SUBJECT DESCRIPTION FORM

Subject Title:	Mathematics I	**Subject Code:**	AMA227
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial and Student Presentation 14 hours

Pre-requisite:	nil	**Co-requisite:**	nil	**Exclusion:**	nil

Aims:

The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. To develop students' ability for logical thinking and effective communication, tutorial and presentation sessions will be held.

Learning Outcomes:

The subject aims to introduce the students to some fundamental knowledge engineering mathematics. The emphasis will be on application of mathematical methods to solving practical engineering problems.

Upon satisfactory completion of the subject, students are expected to be able to:

1. apply mathematical reasoning to analyse essential features of different engineering problems;
2. apply appropriate mathematical techniques to model and solve problems in engineering;
3. develop and extrapolate mathematical concepts in synthesizing and solving new problems;
4. search for useful information in solving problems;
5. undertake continuous learning.

Syllabus:

1. Algebra of Complex Number
   Complex numbers; Geometric representation; n-th roots of complex numbers.

2. Linear Algebra
   Matrices and determinants; Vector space; Elementary algebra of matrices; Eigenvalues and eigenvectors; Normalization and orthogonality.

3. Calculus of One Variable
   Review of differential and integral calculus; Elementary functions; Fundamental Theorem of Calculus; Techniques of integration.

4. Infinite Series
   Infinite Series; Convergence; Taylor series; Fourier series and Fourier transform.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

To ensure that students learn and reflect continuously, Continuous Assessment is an important element and students are required to obtain Grade D or above in both the Continuous Assessment and the Examination components. The continuous assessment comprises of assignments, in-class quizzes and tests. The assignments are used to assist the students to reflect and review on their progress. The end-of-semester examination is used to assess the knowledge acquired by the students and their ability to apply and extend such knowledge.

Textbooks and Reference Books:

1. H. Anton, *Elementary Linear Algebra*, 8th ed., John Wiley & Sons, 2000.
2. G.B. Thomas, R.L. Finney, J.R. Hass, and F.R. Giordano, *Thomas' Calculus*, 11th ed., Addison-

Wesley, 2004.
3. E. Kreyszig, *Advanced Engineering Mathematics*, 8th ed., John Wiley & Sons, 1999.
4. A. Croft, R. Davison, and M. Hargreaves, *Engineering Mathematics*, 3rd ed., Prentice-Hall, 2001.

SUBJECT DESCRIPTION FORM

Subject Title:	Mathematics II	**Subject Code:**	AMA228
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial and Student Presentation 14 hours

Pre-requisite:	nil	**Co-requisite:**	nil	**Exclusion:**	nil

Aims:

The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. To develop students' ability for logical thinking and effective communication, tutorial and presentation sessions will be held.

Learning Outcomes:

This subject aims to provide students with some basic probabilistic and statistical concepts and methods. The emphasis will be on application of statistical methods to solving practical problems.

Upon satisfactory completion of the subject, students are expected to be able to:

1. apply mathematical reasoning to analyse essential features of different problems in engineering;
2. develop and extrapolate statistical concepts in synthesizing and solving new problem;
3. search for useful information and use statistical tables in solving statistical problems in the context of engineering;
4. think critically about the uses and limitations of various statistical methods for solving problems in commerce and industry;
5. undertake continuous learning.

Syllabus:

1. Ordinary Differential Equations
   First and second order linear ordinary differential equations; Laplace transform; Convolution theorem.

2. Descriptive Statistics
   Categorical and Numerical data; Frequency distributions; Mean, mode and median; Range and quartile; Standard Deviation.

3. Probability
   Rules of sums and products; Combinatorial probability; Independence and mutual exclusion; Bayes' theorem.

4. Random Variables
   Discrete and continuous random variables; Binomial, Poisson, Exponential and Normal distributions; Law of large numbers; The Central Limit Theorem; Test of hypothesis.

5. Statistical Inference
   Estimation of the means; Variance and proportion; Confidence interval; Test of Hypothesis; Type I and Type II Errors; Power of a test.

6. Markov Process
   Recursions and Markov chains; Applications to queuing theory; Birth-death process.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

To ensure that students learn and reflect continuously, Continuous Assessment is an important element and students are required to obtain Grade D or above in both the Continuous Assessment and the

Examination components. The continuous assessment comprises of assignments, in-class quizzes and tests. The assignments are used to assist the students to reflect and review on their progress. The end-of-semester examination is used to assess the knowledge acquired by the students and their ability to apply and extend such knowledge.

Textbooks and Reference Books:

1. M.R. Middleton, *Data Analysis Using Microsoft Excel: Updated for Office XP*, 3rd ed., Duxbury Press, 2003.
2. R.E. Walpole, R.H. Myers, S.L. Myers, and K.Y. Ye, *Probability and Statistics for Engineers and Scientists*, 7th ed., Prentice-Hall, 2002.

SUBJECT DESCRIPTION FORM

Subject Title: Electronics Design

Subject Code: EIE210

Number of Credits: 3

Hours Assigned: Lecture/Tutorial 39 hours
Laboratory 3 hours
(Equivalent to 9 laboratory hours)

Pre-requisite: Basic Electricity and Electronics I (ENG237) or Introduction to Electronics and Multimedia Technologies (EIE225)

Co-requisite: nil

Exclusion: nil

Objectives:

To provide a broad treatment of the fundamentals of electronics design, with emphasis of multimedia technologies.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills

1. Understand the fundamentals of electronics systems and the associated technologies.
2. Solve problems and design simple electronics systems related to multimedia technologies.
3. Apply theory to practice by doing laboratory experiments on important electronics techniques.
4. Appreciate the importance of creativity and critical thinking in the creation of ubiquitous electronics systems in a modern society, and to realize that there is no unique solution for any particular situation and that engineers have to find “optimum” solutions, or make optimum designs.

Category B: Attributes for all-roundedness

5. Present ideas and findings effectively.
6. Think critically.
7. Learn independently.
8. Work in a team and collaborate effectively with others.

Syllabus:

1. Introduction to electronics systems
   Overview of the fundamental components in electronics systems: analog and digital subsystems and their components. Basic relation between human sensory organs and audiovisual signals. Need for amplification and filtering. Need for logic manipulation and actuation.
2. Analog subsystems
   DC power supplies and regulators. Characteristics and applications of practical operational amplifiers. The basic concept of negative feedback and their effects on circuits. Feedback oscillators. Characteristics and classification of power amplifiers. Basic filter principle and approximations. Frequency response and realization of analog filters: passive and active filters. Brief introduction to discrete-time implementation of analog filters: SC filters.
3. Digital subsystems
   Operation and design of CMOS logic gates. Typical operation and design of flip-flops, registers, counters. Multi-vibrators and timers. Estimation of the speed of operation. Memory circuits: structure and operation of ROM, RAM.

Laboratory Experiments:

1. Active analog filters
2. Power amplifiers
3. Voltage regulators

Case Study: Composite video signals

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment will consist of a number of assignments, and two tests.

Textbooks:

1. Tom Floyd, *Fundamentals of Analog Circuits*, 2nd ed., Upper Saddle River, N.J: Prentice-Hall, 2002.
2. R. Schaumann and M.E. Van Valkenburg, *Design of Analog Filters*, Oxford University Press, 2001.

Reference books:

1. P.R. Gray and R.G. Meyer, *Analysis and Design of Analog Integrated Circuits,* 4th ed., New York, N.Y: Wiley, 2001.
2. Jan M. Rabaey, *Digital Integrated Circuits: A Design Perspect*ive, 2nd ed., Upper Saddle River, N.J : Pearson Education International, 2003.

SUBJECT DESCRIPTION FORM

Subject Title: Logic Design

Subject Code: EIE211

Number of Credits: 3

Hours Assigned: Lecture/Tutorial 36 hours
Laboratory 6 hours
(Equivalent to 18 laboratory hours)

Pre-requisite: nil

Co-requisite: nil

Exclusion: nil

Objectives:

To provide students with a broad view in both hardware and software aspects of digital systems in general and microprocessor systems in particular, and enable them to gain understanding and skills that will be used in later computer related courses. Emphasis will be placed on topics such as

1. Common binary logic components found in a microcomputer system.
2. Use and applications of programmable logic devices.
3. Structure and organization of microprocessors.
4. Basic assembly language programming techniques.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills

1. Understand the fundamentals of digital systems and associated technologies.
2. Solve problems and design simple system related to digital logic.
3. Apply theory to practice by using logic design techniques to develop simple digital systems.
4. Appreciate the importance of creativity and critical thinking, and to realize that there is no perfect digital system for any particular situation and that engineers have to find "good" solutions, or make good designs.

Category B: Attributes for all-roundedness

5. Present ideas and findings effectively.
6. Think critically in general.
7. Learn independently.
8. Work in a team and collaborate effectively with others.

Syllabus:

1. Logic Circuit and ICs
   - 1.1 Decoders and encoders
   - 1.2 Multiplexers and demultiplexers
   - 1.3 Binary adders, binary adder-subtrators
   - 1.4 Binary multipliers
   - 1.5 HDL representation - Verilog HDL
   - 1.6 Sequential circuit analysis and design
   - 1.7 Registers and counters.
2. Memory and Programmable Logic Devices
   - 2.1 RAM: Write and read operations, timing waveforms, RAM integrated circuits, three-state buffers, DRAM ICs
   - 2.2 Programmable logic technologies
   - 2.3 ROM, PLA and PAL
   - 2.4 VLSI programmable logic devices: Xilinx FPGA.
3. Microprocessor
   - 3.1 Register transfer operations
   - 3.2 Microoperations
   - 3.3 Bus-based transfer
   - 3.4 ALU
   - 3.5 Shifter
   - 3.6 Datapath representation

3.7 Control word
3.8 Control unit
3.9 Algorithmic state machine
3.10 Hardwired control and microprogrammed control.

4. Basic Assembly Language Programming
   4.1 Concepts of assembly/machine languages
   4.2 Operand addressing
   4.3 Addressing modes
   4.4 Instruction set: Data transfer, data manipulation, program control

Laboratory Experiment:

1. Basic logic gates and their applications
2. Hardware description language
3. Programmable logic devices, Assembly language programming

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment consists of a number of short quizzes, assignments, laboratory logbooks and reports, and two tests.

Textbook:

1. M.M. Mano and C.R. Kime, *Logic and Computer Design Fundamentals*, 3rd ed., Upper Saddle River, NJ: Prentice-Hall, 2004.

Reference Books:

1. N.P. Cook, *Digital Electronics with PLD Integration*, Upper Saddle River, NJ: Prentice-Hall, 2001.
2. T.L. Flody, *Digital Fundamentals with VHDL*, Upper Saddle River, NJ: Prentice-Hall, 2003.
3. B.B. Brey, *The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4*, Upper Saddle River, NJ: Prentice-Hall, 2003.

SUBJECT DESCRIPTION FORM

Subject Title: Information Technology

Subject Code: ENG224

Number of Credits: 3

Hours Assigned: Lecture/tutorial 33 hours
Laboratory 6 hours
(Equivalent to 18 laboratory hours)

Pre-requisite: nil

Co-requisite: nil

Exclusion: nil

Objectives:

1. To provide the foundation knowledge in computer engineering, computer networking and data processing that is essential to modern information system design;
2. To provide training in using information technologies to solve practical problems in engineering.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills

1. Be able to identify different components of a computer system and understand their features.
2. Understand the basic structure and functions of a computer operating system and be able to use the services it provided for manipulating computer resources.
3. Be able to set up and configure a simple computer system.
4. Understand the basic structure and limitations of the Internet.
5. Have the ability to understand a Web document and be able to develop the client-side and the server-side programs required for a Web application.
6. Understand the basic structure of a database system and be able to set up and configure a simple database system.
7. Be able to design and develop a web-based system with database connectivity at the server side
8. Learn to make reasonable judgment in choosing suitable technologies for the implementation of an information system.
9. Be able to identify different components and technologies used in a digital network and understand their features.
10. Be able to set up and configure a simple computer network.

Category B: Attributes for all-roundedness

11. Solving problems using systematic approaches.
12. Learn independently and be able to search for the information required in solving problems.

Syllabus:

1. Introduction to computers and computing
   Evolution and applications of computers. Microprocessors – internal structure, fetch and execute cycles, instruction set, basic assembly language programming. Other major computer hardware components: Memory and I/O. Software components – applications, utilities and operating systems. Case study: Linux – background, architecture, user interfaces, file management and storage, process management. Internet and Internet services. Multi-tier Internet model. Internet programming case studies – XHTML, PHP/ASP. (13 hours)
2. Introduction to data processing and information systems
   Database systems – architecture, relational database concept, structural query language (SQL), database management systems, Web and database linking, database application development. Case study: Database management using Microsoft Access/MySQL. Introduction to Information systems. System development life cycle. Structured tool for system analysis and design. Workflow management. (11 hours)

3. Networking Essentials
   Introduction to computer networking – LAN and WAN technologies, clients and servers, networking topologies. Networking models – OSI 7-layer model, IEEE 802 model. Network protocol case studies: Ethernet – cabling, topology, access methods; TCP/IP – application layer message passing, message assembling, port multiplexing, IP addressing, subnetting, routing and address resolution. Networking devices – modem, hub, bridge, switch, and router. (9 hours)

Laboratory Experiments and other Practical Work (18 hours):

1. Installation and use of Linux
2. Setting up a Web site with Apache/IIS and XHTML
3. Server-side programming with PHP/ASP
4. Database management using Microsoft Access / MySQL
5. Structured network cabling
6. Network Address Translation and IP Routing

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment consists of assignments, laboratory reports and tests. The assessment criteria will be made known to the students prior to conducting the assessment.

Reference Books:

1. P. Norton, *Introduction to Computers*, 3rd ed., McGraw-Hill, 1999.
2. S.M. Sarwar, *Linux, the Textbook,* 1st ed., Addison-Wesley, 2002.
3. H.M. Deitel, P.J. Deitel and T.R. Nieto, *Internet and World Wide Web: How to Program,* Prentice-Hall, 2002
4. W. Redmond, *MCSE Training Kit: Networking Essentials Plus*, Microsoft Press, 2000.
5. C.J. Date, *An Introduction to Database Systems,* 5th ed., Addison-Wesley, 2000.
6. K.C. Laudon and J.P. Laudon, *Management Information Systems,* 6th ed., Prentice-Hall, 2000.

SUBJECT DESCRIPTION FORM

Subject Title:	Computer Programming	**Subject Code:**	ENG236
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial/ Laboratory 42 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Objectives:

1. To introduce the fundamental concepts of computer programming.
2. To equip students with sound skills in C/C++ programming language.
3. To equip students with techniques for developing structured computer programs.
4. To demonstrate the techniques for implementing engineering applications using computer programs.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills
After taking this subject, the students should be able to develop a good computer program using C/C++ programming language. To be specific, the students should be able to achieve the following:

1. Familiarize themselves with at least one C/C++ programming environment.
2. Be proficient in using the basic constructs of C/C++, such as variables and expressions, looping, arrays and pointers, to develop a computer program.
3. Be able to develop a structured and documented computer program.
4. Understand the fundamentals of object-oriented programming and be able to apply it in computer program development.
5. Be able to apply the computer programming techniques to solve practical engineering problems.

Category B: Attributes for all-roundedness

6. Solve problems by using systematic approaches.
7. Write technical reports and present the findings.
8. Learn team working skills.

