SUBJECT DESCRIPTION FORM

Subject Title:	Foundation Biology	**Subject Code:**	ABCT102
Number of Credits:	3	**Hours Assigned:**	Lecture 32 hours Tutorial 10 hours

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

Objectives:

The lectures aim to explain and discuss the knowledge of biology at foundation level which is essential to proceed to higher level of study in biology-related disciplines.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand the basic features and functions of cells;
2. describe the basic structures and functions of body systems;
3. understand the fundamental features of microorganisms; and
4. understand the basic features of ecosystems.

Keyword Syllabus (Indicative):

1. Cells
   - Structures and functions of the cell
   - Homeostasis and transport within the cell
   - Cellular respiration and photosynthesis
   - Cell reproduction - mitosis and meiosis
2. Genetics
   - Fundamentals of genetics
   - Nucleic acids and protein synthesis
   - Inheritance patterns
   - DNA technology
3. Body Functions
   - Organization of human tissues, organs and systems
   - Overview of physiological functions:
     Nervous system, cardiovascular system, respiratory system, digestive system, renal system, immune system, endocrine and reproductive systems
4. Microorganisms
   - Bacteria and viruses
   - Protozoa
   - Algae and fungi
5. Ecology
   - Introduction to ecology and populations

Teaching and Learning Approach:

The teaching and learning approach includes lectures which aim to enrich the knowledge and concepts of biology at foundation level. In addition, written assignments and tutorial sessions are also included for further consolidating the knowledge discussed in lectures. Students will be assessed by written assignments, quizzes and written examination.

Method of Assessment:

Continuous Assessment: 50% Examination: 50%

Essential Reading:

1. E. Eldon, C. Frederick and B. David, *Concepts in Biology*, 12th ed., McGraw-Hill, 2007.

Reference List:

1. S. Freeman, *Biological Science*, 3rd ed., Pearson Prentice-Hall, 2008.

SUBJECT DESCRIPTION FORM

Subject Title: Fundamental Chemistry **Subject Code:** ABCT103

Number of Credits: 3 **Hours Assigned:** Lecture 36 hours
Tutorial 6 hours
(The students are also expected to spend about 80 hours for self-study.)

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

Objectives:

This subject educates student with fundamental knowledge in chemistry. It is also a bridging course for students previously learned chemistry in a language other than English.

The subject aims to:

1. provide students with a broad fundamental knowledge in chemistry required for the study of science, technology, engineering or related programme; and
2. help student study chemistry effectively in an English-medium learning environment and to acquaint student with the necessary chemical vocabularies.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

5. understand the fundamental principles of chemistry;
6. have sufficient chemical knowledge for their chosen field of study; and
7. understand and appreciate the chemical terms and principles that they may encounter in written and oral communication.

Keyword Syllabus:

1. Atomic Structure
   Electromagnetic radiation, hydrogen spectrum, energy levels, electron spin, quantum numbers, dual properties of matter, wave function and probability, uncertainty principle, charge clouds of s, p, d and f orbits, radial distribution curves, electronic configurations of many-electron atoms, Pauli exclusion principle, Aufbau principle, ionization energy, electron affinity, electronegativity, atomic and ionic radii and periodicity.
2. Chemical Bonding
   Ionic bonds, covalent bonds, dative bonds, metallic bonds, van der Waals forces, hydrogen bonds, concepts of valance bond theory and hybridization, resonance, molecular shapes by VSEPR method, molecular orbital theory of homonuclear and heteronuclear diatomic molecules, multi-centre bonding in electron deficient molecules.
3. Properties of Solid
   Solids: amorphous solids, types of crystals, unit cell, co-ordination number, closest packing, crystal structures.
4. General Inorganic Chemistry
   Main group elements and their compounds.
5. General Organic Chemistry
   Simple concept of orbital hybridisation of carbon: sp, sp2 and sp3. Naming of compounds containing carbon chains and rings. Isomerism, regioisomer and optical isomer. A preliminary study of the functional group: alkane, alkene, alcohol, aldehyde, ketone, carboxylic acid, ester. Direct and simple functional group transformations.

Teaching and Learning Approach:

Lectures will provide students with general outlines of key concepts and guidance on further reading. Lectures will be further consolidated through assignments and tutorials. Students will be assessed by assignments, quizzes as well as an end-of-term written examination.

Method of Assessment:

Continuous Assessment: 60% Examination: 40%

Essential Reading:

1. R. Chang, *Chemistry*, 7th ed., McGraw-Hill, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Foundation Mathematics I for Science and Engineering	**Subject Code:**	AMA103
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial and Student Presentation 14 hours

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

Objectives:

This is a subject to provide students with a solid foundation in Differential and Integral Calculus. It is essential for all undergraduate students of Engineering or Science. The emphasis will be on application of mathematical methods to solving basic engineering science problems.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand the concept of functions and inverse functions;
2. use mathematical induction in various contexts;
3. understand the algebra and geometry of complex numbers and apply complex numbers to solve science and engineering problems;
4. apply mathematical reasoning to analyse essential features of different mathematical problems such as differentiation and integration;
5. apply appropriate mathematical techniques to model and solve problems in science and engineering;
6. extend their knowledge of mathematical techniques and adapt known solutions in different situations;
7. undertake continuous learning.

Keyword Syllabus:

1. Basic Concepts
   Mathematical induction; Functions and inverse functions; Elementary functions, trigonometric functions; Complex numbers; De Moivre's Theorem; Roots of a complex number.
2. Differential Calculus
   Limits and continuity; Derivatives; Techniques of differentiation; Mean value Theorem; Higher derivatives; Maxima and minima; Curve sketching.
3. Integral Calculus
   Definite and indefinite integrals; Fundamental Theorem of Calculus; Techniques of integration; Taylor's Theorem; Applications in geometry, physics and engineering.

Teaching and Learning Approach:

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.

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.

Reference List:

1. D. Varberg, E.J. Purcell and S.E. Rigdon, *Calculus*, 8th ed., Prentice-Hall, 2000.
2. K.F. Hung and Glory T.Y. Pong, *Foundation Mathematics*, McGraw Hill, 2007.
3. F.R. Giordano, M.D. Weir and R.L. Finney, *Calculus for Engineers and Scientists*, Addison-Wesley, 1988.

SUBJECT DESCRIPTION FORM

Subject Title:	Foundation Mathematics II for Science and Engineering	**Subject Code:**	AMA104
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial and Student Presentation 14 hours

Pre-requisite:	Foundation Mathematics I for Science and Engineering (AMA103)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

This is a subject to provide students with a solid foundation in Mathematics and Statistics. It aims to prepare the students for studying an undergraduate programme in Engineering or Science. The emphasis will be on application of mathematical methods to solving basic engineering science problems.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand the concepts of convergence and divergence of series and to apply Taylor's expansions in solving numerical problems;
2. use the methods in matrices and linear equations in problem solving;
3. apply the techniques of statistics to model and solve problems in science and engineering;
4. undertake continuous learning.

Keyword Syllabus:

1. Infinite Series
   Convergence of series, including tests for convergence; power series; Taylor expansions of functions; applications.
2. Linear Algebra
   Matrices and determinants; Systems of linear equations.
3. Probability and Statistics:
   Descriptive statistics; Frequency distribution; Mean, median and mode; Variance and standard deviation; Probability; Discrete and continuous random variables; Normal distribution; Sampling; Hypotheses testing and estimations.

Teaching and Learning Approach:

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.

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.

Reference List:

1. R.E. Walpole & R.H. Myers, S.L. Myers & K.Y. Ye, *Probability and Statistics for Engineers and Scientists,* 7th ed., Prentice-Hall, 2002.
2. K.F. Hung and Glory T.Y. Pong, *Foundation Mathematics*, McGraw Hill, 2007.
3. F.R. Giordano, M.D. Weir and R.L. Finney, *Calculus for Engineers and Scientists*, Addison-Wesley, 1988.

SUBJECT DESCRIPTION FORM

Subject Title:	Logic : Qualitative and Quantitative	**Subject Code:**	AMA105
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial 14 hours

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

Objectives:

This subject aims to develop students' ability in logical and analytical thinking through the qualitative and quantitative aspects of logic. Introduction to the key concepts and relationships of formal logic will be done primarily through lectures. Examples and case studies will be presented in small group tutorials. Finally, self-study will be encouraged through student accessible computer-based exercises. Assessment will be in the form of both in-class mid-term tests as well as group projects associated with tutorials.

The first part will emphasize qualitative logic and will be taught by the General Education Centre. The second part will emphasize quantitative logic. Some topics from discrete mathematics will be presented as illustrations of the general theory. This part will be taught by the Department of Applied Mathematics.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to demonstrate some ability to:

1. demonstrate basic logical reasoning.
2. see the relationship between formal logic and natural language.
3. apply logical reasoning in both everyday and academic situations.
4. recognize and refute common logical fallacies.
5. appreciate the axiomatic approach in mathematics.
6. understand why proofs of mathematical statements work
7. apply logical reasoning in problem solving.

Keyword Syllabus:

1. Qualitative Logic:
   Introduction_What is Logic? Logic Puzzles. Some Basic Concepts and Logical Relations. Propositional Logic. Syllogistic Logic. Inductive Reasoning. Some Common Informal Fallacies.
2. Quantitative Logic:
   Sets and propositions; Permutations and combinations; Relations and Functions; Graphs and Trees; Natural Numbers.

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.

Reference List:

1. Harry Gensler, *Introduction to Logic*, Routledge, New York, 2002.
2. Alec Fisher, *Critical Thinking*, OUP, Cambridge, 2001.
3. I.M. Copi and C. Cohen, *Introduction to Logic*, 10th ed., Macmillan, New York, 1998.
4. D.L. Johnson, *Elements of Logic via Numbers and Sets*, Springer, 1998.
5. Patrick J. Hurley, *A Concise Introduction to Logic*, Wadsworth Publishing Co., Belmont, 1988.
6. Samuel Guttenplan, *The Languages of Logic: An introduction to formal logic*, Basil Blackwell, Oxford, 1986.
7. W.C. Salmon, *Logic*, 3rd ed., Prentice-Hall, Englewood Cliffs, 1984.
8. Wilfred Hodges, *Logic*, Harmondsworth, 1977.
9. C.L. Liu, *Elements of Discrete Mathematics*, McGraw-Hill, 1985.
10. Cupillari, *The Nuts and Bolts of Proofs*, Academic Press, 2001.

SUBJECT DESCRIPTION FORM

Subject Title: College Physics I

Subject Code: AP101

Number of Credits: 3

Hours Assigned:

Classroom teaching and laboratory experiments
Lecture 34 hours
Laboratory 8 hours

Multimedia teaching/learning and other activities
Virtual Laboratory 12 hours
Self-study 60 hours

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

Objectives:

This is the first bridging course in physics of the Foundation Programme for students admitted from mainland. It provides a broad foundation in mechanics and thermal physics, preparing students to study science, engineering, or related programmes.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. solve simple problems in single-particle mechanics using calculus and vector;
2. solve problems on rotation of rigid body about fixed axis;
3. define simple harmonic motion and solve simple problems;
4. apply Archimedes' principle to solve problems in hydrostatics;
5. apply Bernoulli's equation to simple problems in fluid flow;
6. explain ideal gas laws in terms of kinetic theory;
7. apply the first law of thermodynamics to simple processes;
8. solve simple problems related to the Carnot cycle;
9. solve simple problems in travelling waves;
10. explain the formation of acoustical standing waves and beats; and
11. use Doppler's effect to explain changes in frequency received.

Keyword Syllabus:

1. Preparation in Mathematics
   Review of algebra, geometry and trigonometry; Function and graph; Derivative; Integration; Vectors and coordinate system.

2. Mechanics
   Calculus-based kinematics, dynamics and Newton's laws; Calculus-based Newtonian mechanics, involving the application of impulse, momentum, work and energy, etc.; Conservation law; Gravitation field; Systems of particles; Collisions; Rigid body; Rotation; Angular momentum; Oscillations and simple harmonic motion; Pendulum; Statics and elasticity; Hydrostatics and Archimedes' principle; Bernoulli's equation.

3. Thermal Physics
   Conduction, convection and radiation; Black body radiation and energy quantization; Ideal gas and kinetic theory; Work, heat and internal energy; First law of thermodynamics; Entropy and the second law of thermodynamics; Carnot cycle; Heat engine and refrigerators.

4. Waves
   Longitudinal and transverse waves; Travelling wave; Doppler effect; Acoustics.

Teaching and Learning Approach:

1. Lectures are given to deliver the subject outline and key physics concepts to the students. The students will also get the guidance on further reading.
2. Assignments are used to help the students gain analytical abilities through problem-solving and also to help them strengthen the concepts taught.
3. Laboratories are designed to help the students gain hands-on experience in the operation of equipment and apply their knowledge in the experiments.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

Essential Reading and CD-ROM:

1. Knight, *Physics for Scientists and Engineers with Modern Physics*, Pearson, 2004.
2. *Physics CAI* in CD-ROM, USTC, 2000.
3. *Computer Simulation System for College Physics Experiment*, Version 2.0 for Windows, USTC, 2000.

Reference List:

1. Halliday, Resnick and Walker, *Fundamentals of Physics,* 7th ed., Wiley, 2005.
2. Young and Freedman, *University Physics,* 11th ed., Pearson, 2004.
3. Giancoli, *Physics for Scientists and Engineers,* 3rd ed., Prentice-Hall, 2000.
4. Giambattista, Richardson and Richardson, *College Physics,* 2nd ed., MaGraw-Hill, 2007.
5. Jewett and Serway, Serway's, *Principles of Physics*, 4th ed., Thomson, 2006.

