, Design of Analog CMOS Integrated Circuits, McGraw Hill, 2001</p> <p>T. Chan Carusone, D. Johns and K. Martin, Analog Integrated Circuit Design, 2nd Edition, John Wiley, 2011</p> <p>2.P. Gray, P. Hurst, S. Lewis, and R. Meyer, Analysis and Design of Analog Integrated Circuits, 5th Edition, John Wiley, 2009</p> <p>3.D. Holberg and P. Allen, CMOS Analog Circuit Design, 3rd Edition, Oxford University Press, 2011</p> <p>4.R. Jacob Baker, CMOS Circuit Design, Layout, and Simulation, 3rd Edition, Wiley-IEEE Press, 2010</p>
Course Objectives and Description	<p>The goal of this course is to let students have essential backgrounds on the analysis and design of low-power circuit techniques and systematic perspective. In addition to circuit design, application-oriented case studies are also considered. This course includes the following topics:</p> <ol style="list-style-type: none"> <li>1) CMOS device physics,</li> <li>2) circuit design in the low-power regime,</li> <li>3) Monte-Carlo analysis for PVT variations,</li> <li>4) Rapid prototyping and cell-based IC physical design flow,</li> <li>5) case studies.</li> </ol>
Remarks	3 Credits, Undergraduate Program and Master Program

中文課程名稱：奈米電路設計

Title	Nano Circuit Design
Textbook* and Reference book	Behzad Razavi, Design of Analog CMOS Integrated Circuits, McGraw Hill, 2001* T. Chan Carusone, D. Johns and K. Martin, Analog Integrated Circuit Design, 2nd Edition, John Wiley, 2011 2.P. Gray, P. Hurst, S. Lewis, and R. Meyer, Analysis and Design of Analog Integrated Circuits, 5th Edition, John Wiley, 2009 3.D. Holberg and P. Allen, CMOS Analog Circuit Design, 3rd Edition, Oxford University Press, 2011 4.R. Jacob Baker, CMOS Circuit Design, Layout, and Simulation, 3rd Edition, Wiley-IEEE Press, 2010
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the analysis and design of advanced circuit techniques and semiconductor processes. In addition to circuit design, application-oriented systems are also considered. This course includes the following topics: 1) advanced semiconductor process, 2) circuit design in the nano-regime, 3) Monte-Carlo analysis for PVT variations, 4) layout considerations, 5) case studies.
Remarks	3 Credits, Master Program and Ph.D. Program

中文課程名稱：生醫光電工程及實驗

Title	Biophotonic engineering and experiments
Textbook* and Reference book	E. Hecht, Optics, 4th Edition F.L. Pedrotti, L.S. Pedrotti, and L.M. Pedrotti, Introduction to Optics, 3rd Edition B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, 2nd Edition S.O. Kasap, Optoelectronics and Photonics, Principles and Practices, 2nd edition, Prentice Hall W. Drexler, J. G. Fujimoto (Eds.), Optical Coherence Tomography Technology and Applications, Springer
Course Objectives and Description	This course contains some biophotonic topics including tissue absorption and scattering, bio-fluorescent characteristics, spectroscopic measurement in biomedical application and some basic concepts of optical coherence tomography. One week lecture and one week experiment take turns in this semester. The topics includes the followings:

	<ol style="list-style-type: none"> <li>1. Introduction, including laboratory rules and related safety issues</li> <li>2. Fiber optics – coupling efficiency &amp; alignment loss</li> <li>3. Bio-tissue effects with polarization of light</li> <li>4. Grating based spectroscopy with biological applications</li> <li>5. Measurement of light spectrum and light-tissue interaction</li> <li>6. Bio-fluorescence measurement</li> <li>7. Coherence of light - Michelson interferometer</li> <li>8. Fourier-domain optical coherence tomography</li> </ol>
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：生醫資訊處理

Title	Biomedical Information Processing
Textbook* and Reference book	Lecture notes will be given during class
Course Objectives and Description	<p>In this course, we introduce the basic techniques and theories of biomedical information processing. The lectures focus on various medical information processings and its applications. Students will learn the skills to deal with clinical problems with engineering techniques. The topics includes the followings:</p> <ol style="list-style-type: none"> <li>1. Introduction to biomedical information processing</li> <li>2. Biomedical optics data processing</li> <li>3. Principles and physics for molecular imaging</li> <li>4. Quantitative information extraction from molecular images</li> <li>5. Image processing for clinical applications</li> <li>6. Electrocardiogram analysis and applications</li> <li>7. Signal processing in biomedical applications</li> </ol>
Remarks	3 Credits, Master Program