Syllabus:

1. Introduction to programming
   Software components of a computer – Operating system, directories, files. Evolution of programming languages. Programming environment – Compiler, linker and loader. Building the first program – Hello World. (3 hours)
2. Bolts and Nuts of C/C++
   Preprocessor, program codes, functions, comments. Variables and constants. Expressions and statements. Operators. (3 hours)
3. Program Flow Control
   If, else, switch, case. Looping – for, while, do. Functions, parameters passing, return values. Local and global variables. Scope of variables. (4.5 hours)
4. Program Design and Debugging
   Structured program design. Improving program readability. Flow chart. Modular programming – static library. Programming bugs, errors, mistakes and code rot. Exceptions and debugging. Case study: Using Visual C++ debugger. (4.5 hours)
5. Basic Object Oriented Programming
   Objects and classes. Encapsulation. Private versus public. Implementing class methods. Constructors and destructors. (4.5 hours)
6. Pointer and Array
   The stack and free store. Create and delete objects in free store. Pointer arithmetic. Passing function arguments by pointer. Returning values by pointer. Array of Objects. Multidimensional array. Array and pointer. Array of pointers. Pointer of array. Character array – Strings. Command line processing. (9 hours)

7. Stream I/O
   Input and Output. Input using cin. Output using cout. File I/O using streams. (6 hours)
8. Using C/C++ in Engineering Applications
   Solving numerical problems using C/C++. Developing graphical user interfaces for Engineering applications. Control I/O devices using C/C++. (7.5 hours)

Method of Assessment:

Continuous Assessment: 100%

Textbook:

1. H.M. Deitel and P.J. Deitel, *C++ How To Program*, 5th ed., Prentice-Hall, 2005.

Reference Book:

1. K. Gregory, *Microsoft® Visual C++®.NET 2003 Kick Start*, Sams Publishing, 2003.

SUBJECT DESCRIPTION FORM

Subject Title:	Basic Electricity and Electronics I	**Subject Code:**	ENG237
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 42 hours Laboratory 15 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Objectives:

1. Introduce the fundamental concepts of electrical and electronics principles and components applicable to all engineering students.
2. Develop an ability for solving problems involving electrical and electronics circuits.
3. Provide experimentation on electrical and electronic circuits.
4. Impart the skills and knowledge required for independent learning.

Student Learning Outcomes:

Upon satisfactory completion of the subject, the students are expected to:

1. Have acquired a good understanding of the electrical and electronics principles.
2. Be able to solve problems in electrical and electronic circuits;
3. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations;
4. Learn to search for useful information in solving problems;
5. Be able to carry out independent investigation in an improvised environment.

Syllabus:

1. DC Circuits
   Circuit components, Kirchhoffs laws, Loop & nodal analysis, Thevenin and Norton theorems, Capacitance and inductance, Independent and dependent sources, Source transformation, Instantaneous power, Source loading and maximum power transfer. (6 hours)
2. AC Circuits
   Average and rms values, Phasors, Steady-state analysis, Impedance, Admittance, Network theorems, Real and reactive power, power factor. (6 hours)
3. Basic Electromechanics
   Electric and magnetic fields, Faraday's Law, Self and mutual inductance, Transformer, Basic ac generator, Three-phase voltage generation, Three-phase power, Introduction to electric motors. (6 hours)
4. Time-Domain in Analysis
   Transient analysis, RC , RL and RLC circuits, Initial and final conditions, Laplace transform, Time domain solution by Laplace transform, Impulse and step responses of first- and second-order systems. (9 hours)
5. Basic Diode Circuits
   I-V characteristics of ideal diodes, Practical diode circuits such as rectifier circuits, clipping and clamping circuits. (3 hours)
6. Basic Amplifier Circuits
   Ideal amplifier characteristics, ideal operational amplifier, Op-amp applications: inverting, non-inverting, summing and difference circuits. (3 hours)
7. Digital Logic Circuits
   Binary number system: addition, subtraction, multiplication and division in binary number systems, Conversion between binary and decimal numbers, Two' s complement, Boolean algebra, Basic logic gates, Flip-flops, Karnaugh maps, Don't care condition, Combinational Logic circuit designs and modules. (9 hours)

Laboratory Experiments: (15 hours, 3 hours each)

1. Introduction to Laboratory instrumentation
2. Thevénin and Norton theorems
3. Time dependent circuit analysis
4. Simple op-amp circuits
5. Simple digital circuits

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

Textbook:

1. G. Rizzoni, *Principles and Applications of Electrical Engineering*, McGraw-Hill Higher Education, 4th ed., 2003.

Reference Books:

1. R.A. DeCarlo and P.M. Lin, *Linear Circuit Analysis*, Oxford University Press, 2nd ed., 2001.
2. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 2nd ed., 2000.
3. M.B. Histand and D.G. Alciatore, *Introduction to Mechatronics and Measurement Systems*, McGraw-Hill, 1999.
4. E. Hughes, *Electrical Technology*, Addison-Wesley Longman Limited, 1997.
5. Donald A. Neamen, *Electronic Circuit Analysis and Design*, Boston, McGraw-Hill, 2nd ed., 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	China Studies	**Subject Code:**	GEC2801
Number of Credits:	2	**Hours Assigned:**	Lecture 28 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Role and Purpose:

The objective of this subject is to arouse students' interest in pursuing an understanding of China and to help students acquire a broad-based knowledge about China.

Learning Outcomes:

Upon completion of the subject, students shall be able to develop interest in:
1. the understanding of China, including its culture, legal system, social and political institutions, economy and business, science and technology, etc.;
2. the relationship and linkage of the past and the present Chinese Mainland; and
3. the latest development and trends of the Mainland that shape the future of China.

Teaching/Learning Approach:

The teaching purpose is to provide students with some overall threads about the aspects of development or institutions of the Mainland. The aim is to present a framework for analysis and understanding as well as some learning guidelines on the topic for the students to go on learning after the lectures. The starting point for the lectures is the present, from which students will be introduced to the historical evolution that has shaped the present and upon which students may be helped to learn about the various factors that would affect the future and how the future might unfold under the interplay of these factors.

Learning should mean thinking, not force feeding of facts and information. Students will not be required to do prerequisite reading, but after the lectures they are encouraged to pursue the topic further by the help of the reference lists and more importantly by the use of relevant web-sites of databanks on the topics. During the lectures, time will be reserved, as an integral part of the lectures, for interaction between students and lectures through Q & A.

Indicative Content:

The subject will have 10 theme lectures, each for 4 hours, as follows:

Theme 1 : Recent Development of Chinese Economy **中國經濟最新發展**
Theme 2 : Business Environment in China **中國商貿環境**
Theme 3 : Economic Geography of China **中國經濟地理**
Theme 4 : Legal System and Laws of the PRC **中國法律體制**
Theme 5 : Political System and Institutions of the PRC **中國政治制度及組織架構**
Theme 6 : Science and Technology in China **中國科技發展**
Theme 7 : Contemporary Chinese Society **當代中國社會**
Theme 8 : Topics in Chinese Traditional Culture **中國傳統文化** – including but not limited to:
  a. Architecture and Design **建築及設計**
  b. Food and Cuisines **飲食文化**
Theme 9: Evolution of Chinese Characters **漢字演變**
Theme 10: Chinese Philosophy: Confucianism, Buddhism, and Taoism **中國哲學：儒釋道**

(Note 1: For **Theme 8**, students need to choose **either** 8a **or** 8b for submission of the reflective writing/ worksheet. Only one of them will be counted towards the minimum 5 submissions.)

Method of Assessment:

To complete the subject, students are required to:

1. achieve at least 70% attendance, that means to complete at least 5 out of the 7 theme lectures selected;
2. submit and pass a brief reflective writing or pass a quiz, for each of these 5 themes lectures (see Note 1 below); and
3. submit an essay (about 2,500 characters for essay written in Chinese) on one selected theme at the end of the semester and get a pass.

Grading: Pass/Fail

Learning Support:

1. General Education Centre's Project Room (located at A529)
2. Online resources database accessible via PolyU campus network
   a. Infobank China 中國資訊行 http://www.chinainfobank.com/
   b. Sinowisdom 中華智庫網 http://www.sinowisdom.com/index_c.htm
3. Other electronic database on "China Studies" accessible via the website of PolyU library http://www.lib.polyu.edu.hk/electdb/cdsubjec.htm#CHINA
4. List of Educational Videos (China Studies) http://www.polyu.edu.hk/~gec/video

SUBJECT DESCRIPTION FORM

Subject Title:	Practical Training	**Subject Code:**	IC291
Number of Credits:	5	**Hours Assigned:**	5 weeks (Refer to Training Pattern)

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Objectives:

The objective of this course is to train student with hands-on electronic practice, multimedia electronic product prototype fabrication techniques and practical computing skill. Practical Training will be conducted in Industrial Centre (IC) of the university.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills

1. Practise and learn the basics for best practice in computer operation with client-server computing on contemporary data network for professionals in engineering and technology.
2. Practise and learn the basics of de facto scientific computing software for professionals in engineering and technology.
3. Practise and learn professional practice in printed circuit board assembly fabrication so as to enable the construction, troubleshooting and testing of simple printed circuit board assembly.
4. Practise and learn the essence of multimedia electronic product prototype fabrication techniques so as to enable the construction of simple multimedia electronic product prototype.
5. Practise and create web site for project presentation across Internet.

Category B: Attributes for all-roundedness

6. Practise technical communication skill, produce training log and report.
7. Cultivate personnel ability and attitude by working in project group under an industrial environment.
8. Understand the variation of different personalities of members within a project group, practise adaptation so as to work in harmony with other group members while focusing on the effective delivery of project commitment.
9. Nourish leadership ability and creativity in group work
10. Demonstrate critical thinking and creativeness in electronic project development and prototype fabrication under an industrial environment.

Syllabus:

1. IC 1106 - Electronic Practice for Electronic and Information Engineering (1 week)
   a. Introduction to electronics and its products, cost factors and technical aspects. Introduction to common electronic circuits and components, soldering and desoldering techniques. Introduction to surface mount techniques, choices & properties of related materials.
   b. PCB design, circuit artwork, etching process, prototype PCB fabrication. Hands on practice of PCB circuit design in EDA environment. Use of basic test instruments. Mounting and installation of electronic circuits, wiring of subassemblies.
   c. Training and practice in programming PC interface control.
   d. Training and practice in embedded device programming.

2. IC 1109 – Advanced Electronic Practice with Multimedia Application (2 weeks)
   a. Training in design modification from circuit prototype for multimedia application.
   b. Embedded device programming practice for multimedia electronic product
   c. Multimedia electronic product prototype fabrication
   d. Testing and troubleshooting techniques in multimedia electronic product
   e. Project presentation using Internet

3. IC3003 - Basic Scientific Computing (30 hours)
   a. Approach and techniques in using the MATLAB Development Environment
   b. Mathematical Operations, matrices, linear algebra, polynomials and interpolation, data analysis and statistics, function functions, differential equations

c. Programming, M-files programming and application examples, flow control statements, function files
d. Graphical user interface, data structures, input/output, and object-oriented capabilities
e. Graphics, data plotting, formatting, basic printing and exporting interfaces with examples in basic scientific applications, pie chart, bar chart, area chart, linear and log plots, 3D-View plot experiment with fitting curves to data

4. IC3004 - General Computer and Network Skills (30 hours)
   a. General skills on installing software from Internet; file decompressing; general troubleshooting in PC; virus scan and cleaning; creating PDF documents, Installing, upgrading, configuring, managing and troubleshooting Microsoft Windows (contemporary version)
   b. Managing access to resources, system configuring and data, files and disks management
   c. Network Configuration, TCP/IP addressing, name resolution and IP routing
   d. Remote access configuring and mobile computing

Training Pattern:

Computer training will be conducted in Year 1 term time as elected by student. Training in electronic practice will be scheduled in Year 1 Summer.

Teaching and Learning Approach:

The teaching and learning approach is based on practical workshop training arranged in modules and it can be broadly divided into two parts based on their contents:-

(i) Training in electronic practice will enable student to learn the requirement of practical electronic product fabrication, appreciate the fabrication process so as to create, develop and integrate their knowledge into future design. On completion of the training, student should be able to manage the fabrication of multimedia electronic product prototype for design and development.

In module IC1106, student will learn the basics of electronic product construction practice, printed circuit assembly prototype construction skills, techniques and best practice of the electronic industry. Training activities will include tutorials, practical assignments, test and report.

For module IC1109, students will participate in training groups under an industrial environment with an objective to produce a prototype of electronic product. The product will normally contain multimedia feature with embedded controller application. Student will develop the product under an electronic design automation environment and tackle different parts of product design so as to produce a working prototype for demonstration. Student will experience practical problems that are commonly encountered in the electronic industry during product development. Student will derive solutions to overcome difficulties, produce deliverables for the project in a given time frame. Individual merit will be assessed together with group performance. As such, the training task and activities will be organized in a way to enable a clear identification of work involved while allowing students to work independently and in groups for assessment.

Besides fabrication technologies and prototype implementation, students should be able to cultivate their personal quality, creativity, management skills and leadership in teamwork collaborations. Tutorials and inductions will be provided as require. In addition to the quality and output of the practical tasks such as PCB assembly fabrication, chassis fabrication, prototype testing and demonstration, assessment will include creativeness and a web site for product presentation on the Internet.

(ii) Computer training is delivered through a series of instructor led hands-on training courses. Students are required to complete two computer training modules that are essential to their studies in multimedia technology. Tutorials and practical assignments will be given in class so as to enable learning through practical work. Test will be conducted at the end of individual module. Computer training aims to guarantee student with an adequate level of practical computer skills for academic studies and later in their professional lives.

Method of Assessment:

Assessment is comprised of 100% continuous assessment in practical assignment, report, presentation and test. The weighting of assessment components are tabulated as follows:-

Assessment Component	Weighting
Practical Assignment	50%
Report and Presentation	30%
Test	20%
Total	100%

Reference books:

1. Villanucci, Robert S., Avtgis, Alexander W., et all, *Electronic Techniques: Shop Practices and Construction*, 6th ed., Prentice-Hall, 1999.
2. Ronald K. Jurgen., *Digital Consumer Electronics Handbook*, McGraw-Hill, New York, 1997.
3. Tooley, Michael H., Electronic circuits: fundamentals and applications, 2nd ed., Newnes, Oxford, Boston, 2002.
4. Stadtmiller, D. Joseph, *Applied Electronic Design*, Prentice-Hall, N.J., 2003.
5. O'Hara, Martin, *EMC at Component and PCB Level*, Newnes, Oxford , 1998
6. Harper, Charles A., *Electronic Packaging and Interconnection Handbook*, 4th ed., McGraw-Hill, 2005.
7. Klein Wassink, R. J., *Soldering in Electronics: A Comprehensive Treatise on Soldering Technology for Surface Mounting and Through-hole Techniques*, 2nd ed., Electrochemical Publications Limited, Ayr, Scotland, 1989.
8. Martin, Perry L., *Electronic Failure Analysis Handbook: Techniques and Applications for Electronic and Electrical Packages, Components and Assemblies*, McGraw-Hill, New York, 1999.
9. Meeldijk, Victor, *Electronic Components: Selection and Application Guidelines*, Wiley, New York, 1996.
10. Loveday, George., *Electronic Fault Diagnosis*, 4th ed., Pitman, London, 1994.
11. *Microsoft Official Curriculum in Windows*, Microsoft, Redmond.

SUBJECT DESCRIPTION FORM

Subject Title:	Management and Organisation	**Subject Code:**	MM2021
Number of Credits:	3	**Hours Assigned:**	Lectures 28 hours Seminars 14 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Role and Purpose:

This subject introduces the basic theories and concepts concerning firstly, the functions of managing a business, secondly, the study of human behaviour and its implications for the management of organisations, and thirdly, the importance of social responsibility and ethics in managing organisations. The subject will also develop students' critical thinking and communication skills, both oral and written.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills

1. Identify the nature of managerial work in a variety of forms of organisation, and assess the impact of the external environment on managers' jobs.
2. Explain and analyse the functions of management – planning, organising, leading, and controlling.
3. Understand the essence of human behaviour and be able to assess the implications for the management of organisations and businesses.
4. Evaluate the arguments surrounding social responsibility and ethical behaviour in organisations and businesses, and in so doing have an enhanced awareness of the importance of such issues.

Category B: Attributes for all-roundedness

5. Develop their critical thinking, and oral and written communication skills.

Indicative Content

1. Managers and Management
   Define the nature of managerial work taking into account the impacts of the external environment in modern society. Provide an overview of the evolution of management thoughts.
2. Management Functions
   The major elements of the management functions: planning, organising, leading, and controlling, and their importance for the effective management of business organisations.
3. Planning
   Foundations of planning. Decision making and problem solving. Strategic management.
4. Organising an Enterprise
   Review of a variety of organisational structures and the identification of the conditions under which they are appropriate. Managerial communication and information technology. Staffing and human resource management.
5. Leading
   The manager's role as a leader. Foundations of human behaviour. Leading and motivating employees – individuals and groups.
6. Controlling
   Foundations of control. Operations and quality management. Controlling for organisational performance.
7. Social Responsibility and Managerial Ethics
   Arguments for and against social responsibility as a business objective. Factors affecting managerial ethics. Approaches to improving ethical behaviour.