SUBJECT DESCRIPTION FORM

Subject Title: College Physics II

Subject Code: AP102

Number of Credits: 3

Hours Assigned:

Classroom teaching and laboratory experiments
Lecture 34 hours
Laboratory 8 hours

Multimedia teaching/learning and other activities
Virtual Laboratory 12 hours
Self-study 60 hours

Pre-requisite: College Physics I (AP101)

Co-requisite: nil

Exclusion: nil

Objectives:

This is the second bridging course in physics of the Foundation Programme for students admitted from mainland. It is built on College Physics I and continues on topics in waves and optics, electromagnetism and modern physics, in preparing students to study science, engineering, or related programmes.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. apply simple laws in optics to explain image formation;
2. explain phenomena related to the wave character of light;
3. define electrostatic field and potential;
4. use Gauss' law in solving problems in electrostatics;
5. solve problems on interaction between current and magnetic field;
6. apply electromagnetic induction to various phenomena;
7. solve simple problems in AC circuits,
8. describe simple models of the atom and the nucleus, and
9. explain the properties of materials in relation with bonding and crystal structure.

Keyword Syllabus:

1. Waves and Optics
   Reflection and refraction; Image formation by mirrors and lenses; Compound lens; Microscope and telescope; Superposition of waves; Huygen's principle; Interference and diffraction; Interferometers and diffraction grating; Polarization; Wave-particle duality.

2. Electromagnetism
   Charge and field; Coulomb's law and Gauss' law; Electrostatic field and potential difference; Capacitors and dielectric; Current and resistance; Ohm's law; Electromotive force, potential difference and RC circuits; Magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere's law; Faraday's law and Lenz's law; Self inductance and mutual inductance; Transformers; AC circuits and applications.

3. Modern Physics
   Photons and photoelectric effects; Bohr model and hydrogen spectrum; Compton effect; Molecular bonds; Structure of solids; Mechanical properties of solids; Electric properties of solids.

Teaching and Learning Approach:

1. Lectures are given to deliver the subject outline and key physics concepts to the students. The students will also get the guidance on further reading.
2. Assignments are used to help the students gain analytical abilities through problem-solving and also to help them strengthen the concepts taught.
3. Laboratories are designed to help the students gain hands-on experience in the operation of equipment and apply their knowledge in the experiments.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

Essential Reading and CD-ROM:

1. Knight, *Physics for Scientists and Engineers with Modern Physics*, Pearson, 2004.
2. *Physics CAI* in CD-ROM, USTC, 2000.
3. *Computer Simulation System for College Physics Experiment*, Version 2.0 for Windows, USTC, 2000.

Reference List:

1. Giancoli, *Physics for Scientists and Engineers,* 3rd ed., Prentice-Hall, 2000.
2. Young and Freedman, *University Physics,* 11th ed., Pearson, 2004.
3. Halliday, Resnick and Walker, *Fundamentals of Physics,* 7th ed., Wiley, 2005.
4. Giambattista, Richardson and Richardson, *College Physics,* 2nd ed., MaGraw-Hill, 2007.
5. Jewett and Serway, Serway's, *Principles of Physics*, 4th ed., Thomson, 2006.

SUBJECT DESCRIPTION FORM

Subject Title:	Understanding the Hong Kong Community	**Subject Code:**	APSS184
Number of Credits:	3	**Hours Assigned:**	Lecture 24 hours Seminar 18 hours

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

Objectives:

The subject aims to provide the students with an integrated knowledge required for the understanding and application of sociological concepts to understand the social and cultural development of Hong Kong.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand and describe the historical development, social life, and cultural trajectory of colonial and post-colonial Hong Kong; and
2. analyze the social, cultural and political aspect of colonial and post-colonial Hong Kong.

Keyword Syllabus:

1. Pre-1841 Hong Kong: Wall Communities and the Form of Living.
2. Domestic Villages and the Survival Strategies.
3. 1841: The Coming of the Colonial Hong Kong.
4. The Chinese Communities.
5. Post-1950's Hong Kong: the Minimally Integrated Social and Political System.
6. The Development and the Future of Social Service in Hong Kong.
7. Modern City Life of Hong Kong: Shopping Malls
8. Residence Patterns of Hong Kong People: Public Housing and Home Ownership.
9. Landscape of Hong Kong: Disney World, Tourism and Economic Development.
10. Hong Kong's Tomorrow.

Students will also have to participate in field visits which introduce them to various aspects of the traditional and modern social lives in Hong Kong. They are encouraged to focus on the cultural and social aspects of Hong Kong society. Appropriate sites for visit may include: Market at Yuen Long, Fanling and Sheung Shui; Tai O- a fishing Village, Central and Sheung Wan: Wan Cha; Hong Kong Museum of History and etc.

Teaching and Learning Approach:

Apart from the lectures, students would participate in outings by which they are introduced to, on the one hand, the historic sites that could exhibit the traditional social lives of Hong Kong people, and on the other the modern landscapes of Hong Kong. In addition, students are required to attend seminars and present their views on various aspects of the traditional and modern social lives in Hong Kong. Students are encouraged to focus on the cultural and social aspects of Hong Kong society.

Method of Assessment:

Continuous Assessment: 100%

1. 30% - Individual term paper on social/cultural life of HK
2. 40% - Participation (lecture/seminar/fieldtrip)
3. 30% - Group presentation

Reference List:

1. Jeffrey W. Cody and James R. Richardson, *Urbanizing Forest and Village Trees in Hong Kong's Shatin Valley, 1976-1997*, Traditional Dwellings and Settlements Review, 9: 21-33, 1997.
2. Agnes Ku, *Narratives, Politics, and the Public Sphere: Struggles over Political Reform in the Final Transitional Years in Hong Kong (1992-1994)*, Aldershot, Brookfield USA, Ashgate, Chapter 2, pp. 18-48, 1999.
3. Benjamin K.P. Leung, *Perspectives on Hong Kong Society*, Hong Kong: Oxford University Press, 1996.
4. S.K. Lau, et al., *Indicators of Social Development: Hong Kong*, Hong Kong: Hong Kong Chinese University Press, Various Years.
5. Benjamin K.P. Leung, *Social Issues in Hong Kong*, Hong Kong: Oxford University Press, 1990.
6. *The Other Hong Kong Report*, Hong Kong: Hong Kong Chinese University Press, Various Years.
7. 蔡榮芳,*《香港人之香港史：1841-1945》*, 香港, 牛津大學出版社, 2001.
8. 王宏志,*《歷史的沉重：從香港看中國大陸的香港史論述》*, 香港, 牛津大學出版社, 2000.
9. 呂大樂,*《唔該，埋單！》*, "I.故事": 17-46, 1997.
10. 陳冠中,*《香港未完成的實驗》*: 23-30, 2001.
11. 陳塡慶編,*《諸神嘉年華: 香港宗教研究》*, 香港: 牛津大學出版社, 2002.
12. 潘毅、余麗文（編）,*《書寫城市: 香港的身份與文化》*, 香港, 牛津大學出版社, 2003.
13. 謝均才（編）,《我們的地方，我們的時間: 香港社會新編》, 香港, 牛津大學出版社, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Discovering Psychology	**Subject Code:**	APSS185
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Seminar 14 hours

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

Objectives:

To enable students to:

1. acquire foundational understanding of major psychological theories and their relations to everyday life; and
2. clarify myths and facts about psychology through exploring different psychological specializations.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. develop clear understanding of essentials of psychology; and
2. appreciate the diverse applications of psychological concepts and research findings to real-world problems and challenges.

Keyword Syllabus:

1. Discovering Major Psychological Perspectives and Their Contributions.
2. Exploring Diversity of Psychological Specializations.
   - Biological Psychology: brain's building, nervous system and human behaviour
   - Cognitive Psychology: snapshots of memory, thinking and creativity
   - Developmental Psychology: life-span human development (from newborn to old age)
   - Psychology of Gender and Sexuality: psychology of men and women, theories of love and interpersonal attraction
   - Personality Psychology: major personality types and assessment
   - Health Psychology: stress and coping strategies
   - Abnormal Psychology: basic perspectives of abnormality and major therapies
   - Social Psychology: social perception, attitudes, social and group influence
   - Industrial and Organizational Psychology: work motivation and leadership
   - Consumer Psychology: advertising and conditioning, consumer behavioral patterns
   - Chinese Psychology: application of psychological theories in Chinese culture

Over the past decades, psychology as an integrated discipline of social sciences, arts and science, has become increasingly popular. This subject is designed to provide students with essential psychological concepts and their applications in everyday life. Students are encouraged to explore salient and interesting features of specializations of psychology in a student-friendly format, including: an overview of major theories of psychology and their contributions, brain and human behaviour (biological psychology), snapshots of memory, thinking and creativity (cognitive psychology), life-span approach to human development (developmental psychology), psychology of gender and sexuality, major personality theories and assessment (psychology of personality), concepts of abnormality and major therapies (abnormal psychology), stress and coping (health psychology), social cognition and influence (social psychology), work motivation and styles of leadership (industrial / organizational psychology), and application of psychological theories in Chinese culture (Chinese Psychology).

Teaching and Learning Approach:

The learning and teaching approach is characterized by active experiential learning, which encourages students to master psychological concepts through interactive lectures, small group discussions, and interaction with web-assisted learning and teaching materials. This learn-by-doing focus engages students through active class participation, seminar discussion, group project, and web-assisted practice exercises/quiz.

Method of Assessment:

Continuous Assessment: 100%

1. Class and Seminar Participation (10%)
2. Quiz (30%)
3. Individual Seminar Presentation or Reflection Paper (30%)
4. Group Project Presentation and Report (30%)

Essential Reading:

1. D.A.Bernstein, Essentials of Psychology, Boston, MA: Houghton Mifflin (with CD-ROM), 2005.

Reference List:

1. D.A. Bernstein, L.A. Penner, A. Clarke-Stewart & E.J. Roy, *Psychology*, Boston, MA: Houghton Mifflin (with CD-ROM), 2006.
2. K.S. Feldman, *Understanding Psychology*, New York: McGraw-Hill, 2005.
3. D Kardas, *Psychology Resources on the World Wide Web*, Belmont, CA: Wadsworth / Thomson Learning (with CD-ROM), 2000.
4. J.S. Nevid, *Psychology: Concepts and Applications*, Boston, MA: Houghton Mifflin (with CD-ROM & Film DVD/VHS), 2007.
5. R. Plotnik, *Introduction to Psychology*, Belmont, CA: Wadsworth / Thomson Learning (with CD-ROM), 2006.
6. S.E. Wood & E.R. Greenwood, *The World of Psychology*, Boston, NY: Ally & Bacon, 2002.
7. 丹尼斯．庫恩著、鄭钢 等(譯), 《心理學導論 —— 思想與行爲的認識之路》, 北京: 中國輕工業出版社, 2003.
8. 高尙仁 (主編), 《心理學新論》,香港：商務印書館, 1996, 2002.
9. 葉重新, 《心理學》, 台北：心理出版社, 2004.

SUBJECT DESCRIPTION FORM

Subject Title:	Introduction to Information Technology	**Subject Code:**	COMP100
Number of Credits:	3	**Hours Assigned:**	Lecture 14 hours Laboratory 42 hours

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

Objectives:

This subject provides students with the basic concepts of information technology and computing, as well as knowledge and practice on deploying and controlling common information technology applications. This subject is suitable for all students as a first subject in information technology, whether they intend to continue to study information technology or not. Students who intend to study information technology-related programmes are strongly recommended to take both COMP100 and COMP111.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand how a computer works;
2. understand the potentials of information technologies in business and industry;
3. use popular operating systems to carry out sequence of tasks;
4. appreciate the power of programmed computer operation;
5. understand the current trends in the development of popular information technologies such as the Internet and related tools; and
6. appreciate IT-related intellectual property issues and their protection.

Keyword Syllabus:

1. Introduction to Computer Systems
   Major components of computer systems: central processing units, storage devices and media, inputs / outputs; working principle of computers; contemporary types of CPU, memory, input / output devices currently in use.
2. System Software
   Functions and operations of system software; basic features and commands of MS Windows and Unix / Linux; script language and task control.
3. Communication, Multimedia and the Internet
   Communication and networking; Internet resources and tools; multimedia information creation and application.
4. IT Applications
   Introduce typical applications of information technologies such as office automation, knowledge management, education, entertainment, digital edutainment, manufacturing, geo- informatics, bio-informatics, etc.
5. Inside IT Applications
   Role of programming in IT applications, e.g. shell programs, macros in Excel, robotic control, concept of algorithm and programming, debugging.
6. IT Intellectual Property
   Security, privacy and ethics with software; copyright and patent law; trade secrets and registered design.

Teaching and Learning Approach:

The course material will be delivered as a combination of mass lectures and small group supervised laboratory sessions. Students will get familiarized with common operating systems and environment, internet and multimedia tools. They will also attempt to use basic office automation tools such as word processing, spreadsheet, and simple database operations.

Method of Assessment:

Coursework: 100%

Reference List:

1. G.B. Shelly, T.J. Cashman and M. Vermaat, *Discovering Computers 2005*, Thomson Course Technology, 2005.
2. G.B. Shelly, T.J. Cashman and M. Vermaat, *Office 2003, Course One and Course Two (2 volumes)*, Thomson Centre Technology, 2004.
3. P. Toliver, Y. Johnson and S. Wise, *The Select Series: Microsoft Office XP. Volume 1*, Prentice-Hall, 2002.
4. L.E. Long and N. Long, *Computers*, 12th ed., Prentice-Hall, 2005.

