ACE7410 Computer Aided Design and Manufacturing  T

ACE7420 Computer Interface and Simulation  T
Computer interface: sensor interface, interface design for automated systems, human-computer interaction, and teleoperated systems; virtual reality: solid modeling, graphic software, haptic interfaces, and applications; simulation: off-line programming, motion planning, introduction to dynamic simulation.

ACE7430 Computer Vision and Perception  T

ACE7440 Control and Industrial Automation  NA
State space representation, realizability, stability, controllability, observability, linear control design methods (pole placement, observer, asymptotic tracking and disturbance rejection, internal model design, feedforward design), introduction to nonlinear systems, examples of industrial control systems (robot control, satellite’s attitude control, servomechanism, etc).

ACE7450 Industrial Information Processing  T
The course aims to introduce basic theory and advanced techniques for tackling various industrial information processing problems. Areas of discussion include random signal analysis, detection and estimation theory, and other specialized topics such as wavelets and adaptive signal processing. The required background knowledge will be reviewed at the beginning of the course.

ACE7460 Computational Intelligence and Applications  T
Various areas of emerging technologies of intelligent systems. Introduction and review of neural networks, fuzzy systems, simulated annealing, and genetic algorithms. The applications of intelligent systems to control, robotics, automation, manufacturing, and transportation systems.

ACE7470 Product Design and Manufacturing  M
This course covers topics in product design and manufacturing such as: Product development process; Concept generation and selection; Time-to-market and product life cycle; Product architecture and platform; Design for manufacture and quality; Product design economics; Organization for effective product development; Concurrent engineering; Rapid prototyping and tooling technologies; Metal-products and plastic-products manufacturing; Microelectronics and optoelectronics manufacturing; Agile manufacturing.

ACE7480 Measurement and Instrumentation  T
This course is intended to provide basic concepts, the methods of measurement and instrumentation. Topics include: sensors, methods to interface between electromechanical parts and sensors to computers, analogue and digital circuitry; design of linear circuits with existing ICs and Op-amps; design of low-noise circuit to enhance the sensed signal.

ACE7490 Microelectromechanical Systems Technology and Applications  NA
Introduction to micro systems: integrated circuit and micromachines; microelectromechanical systems (MEMS) fabrication techniques; operational principles of micro sensors and actuators; macro to micro world scaling effects and issues; design and analysis of micro sensors and actuators; applications of micro sensors and actuators in robotic, biomedical, aerospace, and manufacturing industries.

ACE7510 Robotics  T
Introduction to robotics and its applications in industries and services. Classification of robot systems, forward and inverse kinematics associated to manipulator motion, robot design, control, sensing, and programming.

ACE7520 Smart Materials and Structures  NA
Overview of smart materials technology; characteristics of smart materials such as piezoelectric
materials, magnetorheological fluids, and shape memory alloys; smart actuators and sensors; structural modeling and design; dynamics and control for smart structures; integrated system analysis; applications in buildings, automobiles, trains, robots, manufacturing systems, and biomedical devices.

ACE7530 Systems and Optimization

Department of Computer Science and Engineering

CSC7110 Programming Languages: Theory and Implementation
This course focuses on the theory and implementation of modern programming languages. Topics include: logic, lambda calculus, type theory, domain theory, category theory, semantics, and implementation for languages of different paradigms.

CSC7111 Advanced Topics in Parallel/Distributed Systems
This course covers selected topics in parallel/distributed systems. The detailed contents may be changed from year to year depending on the current development and the teacher specialty.

CSC7112 Topics in Software Systems
The course will introduce to students topics in software systems. Topics will be selected from theories, design and implementation methodologies, object technologies and software agent technologies. The detailed contents may be changed from year to year depending on the current development and available expertise.

CSC7120 Computational Complexity
This course introduces advanced topics in computational complexity: relations between complexity classes, reduction and completeness, P vs NP, NP and coNP problems, approximability and parallel computation.

CSC7121 Advanced Topics in Database Systems
This course will introduce to students advanced topics in database systems including query languages, concurrency control, deadlock resolutions, recovery schemes, distributed database systems, and object-oriented approach.

CSC7122 Topics in Theoretical Computer Science
This course will introduce to students advanced topics in Theoretical Computer Science. The detailed contents may be changed from year to year depending on the current development and available expertise.

CSC7130 Advanced Topics in Artificial Intelligence
This course will cover selected topics from: advanced pattern recognition, neural networks, expert
systems and fuzzy systems, evolutionary computing, learning theory, constraint processing, logic programming, probabilistic reasoning, computer vision, speech processing, and natural language processing.