Teaching / Learning Approach:

In the lectures the general principles of the syllabus topic will be presented and developed. In the seminars, students will develop and apply the general principles of the topic in student-centred activities.

Method of Assessment:

Coursework: 50%	Final Examination: 50%

Minimum Pass Grade:	Coursework	(D)
	Final Examination	(D)

Indicative Reading:

Recommended Textbook:

1. Robbins, S.P. and Coulter, M., *Management,* 8th ed., Prentice-Hall, 2005.

References:

1. Certo, *Modern Management,* 9th ed., Prentice-Hall, 2003.
2. Jones, *Contemporary Management*, 3rd ed., McGraw-Hill, 2003.
3. Kinicki & Williams, *Management : A Practical Introduction,* McGraw-Hill, 2003.
4. McShane, *Organizational Behavior,* 2nd ed., McGraw-Hill, 2003.
5. Robbins, *Essentials of Organizational Behavior,* 7th ed., Prentice-Hall, 2003.
6. Sieren, Boos and Boos, *China Management Handbook,* MacMillan, 2002.

Recommended periodicals, newspapers:

1. The Asian Wall Street Journal
2. The Economist
3. South China Morning Post
4. World Executive's Digest
5. Company Annual Reports (see library collection)

SUBJECT DESCRIPTION FORM

Subject Title:	Introduction to Marketing	**Subject Code:**	MM2711
Number of Credits:	3	**Hours Assigned:**	Lectures 28 hours Seminars 14 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Role and Pur pose:

This core subject introduces the basic principles and concepts of Marketing. It provides an analytical foundation for further study of Marketing and also contributes to the Learning Outcomes for all students in two ways. First, the content directly addresses the creation of value, ethics, cultural diversity and globalization. Second, the classroom activities and assessments develop students' teamwork, ability to communicate in English, creative thinking and learning to learn.

Learning Outcomes:

On successfully completing this subject, students will be able to:

1. Understand the role and value of marketing in today' s increasingly competitive, dynamic and turbulent environment.
2. Analyse market situations in different cultural / global environments, identifying marketing opportunities and threats; and understand organisations' response process to these environments.
3. Synthesise the process of marketing planning and the process of corporate planning.
4. Formulate marketing mix strategies and programmes and implem ent them.
5. Apply marketing theories, models, and information technology to practical marketing situations.
6. Establish the relationship between marketing & society in the context of social responsibility and marketing ethics.

Indicative Content:

1. Fundamentals of Modern Marketing
   Marketing in the modern organization, types of marketing, overview of the marketing process, strategic marketing planning, introduction to the marketing mix, developing competitive advantages.

2. Analysing Marketing Structure and Behaviour
   Global and competitive marketing environment, consumer and organization markets and their buying behaviour.

3. Researching and Planning of Marketing Activities
   Marketing research and audit, marketing information system, marketing planning and forecasting.

4. Selecting Market Opportunities
   Market segmentation, market targeting, product positioning, pricing, promotion and placing.

5. Introduction to the Marketing Mix
   Product, Pricing, Promotion and Placing

6. Marketing and society
   Social and Marketing ethics: marketing impacts on individual consumers, society and other businesses.

Teaching/Learning Approach:

Keynote lectures, requiring the active engagement of students, will provide them with the conceptual frameworks required for the analysis of Marketing issues. Classroom work will involve teams of students working together to prepare and give presentations, and to critique the work presented by others. Emphasis is placed throughout on the application of theory to the solution of practical and realistic marketing problems in the local and the global setting.

Method of Assessment :

Coursework: 50% Final Examination: 50%

Minimum Pass Grade:	Coursework	(D)
	Final Examination	(D)

Indicative Reading:

Recommended Textbook:

1. Kotler, P. and Armstrong, G., *Principles of Marketing*, New Jersey, Prentice-Hall, 2004.

References:

1. Boone, E.L. and Kurtz, L.D., *Contemporary Marketing*, Thomson, South-Western, 2004.
2. Etzel M.J., Walker B.J., and Stanton W.J., *Marketing*, McGraw-Hill /Irwin, 2004.
3. Lamb Hair McDaniel, *Marketing*, Thomson, South -Western, 2004.

SUBJECT DESCRIPTION FORM

Subject Title: Product Design and Social Considerations

Subject Code: SD2491

Number of Credits: 2

Hours Assigned: Lecture/Seminar 21 hours
Tutorial/Exercise 7 hours

[The timetable arrangement for the subject is flexible. For example, it can be offered in a 14-week mode (2 hours/week), or a 7-week mode (4 hours/week).]

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Brief Description and Aims:

Social factors are important in product design. Through a research and design project, students will be able to obtain a fundamental concept and experience in design, in particular considering the social factors. Local contexts related to Hong Kong and Chinese mainland are emphasised in this subject.

Learning Outcomes:

Professional skills
1. To develop fundamental skills in product design.
2. To identify social factors/issues related to a particular design or everyday topic.
3. To conduct research to explore a particular topic related to daily life and product design.
4. To generate design solution(s) to solve a specific problem.
5. To present their design ideas by using 2-D and 3-D methods.

Transferable skills
6. To apply the research and design experience related to social consideration in other related subjects and future career.

Indicative Contents:

1. Social factors in design
2. Cultures and society
3. Subcultures and design
4. Daily activities and design
5. User, design and designer
6. Fundamental inclusive and universal concepts in design
7. Fundamental social/design research

Each student is required to conduct research and identify a design project. The project activities include:
1. Investigation of a current social issue
2. Identification of a design need and title
3. Proposal of design solution(s)
4. Presentation(s): 2-D and 3-D

Method of Assessment:

Coursework (design project) 100%

(a) The ability to carry out an independent investigation related to social issues of product design, in particular related to the local context (20%).
(b) The ability to apply findings in design project (25%).
(c) The ability to develop design ideas (40%).
(d) The ability to present design ideas (visual and verbal) (15%).

Indicative References:

1. P. Alasuutari, *Researching Culture: Qualitative Method and Cultural Studies* , London, Thousand Oaks, New Delhi: Sage Publications, 1995.
2. W.E. Bijker, *Of Bicycle, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*, Cambridge, Mass., London: The MIT Press, 1995 .
3. D. Mackenzie, *Green Design: Design for the Environment*, 2nd ed., London: Laurence King, 1997.
4. D.A. Norman, *The Design of Everyday Things*, London: The MIT Press, 1998.
5. N. Whiteley, *Design for Society*, London: Reaktion Books, 1993.

Journals:

1. Design Issues
2. The Design Studies
3. The Design Journal
4. Journal of Popular Culture
5. Popular Culture Review

SUBJECT DESCRIPTION FORM

Subject Title: Computer System Fundamentals **Subject Code:** EIE311

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 39 hours
Laboratory 3 hours
(Equivalent to 9 laboratory hours)

Pre-requisite: Logic Design (EIE211) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To provide a broad treatment of the fundamentals of computer systems.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the fundamentals of computer systems and associated technologies.
2. Solve problems and design simple systems related to computer systems.
3. Apply different important computer interfacing techniques in designing a computer system.
4. Develop a simple assembly program with an assembler.

Category B: Attributes for all-roundedness
5. Present ideas and findings effectively.
6. Think critically.
7. Learn independently.
8. Work in a team and collaborate effectively with others.

Syllabus:

1. Microprocessors and Microcomputers
   The following topics will be discussed in detail with references to one or two well-established (contemporary) microprocessor systems.
   - 1.1 CPU architecture; memory space and I/O space; instruction fetch and execution; pipelining; essential assembly language instruction types; working principle of assembler; assembler directives/pseudocodes; examples of assembly language programs.
   - 1.2 Memory interface: Memory devices; address decoding; memory interface; banking; bus buffering and driving; wait state, bus cycle, instruction cycle.
   - 1.3 Basic I/O interface: Memory-mapped I/O; I/O port address decoding; programmable peripheral interface; handshaking.
   - 1.4 Interrupts: polling, programmed I/O, interrupt I/O; Basic interrupt processing, software interrupt, expanding the interrupt structure, interrupt controller.
   - 1.5 Serial interface: Asynchronous/synchronous interface, RS232C serial interface and handshaking.
   - 1.6 Direct memory Access and DMA-controlled I/O: Basic DMA operation, DMA controller, shared-bus operation, disk memory systems, video displays.
   - 1.7 Cache memory: mapping, associativity; replacement policies; write policies; performance.

2. Disk Operating System
   - 2.1 Roles of basic input/output system (BIOS) and basic disk operating system(DOS); power-up sequence; bootstrap; command processor; system control, automatic program execution (e.g. batch file); operating system calls via software interrupts; system utilities; file operating commands; device driver.
   - 2.2 File system: space management e.g. file allocation table; File management; directory entry and file control block.
   - 2.3 Multitasking and time-sharing: time-slicing; process states and process control block; context-switching mechanism; scheduling schemes and process priorities.

3. Computer Arithmetic
   3.1 Data formats: signed/unsigned numbers, binary/decimal/BCD numbers, ASCII, fixed/floating point numbers, IEEE standard; Arithmetic algorithms: Fast addition, multiplication and division algorithms.

Laboratory Experiment:

Six of the following topics or others.
1. Memory manipulation & Data representation
2. Serial communication
3. Parallel communication
4. Interrupt I/O
5. DMA I/O
6. BIOS
7. Device driver
8. Power-up procedures
9. User interface

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment consists of short quizzes, assignments, laboratory reports and tests.

Textbook:

1. Barry B. Brey, *The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor: Architecture, Programming and Interfacing*, 6th ed., Prentice-Hall, 2003.

Reference Books:

1. C. Hamacher, Z. Vranesic and S. Zaky, *Computer Organization*, 5th ed., McGraw-Hill, 2002.
2. Hans-Peter Messmer, *The Indispensable PC Hardware Book*, 4th ed., Addison-Wesley, 2002.
3. Silberschatz and P.B. Galvin, *Operating System Concepts*, 5th ed., John Wiley & Son, 1999.
4. W. Stallings, *Operating Systems: Internals and Design Principles,* 3rd ed., Prentice-Hall, 1998.

SUBJECT DESCRIPTION FORM

Subject Title: Linear Systems

Subject Code: EIE312

Number of Credits: 3

Hours Assigned: Lecture/Tutorial 36 hours
Laboratory 6 hours
(Equivalent to 18 laboratory hours)

Pre-requisite: Mathematics I (AMA227)

Co-requisite: nil

Exclusion: nil

Objectives:

1. To provide students with basic concepts and techniques for the modelling and analysis of linear continuous-time and discrete-time signals and systems.
2. To provide students with an analytical foundation for further studies in Communication Engineering and Digital Signal Processing.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills

1. Understand the representations and classifications of the signals and systems.
2. Model linear systems using time and frequency domain approaches for both continuous-time and discrete-time models.
3. Analyze signals and systems using both time domain and frequency domain techniques.
4. Understand the generation of a discrete-time signal by sampling a continuous-time signal.
5. Understand the design of analogue filters.
6. Apply software tools, particularly MATLAB, to laboratory exercises for experimenting with theories, and to the analysis and design of signals and systems.
7. Appreciate the advantages and disadvantages of using the different representations and modeling approaches.

Category B: Attributes for all-roundedness

8. Present ideas and findings effectively.
9. Think critically.
10. Learn independently.
11. Work in a team and collaborate effectively with others.

Syllabus:

1. Signal Representation
   Signal Classification, Continuous and Discrete-Time Signals, Random Signals. Time-Domain and Frequency-Domain Representations.
2. Continuous-Time and Discrete-Time Systems
   Impulse Representation and Convolution, Linear Time-Invariant Systems. Properties of Systems: Causality, Time Invariance, Linearity, Systems with Memory, Inverse of a System, Stability. LTI Systems: Differential and Difference Equation Representation, Block Diagram Representations.
3. Fourier Representations for Signals
   Reviews on Periodic and Nonperiodic Signals, Continuous and Discrete Signal, Fourier Series and Transform, Frequency Spectra. Properties of Fourier Representations, Time Functions, Applications on System Frequency Response and Signal Frequency Spectrum. Frequency Response of LTI Systems, Sampling. Discrete-Time Fourier Transform, Discrete Fourier Transform, Circular Convolution.
4. Laplace Transform
   Definition and Properties of Laplace Transform, Inversion of Laplace Transform, Bilateral Laplace Transform. Transform Analysis of LTI Systems, Poles and Zeros. Relationship of Laplace Transform and Fourier Transform.
5. *z*-Transform
   Definition and properties of *z*-Transform. Inverse *z*-Transform: Power Series Expansion, Partial-

Fraction Expansion. *z*-Transfer Analysis of LTI Systems, Frequency Response. Mapping between *z*-Plane and *s*-Plane.

6. Analogue Filters
   Ideal Filters, Bode Plots. Filter Design: Butterworth Filters, Chebyshev Filters, Frequency Transformations.

Laboratory Experiments:

1. Fundamentals of Signals
2. Linear Time-Invariant Systems
3. Fourier Analysis of Continuous-time Signals
4. Sampling
5. Fourier Analysis of Discrete-time Signals
6. Laplace Transform

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment will consist of a number of assignments, laboratory reports, and two tests.

Reference Books:

1. Ed. Kamen and Bonnie Heck, *Fundamentals of Signals and Systems Using the Web and Matlab*, 2/e, Prentice-Hall, 2000.
2. Simon Haykin and Barry Van Veen, *Signals and Systems*, Wiley, 2003.
3. M.J. Roberts, *Signals and Systems: Analysis Using Transform Methods and MATLAB*, McGraw-Hill, 2003.
4. Charles L. Phillips, et al., *Signals, Systems, and Transforms,* 3/e, Prentice-Hall, 2003.

SUBJECT DESCRIPTION FORM

Subject Title:	Object-Oriented Design and Programming	**Subject Code:**	EIE320
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 36 hours Laboratory 6 hours (Equivalent to 18 laboratory hours)

Pre-requisite: Computer Programming (ENG236) **Co-requisite:** nil **Exclusion:** nil

Objectives:

This subject will provide students with the principles of object orientation from the perspective of Java implementation and UML. Students are expected to learn the concepts of and practical approaches to object-oriented analysis, design and programming using UML and Java.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the principles of object oriented design.
2. Apply the programming language Java in object oriented software development.
3. Apply the tool UML in object oriented software modeling.
4. Develop a simple software application using the object oriented approach.

Category B: Attributes for all-roundedness
5. Learn independently and be able to search for the information required in solving problems.
6. Present ideas and findings effectively.
7. Think critically.
8. Work in a team and collaborate effectively with others.

Syllabus:

1. Introduction to Software Engineering
   Software products; the software process; process models; process visibility.
2. Java Programming Basic
   Java technologies; Java platform; Java language basic: variables, operators, expressions, statements, blocks, control flow, methods, arrays
3. Object-Oriented Programming with Java
   Objects and classes; class definition; fields, constructors and methods; object interaction; grouping objects; array and collections; designing classes; inheritance and polymorphism; managing inheritance: creating subclasses and super-classes, hiding member variables, overriding methods. Interfaces and packages.
4. Web Programming with Java
   Java applets: creating custom applet subclasses, HTML applet tag syntax, passing information from Web pages to applets. Java Servlets: architecture of servlets, client interaction, life cycle of servlets, saving client states; servlet communications, session tracking, and using server resources.
5. Unified Modelling Language (UML)
   Purposes of modeling. Structural Modeling: classes, relationships, class Diagrams, interfaces, packages, and object diagrams. Behavioral modeling interactions, use cases, use case diagrams, interaction diagrams, activity diagrams, events, signals, processes and threads. Architectural modeling: components, deployment, collaborations, patterns, frameworks, component diagrams, and deployment diagrams. Mapping UML diagrams to Java Code.

Laboratory Experiment:

1 Laboratory Work
Students will implement an on-line shopping system using Java Servlets and Tomcat Web server.

Students will use a UML software tool to write requirement specifications and design documents for the on-line shopping system.