SUBJECT DESCRIPTION FORM

Subject Title:	Enterprise Information Technology	**Subject Code:**	COMP102
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial/Laboratory 14 hours

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

Objectives:

This subject provides students with the concept of information systems and their role in today's enterprises. This subject can be taken with or without having taken COMP100 as a pre-requisite. It is suitable for all students.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand the use of information systems at various organizational levels;
2. understand the basic principles of the modelling, storage, retrieval and management of information in an enterprise;
3. appreciate the use of strategic information systems for competitive advantages; and
4. understand ethical and social implications of information systems.

Keyword Syllabus:

1. Basic Principles of Databases
   Data, information and knowledge; modelling and storage of information in databases; querying and retrieval of data; transaction processing.
2. More Advanced Manipulation and Management of Information
   The principles and applications of data warehousing, data mining, and knowledge management in an enterprise.
3. Decision Support for Business Intelligence
   Decision and executive support systems; business intelligence technologies such as expert systems, genetic algorithms for organizational modelling, neural networks and fuzzy logic for business applications; hands-on experience in using tools such as SPSS, data mining tool, neural network engine.
4. Electronic Commerce/Business
   Business use of the Internet, world wide web, intranets and extranets; electronic banking; cyber trading and investing; marketing on the internet; smart card trends, development methods and tools; security and cryptography.
5. Networked Enterprise
   Managing cooperative work environments; workflow and business process engineering; groupware and platforms for collaborative work, e.g. Novell.
6. Knowledge Management Concepts
   Corporate memory, intellectual capital, personal knowledge management, knowledge transfer, business intelligence.

Teaching and Learning Approach:

Lectures for delivery of conceptual knowledge and analytical techniques in case studies. Tutorials/Laboratories for discussion of real business cases and hands-on experience of tools and databases.

Method of Assessment:

Coursework: 60% Examination: 40%

Reference List:

1. James O'Brien, *Introduction to Information Systems: Essential for the Business Enterprise*, 13th ed., McGraw-Hill, 2007.
2. K.C. Laudon, et.al., *Management Information Systems: Managing the Digital Firm*, 9th ed., Prentice-Hall, 2006.
3. James O'Brien, *Management Information Systems: Managing Information Technology in the Business Enterprise*, 7th ed., McGraw-Hill, 2006.
4. David S. Linthicum, *Enterprise Application Integration*, Addison-Wesley, 2000.
5. Silberschatz, H.F. Korth and S. Sudarshan, *Database System Concepts*, 5th ed., McGraw-Hill.
6. Shelly, Cashman and Serwatka, *Business Data Communications: Introductory Concepts and Techniques*, 4th ed., Course Technology/Thomson Learning, 2004.

SUBJECT DESCRIPTION FORM

Subject Title:	Information Technology Systems	**Subject Code:**	COMP111
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Laboratory 28 hours

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

Objectives:

This subject provides the students with the foundations of information systems, and basic methods of problem-solving with computer-based tools. It can be taken with or without having taken COMP100. Students who intend to study information technology-related programmes are strongly recommended to take both COMP100 and COMP111.

Learning Outcomes:

On successful completion of this subject, students are expected to be able to:

1. understand underlying principles of computer organization;
2. solve simple problems with computer-based tolls involving programming, algorithms and other technologies; and
3. be able to control and be aware of the opportunities and limitations provided by ready-made tools and software.

Keyword Syllabus:

1. Fundamental Concepts
   Computer logic and organization, binary number representation and manipulation, modern computer architectures and trends, computer cluster, supercomputer, the computational grid.
2. System Software
   Operating system concepts, basic software development methods and tools, programming language, compiler, project management (Unix make file), debugger.
3. Basic Programming
   Basic C programming, simple data types, expression, control structure, structured data types, I/O, files.
4. Basic Algorithm and Problem Solving
   Problem solving procedure and tool, flowchart, pseudo-code, simple algorithms like linear search and bubble sort, implication on program execution time.
5. Data Communication, the Internet, and the World Wide Web
   Networking concepts; TCP/IP and Novell; features of Internet and Internet address, mobile computing.
6. Problem Solving with Computer-based Tools
   Integration of different computer-based technologies such as system software, application software, databases, networking, and mobile technologies to solve real-world problems.

Teaching and Learning Approach:

Lectures for delivery of conceptual knowledge and problem solving techniques. Tutorials/Laboratory for discussions, hands-on programming and implementation of solutions.

Method of Assessment:

Coursework: 60% Examination: 40%

Reference List:

1. Paul K. Andersen, *Just Enough UNIX*, McGraw-Hill, 2003.
2. H.M. Deital and P.J. Deital, *C How to Program*, 5th ed., Prentice-Hall, 2005 .
3. Marty Poniatowski, *UNIX User's Handbook*, 2/E. Prentice-Hall PTR, 2002.
4. John McMullen, *UNIX User's Interactive Workbook*, Prentice-Hall PTR, 1999.
5. Robert Cowart and Brian Knittel, *Using Microsoft Windows XP Professional*, Special ed., Que, 2003.
6. Brian K. Williams and Stacey C. Sawyer, Using Information Technology, McGraw-Hill, 2007.
7. Alan Evans, Kendall Martin and Mary Anne Poatsy, *Technology in Action*, 4th ed., Pearson Prentice-Hall, 2008.

SUBJECT DESCRIPTION FORM

Subject Title:	Extended Writing Skills	**Subject Code:**	ELC1003
Number of Credits:	3	**Hours Assigned:**	Seminars 42 hours

Pre-requisite: English for University Studies I (ELC1004) **Co-requisite:** nil **Exclusion:** nil

Objectives:

This subject aims to further develop students' competence in written communication in academic contexts and to enhance their ability to communicate effectively in an English-medium learning environment.

In striving to achieve the two interrelated objectives, attention will be given to developing confidence and competence in the use of grammar, vocabulary and academic writing conventions.

Learning Outcomes:

By the end of the subject, students should be able to communicate effectively in an English medium university contexts through

1. organising, writing and revising project reports,
2. discussing issues in written texts such as editorials, and
3. organising and writing correspondence to request assistance for study-related work.

To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present and support stance and opinion.

Content:

The content is indicative. The balance of the components, and the corresponding weighting, will be based on the specific needs of the students.

1. Appropriateness and accuracy of vocabulary and grammar
   Collocation and connotation of words; verb forms, prepositions and complex sentences.

2. Coherence and cohesion in writing
   Paragraph development; topicalisation and thematisation; cohesive devices including articles, determiners, connectives, pronouns and anaphoric references.

3. Logical development in writing
   Organisation in a variety of text types; selection of information; logical development of themes and topics.

4. Language development and independent learning strategies
   Self-access study tools such as online dictionaries, thesauruses and web concordancers to enhance language proficiency and develop vocabulary; independent language learning strategies such as the use of learning portfolios.

Teaching and Learning Approach:

The subject is designed to introduce students to the use of grammar and vocabulary in writing a variety of text types. Activities to further develop speaking and listening skills will be integrated into the interactive and project-based work throughout the course.

The study method by which the content is delivered is primarily seminar-based. Interactive learning techniques will be employed in activities such as discussions, role-plays and individual and group activities. Information technology will be employed to facilitate the learning and application of writing skills and online writing tools. Students will be referred to information on the Internet and the ELC's Centre for Independent Language Learning.

Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

Method of Assessment:

Continuous Assessment: 100%

Students' writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.

Indicative references:

1. D. Bunton, *Common English Errors in Hong Kong*, Hong Kong: Longman, 1989.
2. R. Carter, R. Hughes and M. McCarthy, *Exploring Grammar in Context: Upper-Intermediate and Advanced*, Cambridge: Cambridge University Press, 2000.
3. *Collins COBUILD English Dictionary for Advanced Learners*, Glasgow: Collins, 2001.
4. T.T.N. Hung, *Understanding English Grammar: A Course Book for Chinese Learners of English*, Hong Kong: Hong Kong University Press, 2005.
5. C. Madden and T. Rohlck, *Discussion and Interaction in the Academic Community*, Ann Arbor, MI: University of Michigan Press, 1997.
6. M. McCarthy and F. O'Dell, *English Vocabulary in Use: Advanced*, Cambridge: Cambridge University Press, 2002.
7. M. Nettle and D. Hopkins, *Developing Grammar in Context: Intermediate*, Cambridge: Cambridge University Press, 2003.
8. A. Oshima and A. Hogue, *Writing Academic English*, 4th ed., White Plains, NY: Pearson/Longman, 2006.
9. A. Oshima & A. Hogue, *Introduction to Academic Writing*, 2nd ed., New York: Longman, 1997.
10. M. Swan, *Practical English Usage*, 3rd ed., Oxford: Oxford University Press, 2005.

SUBJECT DESCRIPTION FORM

Subject Title:	English for University Studies I	**Subject Code:**	ELC1004
Number of Credits:	3	**Hours Assigned:**	Seminars 42 hours

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

Objectives:

This subject aims to help students study effectively in an English-medium learning environment and to enhance their proficiency in English.

In striving to achieve the two interrelated objectives, attention will be given to enhancing confidence and competence in grammar, vocabulary and pronunciation.

Learning Outcomes:

By the end of the subject, students should be able to communicate effectively in an English medium university contexts through

1. delivering effective oral presentations,
2. summarising and paraphrasing materials from written and spoken sources, and
3. planning, writing and revising expository essays.

Content:

The content is indicative. The balance of the components, and the corresponding weighting, will be based on the specific needs of the students.

1. Spoken communication
   Developing and practising specific oral skills required to prepare and deliver effective oral presentations; developing awareness of interpersonal communication strategies in different social and cultural contexts.

2. Written communication
   Analysing and practising common writing functions; improving abilities of writing topic sentences and strategies for paragraph development; understanding common patterns of organisation in writing; taking notes from written and spoken sources; introducing summarising skills; improving coherence and cohesion in writing; developing revision and proofreading skills.

3. Reading and listening
   Understanding the content and structure of information delivered orally and in print; reading and listening for different purposes.

4. Language development
   Developing relevant grammar, vocabulary and pronunciation skills.

Teaching and Learning Approach:

The subject is designed to enable students to use English effectively in the contexts they will encounter in their university studies. The main emphasis is on improving students' confidence and competence in grammar, vocabulary and pronunciation in these contexts.

The study method is primarily seminar-based. Activities will include discussions, role-plays and individual and group activities. Students will be referred to information on the Internet and the ELC's Centre for Independent Language Learning.

Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

Method of Assessment:

Continuous Assessment: 100%

Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.

Indicative references:

1. J. Boyle and L. Boyle, *Common Spoken English Errors in Hong Kong,* Hong Kong: Longman, 1998.
2. B. Brannan, *A Writer's Workshop: Crafting Paragraphs, Building Essays*, Boston, Mass.: McGraw-Hill, 2003.
3. *Collins COBUILD English Dictionary for Advanced Learners*, Glasgow: Collins, 2001.
4. S. Cunningham and P. Moor, *Cutting Edge (Advanced)*, Harlow, Essex: Pearson/Longman, 2005.
5. M. Hancock, *English Pronunciation in Use,* Cambridge: Cambridge University Press, 2003.
6. T.T.N. Hung, *Understanding English Grammar: A Course Book for Chinese Learners of English,* Hong Kong: Hong Kong University Press, 2005.
7. A. Jay and R. Jay, *Effective Presentation,* London: Prentice-Hall, 2000.
8. M. McCarthy and F. O'Dell, *English Vocabulary in Use: Upper-Intermediate*, Cambridge: Cambridge University Press, 2001.
9. S. Redman, *English Vocabulary in Use: Pre-Intermediate and Intermediate*, Cambridge: Cambridge University Press, 2003.
10. G. Yule, O*xford Practice Grammar (Advanced)*, Oxford: Oxford University Press, 2006.

SUBJECT DESCRIPTION FORM

Subject Title:	English for University Studies II	**Subject Code:**	ELC1005
Number of Credits:	3	**Hours Assigned:**	Seminar 42 hours

Pre-requisite: English for University Studies I (ELC1004) **Co-requisite:** nil **Exclusion:** nil

Objectives:

This subject aims to further enhance the written and spoken English communication skills that students will need to function effectively in their university studies.

Learning Outcomes:

By the end of the subject, students should be able to communicate effectively in an English medium university contexts through

1. participating effectively in group discussions,
2. organising and composing descriptive writing, and
3. planning and writing argumentative essays.

Content:

The content is indicative. The balance of the components, and the corresponding weighting, will be based on the specific needs of the students.

1. Spoken communication
   Enhancing and practising specific oral and aural skills required to participate effectively in formal interactions involving such activities as discussions and debates, as well as in a variety of informal contexts.

2. Written communication
   Writing descriptive texts; understanding and using common organisational patterns of argumentative essays; improving coherence and cohesion in writing; reinforcing revision and proofreading skills; achieving appropriate tone and style in writing.

3. Reading and listening
   Understanding the content and structure of information delivered orally and in print; reading and listening for different purposes.

4. Language development
   Developing relevant grammar, vocabulary and pronunciation skills.

Teaching and Learning Approach:

The subject is designed to further enhance the written and spoken English communication skills that students will need to function effectively in their university studies. The main emphasis is on improving students' confidence and competence in writing essays and participating in discussions

The study method is primarily seminar-based. Activities will include discussions, role-plays and individual and group activities. Students will be referred to information on the Internet and the ELC's Centre for Independent Language Learning.

Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

Method of Assessment:

Continuous Assessment: 100%

Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.