中文課程名稱：圖訊識別

Title	Pattern Recognition
Textbook* and Reference book	Sergios Theodoridis, Konstantinos Koutroumbas, Aggelos Pikrakis, Dionisis Cavou, "Introduction to Pattern Recognition: A Matlab Approach", Academic Press 2010.* Sergios Theodoridis, Konstantinos Koutroumbas, "Pattern Recognition", Academic Press 2008
Course Objectives and Description	The goal of this course is to present the underlying principles of pattern recognition in a unified and integrated manner and to let the students learn the commonly used methods and techniques by doing MatLab exercises. This course includes the following topics: 1) Classifiers based on Bayesian Decision Theory 2) Classifiers based on Cost Function Optimization 3) Data Transformation: Feature Generation and Dimensionality Reduction 4) Feature Selection 5) Template Matching 6) Clustering
Remarks	3 Credits, Master Program and Ph.D Program

中文課程名稱：生醫光電技術

Title	Introduction to Biophotonics techniques
Textbook* and Reference book	Introduction to Biophotonics, by Paras N. Prasad, 2003. 1. Principles of Fluorescence Spectroscopy, 3rd ed. by Joseph R. Lakowicz, 2006. 2. Handbook of Biological Confocal Microscopy, 2nd ed. edited by James B. Pawley, 1995. 3. Handbook of Optical Coherence Tomography, edited by Brett E. Bouma and Guillermo J.
Course Objectives and Description	This course provides the fundamentals and various applications involving the integration of light, photonics and biology into biophotonics. This course includes the following topics: 1) Fundamentals of Optics 2) Tissue Optics 3) Optical imaging technique

	4) Photon therapy 5) Biomedical applications
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：非線性控制

Title	Nonlinear Control
Textbook* and Reference book	Jean-Jacques E. Slotine and Weiping Li, Applied Nonlinear Control, Pearson Education Taiwan Ltd. * Alberto Isidori, Nonlinear Control Systems, Springer-Verlag, 1999.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on the analysis and design of nonlinear systems. This course includes the following topics: 1) basic stability concept of nonlinear system, 2) Lyapunov method, 3) state feedback linearization, 4) sliding control, 5) adaptive control.
Remarks	3 Credits, Master and Ph.D Program

中文課程名稱：消息理論

Title	Information Theory
Textbook* and Reference book	Elements of Information Theory Thomas M. Cover, Joy A. Thomas
Course Objectives and Description	Studies of information measures, coding and transmission capacity of a communication channel. This course includes the following topics: 1. Review of probability and random variables 2. Random process and Markov chain 3. Entropy, Conditional Entropy, and Mutual Information 4. Asymptotic Equipartition 5. Entropy rate of random processes

	6. Huffman code, Shannon code, and the optimal codes 7. Channel Capacity 8. Differential Entropy 9. The Gaussian Channel
Remarks	3 Credits, Master Program

中文課程名稱：光纖通訊實驗

Title	Optical Fiber Communications Laboratory
Textbook* and Reference book	Compile Teaching Materials. * H. Kolimbris, Fiber Optics Communications, Pearson Prentice Hall, 2004, ISBN 0-13-191134-1.
Course Objectives and Description	This course is mainly introducing the experiments of optical devices and the optical fiber systems. The content of the course is as follow: 1. Measure the optical fiber performances 2. Measure the optical source and photodiode parameters 3. Test the performance of the optical modulator 4. Test the bidirectional digital and analog transmission link 5. Test the WDM transmission 6. Measure the optical amplifier 7. Measure the Fiber Bragg grating 8. Measure the passive optical device and system 9. Simulate the optical multiple access system by VPI software.
Remarks	3 Credits, Master Program

中文課程名稱：醫學物理

Title	Medical Physics
Textbook* and Reference book	R. K. Hobbie, Intermediate physics for medicine and biology, 5th edition, Wiley, 2015.
Course Objectives	The purpose of this course is designed to deliver modern biomedical physics knowledge to EE background graduate stud

and Description	ents as a background for biomedical engineering research need. The course itself is multiple disciplinary, and materials i n the preliminary course planning should include (but not least) basic biomedical physics, basic biochemistry, basic mol ecular biology, and modern biophysics research protocols and methods. This course includes the following topics: (1) Physiology and anatomy (2) Biology and biochemistry (3) Molecular biology (4) Biophysical methods and instruments (5) Modern medical and biological/ biophysical applications
Remarks	3 Credits, Ms and PhD Program