2. Practical Work
   Students will be requested to write and debug Java programs during tutorial and lab sessions.

Method of Assessment:

Coursework: 40% Examination: 60%

The continuous assessment consists of a number of short quizzes, programming assignments, a mini-project, laboratory reports and a mid-term test.

Textbooks:

1. G. Booch, I. Jacobson, and J. Rumbaugh, *The Unified Modeling Language User Guide*, Addison-Wesley, 1999.
2. D.J. Barnes and M. Kolling, *Objects First with Java: A Practical Introduction using BlueJ*, Prentice-Hall, 2003.

Reference Books:

1. H.M. Deitel and P.J. Deitel, *Java: How To Program* ,5th ed., Prentice-Hall, 2002.
2. R.C. Lee and W.M. Tepfenhart, *Practical Object-Oriented Development with UML and Java*, Prentice-Hall, 2003.
3. J. Rumbaugh, I. Jacobson, and G. Booch, *The Unified Modeling Language Reference Manual*, Addison-Wesley, 1999.
4. http://java.sum.com.

SUBJECT DESCRIPTION FORM

Subject Title:	Interface and Embedded Systems	**Subject Code:**	EIE322
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 37 hours Laboratory 5 hours (Equivalent to 15 laboratory hours)

Pre-requisite: Computer System Fundamentals (EIE311) **Co-requisite:** nil **Exclusion:** nil

Objectives:

To provide students with the concepts and techniques in designing embedded software and hardware interfaces.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Identify and model real-time requirements of products.
2. Apply embedded software techniques to satisfy functional and response-time requirements.
3. Apply circuit and computer knowledge onto product design.
4. Practice self-learning through reading of manuals and component specifications.
5. Demonstrate practical skills in the construction of prototypes.
6. Design under tradeoffs among various constraints such as manpower, program size and hardware complexity.

Category B: Attributes for all-roundedness
7. Pursue life-long learning through searching and reading technical materials.
8. Design and solve problems in general.
9. Present ideas and findings effectively.
10. Think critically.
11. Work in a team and collaborate effectively with others.

Syllabus:

1. Embedded System Hardware
   Microcontroller-based, microprocessor-based and PC-based approaches; Details of a typical microcontroller architecture e.g. the 8051 or AVR family.
2. I/O Interfacing
   Output-pin driving limitations; Current driving; inductive load driving; Pulse generation and measurement; Keyboard multiplexing, display multiplexing; LCD controllers; analog signals sensing, processing and generation.
3. Embedded Software Development and Testing
   Embedded software issues; tasks and events; Interrupt system: nesting, priority and latencies; inter-task communication, the shared-variables problem and solutions; Multitask embedded software architectures and scheduling schemes; task latencies, CPU utilization, RMS theorem; program simulator, debugger, emulator and logic/state analysis tools; hardware/software co-design issues.
4. Real-time Operating System
   Kernel services; semaphores; task priority and s cheduling; priority inversion.
5. Industrial I/O Standards
   Signalling, transaction protocols, timing specifications and arbitration. e.g. RS485, PS2, I^2C, CAN.and USB. Case studies on USB.
6. Bus Interfacing
   Synchronous and asynchronous transfers; bus events and states, electrical buffering; storage buffering; dynamic bus sizing; data ordering and alignment; pipelined and burst transfers; ac loading effects; switching-current effects; Memory device interfaces: dynamic memory, flash memory and application-specific memories.

Laboratory Experiments:

1. Serial I/O and timer-based baud rate generation
2. Timer-based pulse width measurement
3. Timer-triggered multitasking
4. Pulse-Width-Modulated output generation.
5. USB development tool and programming.

Method of Assessment:

Continuous Assessment: 50% Examination: 50%

The continuous assessment will consist of assignments, tests and laboratory work.

Reference Books:

1. M. J. Pont, *Embedded C*, Addison-Wesley, 2002.
2. D.E. Simon, *An Embedded Software Primer*, Addison-Wesley, 1999.
3. K. Arnold, *Embedded Controller Hardware Design*, Newnes, 2001.
4. S. R. Ball, *Embedded Microprocessor Systems: Real World Design*, 3rd ed., Newnes, 2002.
5. Rai Kamal, *Embedded Systems: Architecture, Programming and Design*, McGraw-Hill, 2004.
6. S. R. Ball, *Analog Interfacing to Embedded Microprocessors: Real World Design*, 2nd ed., 2004.
7. Betty Prince, *High Performance Memories*, John Wiley & Sons, 1996.
8. W. Buchana, *PC Interfacing,Comm and Windows Programming*, Addison-Wesley, 1999.

SUBJECT DESCRIPTION FORM

Subject Title: Telecommunications Technologies **Subject Code:** EIE325

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 36 hours
Laboratory 6 hours
(Equivalent to 18 laboratory hours)

Pre-requisite: Information Technology (ENG224)
Linear Systems (EIE312) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To equip students with the fundamentals of data communication systems, and to train students to appreciate the underlying principle of modern communication systems.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills

1. Understand the fundamentals of telecommunication systems and associated technologies.
2. Solve problems and design simple systems related to telecommunications.
3. Apply theory to practice by doing laboratory experiments on important telecommunication techniques.

Category B: Attribute for all-roundedness

4. Team work and presentation skills will be developed through the case study.
5. Judicious choice of case studies will also allow students to develop a fuller understanding of social and community issues related to the application of telecommunications technologies.
6. To appreciate the importance of creativity and critical thinking, and to realize that there is no perfect telecommunication system for any particular situation and that engineers have to find "optimum" solutions, or make optimum designs.

Syllabus:

1. Introduction
   A communication model. Digital data communications and networks.

2. Data Transmission and Channel
   Review of time and frequency domain representations, Fourier Series, Fourier transform, sampling and aliasing. Analogue and digital data transmission. Data rate and required bandwidth. Channel impairments. Characterisation and attenuation of transmission media, twisted pair, cable, optical fibre, free space.

3. Data Encoding
   Line coding. Digital modulation: ASK, FSK, PSK, QAM. Analogue modulation: amplitude modulation. Pulse-code modulation, uniform and non-uniform quantization.

4. Data Link Control
   Propagation delay, effective throughput. Sliding window protocol. Flow and Error Control, stop-and-wait ARQ, selective reject ARQ, performance. Data link control protocols, characteristics, basic frame structure, operations.

5. Data Communication Interface. Multiplexing and Switching
   Asynchronous and synchronous transmission. Line configurations, simplex, duplex and half-duplex. Interfacing. Clock synchronization. Frequency division multiplexing. Synchronous time division multiplexing. Code division multiplexing. Multiplexing hierarchies, T1, E1, T2 and T3 carrier systems. SONET and SDH transmission systems. Overview of Circuit and Packet Switching.

6. Current Applications
   Fixed telephone network. Private automated branch exchange. RS-232. V.90 56kbps modem. ADSL, discrete multitone, xDSL. Cable modem. Hybrid fibre coax. Other selected applications examples such as mobile cellular network, satellite networks, global position system.

Laboratory Experiment:

1. Construction and testing of a simple FSK modem (9 hours)
2. Simulation of analogue modulation using MATLAB (3 hours)
3. Simulation of digital line coding and estimation of BER using MATLAB (3 hours)
4. Simulation of code division multiple access using MATLAB (3 hours)

Case Study:

1. A detailed study of one of the current applications of telecommunication technologies addressed in this course (for example, section 6 of the Syllabus).

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment consists of a number of short quizzes, assignments, the case study, laboratory reports and two tests.

Textbook:

1. W. Stallings, *Data and computer communications*, 7th ed., Prentice-Hall, 2004.

Reference Books:

1. L. Leon-Garcia and I. Widjaja, *Communication Networks*, McGraw-Hill, 2000.
2. B. Forouzan, *Data Communications and Networking*, McGraw-Hill, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Integrated Project	**Subject Code:**	EIE330
Number of Credits:	2	**Hours Assigned:**	Lecture 12 hours Laboratory 9 hours Mini-project Work 69 hours Total 90 hours

Pre-requisite: Electronics Design (EIE210)
Computer Systems Fundamentals (EIE311)

Co-requisite: nil

Exclusion: nil

Objectives:

At a mid-stage of the programme, this subject plays the role of applying knowledge acquired in other subjects in an integrated manner. While the emphasis will mainly be placed on the technical challenges that may encompass component evaluation, circuit design, software development and troubleshooting, students will also be given opportunities to face various non-technical difficulties behind the implementation/fabrication of electronic/information products.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills

1. Integrate and apply knowledge acquired in previous subjects.
2. Design under cost constraints and with component limitations/tolerances in mind.
3. Critically evaluate the cost-performance benefits of available components.
4. Locate and resolve problems, in both circuits and software.

Category B: Attributes for all-roundedness

5. Search, self-learn and try untaught solutions.
6. Exercise discipline and time-planning to meet deadlines.
7. Present ideas and findings effectively.
8. Think critically.
9. Learn independently.
10. Work in a team, collaborate effectively with others, and exercise leadership.
11. Exercise entrepreneurship while designing the project by addressing cost effectiveness, market position, entry barrier, user acceptance…etc.

(Note: The above outcome number will be referred to within square brackets later)

Syllabus / Operation:

The project(s) shall be of engineering development in nature [1,2,3,4,5,6,9,11] with objectively defined milestones (or **Subtasks**). The scope to be covered shall include embedded software development and circuit design, but does not exclude the possibilities of extending into areas such as DSP or RF. The project(s) shall not be close-ended in nature [2,3,5,8] and shall provide ample headroom for the more enthusiastic students to excel. Students shall work in groups of two or three [10]. Each **Subtask** will be given a certain period of time to complete. Each student will take turn in serving as the Team Leader [11] to lead the group to complete a subtask assigned. Progress will be measured by functional **Demonstrations**, and one or two written **Progress Reports** [7]. Upon the completion of the project, each group should give a demonstration/presentation [7] of the completed product and submit a **Final Report** [7]. Students are required to individually keep a **Logbook** [7] on the work performed during the entire period. The logbooks are to be evaluated and signed by the supervisor /assessor on a monthly or more frequent basis. At the end of the project, the logbook will be collected and graded.

Lectures:

Lectures are to be conducted during the first half of the semester. During these lectures, the instructor shall give clear explanation on the functional and technical requirements [2,3], with a schedule for submitting deliverables [6]. Concepts specific to the project(s), which are not yet learnt by the students, are to be covered in these lectures. Concepts behind critical use of tools and equipment shall also be strengthened [4]. Copies of supplementary/reference material shall be distributed, or, links to on-line material shall be provided for self-paced learning [5].

Guided Laboratory Experiments:

The project will normally require the students to learn to use specific tools and/or equipment [4]. Laboratory demonstrations and exercises will be arranged in the early weeks. Below are some examples:

1. Troubleshooting and measurement techniques using typical equipment.
2. Use of project-specific development tools, software and hardware.
3. Use of specialized equipment for project-specific measurements.

Self-Paced Work:

The class could well be composed of a good mix of students with different timetables. Multiple sessions of laboratory, inevitably some evening slots, will be scheduled to cater for self-paced work in the laboratory, particularly during the second half of the semester.

Method of Assessment:

Continuous assessment: 100%

Throughout the project, the subject lecturer will conduct periodic interview discussions with the student groups. On these occasions, assessment on individual student's ability and contribution will be conducted, according to the attributes detailed below.

INSIGHT	as evidenced by how well issues are understood and resolved [1,2,3,4]
DRIVE	as evidenced by initiative, diligence and tenacity [5,6,9,10]
CREATIVITY	as evidenced by ingenuity and imagination [5,8,9,10]
COMMUNICATION	as evidenced by an ability to express ideas clearly and succinctly [7]

At the completion of each subtask, one member of a team will be asked to give a demonstration to the assessor. Based on the presentation and response to questions addressed to the members, the assessor shall rate the contribution, achievement, and performance of each member. [2,4,6,7,8]
Below is a recommended assessment scheme:

Assessment type	***Weighting***	***Number of times***
Attendance	10 %	= 5
Quiz/Test	10 %	= 2
Progress Demonstrations	20 %	= 2
Logbook & Presentation	20 %	= 2
Progress& Final Reports	20 %	= 2
Final Demonstration	20 %	1

Reference Books:

To be specified by the subject lecturer for each project.

SUBJECT DESCRIPTION FORM

Subject Title: Data and Computer Communications **Subject Code:** EIE333

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 36 hours
Laboratory 6 hours
(Equivalent to 18 laboratory hours)

Pre-requisite: Telecommunication Technologies (EIE325) **Co-requisite:** nil

Exclusion: Data and Computer Communications (EIE442)

Objectives:

This subject is designed to:

1. provide a solid foundation to the students about architectural concepts of data communications and computer networking
2. enable the students to master the knowledge about data communications and computer networking in the context of real-life applications
3. prepare the students for understanding, evaluating critically, and assimilating new knowledge and emerging technology about data communications
4. enable the students to understand the impact of new computer and communication technology on human society

Student Learning Outcomes:

On completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills

1. Describe the services, functions, and inter-relationship of different components within an architectural model such as Open System Interconnection (OSI) seven layer model and TCP/IP model.
2. Describe how components and subsystems in the physical layer, data link layer, and network layer inter-operate; and analyze their performance.
3. Evaluate critically the performance of some common data communications systems.
4. Design solutions to solve engineering problems that require the application of data communications technology.

Category B: Attributes for all-roundedness

5. Take up new knowledge by reading related magazines, journal papers, and trade brochure, and by analyzing new situations while taking into account various constraints.
6. Describe how rapid progress of computer and communication technology can impact on the society in various aspects, such as culture and economics.

Syllabus:

1. Communication Networks, Services, and Layered Architectures
   Evolution of networking and switching technologies. Protocols and services. Layered network architectures: OSI 7-layer model, TCP/IP architecture
2. Digital Transmission
   Baseband data transmission and line coding. Digital modulation and its applications in modems. Transmission media. Transmission impairment, data rate limit, error detection and correction.
3. Protocols in Data Link Layer
   Automatic Repeat Request (ARQ) protocol and reliable data transfer service. Sliding-Window flow control. Framing and point-to-point protocol.
4. Local Area Networks
   Media Access Control (MAC) protocols: the IEEE802.3 and IEEE802.11 standard. Interconnection of LANs: bridge, switch, and virtual LAN
5. Packet Switching Technology
   Connectionless (datagram) packet switching and virtual-circuit switching. Routing in packet networks.

6. TCP/IP Protocols
   IP packet format, addressing, subnetting, and IP routing. TCP protocol: connection management and congestion control. Dynamic Host Configuration, Network Address Translation, and mobile IP.
7. Case Studies (conducted in tutorial sessions)
   Recent development in data Communications and computer Networking.
   Selected topics: Voice over IP, Virtual Private Network, Internet2, High Speed Router design … etc.

Laboratory Experiments:

1. FSK Modem
2. Microcontroller communication over EIA323 interface
3. Protocol Analysis
4. Network Address Translation
5. Routing simulation study
6. Terminal Server over the Ethernet

Method of Assessment:

Continuous assessment: 50% Examination: 50%

The continuous assessment will consist of a number of assignments, laboratory reports, case study reports (administered in tutorial sessions), and two tests.

Textbook:

1. Leon-Garcia, Alberto, *Communication Networks: Fundamental Concepts and Key Architectures*, 2nd ed., New York : McGraw-Hill Higher Education, 2004. (PolyU Call No.: TK5101 .L46 2004)

Reference Books:

1. Stallings, William, *Data and Computer Communications*, 7th ed., Pearson/Prentice-Hall, 2004. (PolyU Call No.: TK5105 .S73 2004)
2. Tanenbaum, Andrew S., *Computer Networks*, 4th ed., Prentice-Hall, 2003. (PolyU Call No.: TK5105.5 .T36 2003)
3. Comer, Douglas, *Computer Networks and Internets: with Internet Applications*, 4th ed., Pearson/Prentice-Hall, 2004. (PolyU Call No.: TK5105.5 .C5897 2004)
4. Bertsekas, Dimitri P., *Data Networks*, 2nd ed., Prentice-Hall, 1992. (This reference is selected as a classics) (PolyU Call No.: TK5105 .B478 1992)

SUBJECT DESCRIPTION FORM

Subject Title:	English for Engineering Students	**Subject Code:**	ELC3501
Number of Credits:	2	**Hours Assigned:**	Seminar 2 hours / bi-weekly for 14 sessions 28 hours
Group Size:	20 (maximum)		

Pre-requisite: nil	**Co-requisite:** nil	**Exclusion:** nil

Objectives:

To develop those English language skills required of engineering students to communicate effectively in their future professional careers. Attention will be given to helping students develop the core competences identified by the University as vital to the development of effective life-long learning strategies and skills.