Indicative references:

1. R. Barrass, *Students Must Write: A Guide to Better Writing in Coursework and Examinations,* 3rd ed., London: Routledge, 2005.
2. R. Carter, R. Hughes and M. McCarthy, *Exploring Grammar in Context: Upper-Intermediate and Advanced*, Cambridge: Cambridge University Press, 2000.
3. *Collins COBUILD English Dictionary for Advanced Learners*, Glasgow: Collins, 2001.
4. C.G. Madden and T.N. Rohlck, *Discussion and Interaction in the Academic Community*, Ann Arbor, MI: University of Michigan Press, 1997.
5. M. McCarthy and F. O'Dell, *English Vocabulary in Use: Advanced*, Cambridge: Cambridge University Press, 2002.
6. A. Oshima and A. Hogue, *Writing Academic English*, 4th ed., White Plains, NY: Pearson/ Longman, 2006.
7. A. Oshima and A. Hogue, *Introduction to Academic Writing*, 2nd ed., White Plains, NY: Pearson/ Longman, 1997.
8. J.T. Wood, G.M. Philips and D.J. Pederson, *Group Discussion: A Practical Guide to Participation and Leadership,* 4th ed., Long Grove, Ill: Waveland Press, 2007.

SUBJECT DESCRIPTION FORM

Subject Title:	Foundation Year Seminar I	**Subject Code:**	ENG1001
Number of Credits:	1	**Hours Assigned:**	Seminars 8 hours Visits 6 hours

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

Objectives:

The subject is to enable students to have a foretaste of the discipline-specific or related study and to provide opportunities for more interaction with the Faculty members, through which students would also be helped to cultivate a sense of belonging to their parent faculty and departments and to build up a correct learning attitude in the University.

Learning Outcomes:

On completion of the subject, students will

1. have a better understanding of their discipline, parent Faculty and Departments;
2. develop a sense of belonging to their parent Faculty and Departments; and
3. familiarise with the issues in effective learning.

Seminar Topics:

Typical Topics of the Seminars

1. Enhancing study habits as independent learners
2. Introduction and development of computing science and its related disciplines
3. Introduction and development of electronic and information engineering and its related disciplines
4. Introduction and development of electrical engineering and its related disciplines
5. Introduction and development of industrial and systems engineering and its related disciplines
6. Introduction and development of mechanical engineering and its related disciplines

Three of the five topics (2) – (6) will be covered in this subject.

Teaching and Learning Approach:

This subject consists of four seminars and three laboratory visits delivered by three Engineering Departments of the Faculty and SAO. Each of the three Departments will offer one seminar and one laboratory visit, and SAO will be responsible for one seminar.

Method of Assessment:

Continuous Assessment: 100%

The subject is assessed on a pass/fail basis, and method of assessment involves a Personal Log Book and a Reflective Essay.

SUBJECT DESCRIPTION FORM

Subject Title:	Foundation Year Seminar II	**Subject Code:**	ENG1002
Number of Credits:	1	**Hours Assigned:**	Seminars 6 hours Visits 6 hours Program Specific Activity 2 hours

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

Objectives:

The subject is to enable students to have a foretaste of the discipline-specific or related study and to provide opportunities for more interaction with the Faculty members, through which students would also be helped to cultivate a sense of belonging to their parent faculty and departments and to build up a correct learning attitude in the University.

Learning Outcomes:

On completion of the subject, students will

1. have a better understanding of their discipline, parent Faculty and Departments;
2. develop a sense of belonging to their parent Faculty and Departments; and
3. familiarise with the issues in effective team work.

Seminar Topics:

Typical Topics of the Seminars

1. Building effective teams in learning
2. Introduction and development of computing science and its related disciplines
3. Introduction and development of electronic and information engineering and its related disciplines
4. Introduction and development of electrical engineering and its related disciplines
5. Introduction and development of industrial and systems engineering and its related disciplines
6. Introduction and development of mechanical engineering and its related disciplines

Two of the five topics (2) – (6) will be covered in this subject.

Teaching and Learning Approach:

This subject consists of three seminars, two laboratory visits, one visit to the Industrial Centre and one program specific activity. SAO will conduct one seminar, and two Engineering Departments of the Faculty will be responsible for two seminars and two laboratory visits. In addition to a visit to the Industrial Centre, a program specific activity will be arranged to let the students have further understanding of their own department. Typical activity includes a gathering to provide students opportunities to meet senior students of their own programmes.

Method of Assessment:

Continuous Assessment: 100%

The subject is assessed on a pass/fail basis, and method of assessment involves a Personal Log Book and a Reflective Essay.

SUBJECT DESCRIPTION FORM

Subject Title: Economics for Engineers		**Subject Code:**	AF2617
Number of Credits: 3		**Hours Assigned:**	Lectures 28 hours Tutorials 14 hours

Pre-requisite: nil **Co-requisite:** nil **Exclusion:** Economics for Engineers (AF3901)

Role and Purpose:

This subject aims to provide students with fundamental concepts of economics / finance / costing and to develop students' ability to analyze the economic situations by application of these concepts. It also aims to explain how these concepts can be applied to affect the functioning of an engineering company and contribute to decision making in engineering operations. It provides a foundation for related higher level subjects in economics/finance.

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

1. Understand the fundamental concepts of microeconomics / finance and costing.
2. Understand the concepts of costs and revenues in global business operation.
3. Develop the ability to understand economic and financial issues in reality.
4. Develop the problem-solving skills to deal with economic and financial problems in reality.
5. Assess the strategies and behaviors of firms operating under various market structures in the global economy.
6. Understand the ethical dimension of business decisions and the social consequences of any business decisions made.

Indicative Contents:

1. Introduction to Microeconomics
   Scarcity, Choice and Opportunity Cost; Demand, Supply and Price; Profit-maximizing Objective of a Firm; Cost and Output of a Firm; Depreciation and Cost.

2. Engineering Economic Decisions
   Engineering Projects: Strategic Engineering Economic Decisions; Short-term Operational Economic Decisions.

3. Time Value of Money and Project Evaluation
   Economic Equivalence and Interest Formulas; Evaluation of Engineering Projects using Methods of Present Value, Annual Worth, and Internal Rate of Return.

4. Capital Budgeting Decision
   Methods of Financing Cost of Capital, and Evaluation of Investment Alternatives.

Teaching/Learning Approach:

There will be a lecture of two hours per week that will be structured to help students to understand engineering economics concepts. Besides, there will be an one-hour tutorial per week, for which students are required to present answers from tutorial questions and discuss relevant cases and examples relating to the subject.

Method of Assessment:

Coursework: 50%	Final Examination: 50%	
Minimum Pass Grade:	Coursework	(D)
	Examination	(D)

Indicative Reading:

Textbook:

1. Park Chan, *Contemporary Engineering Economics*, 4th ed., Prentice-Hall.
2. Michael Parkin, *Economics*, 7th ed., Addison-Wesley.

Reference Books:

1. William, Sullivan, Wicks Elin and Luxhoj James, *Engineering Economy*, 13rd ed., Prentice-Hall.
2. Mankiw, Gregory, *Principles of Economics*, 2nd ed., Harcourt.
3. Stiglitz, Joseph and Carl Walsh, *Principles of Microeconomics*, 4th ed., W.W. Norton and Company Inc.
4. Landsburg, Steven, *Armchair Economist: Economics And Everyday Experience*, Free Press.

Other Readings:

1. The Economist.
2. Far Eastern Economic Review.
3. Hong Kong Economic Journal.
4. Hong Kong Economic Times.
5. Various newspaper articles.

SUBJECT DESCRIPTION FORM

Subject Title: Mathematics I	**Subject Code:** AMA201
Number of Credits: 3	**Hours Assigned:** Lecture 28 hours Tutorial and Student Presentation 14 hours

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

Objectives:

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 of engineering mathematics. The emphasis will be on the 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. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations;
3. apply appropriate mathematical techniques to model and solve problems in engineering;
4. develop and extrapolate mathematical concepts in synthesizing and solving new problems;
5. search for useful information in solving problems;
6. 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. Ordinary Differential Equations
   First and second order linear ordinary differential equations; Laplace transforms; Convolution theorem; Fourier transforms.

Teaching and Learning Approach:

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.

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. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, 2nd ed., McGraw-Hill, 2007.
2. H. Anton, *Elementary Linear Algebra*, 9th ed., John Wiley & Sons, 2004.
3. G.B. Thomas, Weir M.D., J.R. Hass and F.R. Giordano, *Thomas' Calculus*, 11th ed., Addison-Wesley, 2004.
4. G. James, *Advanced Modern Engineering Mathematics*, 3rd ed., Prentice-Hall, 2005.
5. M.E. Van Valkenburg, *Network Analysis*, 3rd ed., Prentice-Hall, 1974.

SUBJECT DESCRIPTION FORM

Subject Title:	Mathematics II	**Subject Code:**	AMA202
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial and Student Presentation 14 hours

Pre-requisite: Mathematics I (AMA201) **Co-requisite:** nil **Exclusion:** nil

Objectives:

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

Learning Outcomes:

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. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations;
3. apply appropriate mathematical techniques to model and solve problems in engineering;
4. develop and extrapolate mathematical concepts in synthesizing and solving new engineering problems;
5. search for useful information in solving problems;
6. undertake continuous learning.

Syllabus:

1. Calculus and Functions of Several Variables
   Infinite series; Power series; Taylor series; Fourier series; Partial differentiation; Maxima and minima; Lagrange multiplier.
2. Partial Differential Equations
   Formulation of partial differential equations; Method of separation of variables; Initial and boundary value problems.
3. Vector Calculus
   Vectors; Scalar and vector products; Gradient, divergence and curl operators; Multiple integrals; Line, surface and volume integrals; Green's theorem, divergence theorem and Stokes' theorem.

Teaching and Learning Approach:

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.

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. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, 2nd ed., McGraw-Hill, 2007.
2. G. James, *Modern Engineering Mathematics*, 3rd ed., Pearson Education. 2002.
3. R. Haberman, *Applied Partial Differential Equations*, 4th ed., Prentice-Hall, 2003.
4. H. Rogers, *Multivariable Calculus with Vectors*, Prentice-Hall, 1998.

SUBJECT DESCRIPTION FORM

Subject Title: Elementary Cantonese 基礎粵語 **Subject Code:** CBS2050

Number of Credits: 3 **Hours Assigned:** 每週 4 小時（共 10.5 週）

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

Objectives:

本課程旨在幫助國內學生在短期內學會日常生活所需使用的香港廣州話，並且通過粵語的學習，幫助他們了解香港文化，認識香港社會。

Learning Outcomes:

1. 幫助學員掌握香港粵語的語音、詞匯和語法的基本特點；
2. 幫助學員以粵語進行日常交際；
3. 通過學習粵語使學員了解香港社會文化並認識香港方言字。

Keyword Syllabus:

第一單元 簡介香港粵語的特點
粵語的拼音方案、粵語的語音
第二單元 介紹
重點學習：常見姓氏
"先"字的句式
第三單元 問候
重點學習：香港人常用的問候方式
比較格式
第四單元 打電話
重點學習：香港人電話交談的方式雙賓語句式
第五單元 約會
重點學習：簡單式語氣助詞
第六單元 問路
重點學習：方位表達法
第七單元 購物
重點學習：算錢的方式
第八單元 交通
重點學習：粵語"定"的動補結構式
第九單元 天氣
重點學習：天氣的表達
第十單元 飲食
重點學習："之嘛"等複合式語氣助詞
第十一單元 香港
重點學習：將字句
第十二單元 買餸
重點學習：單音節形容詞的重疊式
第十三單元 睇醫生
重點學習：意願的表達方式
第十四單元 工作——搵工跳槽
重點學習：表達同意的方式
第十五單元 報紙
重點學習：表達可能的方式
第十六單元 旅遊——海洋公園
重點學習：囑咐的表達方式
第十七單元 電視文化
重點學習：責備的表達方式

第十八單元 香港廟宇——黃大仙
重點學習：安慰的表達方式

Teaching and Learning Approach:

本課程採取情境教學法，共有十八個單元，讓學生在模擬的情境中對話，自然地學習語言。本課程也著重講解在每個情境中所使用的粵語各個成分，包括語音、詞匯和語法，讓學生全面地和更有效地掌握香港粵語，以進行基本的語言交際，包括課堂上的一般討論。

Method of Assessment:

課堂表現		: 10%
測試	一. 課堂練習測驗	: 20%
	二. 個人短講	: 30%
	三. 期末小組口頭報告	: 40%
		: 100%

Essential Reading:

1. 鄭定歐等編,《粵語香港話教程》, 三聯書店出版, 2003 年 10 月.

Reference List:

1. 高華年,《廣州方言研究》, 商務印書館, 1984 年 1 月.
2. 李新魁等, 《廣州方言研究》, 廣東人民出版社, 1995 年 6 月.
3. 歐陽覺亞, 《普通話廣州話的比較與學習》, 中國社會科學出版社, 1996 年 9 月.
4. 饒秉才等, 《廣州話方言詞典》, 商務印書館, 1996 年 11 月.
5. 《廣州音字典》, (普通話對照), 三聯書店（香港）有限公司, 1996 年 4 月.
6. 曾子凡, 《廣州話、普通話口語詞對譯手冊》, 三聯書局, 1994 年 5 月.
7. 張洪年, 《香港粵語語法的研究》, 香港中文大學, 1972 年 10 月.