CSC7220 Advanced Computer Architecture T
This course explores current and future trends in the design of high-performance computing systems. Topics to be discussed will include: Pipelining, branch prediction, hardware/software techniques for exposing more parallelism, memory system design, interconnection networks, and clusters.

CSC7221 Advanced Topics in Internet Technologies T/M
This course will cover advanced topics in Internet technologies. Topics will vary from year to year depending on the current research features. Sonic typical topics to be discussed will include: multimedia streaming, delivery and fault tolerance, content distribution network, peer-to-peer network and services, network economics and incentive, network security and distributed key management, service overlay network, routing and convergence.

CSC7230 Object-Based Distributed Systems T
This course will provide students with understanding and awareness of the main advantages, challenges, design issues, and current techniques in the area of distributed systems and software, based on the object-oriented paradigm and middleware. Topics will include: architectural models for distributed systems, examples of servers such as file servers and name servers, remote procedure calls and multicast communication, Java RMI, emerging standards (CORBA, DCOM) and platforms (Iona Orbix, Visigenix), the features of Unix which are geared towards distributed working, the relevance of concurrency control and transactions in the sharing of distributed data, reliability and security issues.

CSC7231 Image Processing and Computer Vision T
This first part of the course includes fundamental topics in image processing, e.g. image enhancement techniques, color image processing, image segmentation, and image compression. The second part of the course focuses on topics concerning methodologies of recovering 3D information from 2D images. Specifically, techniques for camera calibration, stereopsis, motion analysis, pose estimation and structure from motion will be discussed. These techniques will have practical applications to virtual reality, model reconstruction and graphics.

CSC7232 Computer Models for E-Business T/M

CSC7233 IT Project Management M
This course covers the key elements of the project management framework related to information technology. Topics include the identification of elements and processes of project management, processes involved in project integration management, project scope management, various tools and techniques used to develop project schedules and resource planning, processes of project quality management, project communications management, risk management, human resources management, and project procurement management. Experts from industry will also be invited to share their experience in the topics.

CSC7240 Multi-media Technology T
This course will introduce to students advanced topics in multimedia technology: hypertext, hypermedia systems, core technologies, multimedia information systems, distributed multimedia database, multimedia development tools and environments.

CSC7241 Advanced Topics in Information Systems T
This course will introduce to students advanced topics in Information Systems. The detailed contents may be changed from year to year depending on the current development and the teacher specialty.

CSC7242 Internet-based Virtual Reality T
This course introduces various user-computer interaction techniques and interface tools on internet. It will discuss the current R&D trends in virtual reality (VR) technology, especially
internet-based VR technology applied to various applications including architecture modeling and navigation, virtual prototyping, 3D arts and design, multi-user real-time VR entertainment on Internet, virtual tourist, tele-medicine and distant learning, and interactive visualization.

CSC7250 Seminar  NA
The Seminar is a series of 12 sessions with speakers invited from academic or industry to present a range of current topics in computer science to widen the students’ horizon and perspectives.

CSC7251 / CSC7260 Project I and II  NA
The Project provides a challenge for students to apply their computing knowledge and expertise to carry out independent research and development work in any area of Computer Science. A project report has to be written under the supervision of the lecturing staff.

Department of Electronic Engineering

ELE7040 Optoelectronics and Optical Communication  T

ELE7050 Wireless Communication Systems  T

ELE7060 RF Circuits and Systems  T
Introduction. RF Circuit Design. Transceiver architecture. High efficiency power amplifier design. Linearization techniques for RF transmitters. Modern wireless communication systems. Advanced technologies for wireless communications

ELE7070 Computer Vision and Applications  T

ELE7080 Digital Processing of Speech Signals  T

ELE7090 Image Processing and Video technology  T

ELE7100 Advanced Signal Processing for Communications  T

ELE7120 Tele-Medicine: Techniques and Applications  T
The origins of bioelectric signals : action potentials, ECG, EMG, EEG. Biomedical signal processing and modeling : frequency-domain analysis, higher-order spectra, and cable analogy. Medical devices and sensors : electrodes, biopotential amplifiers, and drug delivery devices. Electrical information technology for biomedicine : biotelemetry, bioinformation compression and transmission. Telemetry, blood pressure measurements and other topics of recent interest. Concept of E-medicine, tele-healthcare, and tele-medicine. Basic techniques in tele-medicine: communication systems and networks, medical devices, e-medical records, wireless communications in medicine, information security and confidentiality, bio-modeling, medical data coding and compression, and functions of PACS and HIS. Applications include: tele-consultation, tele-education, tele-radiology, tele-pathology, tele-surgery,
Current topics of research interests in tele-medicine.