Student Learning Outcomes:

By the end of the subject, students should be able to use appropriate language and text structure to:

Category A: Professional/academic knowledge and skills
1. Write reports related to technical studies.
2. Write workplace correspondence related to engineering professions.
3. Present information and ideas professionally.

Category B: Attributes for all-roundedness
4. Communicate effectively in speech and in writing.
5. Work individually on their own initiative, and as team members.
6. Engage in lifelong learning for career development and personal growth.

Syllabus:

1. Written Communication
   Identifying and writing functions common in technical subject discourse; understanding and applying principles of technical text structure; developing paraphrasing, summarising and referencing skills; improving editing and proofreading skills; achieving appropriate tone and style in technical and report writing; selecting and using relevant content, appropriate style, acceptable format, structure and layout in letters, memoranda and reports.
2. Spoken Communication
   Recognising the purposes of and differences between spoken and written communication in English in professional contexts; identifying and practising interactional and linguistic skills for oral presentations; preparing and delivering presentations.
3. Language Appropriacy
   Introducing notions of context-sensitive language use in both spoken and written English.
4. Language Development
   Improving and extending relevant features of students' grammar, vocabulary and pronunciation.

Teaching and Learning Approach and Teaching Schedule:

The subject is designed to introduce students to the communication skills, both oral and written, that they may be expected to need to function effectively in their future professions. These skills will be necessary for successful employment in any organisation where internal and/or external communication is conducted in English.

The study method is primarily based on seminars which will include discussions, role-play, individual and group activities. In addition to learning materials specially prepared by English Language Centre staff, use will be made of information technology and the ELC's Centre for Independent Language Learning. Teachers will also recommend additional reference materials as required. A considerable amount of individual self-access learning is expected of students.

Classes will be for 2 hours/ bi-weekly x 14 sessions = 28 hours. They will therefore run from Week 1, Week 3, and so on. Two hours bi-weekly is more appropriate than one hour per week since the former allows a more in-depth coverage and students can be given private study in one week and be required to hand it in two weeks later when they have the next class.

Session	**Topic Area**	
1st	Technical writing:	describing products and procedures
2nd	Technical writing:	explaining, comparing and contrasting
3rd	Technical writing:	presenting problems and solutions
4th	Report writing:	describing aims, background, procedure
5th	Report writing:	presenting findings and conclusions
6th	Report writing:	writing a summary (abstract)
7th	Oral presentation:	planning
8th	Oral presentation:	delivery
9th	Oral presentation:	language practice
10th	Workplace writing:	letters of enquiry
11th	Workplace writing:	letters of adjustment
12th	Workplace writing:	memo reports
13th	Workplace writing:	office memos
14th	Assessment (oral/ written)	

Method of Assessment: Continuous Assessment: 100%

Reference Books:

Written Communication

1. Bilbow, G.T, *Business Writing for Hong Kong*, Hong Kong: Longman, 2000.
2. Guffey, M.E., *Essentials of Business Communication*, 6th ed., Ohio:South-Western College Pub, 2004.
3. Houp, K.W. (et al.), *Reporting Technical Information*, New York: Oxford University Press, 2002.
4. White, F.D., *Communicating Technology: Dynamic Processes and Models for Writers*, New York: Harper Collins College Publishers, 1996.

Spoken Communication

1. Conradi, M. and Hall, R., *That Presentation Sensation*, London: Pearson Education Ltd, 2001.
2. Sampson, E., *Creative Business Presentation: Inventive Ideas for Making an Instant Impact*, London: Kogan Page, 2003.
3. Walther, G. R., *Power Talking Skills: How to Say What You Mean and Get What you Want*, A video seminar. Newcastle, WA: Speaking From Experience, Inc, 1996.
4. *Longman Dictionary of Contemporary English*, Harlow: Longman, 2003.

SUBJECT DESCRIPTION FORM

Subject Title:	Introduction to Industrial Design	**Subject Code:**	SD348
Number of Credits:	3	**Hours Assigned:**	Lecture/Seminar 28 hours Tutorial/Exercise 14 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Brief Description and Aims:

This course gives an introduction to the field of Industrial Design as a creative discipline, a discipline which synthesises knowledge from fields as diverse as e.g. the Arts, the Sciences and Engineering. Industrial Design is known for its capacity to innovate and to add value to products and services. Industrial Designers solve problems centred on user needs with the intent to improve the quality of people's lives. The design process incorporates unique problem solving methods and creativity process. Industrial Design intends to work with technological and ecological parameters in an appropriate way. The development and use of state of the art tools and technologies puts Industrial Design in a significant position socially and economically.

It is the aim of this course to equip students with enough knowledge and experience of Industrial Design to appreciate the profession, relate to its practitioners in different work situations, employ the design process appropriately for problem solving and innovation, and to realise the importance of a user centred approach to the creation of new products and services.

Learning Outcomes:

Professional skills

1. To appreciate the industrial/product design profession, relate to its practitioners in different work situations.
2. To employ the design process appropriately for problem solving and innovation.
3. To realise the importance of a user centered approach to the creation of new products and services.
4. To apply visualisation skill in project presentation.

Transferable skills

5. To understand objectives of industrial/product design, and apply knowledge and experience in other related subjects and future career.

Indicative Contents:

The field of Industrial Design is introduced through a series of lectures featuring a review of milestones of design achievements internationally and locally. The relationships between Design, culture and society are highlighted through a look at topics like cultural identity in product design, user centred design, employment of technologies, and design and sustainability.

Further lectures and seminars cover two major parts of Industrial Design and its professional practice:

1. The essentially theoretical foundation of the industrial design process and methodology covering topics such as
   - Design and culture
   - Form, aesthetics and semantics
   - Human factors and ergonomics in design
   - Research and problem identification
   - Design requirements and design brief
   - Design development and specifications
   - Design evaluation and concept selection

2. The essentially practical aspects of the industrial design process covering topics such as
   - Design visualisation, presentation and communication
   - Product prototyping and user testing
   - Manufacturer and marketing relations

Emphasis in the practical exercises is placed on student's creativity in relation to designing. Students explore different approaches to problems and experience methods of problem solving with the designer' s tools.

Method of Assessment:

Coursework (design project) 100%

(a) The ability to understand design process (10%).
(b) The ability to conduct investigation and then to apply their findings in design (30%).
(c) The ability to develop design ideas (45%).
(d) The ability to present design ideas (visual and verbal) (15%).

Indicative References:

1. *Design: Education, Culture and Technology* , Taipei: Asia-Pacific Books Publisher, 1997.
2. *Design Issues*. The MIT Press. (Journal)
3. *Design Management Journal*. The Design Management Institute. (Journal)
4. *Design Studies*. Elsevier Science. (Journal)
5. T.E. Graedel, *Industrial Ecology*, 2nd ed., Upper Saddle River, NJ: Prentice-Hall, 2003.
6. P.W . Jordan, *Putting the Pleasure into Products*, IEE Review, 249-252, November 1997.
7. J.Y.C. Kwok, (Ed.), *(Re)-Discovering Design: A Critical Consideration of the Hong Kong Culture of Design* , Hong Kong: A Better Tomorrow Workshop Ltd., 1997.
8. D. Mackenzie, *Green Design: Design for the Environment*, 2nd ed., London: Laurence King, 1997.
9. D.A. Norman, *The Invisible Computer: Why Good Products can Fail, the Personal Computer is so Complex and Information Appliances are the Solution* , Cambridge, Mass., London: The MIT Press, 1998.
10. D.A. Norman, *The Design of Everyday Things*, London: The MIT Press, 1998.
11. H. Roqueta, *Product Design* , London: Te Neues, 2002.
12. P.G. Rowe, *Design Thinking*, Cambridge, Mass.: The MIT Press, 1987.
13. N. Stanton, (Ed.), *Human Factors in Consumer Products*, London: Taylor & Francis, 1998.
14. K.T. Ulrich, *Product Design and Development*, 3rd ed., New York, NY: McGraw-Hill/Irwin, 2004.
15. S.Z. Wang, *A History of Modern Design 1864-1996*, Guangzhou: Xin Shi Ji Chu Ban She, 1995.
16. N. Whiteley, *Design for Society*, London: Reaktion Books, 1993.
17. J. Zeisel, *Inquiry by Design*, Reprinted ed., Cambridge: Cambridge University Press, 1997.

SUBJECT DESCRIPTION FORM

Subject Title:	Computer Game Development I	**Subject Code:**	SD3982
Number of Credits:	2	**Hours Assigned:**	Lecture/Tutorial 22 hours Laboratory 20 hours

Pre-requisite: Computer Programming (ENG236) **Co-requisite:** nil **Exclusion:** nil

Objectives:

1. To provide a broad overview of fundamental elements and concepts in computer games design and development, and in their production process
2. To provide students with hands-on experience in designing and developing a computer game

Student Learning Outcomes:

Professional/academic knowledge and skills
1. Design, analyze, implement and evaluate computer games
2. Appreciate computer games' designs and complexities
3. Demonstrate understanding of game production process through developing a computer game in a team starting from ideas

Attitudes of all-roundedness
4. Collaborate, organize and communicate with others in effective team work
5. Realize the interdisciplinary nature in computer games development and appreciate importance of collaboration
6. Be creative and critical to game and play design

Syllabus:

1. Game design overview
   History of computer games, types of computer games (video, console, arcade, hand-held, wireless, mobile); game genres; play mechanics; game rules; game balancing: obstacle/aid, penalties/rewards; board game, role-playing game; interface design, information design, human-computer interaction design; integration of visual , audio, tactile and textual elements; visual design: composition, lighting and color, graphics design; Audio design: music, sound effects; storytelling; game theory

2. Media and tools
   Game arts; tools and standards of media: image and audio; JPEG, PNG, GIF, MP3, Ogg

3. Game production process
   Evaluating game concepts; game design documentation, storyboard, playtest; content creation, team roles, group dynamics, risk assessment; software engineering, project management; prototyping, iterative development; pre-production, production, testing

4. Game programming
   Game loop; game engine architecture; Managed DirectX (DirectDraw, DirectSound, DirectInput); networking (DirectPlay); physics and collision detection

Method of Assessment:

Laboratory: 20% Mini-project: 80%

Reference Books:

1. 葉勁峰, 張承廣, 吳家維, *DirectX9 遊戲開發實務*, 旗標出版社, 2003.

2. Tom Miller, *Managed DirectX® 9 Kick Start: Graphics and Game Programming*, 2003. (QA76.76.C672 M54 2004)
3. Salvatore A. Buono, *C# and Game Programming: A Beginner's Guide*, AK Peters, c 2003. (QA76.73.C154 B85 2003)
4. Andrew Rollings, Dave Morris, *Game Architecture and Design*, New Riders Publishing, 2003. (QA76.76.C672 R654 2004)
5. Katie Salen and Eric Zimmerman, *Rules of Play: Game Design Fundamental*, 2004. (QA76.76.C672 S25 2004)
6. Francois Dominic Laramee, *Game Design Perspectives*, Charles River Media, 2002. (QA76.76.C672 G34 2002)
7. John Scott Lewinski, *Developer' s Guide to Computer Game Design*, WordWare Publishing Inc, 2000. (QA76.76.C672 L49 2000)
8. Erik Bethke, *Game Development and Production*, WordWare Publishing Inc, 2003. (QA76.76.C672 B47 2003)
9. David Michael, *The Indie Game Development Survival Guide*, Charles River Media, 2003. (QA76.76.C672 M53 2003)
10. IGDA (www.igda.org).

SUBJECT DESCRIPTION FORM

Subject Title:	Computer Game Development II	**Subject Code:**	SD3983
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 35 hours Laboratory 20 hours

Pre-requisite: Computer Game Development I (SD3982)
Computer Graphics (COMP407)

Co-requisite: nil **Exclusion:** nil

Objectives:

1. To introduce students with fundamental concepts and algorithms to develop advanced 3D computer games
2. To develop foundations for students to explore new algorithms for future 3D computer games

Student Learning Outcomes:

Professional/academic knowledge and skills

1. Identify essential building blocks in advanced 3D computer games
2. Understand, analyze, implement and evaluate real-time algorithms in developing advanced 3D computer games
3. Realize trends in real-time algorithms in advanced 3D computer games
4. Explore new algorithms for future 3D computer games

Syllabus:

1. Introduction
   3D game programming (Direct3D); Game engine architectures; scripting

2. Graphics and rendering
   Graphics rendering pipeline; 3D hardware: programmable graphics pipeline, shading languages, procedural shading, lighting, effects; 3D modeling, texturing, animation

3. 3D Audio
   Fundamentals of 3D and multi-channel sound; modeling for effects, echo, room size simulation

4. Artificial intelligence
   Path planning; agent architecture; decision-making systems; genre-specific AI (FPS, RTS, RPG, racing and sport AI)

5. Simulation
   Fluid simulation, behavioral modeling

6. Physics
   Physics basic concepts; kinematics, kinetics, dynamics; Newton's laws, mass, moment of inertia, friction, force; constrained motion; particle systems

7. Network
   Multiplayer game architecture, networking, protocols, topologies, security, database; online game systems

Laboratory Experiment:

3D modeling software (3D Studio Max)

Method of Assessment:

Laboratory: 30% Mini-project: 70%

Reference Books:

1. Tomas Moller, *Real-Time Rendering*, A.K. Peters, 1999. (T385.M635 1999)
2. James D. Foley, *Computer Graphics: Principles and Practice*, 1996. (T385 .F63 1995)
3. Alan Watt, *3D Games: Real-time Rendering and Software Technology*, Addison-Wesley, 2001. (QA76.76.C672 W39 2001)
4. Rick Parent, *Computer Animation: Algorithms and Techniques*, Morgan Kaufmann, 2001. (TR897.7 .P34 2002)
5. David M. Bourg, *Physics for Game Developers*, O' Reilly, 2002. (QC23.2 .B68 2002)
6. Ahmed A. Shabana, *Computational Dynamics*, Wiley, 2001. (QA845 .S44 2001)
7. Patrick Henry Winston, *Artificial Intelligence*, Addison-Wesley, 1992. (Q335.W56 1992)
8. Steve Rabin, *AI Game Programming Wisdom*, Charles River Media, 2002. (QA76.76.C672 A53 2002)
9. Steve Rabin, *AI Game Programming Wisdom 2*, Charles River Media, 2002. (QA76.76.C672 A532 2004)
10. Todd Barron, *Multiplayer Game Programming*, Prime Tech, 2001. (QA76.76.C672 B37 2001)
11. Andrew Mulholland, *Developer's Guide to Multiplayer Game*, WordWare Publishing Inc, 2002. (QA76.76.C672 M85 2002)

SUBJECT DESCRIPTION FORM

Subject Title: Computer Graphics **Subject Code:** COMP407

Number of Credits: 3 **Hours Assigned:** Lecture 28 hours
Laboratory 14 hours
(Equivalent to 18 laboratory hours)

Pre-requisite: Computer Programming (ENG236) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To provide students with the fundamental basis of 2D and 3D computer graphics and image synthesis architecture, algorithms, and data flow, and to train students the principles of modern computer graphics programming.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills
1. To become familiar with 3D computer graphics API programming,
2. To understand the interactive computer graphics architecture,
3. To attain basic skills in 3D computer graphics modeling and rendering.

Category B: Attributes for all-roundedness
4. In-depth knowledge of display systems, image synthesis, shape modeling, and interactive control of 3D computer graphics applications.
5. Appreciation of modern computer system enhanced with 2D and 3D visual information.
6. Understand how to deal with constraints in the representation of visual information and how to add visual components into a general computer system.

Syllabus:

1. Basic Computer Graphics Hardware/Software Interfaces (16 hours)
   Graphical input/output devices, 2D primitive drawing, rasterization, 2D transformation, 3D transformation and projection, synthetic camera and viewing volume, clipping, object modeling and hierarchical structures.
2. Image Synthesis and Generation Techniques (12 hours)
   Some of the important image generation techniques including hardware-based rendering, scan-conversion, local illumination models, reflections and shading. Related issues such as anti-aliasing and texture mapping will also be discussed.
3. Applications of Computer Graphics (14 hours)
   Introduction to OpenGL and device independent Application Programming Interfaces (API), virtual reality, hardware supported 3D modeling and rendering.