SUBJECT DESCRIPTION FORM

Subject Title:	Chinese for Electronic and Information Engineering	**Subject Code:**	CBS2065
Number of Credits:	2	**Hours Assigned:**	28 hours

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

Role and Purpose:

This subject aims to equip the students of EIE with competence in written Chinese and Putonghua to cope with the increasing professional interactions between Chinese mainland and Hong Kong. The training will enhance the students' abilities in (1) writing Chinese official letters, notice, email for communication / negotiation, (2) reading document such as report, articles and to familiarize with Chinese terminology of the profession; and (3) writing professional report, proposal.

Learning Outcomes:

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

Category A: Professional/academic knowledge and skills
1. master the functions, formats and styles of various Chinese practical writing for formal communication and other purposes in professional settings,
2. be familiarized with the style and the terminology of the profession in reading professional articles, reports and other documents,
3. produce professional documents such as report, proposal, guidelines/manuals.

Category B: Attributes for all-roundedness
4. develop the confidence in writing Chinese genres / documents for official communication and professional interaction;
5. develop the competence of choosing suitable styles and strategies of expression for the intended functions through Chinese writing.

Indicative Content:

1. Practical Chinese writing for effective communication (12 hrs)
   - official letters
   - internal memos
   - press releases
   - web writing
   - direct-mail packages

2. Reading of professional documents and terminology (4 hrs)
   - glossary of terminology (English vs Chinese)
   - articles
   - reports

3. Writing of professional documents (12 hrs)
   - report
   - proposal
   - manual / guideline

Forms of learning and teaching:

This subject will mainly be in the form of lectures interspersed with small group discussions. By using working examples, a tight link between theoretical input and practical applications will be made. Students are required to work individually and in small groups to develop their language and analytical skills.

Method of Assessment:

100% of the assessment for this subject is based on coursework in terms of both subject knowledge and writing skills in professional contexts, among which 60% will be based on 3 written assignments which evaluate students' written expression and 40% will be based on a group project on project activity. The group project will also include an end-of-semester oral presentation.

Reading List:

1. 司有和 ，《科技寫作簡明教程》，安徽教育出版社，1984。
2. 香港貿易發展局中文事務組編 ，《中國貿易應用文》，香港三聯書店，1994。
3. 于成鯤，《現代應用文》，復旦大學出版社，1996。
4. 陳瑞端著，《生活錯別字》，中華書局，2000。
5. 邢福義 汪國勝 主編，《現代漢語》，華中師範大學出版社，2003。

SUBJECT DESCRIPTION FORM

Subject Title: Logic Design

Subject Code: EIE211

Number of Credits: 3

Hours Assigned: Lecture/tutorial 33 hours
Laboratory 9 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 including

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. Analyse and design simple systems related to digital logic.
3. Apply theory to practice by using logic design techniques to construct digital systems with programmable logic devices and microprocessors, and appreciate the use of them.
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.
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 Sequential circuit analysis and design
   - 1.6 Registers and counters
   - 1.7 HDL representation - Verilog HDL.
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.

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: 50% Examination: 50%

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

Textbook:

1. M.M. Mano and C.R. Kime, *Logic and Computer Design Fundamentals*, 4th ed. Upper Saddle River, NJ: Prentice-Hall, 2008.

Reference Books:

1. M.M. Mano and M.D. Ciletti, *Digital Design,* Upper Saddle River, NJ: Prentice-Hall, 2007.
2. T.L. Floyd, *Digital fundamentals with PLD programming,* Upper Saddle River, NJ: Prentice-Hall, 2006.
3. B.B. Brey, *The Intel microprocessors : 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, and Pentium 4 : architecture, programming, and interfacing,* Upper Saddle River, NJ: Prentice-Hall, 2006.

SUBJECT DESCRIPTION FORM

Subject Title: University English I	**Subject Code:** ELC2501
Number of Credits: 2	**Hours Assigned:** 28 hours

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

Objectives:

This subject aims to help students to study effectively in the University's English medium learning environment and, more specifically, to improve and develop their English language proficiency within a framework of academic contexts.

In striving to achieve the two interrelated objectives, attention will be given to developing the core competencies the University has identified as vital to the development of effective life-long learning strategies and skills.

Learning Outcomes:

By the end of the subject, students should be able to communicate effectively in an academic context through

1. writing well-organised academic texts, such as expository essays,
2. delivering effective oral presentations, and
3. using appropriate referencing skills in academic writing and speaking.

To achieve the above outcomes, students are expected to use language and text structure appropriate to the context and to critically select relevant information to develop a theme in a text.

Content:

This syllabus is indicative. The balance of the components, and the corresponding weighting accorded to each, will be based on the specific needs of the students.

1. Written academic communication
   Identifying and employing functions common in written academic discourse; note-taking from reading and listening inputs; understanding and applying principles of academic text structure; developing paraphrasing, summarising and referencing skills; improving editing and proofreading skills; achieving appropriate tone and style in academic writing.

2. Spoken academic communication
   Recognising the purposes of, and differences between, spoken and written communication in English in academic contexts; identifying and practising the verbal and non-verbal interaction strategies in oral presentations; explaining and presenting ideas that require the development and application of logical thinking.

3. Reading and listening in academic contexts
   Understanding the content and structure of information delivered orally and in print; reading and listening for different purposes e.g. as input to tasks, and for developing specific reading or listening skills; using a dictionary to obtain lexical, phonological and orthographical information.

4. Language development
   Improving and extending relevant features of students' grammar, vocabulary and pronunciation.

Teaching and Learning Approach:

The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in academic contexts.

The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving drafting and evaluating texts, mini-presentations and discussions. Students will be referred to information on the internet and the ELC's Centre for Independent Language Learning.

Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

Method of Assessment:

Continuous Assessment: 100%

Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.

Indicative references:

1. J. Billingham, *Giving presentations,* Oxford: Oxford University Press, 2003.
2. R. Carter, R. Hughes and M. McCarthy, *Exploring Grammar in Context: Upper-intermediate and Advanced*, Cambridge: Cambridge University Press, 2000.
3. *Collins COBUILD English Dictionary for Advanced Learners*, Glasgow: Collins, 2001.
4. H. Gelfand, C. Walker & the American Psychological Association, *Mastering APA Style: Student's Workbook and Training Guide*, Washington, DC: American Psychological Association, 2002.
5. A. Jay and J. Ros, *Effective Presentations*, London: Prentice-Hall, 2000.
6. I. Leki, *Academic Writing: Exploring Processes and Strategies*, Cambridge: Cambridge University Press, 1998.
7. M. McCarthy and F. O'Dell, *English Vocabulary in Use: Upper-intermediate*, Cambridge: Cambridge University Press, 2001.
8. S. Reinhart, *Giving Academic Presentations,* Ann Arbor, MI: University of Michigan Press, 2002.
9. R. F. Verderber, K. S. Verderber and D.D. Sellnow, *The Challenge of Effective Speaking,* 14th ed., Belmont, CA: Thomson/Wadsworth, 2008.
10. M. Waters and A. Waters, *Study Tasks in English*, Cambridge: Cambridge University Press, 1995.

SUBJECT DESCRIPTION FORM

Subject Title: University English II	**Subject Code:** ELC2502
Number of Credits: 2	**Hours Assigned:** 28 hours

Pre-requisite: University English I (ELC2501) **Co-requisite:** nil **Exclusion:** nil

Objectives:

This subject aims to further develop those English language skills required by students to study effectively in the University's English medium learning environment.

Learning Outcomes:

By the end of the subject, students should be able to communicate effectively in academic contexts through

1. writing academic argumentative essays, and
2. participating actively in academic discussions.

To achieve the above outcomes, students are expected to use language and text structure appropriate to the academic context and to critically select relevant information to develop a thesis and arguments in a text.

Content:

This syllabus is indicative. The balance of the components, and the corresponding weighting, will be based on the specific needs of the students.

1. Written academic communication
   Understanding and applying principles of the text structure of persuasive and argumentative academic texts; further developing paraphrasing, summarising and referencing skills; improving editing and proofreading skills; achieving appropriate tone and style in academic writing.

2. Spoken academic communication
   Identifying and practising the verbal and non-verbal interaction strategies in academic discussions; explaining and presenting ideas that require the development and application of creative and critical thinking.

3. Reading and listening in academic contexts
   Understanding the content and structure of ideas delivered orally and in print; distinguishing between 'fact' and 'opinion'.

4. Language development
   Further improving and extending relevant features of grammar, vocabulary and pronunciation.

Teaching and Learning Approach:

The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in academic contexts.

The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving drafting and evaluating texts, mini-presentations and discussions. Students will be referred to information on the internet and the ELC's Centre for Independent Language Learning.

Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

Method of Assessment:

Continuous Assessment: 100%

Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.

Indicative references:

1. R. Carter, R. Hughes and M. McCarthy, *Exploring Grammar in Context: Upper-intermediate and Advanced*, Cambridge: Cambridge University Press, 2000.
2. T.E. Damer, *Attacking Faulty Reasoning: A Practical Guide to Fallacy-free Arguments*, Belmont, CA: Thomson/Wadsworth, 2005.
3. H. Gelfand, C. Walker and the American Psychological Association, *Mastering APA Style: Student's Workbook and Training Guide*, American Psychological Association, 2002.
4. K. Hyland, *English for Academic Purposes: An Advanced Resource Book*. London; New York: Routledge, 2006.
5. IEEE referencing style http://elc.polyu.edu.hk/cill/referenceMachine.htm.
6. Leki, *Academic Writing: Exploring Processes and Strategies*, Cambridge: Cambridge University Press, 1998.
7. C.G. Madden and T. Rohlck, *Discussion and Interaction in the Academic Community*, Ann Arbor, MI: University of Michigan Press, 1997.
8. K.T. McWhorter, *Study and Critical Thinking Skills in College*, New York: Pearson/Longman, 2008.
9. A. Meyers, *Gateways to Academic Writing: Effective Sentences, Paragraphs and Essays*, White Plains, NY: Longman, 2005.
10. A. Oshima and A. Hogue, *Writing Academic English*, 4th ed., White Plains, New York: Pearson/Longman, 2006.
11. A. Weston, *A Rulebook for Arguments,* Indianapolis, IN: Hackett Publishing Co., 1992.
12. N.V. Wood, *Writing Argumentative Essays*, Upper Saddle River, NJ: Prentice-Hall, 2001.
13. L.J. Zwier, *Building Academic Vocabulary,* Ann Arbor, MI: University of Michigan Press, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Information Technology	**Subject Code:**	ENG224
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 42 hours Laboratory 9 hours

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

Objectives:

To provide the foundation knowledge in computers, computer networks and data processing that is essential to modern information system design.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills

1. Understand the functions and features of computer hardware and software components.
2. Understand the architecture and functions of a computer operating system and be able to use the services it provided for managing computer resources.
3. Understand the basic structure of a database system and be able to set up and configure a simple database system.
4. Understand the principles of computer networks and be able to set up and configure a simple computer network.

Category B: Attributes for all-roundedness

5. Solving problems using systematic approaches.

Syllabus:

1. Introduction to computers
   Introduction to applications of information technology in different engineering disciplines. Introduction to computer hardware components: CPU, RAM, ROM, I/O devices and internal buses. Software components: applications, utilities and operating systems.
   Case study: Linux – user Interfaces, file management and process management.
   (10 hours)
2. Computer networks
   Introduction to computer networks: LAN and WAN, client-server and peer-to-peer architectures, network topology. OSI 7-layer model. TCP/IP protocol: UDP and TCP, port multiplexing, IP addressing and routing protocols. Internet applications. Networking devices: DSL modem, hub, bridge, switch, and router.
   Case studies: Ethernet – cabling, topology and access methods.
   (18 hours)
3. 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. Introduction to Information systems. Workflow management.
   Case study: Database management using Microsoft Access/MySQL.
   (14 hours)

Laboratory Experiments and other Practical Work (18 hours):

1. File management and process management in Linux
2. Setting up a Web server
3. Network Address Translation and IP Routing

Method of Assessment:

Continuous Assessment: 40% Examination: 60%
The continuous assessment consists of assignments and test.

Reference Books:

1. M. Small, *Information Technology and the Internet: The Kernel*, McGraw Hill, 2007.
2. D. E. Comer, *Computer Networks and Internets: with Internet Applications*, 4th ed., Prentice-Hall, 2004.
3. W. Stalling, *Data and Computer Communications*, 8th ed., Prentice-Hall, 2007.
4. C.J. Date, *An Introduction to Database Systems,* 5th ed., Addison-Wesley, 2000.

SUBJECT DESCRIPTION FORM

Subject Title: Engineering Science	**Subject Code:** ENG232
Number of Credits: 3	**Hours Assigned:** 42 hours

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

Objectives:

This subject aims:

1. to enable students to establish a broad knowledge base on the atomic structure and properties of materials with an emphasis on using this knowledge to solve engineering problems.
2. to provide a basic understanding on relationship between material properties and manufacturing processes so that they (students) are able to select those that are appropriate taking into consideration green design and environmental issues.
3. to enable students to understand the forms of energy and their conversion.

Student Learning Outcomes:

Upon satisfactory completion of the subject, students are expected to achieve the following learning outcomes:

1. To be able to apply the knowledge of materials science to analyse and solve basic engineering problems related to stress, strain and fracture of materials.
2. To be able to select appropriate materials and manufacturing processes for different products taking into consideration of issues in cost, quality and environmental concerns.
3. To be able to familiarize and apply thermodynamic properties of common substances, such as air and water, for the reversibility and efficiency considerations of energy balance, usage , and waste disposal in common energy transformation devices and systems.

Syllabus:

Materials Science and Engineering (27 hours)

Atomic Structure and Structure of Crystalline Solids: Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystal structures and energy levels; Introduction to phase diagram.