ELE7210 MOS Devices & Fabrication  NA
MOS device physics; MOS transistor modeling; device simulation; MOS transistor design; and advanced sub-micron CMOS process technology.

ELE7230 CMOS Digital IC Design  T
Advanced CMOS digital design techniques: static logic, dynamic logic, transmission gate intensive logic; DC and AC switching characteristic of CMOS digital logic; I/O buffer; and CMOS SRAM.

ELE7240 CMOS Analog IC Design  T
Review of fundamentals; analog circuit building blocks: operational amplifier, comparator, voltage and current references; switched-capacitor circuits; current mode circuits; continuous-time filters; A/D and D/A converters; parallel, serial, algorithmic and over-sampling converters; mixed signal techniques.

ELE7260 VLSI Design Methodology and Testing  T
Variation of different circuit implementation methods; conventional design flow; rapid-prototyping; VHDL and Verilog; deep submicron design flow; high-level synthesis; IC testing, test pattern generation; scan design and built-in self-test; introduction to packaging technology.

ELE7300 IC Design Project  NA
The objective of this course is for students to get hand-on design experience.

ELE7400 Management Techniques for Engineers  M
This is intended as a basic course in learning how to manage in an organization. Various Approaches to organization and management are analyzed. All kinds of communication skills (making presentations, chairing meetings, negotiating deals, writing reports and teaching your fellow staff) will be taught. Through group discussion, class presentation and project assignment, students will learn how to plan, organize, lead, motivate and control a project.

Department of System Engineering & Engineering Management

SEG 7410 Principles of Engineering Management  M
This course is designed to provide fundamental principles of managing engineering and industrial organizations. The focus is on the application of quantitative and qualitative approaches in the practice of engineering management. Quantitative modelling and solution techniques for strategic and operational problems are discussed. The role of strategic management, strategy formulation, and strategy implementation are covered. Other strategic issues involving innovation and ethics are also addressed.

SEG 7420 Manufacturing and Service Operations Management  NA
Topics in manufacturing operations management: forecasting, aggregate planning, inventory theory, manufacturing resource planning, Just-In-Time (JIT) production. Topics in service operations management: the framework to analyze service operations, methods for designing, evaluating and delivering services, locating service facilities, allocation of service resources, workforce management and quality management.

SEG 7430 Information Technology Management  M

SEG 7440 Advanced Engineering Economics  M

SEG 7450 Expert Systems and Decision Support  
Overview of management support systems. Data and model management in decision support systems. Group decision process. Group decision support systems and distributed group decision support systems. Executive information and support systems. Applications of artificial intelligence methodologies in decision support. Integration of decision support technologies. Design and development of management support systems. Organizational and societal impacts.

SEG 7460 Client/Server Information Systems  

SEG 7470 Open Systems and Electronic Commerce  
Introduction to open system standards and protocols. Transaction protocols. Electronic commerce applications using open system and artificial intelligence technologies. Application of intelligent agents for automated transaction processing. Integration of HTML and JAVA with information and communication systems.

SEG 7480 Quality Assurance and Control  

SEG 7490 Project and Technology Management  

SEG 7500 Logistics Management  

SEG 7520 Models and Decisions with Financial Applications  

SEG 7530 Stochastic Investment Models  
The focus of the course is on various stochastic models that support investment decisions. Overview of investment problems: pricing, hedging, portfolio selection, investment vs. consumption. Asset dynamics, binomial trees, Ito processes. Introduction to option pricing, Black-Scholes formula. Term structure, interest-rate derivatives. Portfolio optimization, optimal control models: Bellman equation and necessary conditions.

SEG 7540 Financial Analysis and Security Trading (CEF No. 23Z02195-3)  
http://www.info.gov.hk/sfaa/cef/course.htm
Working knowledge of different financial markets. Equity risk, bond risk, FOREX risk, commodity risk and their corresponding risk management practices. The use of REUTER's, Bloomberg, Dow Jones, and TIBCO traders' terminals.

SEG 7550 Computational Intelligence in Financial Information Systems  
knowledge-based system for financial engineering applications.