Laboratory Experiment:

Laboratory exercises will normally be conducted using the currently available computer graphics API such as OpenGL. The students will experiment with:

1. Framebuffer control
2. pixel processes
3. 2D drawings and rasterization
4. 3D transformations and projections
5. Scene hierarchy and modeling objects
6. Color and rendering
7. Interactive animation

Case Study:

A study of digital drawing and rendering tools and applications to object modeling, spatial partitioning and interactive animation control will be given.

Method of Assessment

Continuous Assessment: 60% Examination: 40%

The continuous assessment consists of a number of short quizzes, assignments, laboratory experiments.

Note: To pass this subject, students must obtain grade D or above in BOTH the coursework and the final examination.

Textbook:

1. Hill, F.S. Jr., *Computer Graphics Using Open GL*, 2nd ed., Prentice-Hall, 2001.

Reference Books:

1. Angel, E.S., *Interactive Computer Graphics, A top-down approach with OpenGL*, 2nd ed., Addison-Wesley, 2000.
2. Angel, E.S., *OpenGL: A Primer*, Addison-Wesley, 2000.
3. Watt, A., *3D Computer Graphics*, 3rd ed., Addison-Wesley, 2000.
4. Hearn, D. and Baker, M., *Computer Graphics*, 2nd ed., Prentice-Hall, 1994.

SUBJECT DESCRIPTION FORM

Subject Title: Middleware and Distributed Objects **Subject Code:** COMP436

Number of Credits: 3 **Hours Assigned:** Lecture 36 hours
Seminar/Laboratory 6 hours

Pre-requisite: Object-Oriented Design and Programming (EIE320) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

1. To present an integrated view of the basic building blocks of a distributed system and how middleware can help developers to more easily satisfy the requirements of building distributed systems.
2. To provide the foundation knowledge of middleware, particularly object-oriented middleware.
3. To provide training in using CORBA as middleware to build practical distributed systems.

Student Learning Outcomes:

After taking this subject, the students should be able to :

Category A: Professional/academic knowledge and skills
1. understand the basic structure of distributed systems;
2. understand the motivation of using middleware;
3. understand the basic theories underlying the design of middleware;
4. learn to make judgment in choosing a suitable middleware for application problems;
5. understand the basic concepts of CORBA;
6. develop distributed object-based systems using CORBA.

Category B: Attributes for all-roundedness
7. apply the technical knowledge learned to solve real-life practical problems;
8. appreciate and evaluate existing and new technologies.

Syllabus:

1. Introduction to distributed systems (4 hours)
   Distributed system requirements; transparency in distributed systems; object-oriented approach to distributed systems; local versus distributed objects.
2. Principles of object-oriented middleware (4 hours)
   Why middleware; types of middleware; object-oriented middleware; developing systems with object-oriented middleware.
3. Fundamentals of CORBA(8 hours)
   Architecture; Interface definition language (IDL); system development using CORBA.
4. Communication between distributed objects (4 hours)
   Synchronous requests; oneway requests; deferred synchronous requests; asynchronous requests; dynamic invocation; pros and cons of different communication paradigms of CORBA.
5. Portable Object Adaptor (POA) (10 hours)
   Objects vs. servants; lifecycle of objects; request invocation via POA; servant activator and servant locator; case study: using POA to implement various load balancing solutions for distributed systems.
6. Common object services (2 hours)
   Naming service; event service.
7. ICE: emergent OO middleware (4 hours)
   Comparing CORBA and ICE; introduction to ICE programming.

Laboratory Experiment:

In the laboratory session, students will learn how to develop distributed systems using an implementation of CORBA, called VisiBroker (or the Borland Enterprise Server – VisiBroker Edition), using Java as the programming language.

Case Study:

Case studies on load balancing with CORBA.

Method of Assessment

Continuous Assessment: 55% Examination: 45%

Textbook:

1. W. Emmerich, *Engineering Distributed Objects*, Wiley, 2000.

Reference Books:

1. F. Bolton, *Pure CORBA*, Sams, 2002.
2. R. Orfali, D. Harkey and J. Edwards, *Client/Server Survival Guide*, 3rd ed., Wiley, 1999.
3. IEEE Distributed Systems Online, http://dsonline.computer.org.
4. Articles from journals, magazines, and conference proceedings, including ACM TOCS, IEEE TPDS, IEEE TSE, IEEE TOC, CACM, IEEE Computer, ICDE, DOA.

SUBJECT DESCRIPTION FORM

Subject Title: Principles of Virtual Reality **Subject Code:** EIE408

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 33 hours
Laboratory 9 hours
(Equivalent to 27 laboratory hours)

Pre-requisite: Computer Graphics (COMP407) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To provide the theoretical and practical knowledge about virtual reality technologies and the fundamental concepts involved in building and displaying virtual worlds.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the underlying enabling technologies of VR systems,
2. Design and create a virtual environment, and
3. Design an appropriate virtual reality solution for an application.

Category B: Attributes for all-roundedness
4. Learn independently.
5. Acquire team work and presentation skills.
6. Appreciate the importance of creativity and critical thinking, and to realize that there is no perfect virtual reality system for any particular situation and that engineers have to find "optimal" solutions, or make practical designs.
7. Develop a fuller understanding of social and community issues related to the application of virtual reality systems from case studies.

Syllabus:

1. Introduction to Virtual Reality
   - 1.1 Historical Development of Virtual Reality
   - 1.2 The Benefits of Virtual Reality

2. 3D Computer Graphics
   - 2.1 Transformations and the 3D World
   - 2.2 Modelling Objects, Dynamic Objects
   - 2.3 Physical Modeling: Constraints; Collision Detection, Surface Deformation
   - 2.4 Perspective Views; Stereoscopic Vision

3. Human Factors
   - 3.1 Vision and Display
   - 3.2 Hearing, Tactile and Equilibrium
   - 3.3 Health and Safety Issues

4. VR Hardware
   - 4.1 Computers : Graphics and workstation architectures
   - 4.2 Input Devices: 3D Trackers, Navigation and Gesture Interface
   - 4.3 Output Devices: 3D Sound, Graphics; Haptic Displays

5. VR Software
   - 5.1 VR Software Features and Web-based VR
   - 5.2 Virtual Word and Virtual Environment
   - 5.3 Toolkits: World Toolkit, Java 3D

6. VR Applications
   - 6.1 Engineering and Industrial

6.2 Training, Education and Simulators
6.3 Games and Entertainment
6.4 Medicine and Therapy

Laboratory Experiments:

1. VR related Hardware
2. VR related Programming Tools
3. Practical VR Systems

Case Studies:

1. Applications of VR/VE in Training
2. Applications of VR/VE in Entertainment
3. Applications of VR/VE in Manufacturing and Product Design
4. Applications of VR/VE in Therapy

Method of Assessment:

Continuous Assessment: 50% Examination: 50%

The continuous assessment consists of a number of short quizzes, assignments, the case study, laboratory reports and two tests.

Textbooks:

1. Grigore C Burdea and Philippe Coiffet, *Virtual Reality Technology*, 2nd Eds., Wiley Interscience, 2003.
2. John Vince, *Introduction in Virtual Reality* , Springer, 2004.

Reference Books:

1. IEEE Proceedings in the 2nd International Workshop on Haptic, Audio and Visual Environments and their Applications – HAVE 2003, Ottawa, Canada, 2003.
2. IEEE Proceedings in 2003 IEEE International Symposium on Virtual Environments, Human-Computer Interfaces and Measurement Systems, Lugano, Switzerland, 2003.
3. ACM Symposium on VR, VRST2004, Hong Kong, http://www.cs.cityu.edu.hk/~vrst2004/
4. R Earnshaw, R Guedj, A Dam, and J Vince (Eds), *Frontiers of Human-Centred Computing, Online Communities and Virtual Environments*, Springer, 2001.
5. M.L. McLaughlin, J.P. Hespanha, and G.S.(Eds.), *Touch in Virtual Environments*, IMSC, 2002.
6. John Vince, *Virtual Reality Systems*, 1st ed., Addison-Wesley, 1995.
7. MEDIA LAB at MIT, http://www.media.mit.edu/.
8. Electronic Visualization Laboratory at the University of Illinois in Chicago, http://www.evl.uic.edu/EVL/index.html.
9. Augmented Reality Links http://www.se.rit.edu/~jrv/research/ar/index.html.
10. Virtualized Reality at CMU http://www.cs.cmu.edu/~VirtualizedR/
11. Augmented Reality & Computer Augmented Environments http://www.csl.sony.co.jp/project/ar/ref.html.
12. Virtual Reality, Augmented Reality, Tele-robotics, http://gypsy.rose.utoronto.ca/bookmarks.html#vr.
13. Virtual Reality in Medicine, http ://www.psicologia.net/pages/links.htm .
14. WorldToolKit by Sense8, http://www.sense8.com/index.html.
15. Visualization and Virtual Reality for Manufacturing, http://ovrt.nist.org/
16. The VR Lab, Swiss Federal Institute of Technology, http://ligwww.epfl.ch/
17. Virtual Reality WWW Sites, pages and Compendiums, http://kb.hitl.washington.edu/projects/knowledge_base/inter.html
18. Hot VR Sites, http://www.itl.nist.gov/iaui/ovrt/hotvr.html
19. VR useful Links, http://www.caip.rutgers.edu/vrtechnology/links.html

Other References:

QA76.76.I59S88(2003)	Alistair Sutcliffe, Multimedia and VR
QA76.9.H85V54(1995)	Woodrow Barfield and Thomas Furness III, VE and Advanced Interface Design
QA76.9.H85J33(1994)	Linda Jacobson, Garage VR
QA76.9.H85G73(1994)	Joe Gradecki, The VR Construction Kit
QA76.9.H85(1994)	Joe Gardecki, The VR Programmer' s Kit
QA76.9.H85V572(1995)	RA Earnshaw, JA Vince, H Jones, VR applications.
QA76.9.H85V535(2004)	Peter Anderson and Lars Qvortup, Virtual Applications
QA76.9.H85K38(1993)	Roy Kalawsky, The Science of VR and VE.
QA76.9.H85M42(2002)	Margaret McLaughlin, el at (Ed.), Touch in VE.
QA76.9.H85B8713(2003)	Burdea Coiffet (ed.), VR technology
QA76.9.H85V525(2004)	J Vince, Introduction to VR
QA76.9.H85V525(1998)	J Vince, Essential VR Fast
QA76.9.C65H349(2002)	Kay Stanney, Handbook of VEs
QA76.9.H85F76(2001)	Earnshaw, Guedj, van Dam and Vince (Eds.), Frontiers of Human-Centred Computing, Online Communities and VEs.
QA76.9.D5D427(2001)	Stephan Diehl, Disturbed V Words
QA76.9.H85I1428(2003)	IEEE Proceedings Int. workshop HAVE 2003
QA76.9.H85I1425(2003)	IEEE Int.. Symposium VECIM 2003.

SUBJECT DESCRIPTION FORM

Subject Title:	Digital Signal Processing	**Subject Code:**	EIE413
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 39 hours Laboratory 3 hours (Equivalent to 9 laboratory hours)

Pre-requisite:	Mathematics I (AMA227) Mathematics II (AMA228) Linear Systems (EIE312)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

This is an essential subject to provide fundamental signal processing techniques important to many communications and multimedia subjects. Both theory and practical realisation are stressed. After completion of the subject, the student should be able to understand the design principles and the implementation of digital filters and DFT/FFT, and be able to make use of random signal processing concepts and wavelets to perform some simple applications.

Student Learning Outcomes:

On successful completion of this subject, thestudents will be able to:

Category A: Professional/academic knowledge and skills

1. Understand the theories behind and to be able to realize filter equations and DFF/FFT for practical applications.
2. Design FIR/IIR filters on paper by using MATLAB, and implement the design using a programming language and/or digital processor.
3. Understand the basic theory of wavelet transform and the concepts of using simple wavelets for data compression and feature extraction.
4. Understand the importance of random signal processing in DSP, and its application on statistical measures and data modelling.
5. Possess basic background in the DSP area sufficiently for supporting subjects such as: communication principles, computer networks, speech processing, image processing, multimedia, and video technology.
6. Possess necessary background for advance studies in DSP, especially for taking the subject Advanced Digital Signal Processing, or other multimedia signal processing subjects.

Category B: Attributes for all-roundedness

7. Present ideas and findings effectively.
8. Think critically.
9. Learn independently.
10. Work in a team and collaborate effectively with others.

Syllabus:

1. Revision on the Discrete-time Systems and General Realization Techniques
   - 1.1 Basic definition of discrete-time signal. Sampling of continuous-time signal. Time invariance, causality, linearity, convolution. The z-transform and its inverse, delay property and its meaning in the time domain, frequency response and stability.
   - 1.2 Realization of digital filter structures, direct realization, canonic form, cascade and parallel realization of digital systems.

2. Design of Infinite Impulse-response (IIR) and Finite Impulse-response (FIR) Digital Filters
   - 2.1 Revision of analog systems, Butterworth filters and Chebyshev filters. Types of digital filters: IIR and FIR. IIR filter design, bilinear transformation, frequency scaling, transformation from prototype low-pass filter to high-pass filter and band-pass filter. Impulse-invariant and step-invariant approaches.
   - 2.2 FIR filter analysis, Fourier series approach, windowing, Gibbs phenomenon, commonly used windows, concept of linear phase, frequency transformation, low-pass, band-pass, high-pass filters and filter band design.

3. Discrete Fourier Transform and Convolution
   3.1 Convolutions and its applications, circular convolution, convolution by section, overlap-add method and overlap-save method.
   3.2 Fourier series and continuous-time Fourier transform. Discrete Fourier series and discrete Fourier transform (DFT), properties of the DFT, Fourier analysis using the DFT, convolution theorem, the fast Fourier transform (FFT) algorithm and implementation of the FFT.

4. Wavelets
   4.1 Short-time Fourier transform, continuous wavelet theory, dyadic structure, discrete wavelet transform, wavelet and scaling functions, multi-resolution analysis, sample applications of wavelet transform.

5. Random Signal Processing
   5.1 Revision on Random Processes, cross- and auto-correlations, bias and consistence. Power spectrum estimation, non-parametric and parametric approaches, AR, ARMA models.

6. Advanced DSP and Applications
   To discuss not less than one of the following topics,
   6.1 Architectures of digital signal processors and DSP chips.
   6.2 Adaptive digital filters: Concepts of adaptive filtering, basic Wiener filter theory, basic LMS adaptive algorithm. Application example.
   6.3 Multirate digital signal processing: Concepts of multirate signal processing, design of practical sampling rate converters. Application examples.

Laboratory Experiments:

The student will carry out at least three laboratory exercises on the topics below:
1. Laboratory 1: MATLAB for DSP laboratory exercises.
2. Laboratory 2: FIR filter analysis and design.
3. Laboratory 3: IIR filter analysis and design.
4. Laboratory 4: Properties of DFT and the fast Fourier transform.
5. Laboratory 5: Wavelet properties and its applications.
6. Laboratory 6: Parametric power spectrum estimation.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment will consist of a number of assignments, laboratory reports, short quizzes, and two tests.

Textbooks:

1. S.K. Mitra, *Digital Signal Processing*, McGraw-Hill Education (Asia), 3rd ed., 2006 Edition.
2. E.C. Ifeacher and B.W. Jervis, *Digital Signal Processing - A Practical Approach*, Prentice-Hall (Pearson Education), 2002.

Reference Books:

1. W.D. Stanley, G.R. Doughterty, and R. Doughterty, *Digital Signal Processing*, Reston Pub. Co. Ltd, Prentice-Hall International, Inc., 1984.
2. J.G. Proakis and D.G. Manolakis, *Digital Signal Processing*, 3/e., Prentice-Hall, 1996.