Electrical and Optical Properties of Materials: Conductors and insulators; Semi-conductor materials; N-type and P-type semiconductors; P/N junction; Light interactions with materials; Light emitting diode (LED) and optical detectors; Laser; Light propagation in optical fibers.

Mechanical Properties of Materials: Concept of stress and strain; Stress-strain behaviour; Elastic properties of materials; Tensile properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Design and safety factors; Fracture and fatigue.

Dislocations and Strengthening Mechanism: Characteristics of dislocations; Mechanism of strengthening in metals; Grain size reduction; Solid solution strengthening; Strain hardening; Precipitation hardening.

Manufacturing Technology of Materials: Role of materials in manufacturing; Relationship between manufacturing processes and material properties; Process capability.

Applications and Selection of Engineering Materials: Metallic materials; Ferrous and non-ferrous alloys; Ceramics; Polymers; Thermoplastics and thermosets; Composite materials.

Process Selection and Ecological Design: Cost consideration in materials selection; Selection of materials and manufacturing processes; Green manufacturing and environmentally conscious design.

Energy Utilization (15 hours)

Energy Trends, Conversion and Engineering: World consumption of primary energy sources; Technologies and issues in the conversion of different sources of energy.

Basic Concepts and Laws of Energy Conversion: Thermodynamic states, variables and systems; Thermodynamic properties of H_2O; Work, heat, and internal energy; Conservation of mass and energy; Reversibility of energy exchange; Energy balance for a flow.

Basic Cycles and Common Thermal Systems: Rankine cycle and the steam engine; Refrigeration and heat pump; Ideal gas basics; Otto cycle and the internal combustion engine; Brayton cycle and the gas turbine.

Laboratory Experiment (4 hours)

1. Tensile strength of metallic and plastic materials.
2. Conversion of fuel energy into engine power.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

Continuous Assessment may include assignments and short tests

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Textbooks and references:

1. W. Bolton, *Engineering Science*, 4th ed., Newnes, Oxford, 2001.
2. W.D. Callister Jr., *Materials Science and Engineering – An Introduction*, 7th ed., John Wiley & Sons, Inc., 2007.
3. *Manufacturing with Materials*, by Open University, Butterworths, 1st ed., 1990.
4 M. Ashby and D. Cebon, *Cambridge Engineering Selector CES 4 Edu Pack*, Granta Design Ltd.
5. Sonntag, *Borgnakke & Wylen Fundamentals of Thermodynamics*, Wiley & Sons, 2003.
6. T.D. Eastop and A. McConkey, *Applied Thermodynamics for Engineering Technologists*, 5th ed., Longman Group UK, 1993.

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%

For this subject, students need to go through three 2-hours programming tests in which students will be asked, within the allowed time period, to develop a set of computer programs using the C/C++ programming language to solve a problem. These three tests are worth 30% of the total marks.

Students also need to go through three 1-hour written tests to demonstrate their understanding to C/C++ programs. These three tests are worth 20 % of the total marks.

Besides, students need to finish a mini-project in this subject. Students are expected to spend not less than 35 hours of self-studying in order to finish the mini-project. The mini-project is worth 30% of the total marks.

The remaining 20% of marks are allotted to assignments that will be given during and after the classes.

Textbook:

1. J. Liberty and D.B. Horvath, *Sams Teach Yourself C++ in 24 hours*, Sams Publishing, 2005.

Reference Book:

1. H.M. Deitel and P.J. Deitel, *C++ How To Program*, 5th ed., Prentice-Hall, 2005.
2. I. Horton, *Ivor Horton's Beginning Visual C++ 2005,* Wiley Publishing, 2006.

SUBJECT DESCRIPTION FORM

Subject Title:	Basic Electricity and Electronics I	**Subject Code:**	ENG237
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 42 hours Laboratory 12 hours

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

Objectives:

1. Introduce the fundamental concepts of operation of electric circuits applicable to all engineering students.
2. Develop an ability for solving problems involving electric circuits.
3. Develop skills for experimentation on electric circuits.
4. Impart relevant skills and knowledge in basic electricity and electronics for independent learning of other subjects that require such skills and knowledge.

Student Learning Outcomes:

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

1. Have acquired a good understanding of the electric circuit operating principles;
2. Be able to solve simple problems in electric circuits;
3. Be able to use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations;
4. Be able to search for useful information in solving problems in electric circuits.

Syllabus:

1. DC Circuits
   Introduction to electric circuits. Potential and potential difference. Charge and flow of charge. Voltage and current as two basic variables. Kirchhoff's current and voltage laws. Independent and dependent sources. Resistance. Simple circuit styles: voltage divider, current divider, series and parallel circuits. Nodal and mesh analyses. Thévenin and Norton theorems. Power dissipation. Source loading and maximum power transfer. (8 hours)
2. Capacitance, Inductance and First Order Transients
   Constitutive relations of capacitor and inductor. Brief introduction to physics (electric and magnetic fields). Introduction to time-varying circuits. Simple RC and LC circuits. Important concept of independent state variables. First-order differential equation (with simple solution of exponential form). First order transient analysis. Time-domain solution and transient behaviour of first order circuits. Time constant. (6 hours)
3. Mutual Inductance and Transformer
   Basic coupled inductance equation. Concept of ideal transformer (assuming sinusoidal voltages and currents). Dot convention. Physical transformer as ideal transformer with leakage and magnetizing inductances. Applications in galvanic isolation and voltage/current level conversion. (3 hours)
4. Steady-state Analysis of AC Circuits
   Average and rms values. Phasors (rotating vectors). Steady-state analysis of circuits driven by single fixed frequency sinusoidal sources. Impedance and admittance. Analysis approach 1: phasor diagrams for simple circuits. Analysis approach 2: systematic complex number analysis, i.e., same treatment as DC circuits but with complex numbers representing phase and magnitude of AC voltages and currents. Real and reactive powers. Power factor. Three-phase circuits. Measuring three-phase power by two-wattmeter method. (9 hours)
5. Load Line Analysis and Diode Circuits
   I-V characteristics of general nonlinear components. Diode as specific case. Low voltage case: DC solution based on load line construction. High voltage case: rectifier circuits, clipping and clamping circuits. (4 hours)

6. 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. (8 hours)

7. Instrumentation and Measurement
   Choice of measurement method; Analogue and digital instruments; Bridges; Measurement uncertainties. (4 hours)

Laboratory Experiments: (12 hours, 3 hours each)

1. Instrumentation and circuit theorems
2. First order transient
3. Single-phase and three-phase AC circuits
4. Simple digital circuits

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

Textbook:

1. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, *Engineering Circuit Analysis,* 7th ed., New York: McGraw Hill, 2006.

References:

1. C.K. Tse, *Linear Circuit Analysis,* London: Addison-Wesley, 1998.
2. D.A. Neamen, *Micoelectronics: Circuit Analysis and Design*, Boston: McGraw-Hill, 3rd ed., 2006.
3. R.A. DeCarlo and P.M. Lin, *Linear Circuit Analysis*, 2nd ed., Oxford University Press, 2001.
4. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 2nd ed., 2000.

SUBJECT DESCRIPTION FORM

Subject Title:	Basic Electricity and Electronics II	**Subject Code:**	ENG238
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 42 hours Laboratory 12 hours

Pre-requisite: Basic Electricity and Electronics I (ENG237) **Co-requisite:** nil Exclusion: nil

Objectives:

To introduce students to the operating principles of electrical and electronic circuits. Several classes of electronic circuits will be covered in this subject – diode circuits, BJT transistor circuits, FET transistor circuits, and operational amplifier circuits. An introduction to electrical machines will be given.

Student Learning Outcomes:

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

1. should have acquired some understanding in the fundamental aspects of electric and electronics principles with specific focus in the following topics:
   a) PN junction characteristics, load line concept, and the design of basic diode circuits;
   b) DC biasing of BJT and FET circuits
   c) basic operating principles of BJT and FET transistor circuits and design;
   d) basic operating principles of ideal operational amplifiers;
   e) basic frequency response of amplifiers.
   f) electrical machines basics
2. should have the ability to solve basic circuit problems in electric and electronic circuits;
3. should have acquired better skills in performing the laboratory experiments;
4. should be able to perform independent learning in basic electric and electronic principles.

Syllabus:

1. Diode Fundamentals
   P-N junction basics. Input, output and transfer characteristics of practical diodes. Biasing through load line concept. (3 hours)
2. Transistors and Biasing Circuits
   The bipolar junction transistors (BJT). DC biasing and analysis of BJT circuits. MOS field-effect transistors (MOSFET). Junction field effect transistors (JFET). Simple biasing arrangements. Load line and graphical large-signal analysis. Transistor amplification concept. (6 hours)
3. Transistor Amplifiers and Small-signal Concepts
   Basic BJT and MOSFET amplifier configurations: common emitter and common source configurations. Small-signal models and parameters. Concept of transconductance. Voltage gain. Input and output impedances. Introduction to loading effect (arrived naturally from consideration of loading a common emitter amplifier). Need for emitter follower as buffer. (9 hours)
4. Frequency Domain Analysis
   Transfer functions from ac circuits in terms of $j\omega$. Introduction to frequency domain, from $j\omega$ to s. General s-domain transfer functions. Simple first-order filter circuits. Introducing concepts of pole, corner frequency, bandwidth. For sinusoidal driving sources, use of $j\omega$ axis for magnitude and phase plots. Extension to asymptotic plots and hence Bode plots. (10 hours)
5. Operational Amplifiers
   Ideal operational amplifier. Defining characteristics (i.e., infinite gain and infinite input resistance). Op-amp circuits: inverting amplifier, non-inverting amplifier, summer, difference amplifier, integrator and differentiator. Applications: analog-digital converter, instrumentation amplifier; current-to-voltage and voltage-to-current converters. (6 hours)
6. Fundamentals of Electrical Machines
   Basic operating principles of transformers, d.c. machines, induction motors and synchronous machines. (8 hours)

Laboratory Experiments:

1. Op-amps as analog computers and as current-to-voltage converters.
2. DC transistor biasing/load line and diode clamping circuits.
3. Transistor amplifier circuits.
4. Transformer tests and characteristics.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

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

Textbook:

1. Donald A. Neamen, *Microelectronics: Circuit Analysis and Design*, 3rd ed., Boston: McGraw-Hill, 2006.

References:

1. C.K. Tse, *Linear Circuit Analysis,* London: Addison-Wesley, 1998.
2. G. Rizzoni, *Principles and Applications of Electrical Engineering*, 5th ed., New York: McGraw-Hill, 2006.
3. A.S. Sedra and K.C. Smith, *Microelectronic Circuits,* 5th ed., New York: Oxford University Press, 2004.
4. R.W. Goody, *PSPICE for Windows – A Circuit Simulation Primer*, Englewood Cliff: Prentice-Hall, 1995.

SUBJECT DESCRIPTION FORM

Subject Title:	Industrial Centre Training I	**Subject Code:**	IC272
Number of Credits:	9 training credits	**Hours Assigned:**	9 weeks (Refer to Training Pattern)

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

Objectives:

Industrial Centre Training I is offered by The Hong Kong Polytechnic University Industrial Centre. The objective of the subject is to equip students with practical skills, techniques and technologies which are general and essential in the practice of electronic and information engineering (EIE). The training is comprised of three parts; namely technology training, engineering graphics and industrial safety.

1. Technology training provides training in engineering practice in electronic and information engineering. Students should be able to acquire fundamental knowledge in electronic product design and prototype fabrication with an appreciation of electronic product manufacturing process and practise. On completion of the engineering practice, student should be able to handle projects and fabricate prototype for electronic design and development. Furthermore, students also receive training in computer software that is essential for business and engineering.
2. Engineering graphics provides an opportunity for student to learn and use technical graphics as a media to express ideas and describe objects. The emphasis is put on practicing the principle and interpretation of technical drawing and to communicate design idea using simple sketch and computer graphics. In addition to computer based technical graphics, students are expected to be familiar with using electronic design automation (EDA) software to capture and design electronic circuit boards and comprehend different types of electrical drawings that are frequently encountered in electronic and electrical engineering.
3. Industrial Safety provides students with an understanding of industrial hazards and their control in practicing engineering in industry.

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills

1. Acquire practical professional skills and best practice in electronic and information engineering for application on the design, construction, operation and maintenance of electronic and information equipment and system.
2. Acquire fundamentals in using commercial available software to solve problems.
3. Demonstrate technical competence in handing electronic projects and produce prototypes for design and development.
4. Understand the importance of safety, responsibility and regulation in the practice of engineering.
5. Application of fundamental principles in electronic and information engineering and develop practical methods to solve circuit or production development problems.

Category B: Attributes for all-roundedness

6. Communicate effectively and work in harmony with other members in a team and develop leadership capability.
7. Communicate effectively with the use of engineering graphics and computer graphics.
8. Demonstrate critical and creative thinking in electronic project development and handling.
9. Understand the importance of training and the needs for continual professional development in professional engineering career.
10. Practice and demonstrate initiative and learn by practice interactively and produce solutions to open-ended problems.