中文課程名稱：醫學影像系統

Title	Medical image system
Textbook* and Reference book	K. Kirk Shung, Michael B. Smith, and Benjamin M. W. Tsui, Principles of Medical Imaging, Academic Press Inc., San Diego, 1992
Course Objectives and Description	This course is intended to teach senior-college or graduate student who has the background of engineering for basic principles of medical imaging system. This course includes the following topics: 1) biomedical engineering, 2) electrical engineering, 3) medical physics, 4) radiological sciences, 5) X-ray, 6) magnetic resonance imaging, 7) ultrasound 8) radionuclide imaging
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：無線網路

Title	Wireless Network
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Textbook* and Reference book	Dharma Prakash Agrawal and Qing-An Zeng, Introduction to Wireless & Mobile Systems, 3rd edition, ISBN-13:978-1-4390-6207-4* William Stallings, Wireless Communications and Networks, ISBN 0-13-095011-4
Course Objectives and Description	Objective of this course is to train students to understand the concepts of cellular and mobile communication system and their applications. Advanced concepts of cellular system and mobile communication system will be discussed. Students have to read and present different research articles of Wireless Communications and networks to improve their research methods and to initiate research ideas
Remarks	3 Credits, Ph.D Program

中文課程名稱：醫學影像處理

Title	Medical image processing
Textbook* and Reference book	Applied Medical Image Processing, Second Edition: A Basic Course 2nd Edition, Wolfgang Birkfellner. Biosignal and Medical Image Processing, Third Edition Feb 25, 2014, by John L. Semmlow and Benjamin Griffel.
Course Objectives and Description	This class will give the student an introduction to image processing in medicine, emphasizing the clinical relevance and special requirements of the field. This course includes the following topics: 1) overview of the physics of medical image processing, 2) MATLAB and LabVIEW programming, 3) image formats and data storage, 4) intensity transforms, 5) filtering of images, 6) volume rendering, image registration, and tomographic reconstruction
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：展頻通訊

Title	Spread Spectrum Communications
Textbook* and Reference book	D. Torrieri, "Principles of spread-spectrum communication systems," Springer, 2005. R. L. Peterson, R. E. Ziemer, and D. E. Borth, "Introduction to Spread Spectrum Communications", Prentice Hall, 1995.

	V. P. Ipatov, "Spread Spectrum and CDMA:principles and applications", Wiley, 2005.
Course Objectives and Description	This course teaches the fundamentals of digital communication that are the foundation for many of the techniques employed in spread spectrum communications. These include spreading sequence, direct sequence (DS) and frequency hopping (FH) spread spectrum, performance of spread-spectrum systems in jamming environments and capacity calculation for CDMA systems. Students gain an overview of wireless architecture, spread spectrum systems, code synchronization, design of optimum receivers, CDMA theories, calculation of theoretical capacity of CDMA system, effects of interference in CDMA, and 3G wireless systems using OFDMA and CDMA technologies.
Remarks	3 Credits, Master and Ph.D Programs

中文課程名稱：密碼學

Title	Cryptology
Textbook* and Reference book	A.J.Menezes, P.C. van Oorschot and S.A. Vanstone, "Handbook of Applied Cryptography", McGraw-Hill , 2001 , CRC Press*  Douglas R. Stinson, "Cryptography - Theory and Practice", CRC Press, 2005. 賴溪松，韓亮，張真誠，"近代密碼學及其應用"，旗標。 Wenbo Mao, "Modern Cryptography - Theory and Practice", Prentice-Hall PTR, 2004 , 全華
Course Objectives and Description	This course will discuss the mathematics background and the variant algorithms of the cryptography. The mathematical background will include the probability and statistics, the information theory, and the number theory. The cryptographic algorithms discussed are the basic algorithms of the information security, the network security, the communication security. In this course, the survey of both the principles and practice applications of the cryptography will be discussed. In addition, the attacks on these cryptosystems will be addressed as well.  The main topics are : 1.Background Review 2.Classic Ciphers 3.Symmetric-key Block Ciphers Feistel Structure, FEAL, DES, AES 4.Symmetric-key Block Ciphers

	<p>LFSR Structure, A5, RC4</p> <p>5.Hash Functions</p> <p>MD5, SHA-1, SHA-256</p> <p>6.Public-key Ciphers</p> <p>Knapsack , RSA, ElGamal, ECC, NTRU</p> <p>7.Digital Signatures</p> <p>RSA, DSA, ECC</p> <p>8.Key Management</p> <p>Key Distribution, Diffie-Hellman Key Agreement</p> <p>9.Authentication Protocols</p> <p>password based authentication, challenge-response authentication</p> <p>10.Integrity Check Protocols</p> <p>CRC, MAC, HMAC</p>
Remarks	3 Credits, Ph.D Program