SUBJECT DESCRIPTION FORM

Subject Title: Computer Architecture and Systems **Subject Code:** EIE414

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 37 hours
Laboratory 5 hours
(Equivalent to 15 laboratory hours)

Pre-requisite: Computer System Fundamentals (EIE311) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To provide students with
1. concepts and design techniques of high performance computer architectures and
2. techniques to analyse performance in time domain.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Appreciate the techniques deployed in the design of modern high performance computers.
2. Develop analytical ability in the concurrency domain.
3. Identify and resolve problems arising from concurrent hardware functional units.
4. Identify and resolve problems arising from the concurrent execution of cooperating software structures.
5. Critically evaluate the performance of computers and real-time embedded systems.

Category B: Attributes for all-roundedness
6. Present ideas and findings effectively.
7. Think critically.
8. Learn independently.
9. Work in a team and collaborate effectively with others.

Syllabus:

1. Taxonomy of Computer Architectures
   - 1.1 Revision on the classifications of computer architectures: ISA and HAS, Von Neumann, RISC and CISC.
   - 1.2 Performance issues, examples of evaluation using simulators.
2. Memory System
   - 2.1 Memory system hierarchy: locality principles; cache organizations, replacement policies and write policies; virtual memory, disk latencies and thrashing.
   - 2.2 Memory management: Logical and physical space; address translation, protection and sharing; paging and segmentation; replacement policies.
3. Pipelined Processors
   - 3.1 Pipelined ILP organization: classifications, instruction pipeline, arithmetic pipelines and pre-fetch buffers.
   - 3.2 Dependencies: data dependencies, control dependencies and resource dependencies.
4. Superscalar Processors
   - 4.1 Concurrent instruction execution: decode, issue and dispatch stages; pre-decoding; out-of-order issue and dispatch; operand availability; shelving; register renaming.
   - 4.2 Speculative execution: preserving processor consistency; the reorder buffer.
   - 4.3 Branch processing: detection, speculation and recovery schemes.
5. Concurrent Real-Time Systems
   - 5.1 Mutual exclusion and process synchroniza tion.
   - 5.2 RTOS: Tasks and scheduling; inter-task communication methods; events; memory management user-ISR;
   - 5.3 RTOS services: Case study e.g. uC/OSII.

6. Application-Oriented Processors for Advanced Embedded Systems
   6.1 High performance embedded processors e.g. ARM
   6.2 Embedded DSP and media processors e.g. TMS 320Cxxxx & Nexperia
7. Multiprocessor Systems
   7.1 Cache coherence and memory consistency.
   7.2 Multiprocessor bus; Case study e.g. PCI.

Laboratory Experiments:

1. Superscalar simulation tool.
2. Tracing the operation of superscalar CPU by simulation.
3. Multitasking under a RTOS.
4. Handling user's hardware interrupts under a RTOS.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment will consist of assignments, tests, laboratory work and a mini-project.

Reference Books:

1. D. Sima, T. Fountain, and P Kasuk, *Advanced Computer Architectures*, Addison-Wesley, 1997.
2. J.L. Hennessy and D.A. Patterson, *Computer Architecture - A Quantitative Approach*, Morgan Kaufmann, 1996.
3. A. Siberschatz and P. Galvin, *Operating System Concepts*, 5th ed., Addison-Wesley, 1999.
4. J. Labrosse, *Micro C/OS-II*, R & D Books, Miller Freeman, 1999.
5. R. Hamal, *Embedded Systems - Architecture, Programming and Design*, McGraw-Hill, 2004.
6. D. Anderson, *PCI System Architecture*, 4th ed., Addison-Wesley, 1999.

SUBJECT DESCRIPTION FORM

Subject Title:	Distributed Systems and Network Programming	**Subject Code:**	EIE424
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 36 hours Laboratory 6 hours (Equivalent to 18 laboratory hours)

Pre-requisite:	Object Oriented Design and Programming (EIE320)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

This subject will provide students with the principles and practical programming skills of developing distributed systems. It enables students to master the development skill for providing distributed services on the Web. Through a series of lab exercises, students will have the chance of developing interoperable and distributed Web applications.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the enabling technologies for building distributed systems.
2. Understand the different components for developing Web Services.
3. Set up and configure a standard Web Service system and develop simple Web Service applications.

Category B: Attributes for all-roundedness
4. Think critically.
5. Learn independently.
6. Work in a team and collaborate effectively with others.
7. Present ideas and findings effectively.

Syllabus:

1. Introduction to Distributed Systems
   1.1 Characteristics. Design goals. Architecture examples.
2. Enabling Tools and Techniques for Building Distributed Systems
   2.1 Networked Computing
   TCP/IP protocol suite. Socket programming.
   2.2 Component-based Software Development
   Component models. JavaBeans; CORBA; Remote Method Invocation (RMI); OM/DCOM; Enterprise JavaBeans (EJB).
   2.3 Extensible Markup Language (XML)
   XML Markup; parser; CDATA sections; XML namespaces. Document Type Definition (DTD); well-formed XML documents; document type declaration; element of type declarations; attribute declarations.
3. Distributed Services on the Web: Web Services
   3.1 Introduction to Web Services.
   3.2 Simple Object Access Protocol (SOAP): SOAP specification; message processing; use of namespaces.
   3.3 Web Services Description Language (WSDL): Role of WSDL in Web services, WSDL documents, remote web-services invocation using WSDL.
   3.4 Universal Description, Discovery and Integration (UDDI): role of UDDI in Web services; UDDI registries; discovery technologies.

Laboratory Experiment:

Practical Works
1. Remote Method Invocation (RMI)
2. Extensible Markup Language (XML)
3. XML-RPC
4. SOAP
5. WSDL
6. UDDI

Method of Assessment:

Coursework: 40% Examination: 60%

The continuous assessment consists of assignments, laboratory reports and tests.

Textbooks:

1. M.L. Liu, *Distributed Computing: Principles and Applications*, Addison-Wesley, 2003.
2. C. Ethans, *Web Services Essential,* O. Reilly, 2002.

Reference Books:

1. R. Nagappan, *Developing Java Web services : Architecting and Developing Secure Web services using Java*, Wiley Pub., 2003.
2. U. Wahli, G.G. Ochoa, S.Cocasse, and M.Muetschard*, Websphere Version 5.1 Application Developer 5.1.1 Web Services Handbook*, IBM, 2nd ed., 2004.
3. P. Pacheco, *Parallel Programming with MPI*, Morgan Kaufmann, 1998.
4. S. Graham, etal*, Building Web Services with Java*, Sams, 2 nd Ed, 2004.

SUBJECT DESCRIPTION FORM

Subject Title:	Video, Image and Audio Processing	**Subject Code:**	EIE425
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 39 hours Laboratory 3 hours (Equivalent to 9 laboratory hours)

Pre-requisite: Linear Systems (EIE312) **Co-requisite:** nil **Exclusion:** nil

Objectives:

To provide a broad treatment of the fundamentals of speech, image, audio and video processing.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the fundamentals of speech, image, audio and video signal processing and associated techniques.
2. Solve practical problems with some basic speech, image, audio and video signal processing techniques.
3. Design simple systems for realizing some multimedia applications with some basic speech, image, audio and video signal processing techniques.

Category B: Attributes for all-roundedness
4. Present ideas and findings effectively.
5. Think critically.
6. Learn independently.
7. Work in a team and collaborate effectively with others.

Syllabus:

1. Speech processing
   - 1.1 Physiology of speech generation: characteristic of speech sounds; glottal excitation; speech production models: discrete-time speech production model; discrete-time filter model for speech production; source excitation model.
   - 1.2 Linear prediction analysis: All-pole models; least-squares estimation; spectral matching; spectral envelopes; applications of LP analysis.
   - 1.3 Speech coding: Coder's attributes; waveform coding; vocoders; analysis-by-synthesis coding; code-excited linear predictive vocoder; regular pulse-excited LPC.

2. Image processing
   - 2.1 Fundamentals of digital image: Digital image representation and visual perception, image sampling and quantization.
   - 2.2 Image enhancement: Histogram processing; Median filtering; Low-pass filtering; High-pass filtering; Spatial filtering; Linear interpolation, zooming.
   - 2.3 Image coding and compression techniques: Scalar and vector quantizations; Codeword assignment; Entropy coding; Transform image coding; Wavelet coding; Codec examples.
   - 2.4 Image analysis and segmentation: Feature extraction; Histogram; Edge detection; Thresholding.
   - 2.5 Image representation and description: Boundary descriptor; Chaincode; Fourier descriptor; Skeletonizing; Texture descriptor; Moments.

3. Audio processing
   - 3.1 Fundamentals of digital audio: Sampling; Dithering; Quantization; psychoacoustic model.
   - 3.2 Basic digital audio processing techniques: Anti-aliasing filtering; Oversampling; Analog-to-digital converion; Dithering; Noise shaping; Digital-to-analog Conversion; Equalisation.
   - 3.3 Digital Audio compression: Critical bands; threshold of hearing; Amplitude masking; Temporal masking; Waveform coding; Perceptual coding; Coding techniques: Subband coding and Transform coding; Codec examples.

4. Video processing
   4.1 Fundamentals of digital video: Basics of digital video; digital video formats.
   4.2 Basic digital video processing techniques: Motion estimation; Interframe filtering; Motion-compensated filtering; Error concealment.
   4.3 Video coding techniques: Temporal redundancy; Spatial redundancy; Block-based motion estimation and compensation; Coding techniques: Model-based coding, Motion-compensated waveform coding; Codec examples.

Laboratory Experiments:

1. Audio compression
2. Speech signal analysis
3. Psychoacoustic behavior
4. Motion estimation and its application in video coding
5. Image processing techniques
6. Image compression

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment will consist of a number of assignments, laboratory reports, and two tests.

Textbooks:

1. R.C. Gonzalez and R.E. Woods, *Digital image processing*, 2nd ed., Prentice-Hall, 2002.
2. J.R. Deller, J.G. Proakis, and J.H.L. Hansen, *Discrete-Time Processing of Speech Signal*, Macmillan Pub. Company, 2000.

Reference Books:

1. Yao Wang, Joern Ostermann, and Ya-Qin Zhang, *Video Processing and Communications*, Prentice-Hall, 2002.
2. Ken C. Pohlmann, *Principles of digital audio*, 3rd ed., McGraw-Hill, 1995.
3. L.R. Rabiner and B.H. Juang, *Fundamentals of Speech Recognition*, Prentice-Hall, 1993.
4. T.P. Barnwell III, K. Nayebi, and C.H. Richardson, *Speech Coding: A Laboratory Textbook*, John Wiley & Sons, Inc., 1996.

SUBJECT DESCRIPTION FORM

Subject Title:	Artificial Intelligence and Computer Vision	**Subject Code**:	EIE426
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial/ Seminar 39 hours Laboratory/ Demonstration 3 hours (Equivalent to 9 laboratory hours)

Pre-requisite: Object Oriented Design and Programming (EIE320) **Co-requisite:** nil **Exclusion:** nil

Objectives:

1. To introduce the student the major ideas, methods, and techniques of Artificial Intelligence (AI) and computer vision;
2. To develop an appreciation for various issues in the design of intelligent systems;
3. To provide the student with programming experience from implementing AI techniques, simple knowledge systems, and computer vision applications.

Student Learning Outcomes:

On successfully completing this subject, students will be able to:

Category A: Professional/academic knowledge and skills

1. Understand the benefits and limitations of current AI techniques, its culture and society impacts, and possible future development.
2. Implement major game search te chniques for simple computer games.
3. Apply machine learning techniques to information processing and data mining.
4. Develop simple expert systems for internet and engineering applications.
5. Explore robotics and computer vision techniques, and their applications to entertainment and engineering domains.

Category B: Attributes for all-roundedness

6. Present ideas and findings effectively.
7. Think critically.
8. Learn independently.
9. Work in a team and collaborate effectively with others.

Syllabus:

1. Introduction
   Definitions, the Foundations of AI, the History of AI, the State of the Art.

2. Intelligent Agents
   Agents and Environments, the Concept of Rationality, the Nature of Environments, the Structure of Agents, Applications.

3. Blind and Informed Search Methods
   Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Avoiding Repeated States, Searching with Partial Information, Informed (Heuristic) Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems, Local Search in Continuous Spaces, Online Search Agents and Unknown Environments.

4. Game Playing
   Games, Optimal Decisions in Games, Alpha-Beta Pruning, Imperfect Decisions, Games That Include an Element of Chance, State-of-the-Art Game Programs.

5. Knowledge Systems
   Rule-Based Deduction Systems, Rule-Based Reaction Systems, Forward and Backward Chaining, the Knowledge Engineering Process, Analysis of Typical Knowledge Systems.

6. Machine Learning
   Forms of Learning, Inductive Learning, Learning Decision Trees, Computational Learning Theory, Machine Learning Techniques for Intelligent Information Processing and Data Mining.

7. Computer Vision
   Imaging and Representation, Image Preprocessing, Extracting 3-D Information, Object Recognition, Using Vision for Manipulation and Navigation, Concepts of Virtual Reality, Applications.

8. Robotics
   Robot Hardware, Robotic Perception, Planning to Move, Planning Uncertain Movements, Robotic Software Architectures, Entertainment Robots, Engineering Applications.

9. Culture and Society Impacts
   Understanding Intelligence: Issues and Directions, the Ethics and Risks of Developing Artificial Intelligence.

Method of Assessment:

Coursework: 45% Examination: 55%

Recommended Textbooks:

1. S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, 2nd ed., Prentice-Hall, 2003.
2. L.G. Shapiro and G. Stockman, *Computer Vision*, Prentice-Hall, 2001.

Reference Books:

1. G.F. Luger, and W.A. Stubbefield, *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, 4th ed., Addison-Wesley Longman, 2002.
2. P.H. Winston, *Artificial Intelligence*, 3rd ed., Addison-Wesley, 1993.
3. T. Dean, J. Allen, and Y. Aloimonos, *Artificial Intelligence: Theory and Practice*, Addison-Wesley Publishing, 1995.

SUBJECT DESCRIPTION FORM

Subject Title: Mobile and Pervasive Computing **Subject Code:** EIE427

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 39 hours
Laboratory 3 hours
(Equivalent to 9 laboratory hours)

Pre-requisite: Data and Computer Communications (EIE333) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To introduce fundamentals of mobile and pervasive computing and provide in-depth treatment on issues related to practical pervasive computing.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the fundamentals of wireless network access technologies.
2. Possess a knowledge of contemporary mobile and pervasive computing device architectures.
3. Have an understanding of protocols and techniques used in networking and security that are related to pervasive computing.
4. Apply mobile and pervasive computing devices in designing simple practical ubiquitous computing systems.

Category B: Attributes for all-roundedness
5. Present ideas and findings effectively.
6. Think critically.
7. Learn independently.
8. Work in a team and collaborate effectively with others.

Syllabus:

1. Mobile computing:
   Network computing. Mobile computing mechanisms. Mobile middleware. Wireless Internet Protocols. Wireless local area networks and security issues. Mobility management.

2. Pervasive devices:
   Smart cards. Handheld computers. Palm OS-based devices. Smart labels. Embedded controls: sensors, actuators. Middleware: Java for mobile computing, XML. Human-computer interaction. Pervasive software systems.

3. Network architectures for pervasive computing:
   Ad hoc networks. Sensor networks. Wired and wireless grids. Wireless application protocol. Pervasive services discovery. Location mechanisms.

4. Wireless security:
   Cryptographic algorithms. Cryptographic tools. Security infrastructures. Secure socket layer. Practical techniques for security and user-authentication.

5. Case study:
   Pervasive computing systems.

Laboratory Experiments:

1. Interfacing pervasive devices, e.g. RFID or similar devices
2. Mobile middleware programming
3. Customized embedded OS for mobile devices

Method of Assessment:

Continuous Assessment: 50% Examination: 50%

The continuous assessment consists of assignments, lab assessment, quizzes and two tests.

Reference Books:

1. F. Adelstein, S.K.S. Gupta, G. Richard, and L. Schwiebert, *Fundamentals of Mobile and Pervasive Computing,* McGraw-Hill, 2004.
2. U. Hansmann, L. Merk, M. Nicklous, and T. Stober, *Pervasive Computing Handbook* , 2nd ed., Springer, 2003.
3. J. Burkhardt, H. Henn, S. Hepper, K. Rindtorff, and T. Schack, *Pervasive Computing: Technology and Architecture of Mobile Internet Applications*, Addison-Wesley, 2002.
4. M. McCullough, *Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing*, MIT Press, 2004.