Syllabus:

I. Technology Training (7 weeks)

1. IC 0705 – Automation and Robotics (1 week)
   1.1 Introduction to industrial robots, programming and interface.
   1.2 Introduction to electronic motion control systems, programmable logic controller, servo and stepping motors. Data communication for industrial robots.
   1.3 Applications of sensors for automation and control. Application of electro-pneumatic components and system for automation and control.
   1.4 Introduction to material handling devices and Automatic Storage and Retrieval System (ASRS). Introduction to Computer Integrated Manufacturing system (CIM).
2. IC 1101 – Basic Electronic Practice for Electronic and Information Engineering (1 week)
   2.1 Introduction to common electronic parts, use of basic test instruments, best practices and basic troubleshooting techniques, electronic workshop safety.
   2.2 Soldering and de-soldering techniques, mounting and installation of electronic circuits, wiring of subassemblies.
   2.3 PCB design, hands-on practice on PCB circuit design in EDA.
   2.4 Circuit artwork, etching process, PCB prototype fabrication.
   2.5 Application and use of electronic test instruments: current and voltage measurements, two wire and four wire techniques, power and signal sources, oscilloscope probes, analogue and digital oscilloscopes
   2.6 Introduction to Virtual Instrument, application and hands-on practice on Labview or an equivalent software package
3. IC 1102 – Advanced Electronic Practice for Electronic and Information Engineering (1 week)
   3.1 Introduction to electronic circuit interconnect technologies: SMT, COB and wave-soldering.
   3.2 Introduction to electronic assembly design and manufacturing process, components, tools and machines.
   3.3 Hands-on practice on wave-soldering, SMT process, chip level wire bonding, chip-on-board encapsulation, LCD display attachment with heat seal connector.
   3.4 Introduction to advanced electronic packaging and assembly process: fine-pitch SMT, BGA, Flip-chip and CSP
   3.5 Soldering quality of BGA assembly and X-ray inspection machine
4. IC1610 - Workshop practice for Electronic and Information Engineering (1 week)
   4.1 Introduction to materials and design of mechanical small parts, chassis and support for electronic products. Hands-on training will focus on the design and fabrication of parts for electronic prototype assembly using available stock material and fastening solution.
   4.2 Design and application of sheet metal on electronic chassis and small parts. Make use of basic sheet metal processing tools in machine shop to fabricate prototype parts such as heat sink, chassis or mechanical structure for electronic products. Typical tools should include manual shear and press brake, drilling, stamping and application of sheet metal fastening solutions with necessary safety measures.
   4.3 Application of engineering plastic stock in the design and fabrication of parts, linkages and structures for electronic product prototype. Hands-on training will focus on the application of tools and processes including laser processing, heat forming and vacuum forming with appropriate joining techniques, fastening and assembly solution.
   4.4 Appreciation of mass production processes for sheet metal and plastic parts fabrication
5. IC3003 - Basic Scientific Computing (30 hours)
   5.1 Approach and techniques in using the MATLAB Development Environment.
   5.2 Mathematical operations, matrices, linear algebra, polynomials and interpolation, data analysis and statistics, function functions, differential equations.
   5.3 Programming, M-files programming and application examples, flow control statements, function files
   5.4 Graphical user interface, data structures, input/output, and object-oriented capabilities.

5.5 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.

6. IC1110 – Microcomputer Applications and Practice (1 week)
   6.1 Introduction to Microchip Microcomputer families and development tools
   6.2 Hands-on practice on memory, I/O, data communications, ADC operations
   6.3 Hands-on practice on LED and LCD displays
   6.4 Hands-on practice on motor control and sensors
   6.5 Application of microcomputer on consumer electronic products, mechatronics, home automation products, wired and wireless connectivity

7. IC1111 – Business Software Applications (1 week)

   7.1 Application of Microsoft Access in simple database creation, indexing, input and output.
   7.2 Introduction to business workflow, forms and data collection using Web services
   7.3 Web form production using Microsoft InfoPath
   7.4 Introduction to Microsoft Office Server

II. Engineering Graphics (46 hours)

IC8031 Drawing for Electronic and Information Engineering (46 hours)

1. Mechanical Engineering Drawing (36 hours)

   1.1 Principle of Engineering Drawing (15 hours)
   Engineering graphics as a design communication tool, geometrical sketching, problems and visualization; principle of engineering drawing and interpretation in accordance with international standards; orthographic projection systems, multi-view and sectional drawings; introduction to axonometric projections, isometric drawing; introduction to dimensioning and tolerance.

   1.2 CAD in Engineering Drawing (21 hours)
   Multi-view and engineering drawings using AutoCAD, fundamental AutoCAD commands and drawing aids, engineering drawing practice; three-dimensional modelling and presentation, wire frame and solid models; constructive solid geometry; primitives and Boolean operation.

2. Electronic and Information Engineering Drawing (10 hours)

   2.1 Electronic Design Automation (6 hours)
   Introduction to electronic design automation software, circuit schematics and logic diagrams; placement of components, capturing, annotation, labelling, net list. Electronic parts library, symbols, decals, physical packages, discrete components, integrated circuits, logic and analogue circuits, electronic parts creation and application.

   2.2 Electrical and Electronic Drawing (4 hours)
   Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical and electronic device symbols and layout, architectural wiring diagram with reference to the architectural symbols for electrical drawings in Hong Kong and international standards.

III. Industrial Safety (15 hours)

IC2002 Industrial Safety I for Engineering Discipline (15 hours)

1. Safety Management
   1.1 Overview in safety management.
   1.2 Development of safety in Hong Kong and Government's current safety policy; safety training.
   1.3 Principles of safety management.
   1.4 Essential elements of safety management; causes of accidents and prevention methods; accident reporting procedures.
   1.5 Job safety analysis and fault tree analysis.

2. Safety Law
   2.1 F&IU Ordinance and Principal Regulations.
   2.2 Construction Sites (Safety) Regulations.

3. Occupational Hygiene
   3.1 Noise hazard and control.
   3.2 Dust hazard and control.
   3.3 Personal protective equipment.
   3.4 First aid and emergency procedures.

4. Safety Technology
   4.1 Manual and mechanical handling.
   4.2 Fire prevention.
   4.3 Dangerous substances and chemical safety.
   4.4 Machinery hazards and principles of guarding.
   4.5 Electrical safety.
   4.6 Construction safety - potential hazards and risks associated with construction sites; safety codes of practice at work.

Training Pattern:

(I) Technology Training	:	IC3003 Year 1 term 1; balance in Year 1 term break and summer
(II) Engineering Drawing and Computer Graphics (IC8031)	:	46 hours in Year 1 term time.
(III) Industrial Safety (IC2002)	:	15 hours in Year 1 term time.

Method of Assessment:

The assessment is comprised of 100% continuous assessment with the following weighting approximately:-

Assignment: 50% Report: 30% Test: 20%

Reference Books:

1. Villanucci, Robert S., Avtgis, Alexander W., et all, *Electronic Techniques : Shop Practices and Construction*, 6th ed., Prentice-Hall, 1999.
2. Tooley, Michael H., *Electronic Circuits: Fundamentals and Applications*, 3rd ed., Newnes, Oxford, Boston, 2006.
3. Stadtmiller, D. Joseph, *Applied Electronic Design*, Prentice-Hall, N.J., 2003.
4. O'Hara, Martin, *EMC at Component and PCB Level*, Newnes, Oxford , 1998
5. Harper, Charles A., *Electronic Packaging and Interconnection Handbook*, 4th ed., McGraw-Hill, 2005.
6. Klein Wassink, R. J., *Soldering in Electronics : A Comprehensive Treatise on Soldering Technology for Surface Mounting and Through-hole Techniques*, 2nded., Electrochemical Publications Limited, Ayr, Scotland, 1989.
7. Martin, Perry L., *Electronic Failure Analysis Handbook : Techniques and Applications for Electronic and Electrical Packages, Components and Assemblies*, McGraw-Hill, New York, 1999.
8. Meeldijk, Victor, *Electronic Components: Selection and Application Guidelines*, Wiley, New York, 1996.
9. Loveday, George., *Electronic Fault Diagnosis*, 3rd ed., Pitman, London, 1995.
10. *The ARRL Handbook for Radio Communications*, ARRL, Newington, Conn.
11. Giesecke, Frederick E., et al., *Modern Graphics Communication*, 8th ed., Prentice-Hall, N.J., 2004.
12. Cheng, Ron, *Maximizing Autodesk Mechanical Desktop 2005*, Delmar Learning, N.Y., 2005.
13. *Code of Practice for the Electricity (wiring) Regulations*, EMSD, The Government of the HKSAR.

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: Introduction to Management (MM201)
Organisational Behaviour (MM211)
Organisation and Management (MM202/MM302)
People and Management (MM2191)

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:

On completion of this subject, students will:

Category A: Professional/academic knowledge and skills

1. Be able to 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. Be able to 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. Be able to 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. Have further developed 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:

**Individual subject lecturer may prescribe different textbooks for the course.*

Recommended Textbook:

1. S.P. Robbins and M. Coulter, *Management,* 9th ed., Prentice-Hall, 2007.

References:

1. Certo, *Modern Management,* 10th ed., Prentice-Hall, 2006.
2. Jones, *Contemporary Management*, 4th ed., McGraw-Hill, 2006.
3. Kinicki & Williams, *Management: A Practical Introduction,* 2nd ed., McGraw-Hill, 2006.
4. McShane, *Organizational Behavior,* 3rd ed., McGraw-Hill, 2005.
5. Robbins, *Essentials of Organizational Behavior,* 8th ed., Prentice-Hall, 2005.
6. J.R. Schermerhorn, *Management*, 8th ed., John Wiley & Sons, 2005.
7. Sieren, Boos and Boos, *China Management Handbook,* MacMillan, 2003.

Current journal articles, periodicals & newspapers will also be assigned for study.

SUBJECT DESCRIPTION FORM

Subject Title:	Probability and Engineering Statistics	**Subject Code:**	AMA305
Number of Credits:	3	**Hours Assigned:**	Lecture 28 hours Tutorial and Student Presentation 14 hours

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

Objectives:

The lectures aim to provide the students with an integrated knowledge required for the understanding and application of statistical 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 basic probability theory and stochastic processes. The emphasis will be on application of statistical methods to solving practical engineering problems.

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

Category A: Professional/academic knowledge and skills
1. Apply mathematical reasoning to analyse essential features of different statistical problems in engineering.
2. Apply appropriate probabilistic techniques to model and solve problems in engineering.
3. Make use of stochastic and Markov processes to solve typical engineering problems.
4. Search for useful information and use statistical tables in solving statistical problems in the context of engineering.

Category B: Attributes for all-roundedness
5. Undertake continuous learning.

Syllabus:

1. Probability Theory
   Probability and random variables; Probability distributions; Sampling distributions; Sampling means; The Central Limit Theorem; Significance and test of hypothesis.
2. Stochastic Process
   Bernoulli process; Poisson process; time averaging and ergodicity; Spectral analysis; Correlation and spectra; Wiener-Khintchine theorem; White noise; Narrow-band noise; thermal noise; Signal-to-noise ratio and probability of error; Effective noise temperature and noise figure.
3. 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. 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.
2. A.V. Balakrishnan, *Introduction to Random Processes in Engineering*, 2nd ed., John Wiley & Sons, 2005.
3. W.A. Gardner, *Introduction to Random Processes: with Applications to Signals and Systems*, 2nd ed., McGraw-Hill, 1990.

SUBJECT DESCRIPTION FORM

Subject Title: Electronic Circuits

Subject Code: EIE304

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)
Basic Electricity and Electronics II (ENG238)

Co-requisite: nil

Exclusion: nil

Objectives:

This is the main foundation subject introducing the working principles and constructions of analog electronic circuits. The specific aim is to familiarize students with the design and operation of analog building blocks (e.g., mirrors, differential stages, output stages), practical operational amplifiers, feedback amplifiers and oscillators.

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 operations of transistor devices, e.g., BJT and MOSFET
2. Analyze the small-signal characteristics of transistor amplifiers
3. Design basic analogue building blocks
4. Understand the operations and limitations of operational amplifiers
5. Analyze and design feedback circuits and oscillators

Category B: Attributes for all-roundedness

6. Communicate effectively
7. Think critically and creatively
8. Assimilate new technological development in related field

Syllabus:

1. Analog Building Blocks
   - 1.1 Simple current mirrors; problem due to Early effect and non-ideality; Wilson and Widlar mirrors; use of mirrors as active loads.
   - 1.2 Differential amplifier (DA) stage; analysis using half-circuit models, common-mode and differential-mode gains; common-mode rejection ratio (CMRR).
   - 1.3 Output stages; class A, class B and class AB output stages; efficiency; harmonic distortions.
2. Operation Amplifier Design
   - 2.1 Typical operational amplifier circuit: input differential stage, CE gain stage, and output stage; details of internal circuit design: active loading, level shift, current sourcing.
   - 2.2 Non-idealities: dc offset, input bias current (causing offset); finite input impedance, etc.
   - 2.3 Slew-rate limitation; gain-bandwidth product; stability design; concept of unity-gain feedback; phase margin; design of low-frequency pole and use of Miller effect for internal compensation.
3. Feedback Circuits and Oscillators
   - 3.1 General feedback configuration; basic amplifier gain, loop gain and closed-loop (overall) gain.
   - 3.2 Effects of feedback on gain, frequency response, distortion, input and output impedances.
   - 3.3 Feedback circuit configurations: shunt-series, shunt-shunt, series-shunt and series-series feedback; stability analysis; phase margins and compensation methods; analysis of feedback circuits via two-port models.
   - 3.4 Oscillation criteria; amplitude limiting and sustained oscillation; Colpitts, Hartley, Wien bridge, phase-shift and crystal oscillators.

Laboratory Experiments:

Each student is required to complete the following three laboratory experiments:

1. Title: Negative Feedback Amplifier
   Objective: To design the feedback network for a given amplifier in order to meet certain specifications.
2. Title: Oscillator
   Objective: To design a Wien-bridge oscillator using an IC amplifier.
3. Title: Characteristics of Operational Amplifier
   Objective: To study the internal operation of an operation amplifier and measure the characteristics of the responses.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

The continuous assessment consists of assignments, lab reports, and a test.