SEG 7560 Data Analysis in the Financial Markets NA
This course emphasized on econometrics modeling and inference techniques. Topics include: OLS, GLS, maximum likelihood estimation, statistical hypothesis testing, GMM, ARFIMA model, GARCH model and Stochastic Volatility model, cointegration, common factors and common features, switching regime model and other nonlinearities, simulation and estimation of continuous diffusion process, the use of S-plus.

SEG 7570 Computational Finance NA
The course emphasizes the implementation of numerical algorithms applied to financial problems. The numerical methods include: binomial trees, Monte Carlo simulation, finite difference methods, among others. These methods will be applied to basic options, exotic options, futures, term structure, fixed income securities, dynamic trading strategies, and financial risk management.

SEG 7580 Supply Chain Management M
This course introduces the key models and concepts in supply chain management. Topics include: demand forecasting, aggregate planning, supply management, inventory management, matching supply with uncertain demand, information distortion and demand management, information technologies for supply chain co-ordination, e-business models, etc.

E-Commerce (Technologies)

ECT 7010 Fundamentals of E-commerce Technologies M
An overview of the principles of E-Commerce. The origin and growth of E-Commerce. Technologies that support the development of E-Commerce applications. Business models and strategies for E-Commerce. Legal issues related to E-Commerce such as privacy, consumer rights, and intellectual property.

ECT 7020 Electronic Payments Systems M
This course covers various methods of transferring payments over the Internet and compares their functionality. Topics include electronic money, electronic contracts, micro-payments, authenticity, integrity and reliability of transactions, the encryption and digital signature techniques needed to support electronic cash, and the technologies available to support secure transactions on the Internet.

ECT 7030 Logistics Management (CEF No. 002 CUHK 25Z02210-6) M

ECT 7040 Cryptography, Information Security and E-Commerce M/T

ECT 7110 E-Commerce Data Mining Techniques T
Data mining provides techniques for the analysis, understanding and extraction of useful information form huge databases. These techniques are used in business, finance, medicine and engineering. This course will introduce the techniques used in data-mining for E-Commerce information. Topics will include clustering, classification, estimation, forecasting, statistical analysis and visualization tools.

ECT 7120 Distributed and Mobile Systems T
Distributed Systems are the key framework for E-Commerce applications. This course covers the principles of distributed systems and software, and the engineering mechanisms for their specification, design, deployment, and evaluation. Topics include: architectural models for
distributed systems, server techniques, remote procedure call and multicast communication, emerging standard and platforms (CORBA, DCOM), distributed transactions, concurrency control, reliability and security issues.

ECT 7130 Network and Web Programming  T
This course addresses the techniques for programming in both low-level (Network) and high-level (Web) internet. Network Programmes includes: Client-server system design; interprocess communication; sockets; blocking and nonblocking I/O; multithreaded process; iterative and concurrent server designs; Web programming includes HTML, JAVA, Web page design and construction.

ECT 7140 Open Systems for E-Commerce  T/M
Introduction to open system standards and protocols. Transaction protocols. Electronic commerce applications using open system and artificial intelligence technologies. Application of intelligent agents for automated transaction processing. Integration of Web programming techniques with information and communication systems. Case studies for E-Commerce open system applications.

ECT 7150 Project I in E-Commerce Technologies  NA
An individual or a team project on E-Commerce technologies

ECT 7160 Mobile Commerce  M
This course introduces key technologies that support operations of mobile commerce. Topics include security and communication protocols, mobile payment, location-sensitive applications and other new applications and solutions, regulation frameworks, and new business and revenue models. Mobile commerce applications that are important to Hong Kong, such as mobile tourism and mobile logistics will also be discussed through case studies.

ECT 7210 Information Technology Management  M
The challenges, techniques and technologies associated with the management of information technology (IT) in the E-Commerce environment. The linkage of IT to business strategy and business process re-engineering. Information systems planning. Systems project management and control.


ECT 7220 Decision Methodology with Financial Applications  NA

ECT 7230 Engineering Economics  M

ECT 7240 Supply Chain Management (CEF No. 002 CUHK 25Z02211-4)  M
Management of moving raw materials, in-process inventory, and finished-goods; transferring information and payment. Topics include: electronic information and payment transfer and its impact, distribution, forecasting, inventory management, purchasing and supplier management, ERP systems supply chain integration and strategic partnering. Impacts of E-commerce in supply chain management.

ECT 7250 Project II in E-Commerce Technologies  NA
An individual or a team project on E-Commerce technologies.

T: Technology Track
M: Management Track
NA: Not Applicable