SUBJECT DESCRIPTION FORM

Subject Title: Multimedia Communications **Subject Code:** EIE428

Number of Credits: 3 **Hours Assigned:** Lecture/Tutorial 39 hours
Laboratory 3 hours
(Equivalent to 9 laboratory hours)

Pre-requisite: Data and Computer Communications (EIE333) **Co-requisite:** nil **Exclusion:** nil

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Objectives:

To study the technical issues and system solutions for providing multimedia communications on the Internet.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the current state-of-the-art developments in Internet technologies for multimedia communications.
2. Appreciate the principles used in designing multimedia protocols, and so understand why standard protocols are designed the way that they are.
3. Understand the system design principles of multimedia communications systems.
4. Solve problems and design simple networked multimedia systems.

Category B: Attributes for all-roundedness
5. Present ideas and findings effectively.
6. Think critically.
7. Learn independently.
8. Work in a team and collaborate effectively with others.

Syllabus:

1. Network Layer Support for Multimedia Communications
   IP routing, forwarding and switching: IP addressing; Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) protocol; Classless Interdomain Routing (CIDR); IP forwarding, Longest Prefix Match (LPM); Label Switching; Multiprotocol Label Switching (MPLS); IP Multicast, Internet Group Management Protocol (IGMP); IPv6

2. Transport Layer Support for Multimedia Communications
   Media transport protocols: Real Time Protocol (RTP) and Real Time Control Protocol (RTCP); Signaling Protocols: Session Initiation Protocol (SIP), Session Description Protocol (SDP)

3. Quality of Services (QoS)
   Integrated services (intserv): Architecture and Service Model, Resource Reservation Protocol (RSVP), Packet Scheduling Disciplines in the Internet
   Differentiated Services (diffserv): Framework and Concept, Assured and Expedited Services, Packet Classification, Routers Internals and Packet Dropping Techniques

4. Multimedia Streaming Systems
   Streaming architecture: Real-time Streaming and On-demand Streaming, Congestion Control and Error Control, Scalable Transmission, Streaming Server Design, Buffering and Scheduling Techniques, Data Sharing Techniques, Support of Interactive Operations, Case Studies on Real Networks and Interactive TV

5. Voice over IP (VoIP)
   Business model; VoIP Architecture, H.323 standards; Case Study on Enterprise VoIP applications

Laboratory Experiments:

1. Internet routing
2. Simulation study on congestion control
3. Multimedia streaming

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

The continuous assessment will consist of a number of assignments, quizzes and two tests.

Reference Books:

1. K.R. Rao, ZS. Bojkovic, D.A. Milovanovic, *Multimedia Communication Systems: Techniques, Standards, and Networks*, Prentice-Hall PTR, 2002.
2. F. Halsall, *Multimedia Communications: Applications, Networks, Protocols, and Standards*, Addison-Wesley, 2001.
3. Jon Crowcroft, Mark Handley, and Ian Wakeman, *Internetworking Multimedia*, Morgan Kaufmann, 1999.
4. J. K. Kurose, *Computer Networking: A Top-down Approach Featuring the Internet*, 2nd ed., Addison-Wesley, 2003.
5. S. Vegesna, *IP Quality of Service*, Prentice-Hall PTR, 2001.
6. Colin Perkins, *RTP: Audio and Video for the Internet*, Addison-Wesley, 2003.
7. A. Dashti, S.H. Kim, C. Shahabi, and R. Zimmermann, *Streaming Media Server Design*, Prentice-Hall PTR, 2002.
8. U. Black, *Voice Over IP*, 2/E, Prentice-Hall PTR, 2002.

SUBJECT DESCRIPTION FORM

Subject Title: Corporate Networking

Subject Code: EIE429

Number of Credits: 3

Hours Assigned: Lecture/tutorial 39 hours
Laboratory 3 hours
(Equivalent to 9 laboratory hours)

Pre-requisite: nil

Co-requisite: nil

Exclusion: nil

Objectives:

Telecommunication and computer networking technologies have been advancing rapidly in recent years. New technologies have been developed, and new economic orders have been built. Against this background, this subject is designed to:

1. Give a practical treatment on the design, implementation and management of multinational corporate networks.
2. Introduce the variety of facilities, technologies and communication systems to meet future needs of network services.
3. Discuss in details network planning, management, marketing, performance and security issues.
4. Evaluate critically the performance of existing and emerging global communication networking technologies and their impact on enterprise and world economy.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Describe the operational, marketing, functional attributes of different components of enterprise networks [1,2]
2. Evaluate critically the design, implementation, and performance of enterprise networks with regard to different criteria [1,3,4]
3. Design enterprise networking solutions by taking into account various constraints and requirements [1,2,3]

Category B: Attributes for all-roundedness
4. Develop a global outlook by recognizing the effect of advancement in communication technologies on business opportunity and world economic, social and cultural development [4]
5. Think and evaluate critically [3,4]
6. Take up new technology for life-long learning [2,4]
7. Present ideas and findings effectively [3]
8. Work in a team, and collaborate effectively with other members [4]

Syllabus:

1. Communication Networks and their Features
   Global networks, enterprise networks, private networks, network topology and optimization, network evolution strategy.
2. Protocols and Technologies
   WAN protocols, Virtual Local Area Network, IP Switching and MPLS, Metro Ethernet WAN, Voice over IP, Softswitch.
3. Network Security
   Cryptography, firewall, IP Security, Virtual Private Network (VPN).
4. Traffic Theory and Marketing
   Teletraffic theory, tariff and cost analysis, deregulations.

Laboratory Experiments:

1. Voice over IP experiment and softswitch.
2. Virtual Private Network and IP Security.

3. LAN switching management.

Method of Assessment:

Continuous Assessment: 50% Examination: 50%

Textbook:

1. V. Theoharakis, *Enterprise Networking: Multilayer Switching and Applications*, Idea Group Pub., 2002.

Reference Books:

1. Housel, Thomas J., *Global Telecommunications Revolution: The Business Perspective*, McGraw-Hill/Irwin, 2001.
2. R.R. Panko, *Corporate Computer and Network Security,* Prentice-Hall, 2004.
3. D. Cameron, *Global Network Security: Threats and Countermeasures*, Computer Technology Research Corp., 2000.
4. *Handbook of Telecommunications Economics*, Amsterdam; Boston, Mass. : Elsevier, 2002.
5. M. Mueller, *Telecom Policy and Digital Convergence,* City University of Hong Kong Press, 1997.
6. *Global Networks, Linked Cities*, Routledge, 2002.
7. Jean-Jacques, *Competition in Telecommunications*, MIT Press, 2000.
8. D. Minoli, *Enterprise Networking: Fractional T1 to SONET, Frame Relay to BISDN*, Artech House, 1993.

SUBJECT DESCRIPTION FORM

Subject Title:	Honours Project	**Subject Code:**	EIE430
Number of Credits:	6	**Hours Assigned:**	Structured Study 84 hours Self-work/ Guided Study 168 hours Total 252 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Objectives:

Engineering is the science of the applying scientific principles and technology to improve human life. This may take the form of invention, design, implementation, so on and so forth. The objective is to come up with solutions to existing problems while considering various constraints. Hence the students studying in a curriculum will be most benefited from doing a project in order to have the chance to practise hands-on application of the knowledge the student has learned throughout the curriculum, while producing something useful or valuable. Against this background, there is a final year project (FYP) component in the curriculum with the objectives:

1. To provide the opportunity to the student so that he/she can apply what he/she has learnt in previous stages in a real-life engineering context
2. To enable the student to acquire and practise project management skills and discipline while pursuing the FYP
3. To enable the student to apply engineering knowledge in analysis of problems and synthesis of solution while considering various constraints

Student Learning Outcomes:
On completion of the final year project, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand, take up, and master the basic knowledge and skills related to the specific project
2. Understand the background, the requirements, objectives, and deliverables to be produced
3. Integrate and apply knowledge learnt in present and previous stages (vertical integration) and across different subjects (horizontal integration)
4. Apply various professional skills in electronic and information engineering to achieve the objectives of the project
5. Learn to use new tools and facilities, and to gather new information, for the conduction of the project

Category B: Attributes for all-roundedness
6. Work under the guidance of a supervisor while exercising self-discipline to manage the project
7. Review critically the student's own achievement and other related works
8. Communicate effectively with related parties (supervisor, peers, vendors)
9. Work with others (team partners, outsource company, technical support staff) collaboratively
10. Realize different constraints, and to make appropriate compromise, when designing a solution to an engineering problem
11. Disseminate effectively the results and knowledge learnt in the project
12. Transfer the knowledge and skills learnt in the project.

Syllabus:

The progression of the project will be guided by a framework, which consists of the following indicative stages. The specific details will vary from project to project.

Project Specification
In this stage, the student will work in conjunction with the project supervisor to draw up a concrete project plan specifying at least the following:
1. Background of the project
2. Aims and objectives
3. Deliverables
4. Methodology to be adopted

5. Schedule

Project Execution

This is the major part of the project. After the specification is done, the project will be pursued so that the objectives are to be met; the deliverables are to be produced in accordance with the schedule. The student and the project supervisor will meet constantly to discuss the progress. In particular the following should be demonstrated:

1. Adherence to the schedule
2. Achievement of objectives by the student's work
3. Initiatives of the students to work, design, and to solve problems
4. Inquisitiveness of the student (e.g. to probe into different phenomena or to try different approaches)
5. Diligence of the students to spend sufficient effort on the project
6. Systematic documentation of data, design, results, …etc. during the process of working out the project

Project Report

After the project is finished, it is important that the student can be able to disseminate the results so that the results can be reviewed by others. Through this dissemination process, project achievements can be communicated, experience can be shared, knowledge and skills learnt can be retained and transferred. The following elements will be important:

1. Project log book
2. Project report (hardcopy and softcopy)
3. Presentation
4. Performance in a Question-and-Answer session

Method of Assessment:

Continuous Assessment: 100%

Reference Books:

To be specified by the project supervisor for each project.

SUBJECT DESCRIPTION FORM

Subject Title:	Digital Video Production and Broadcasting	**Subject Code:**	EIE431
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 35 hours Laboratory 7 hours (Equivalent to 21 laboratory hours)

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** nil

Objectives:

This subject provides a fundamental knowledge both in principles and practices on digital video production, and an in-depth knowledge of some important topics in digital video broadcasting. After the completion of the subject, the student should be able

1. to work on small scale video productions, and
2. to appreciate a wide range of techniques adopted in the movie and video broadcasting industries.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the fundamentals of digital video systems with emphasis on production and broadcasting.
2. Understand the production process and production techniques for small scale digital video production.
3. Work with digital video equipments in video shooting and video editing.
4. Design simple systems related to video broadcasting.
5. Apply theory to practice by doing projects on creating movies and configuring digital production and broadcasting equipments.
6. Facilitate students for further development in advanced digital video production and broadcasting.

Category B: Attributes for all-roundedness
7. Present ideas and findings effectively.
8. Think critically.
9. Learn independently.
10. Work in a team and collaborate effectively with others.

Syllabus:

1. Fundamental of Video Production:
   Production process, pre-production, production and post-production.

2. Pre-Production:
   Story and Script writing. Visualization and storyboarding. Production schedule and budgeting.

3. Production:
   Working with camera and lighting. Location sound production.

4. Post-Production:
   Digital video editing. Digital audio editing.

5. Introduction to Digital Video Broadcasting:
   Video broadcasting services in Hong Kong. Introduction to digital video broadcasting. Video broadcasting standards and current development.

6. Video Broadcasting Techniques:
   Analog video broadcasting techniques. Digital video broadcasting: MPEG-2 systems and multiplexing, programme specific information (PSI) and service information (SI), error control in digital

video, digital modulation technique and conditional access for digital TV.

7. Implementation Issues on Digital Video Broadcasting:
   Video broadcasting equipments. Consumer products related to DVB: set-top design, dgital video cassette recorder, etc.

Laboratory Experiments:

1. Digital video production project
2. Case study on digital video broadcasting

Method of Assessment:

Continuous Assessment: 60% Examination: 40%

The continuous assessment will consist of one production project, laboratory reports, a number of short quizzes, assignments, the case study and two tests.

Reference Books:

1. U. Reimers, *DVB: The Family of International Standards for Digital Video Broadcasting*, Springer, 2005.
2. Richard Brice, *Newnes Guide to Digital TV*, Newnes, 2003.
3. Gerald Millerson, *Television Production*, Focal Press, 2001

SUBJECT DESCRIPTION FORM

Subject Title:	Web Systems and Technologies	**Subject Code:**	EIE432
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 36 hours Laboratory 6 hours (Equivalent to 18 laboratory hours)

Pre-requisite: Information Technology (ENG224) **Co-requisite:** nil **Exclusion:** nil

Objectives:

This subject will provide students with the principles and practical programming skills of developing Internet and Web applications. It enables students to master the development skill for both client-side and server-side programming, especially for database applications. Students will have opportunity to put into practice the concepts through programming exercises based on various components of client/server web programming.

Student Learning Outcomes:

On successful completion of this subject, the students will be able to:

Category A: Professional/academic knowledge and skills
1. Understand the enabling technologies for building Internet and Web database applications.
2. Understand the different components for developing client/server applications.
3. Apply the techniques and features of the client/server development languages to construct a database application based on Internet.
4. Develop the web database applications through programming exercises.

Category B: Attributes for all-roundedness
5. Present ideas and findings effectively.
6. Think critically.
7. Learn independently.

Syllabus:

1. Introduction to Client/Server Computing
   The basic principles of client/server computing; Distinguished characteristics of client/server systems and application areas; Comparison of 2 tier versus three tier client/server solutions; Web programming model; Interactive web.

2. Web Programming
   Client Side Web Programming: Benefits and limitation of client-side web programming; Byte code versus scripting. Basic concepts and development based on Java applet, Java script & dynamic HTML (DHTML).

   Server Side Web Programming: Approaches to server-side programming based on PHP, Java servlet technologies, Active Server pages (ASP) and/or Java Server Pages (JSP). Benefits and limitations of server-side web programming. Development framework for server-side programming based on PHP/servlet/JSP

   Web application development. Development of a web application based on client-side and server-side side programming.

3. Web Database
   Introduction to Database: File and database processing systems; Definition of database; DBMS examples.

   Data Modelling: Entity relationship model; Elements of the E.R. model.

   Database Design and Implementation: Relation model; Mapping an ER model to table model; Mapping

entities and attributes; Normalization; Foundations of relational implementation; Defining relational data; Relational data manipulation; Relational algebra; Structured query language; Restricting and sorting data; Displaying data from multiple tables.

Multi-user Database Processing: Database administration; Concurrency control; Security issues; Data dictionary; Database backup and recovery; Case study of a contemporary database server.

Web Database Applications: Multi-tier architecture; Principle of web database applications: store, manage and retrieve data.

4. Security on the Web
   Access control and passwords; cryptography; public key encryption; authentication with digital signature; packet filtering; firewalls.

Laboratory Experiments:

Practical Works:
1. Client-side web application programming.
2. Server-side web application programming.
3. Database driven web design.
4. Evaluation of commercially available database management systems.
5. Creating and managing a database.
6. Web database Applications.

Method of Assessment:

Coursework: 40% Examination: 60%

The continuous assessment consists of a number of short quizzes, assignments, laboratory reports and two tests.

Text Books:

1. M. Hall, *Core Web Programming*, Prentice, 2003.
2. D.M. Kroenke, *Database Processing Fundamentals, Design and Implementation*, 8/e., Prentice-Hall, 2001.

Reference Books:

1. F.J. Cooper et al., *Implementing Internet Security*, New Riders, 1995.
2. Peter Rossbach and Hendrik Schreiber, *Java Server and Servlets*, Addison-Wesley, 2000.
3. Jason Hunter and William Crawford, *Java Servlet Programming*, 2nd ed., O' Reilly, 2001.
4. Susan Boardman, Melanie Caffrey, Solomon Morse and Benjamin Rosenzweig, *Oracle Web Application Programming for PL/SQL Developers*, Prentice-Hall, 2003.
5. Michael V. Mannino, *Database, Design, Applications Development, & Administration*, 2nd ed., McGraw-Hill, 2004.