中文課程名稱：強健控制

Title	Robust Control
Textbook* and Reference book	<p>(1)Applied Nonlinear Control, by J.-J. E. Slotine and W. Li.*</p> <p>(2)Robust and Optimal Control, by K. Zhou.*</p> <p>(1) Nonlinear Systems, by H. K. Khalil.</p> <p>(2) 線性與非線性 H-infinity 控制理論 -Game Theoretic Approach by 楊憲東 and 葉芳柏</p>
Course Objectives	In this class, robust control includes

and Description	adaptive control, variable structure control, and H-infinity control. First, stability analysis is introduced, then the fundamentals of the above control schemes are introduced, finally some practical applications are presented.
Remarks	3 Credits, Ph.D Program

中文課程名稱：偵測與評估理論

Title	Detection and Estimation Theory
Textbook* and Reference book	Harry L. Van Trees, "Detection, Estimation, and Modulation Theory, Part I," John Wiley & Sons, 2001. *  1. Steven Kay, "Fundamentals of Statistical Signal Processing: Estimation Theory," Vol. I, Prentice-Hall, 1993 and 1993. 2. Steven Kay, "Fundamentals of Statistical Signal Processing: Detection Theory," Vol. II, Prentice-Hall, 1998.
Course Objectives and Description	1. Classical detection and estimation theory 2. Representations of random process 3. Detection of signals, estimation of signal parameters 4. Estimation of continuous waveforms 5. Linear estimation
Remarks	3 Credits, Ph.D Program

中文課程名稱：醫療儀器學

Title	Medical Instrumentation
Textbook* and Reference book	J. G. Webster: Medical Instrumentation, 2009* R. S. Khandpur: Biomedical Instrumentation, 2005, McGraw-Hill Publishing*
Course Objectives and Description	The medically related design problems can range from very complex large-scale constructs, such as the design and implementation of automated clinical laboratories, multiphasic screening facilities, and hospital information systems, to the creation of relatively small and simple devices, such as recording electrodes and biosensors.

	The introduction of different instruments are listed on the teaching program.
Remarks	3 Credits, Ph.D Program

中文課程名稱：生醫微系統工程

Title	Biomedical Microsystem Engineering
Textbook* and Reference book	Fundamentals of BioMEMS and Medical Microdevices Steven S. Saliterman, 2006, John Wiley, ISBN 0-8194-5977-1* Geschke, O., Klank, H., and Tellemann P.: Microsystem Engineering of Lab-on-a-Chip Devices
Course Objectives and Description	Biomedical microsystem engineering(or Biomedical microelectromechanical systems, BioMEMS) has emerged as a subset of MEMS devices for application in biomedical research and medical microdevices. For the purpose of teaching biomedical microsystem engineering, the following subjects will be covered: (1) Microfabrication of silicon, glass, & polymer devices. (2) Microfluidics & electrokinetics. (3) Sensors, actuators, & drug delivery systems. (4) Micro-total-analysis systems & lab-on-a-chip(LOC). (5) Clinical laboratory medicine. (6) Detection & measuring systems. (7) Genomics & DNA Microarrays, Proteomics & Protein Microarrays. (8) Emerging applications in medicine, research, & homeland security. etc. The Contents of Biomedical Microsystem Engineering cover: Introduction to BioMEMS, Silicon Microfabrication, "Soft" Fabrication Techniques and polymer materials, Microfluidic Principles, Sensor Principles and Microsensors, Microactuators and Drug Delivery, Clinical Laboratory Medicine, Micro-Total-Analysis Systems (microTAS)., Detection and Measurement Methods, Genomics and DNA Microarrays, Proteomics and Protein Microarrays, Emerging BioMEMs Technology, Biocompatibility, Analytical Chemistry on Microsystems, Microbiology, etc.
Remarks	3 Credits, Master Program

中文課程名稱：最佳化方法

Title	Optimization Method
Textbook* and Reference book	E. K. P. Chong and S. H. Zak, An Introduction to Optimization, 3rd ed., John-Wiley & Sons, 2008. * D. G. Luenberger, Linear and Nonlinear Programming, 2nd ed., Kluwer Academic Publishers, 2003.
Course Objectives and Description	The goal of this course is to let students have essential backgrounds on optimization methods. This course includes the following topics:

	<ol style="list-style-type: none"><li>1) unconstrained optimization methods: gradient, conjugate gradient, Newton's and quasi-Newton's methods,</li><li>2) nonlinear constrained optimization,</li><li>3) problems with equality constraints,</li><li>4) problems with inequality constraints,</li><li>5) algorithms for constrained optimization.</li></ol>
Remarks	3 Credits, Master Program