Textbooks:

1. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, *Analysis and Design of Analog Integrated Circuits,* New York: Wiley, 2001.
2. K.R. Laker and W.M.C. Sansen, *Design of Analog Integrated Circuits and Systems*, New York: McGraw-Hill, 1994.

Reference Books:

1. D.A. Jones and K. Martin, *Analog Integrated Circuit Design*, New York: Wiley, 1997.
2. D.A. Neamen, *Electronic Circuit Analysis and Design*, 2nd ed., New York: McGraw-Hill, 2001.
3. R.W. Goody, *PSPICE for Windows - A Circuit Simulation Primer*, Englewood Cliffs: Prentice-Hall 1995.

SUBJECT DESCRIPTION FORM

Subject Title:	Integrated Analogue and Digital Circuits	**Subject Code:**	EIE305
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) Basic Electricity and Electronics II (ENG238) Electronic Circuits (EIE304)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

To develop an in-depth understanding of the design principles and applications of integrated analogue and digital circuits.

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 fundamental principles and applications of digital logic circuits.
2. Design periodic signal generators from digital logic circuits.
3. Understand filter design principles and circuit technologies.
4. Apply theory and realize analog filter circuits.
5. Understand the Verilog style digital design.
6. Perform logic synthesis using FPGA tools.

Category B: Attributes for all-roundedness
7. Communicate effectively
8. Think critically and creatively
9. Assimilate new technological development in related field

Syllabus:

1. Digital Circuits
   - 1.1 Digital logic circuit families: Transistor-transistor logic (TTL), emitter-coupled logic (ECL), and CMOS logic. Input and output characteristics. Fan-in (in CMOS) and fan-out (in TTL). Noise margin. Time delay. Power loss. Switching speed.
   - 1.2 Multi-vibrators: Mono-stable, bi-stable and astable circuits. Saturating and non-saturating multi-vibrators. Schmitt trigger and 555 timer.
   - 1.3 Memory circuits: RAMs, ROMs and EPROMs.
2. Analog Filter Design
   - 2.1 Basic filter principles. Filter approximations (e.g., Butterworth, Chebychev, elliptic, Cauer, etc.). Transfer functions for low-pass, band-pass, high-pass, and band-stop filters. Frequency responses (magnitude and phase).
   - 2.2 Analogue filters: lossless passive realization and active RC realization. Standard first-order filters and biquads.
   - 2.3 Discrete-time realizations. z-domain functions. Active switched-capacitor realization. Standard first-order filters and biquads.
3. Introduction to Verilog Styles Digital Design and Synthesis
   - 3.1 Basic language structures: data types and modules. Structural and behavioural specifications: basic gates, user-defined primitives, modelling levels, synthesizable operations, continuous assignments. Procedural specifications: blocks, functions and tasks, blocking and non-blocking assignments, control and conditional constructs.
   - 3.2 Basic design methodology: small module design, module validation, finite state machines. Managing large complexity leading to large designs.
   - 3.3 Synthesis to FPGA: timing, area and power considerations.

Laboratory Experiments:

1. Design of electronic circuits using Xilinx FPGA tools.
2. Simulation of filter design using SPICE.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

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

Textbooks:

1. R. Schaumann and M.E. Van Valkenburg, *Design of Analog Filters*, New York: Oxford University Press, 2001.
2. D.R. Smith and P.D. Franzon, *Verilog Styles for Synthesis of Digital Systems*, Englewood Cliffs: Prentice-Hall, 2000.
3. J.P. Hayes, *Introduction to Digital Logic Design*, Reading: Addison-Wesley, 1993.

Reference Books:

1. P.R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, *Analysis and Design of Analog Integrated Circuits,* New York: Wiley, 2001.
2. D. Van den Bout, *The Practical Xilinx Designer Lab Book*, Englewood Cliffs: Prentice-Hall, 1999.

SUBJECT DESCRIPTION FORM

Subject Title:	IC Technology and Processes	**Subject Code:**	EIE306
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:

To enable students to gain basic knowledge and understanding in the following aspects:
1. Fundamentals of semiconductors
2. The operating principles of pn junctions and MOSFETs
3. CMOS processes and basic CMOS logic gates
4. Fabrication processes of semiconductor devices

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills
1. Understand basic electronic properties of semiconductors.
2. Design structures of pn junctions to meet a given specification.
3. Fabricate basic semiconductor devices.
4. Appreciate the effects of defects and impurities on the properties of semiconductor devices.
5 Optimize the physical structure of a MOSFET .

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. Semiconductor Fundamentals
   Energy band, extrinsic semiconductor, carrier concentration, mobility, drift and diffusion currents, Einstein Relationship.
2. P-N Junctions
   Energy band diagram, electrostatics of p-n junctions, capacitance, forward and reverse current characteristics, applications in optoelectronics.
3. Bipolar Junction Transistors
   Energy band diagram at equilibrium and under bias, current components, dependence of current gain on transistor parameters, Ebers-Moll model, Charge control model.
4. MOS Field-Effect Transistors
   MOS structure, capacitance of MOS system, operation of MOSFETs, oxide and interface charge, derivation of the threshold voltage, I-V characteristics, short channel effects.

Laboratory Experiments:

Fabrication of Semiconductor Device
Session 1: Cleaning of wafers and oxidation and windows opening and doping;
Session 2: Thin film deposition, photolithography, mask alignment, pattern definition and etching; and
Session 3: Device characterization

Method of Assessment:

Continuous assessment: 40% Examination: 60%

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

Textbook:

1. Robert F. Pierret, *Semiconductor Device Fundamentals*, Addison-Wesley, 1966.

Reference Book:

1. Betty Lise Anderson and Richard L. Anderson, *Fundamentals of Semiconductor Devices,* McGraw-Hill, 2005

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

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 (AMA201) **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.

Syllabus:

1. Embedded System Hardware
   Microcontroller-based, microprocessor-based and PC-based approaches
   The details of a typical microcontroller architecture, e.g. the 8051 or AVR family
2. Programming with Embedded System
   Timers/counters, serial port communications and interrupt handling
3. I/O Interfacing
   Introduction to different I/O interfacing techniques such as output-pin driving limitations, current driving, inductive load driving; pulse generation and measurement; keyboard multiplexing, display multiplexing, driving LCD controllers, analog signals sensing, motor control and measurements
4. Sytstem Bus and Memory Interfacing
   Concepts of system bus
   Discussion on memory device interfaces
5. Embedded Software Development and Real-time Operating System (RTOS)
   Discussion on the embedded software issues including tasks and events, interrupt system, inter-task communication and the shared-variables problem and solutions
   Introduction to RTOS: Kernel services, semaphores, priority inversion, task priority and scheduling
6. Industrial I/O Standards
   Timing specifications and arbitration of different industrial I/O standards, e.g. RS485, SPI, I^2C, CAN and USB

Laboratory Experiments:

1. Serial I/O and timer-based baud rate generation
2. Timer-based pulse width measurement
3. Interrupt handling
4. Pulse-Width-Modulated output generation.

Method of Assessment:

Continuous Assessment: 50% Examination: 50%

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

Reference Books:

1. M. A. Mazidi, J. G. Mazidi and R. D. Mckinlay, *The 8051 Microcontroller and Embedded Systems Using Assembly and C*, Prentice-Hall, 2006.
2. A. Deshmukh, *Microcontrollers: Theory and Application*, McGraw-Hill, 2005.
3. Rai Kamal, *Embedded Systems: Architecture, Programming and Design*, McGraw-Hill, 2004.
4. S. R. Ball, *Analog Interfacing to Embedded Microprocessors: Real World Design*, 2nd ed., 2004.
5. M. J. Pont, Embedded C, Addison-Wesley, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Integrated Project	**Subject Code:**	EIE329
Number of Credits:	3	**Hours Assigned:**	Lecture 24 hours Laboratory 36 hours Mini-project Work 60 hours Total 120 hours

Pre-requisite: Computer Systems Fundamentals (EIE311)
Basic Electricity and Electronics II (ENG238)

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:	Communication Fundamentals	**Subject Code:**	EIE331
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 36 hours Laboratory 6 hours (Equivalent to 18 laboratory hours)

Pre-requisite:	Mathematics I (AMA201) Mathematics II (AMA202)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

Telecommunication plays an important role in modern societies that build heavily on knowledge economy. Telecommunication systems enable the transfer and exchange of information over communication channels that are corrupted by disturbances and noises in a cost-effective manner. The major objectives of this subject are for the students to establish a firm foundation for the understanding of telecommunication systems, and the relationship among various technical and socio-economic factors when such systems are designed and operated.

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills

1. Identify various elements, processes, and parameters in telecommunication systems, and describe their functions, effects, and interrelationship
2. Analyze, measure, and evaluate the performance of a telecommunication system against given criteria
3. Design typical telecommunication systems that consist of basic and essential building blocks.

Category B: Attributes for all-roundedness

4. Communicate effectively.
5. Think critically and creatively.
6. Work in a team collaboratively.
7. Assimilate new technological development in related field.

Syllabus:

1. Introduction
   - 1.1 Introduction to telecommunication systems, their past and present development; elements of a basic communication system; examples of practical telecommunication systems.
2. Analog Communications
   - 2.1 Amplitude Modulation (AM): double sideband, double sideband with suppressed carrier, single sideband, vestigial sideband modulation; frequency spectrum and power of the AM signal
   - 2.2 Demodulation of AM signals: envelope detector, coherent detector
   - 2.3 Radio receiver design: Tuned Radio Frequency (TRF) receiver and superheterodyne receiver.
   - 2.4 Angle modulation: phase modulation (PM) and frequency modulation (PM), frequency spectrum of the PM and FM signals, Stereo FM.
   - 2.5 Demodulation of angle modulation signals: discriminator, Phase-Locked Loop (PLL) detector.
3. Noise in Analog Modulation
   - 3.1 Random variables, white noise, bandpass noise
   - 3.2 Effect of noise on AM and FM systems, figure of merit
   - 3.3 Signal-to-noise ratio (S/N) and its improvement through pre-emphasis/de-emphasis in FM systems

4. Analog pulse Modulation
   4.1 Sampling of analog signals and the sampling theorem; pulse amplitude modulation
   4.2 Quantizing and coding, quantization noise, uniform and non-uniform quantization
   4.3 Pulse code modulation (PCM), differential PCM, delta modulation
   4.4 Time division multiplexing: concept of framing and synchronization, TDM-PCM telephone system, comparison of TDM and FDM.

5. Information Theory
   5.1 Measure of information and entropy.
   5.2 Conditional, joint and mutual information. Channel capacity.

Laboratory Experiment:

Mini Projects

1. Design and implementation of an Amplitude Modulator with a linear multiplier IC; AM generation and coherent demodulation (two 3-hour sessions)
2. Design and implementation of Stereo FM signal generator; generation of standard stereo FM signals, and reception of FM signals with a commercial FM radio receiver (four 3-hour sessions)

Method of Assessment:

Continuous assessment: 40% Examination: 60%

Textbook:

1. T.G. Thomas and S.C. Sekhar, *Communication Theory*, McGraw-Hill, 2006.

Reference Books:

1. R.E. Ziemer and W.H. Tranter, *Principles of Communications: Systems, Modulation and Noise*, 5th ed., New York: John Wiley & Sons, c2002.
2. A.B. Carlson, P.B. Crilly and J.C. Ruthledge, *Communication Systems: an introduction to signals and noise in electrical communication,* 4th ed., McGraw-Hill, 2002.
3. S. Haykin, *Communication Systems,* 4th ed., John Wiley & Sons, 2001.
4. W.D. Stanley and J.M. Jeffords, *Electronic Communications: Principles and Systems*, Thomson Delmar Lerning, 2006.

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: Communication Fundamentals (EIE331) **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.

Possible Computer-Based Experiments:

1. Digital transmission
2. Error correction
3. Protocol Analysis
4. Routing simulation study

Method of Assessment:

Continuous assessment: 35% Examination: 65%

The continuous assessment will include one test and computer-based experiments.

Textbook:

1. Behrouz A. Forouzan, *Data Communications & Networking*, 4th ed., New York, U.S.A.: McGraw-Hill, 2007.

SUBJECT DESCRIPTION FORM

Subject Title:	Applied Electromagnetics	**Subject Code:**	EIE338
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:

1. To introduce to students the physical laws that govern the electromagnetic phenomena commonly encountered in electrical engineering systems.
2. To familiarise students with the techniques for solving problems in Electromagnetics.
3. To provide students the foundation of electromagnetic field theory required for pursuing the EE programme.

Student Learning Outcomes:

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

Category A: Professional / academic knowledge and skills:

1. Apply mathematical techniques to formulate the fundamental field equations and to analyse electromagnetic phenomena related to electrical engineering systems.
2. Select the most appropriate laws/theorems/solution techniques for electromagnetic field analysis.
3. Appreciate the effect of material media and boundary conditions on the behaviour of field quantities.
4. Apply electromagnetic theory to the design of practical electromagnetic devices and components.
5. Appreciate recent developments in computational electromagnetics.
6. Have had hands-on experience in electromagnetic measurements and be able to compare/apprecipate different kinds of field plotting mechanisms, e.g., to verify Laplace's equation with a resistance network.

Category B: Attributes for all-roundedness:

7. Appreciate the engineering applications of electromagnetic theory.
8. Appreciate the importance of electromagnetics from a historical perspective.
9. Interpret the physical meaning and phenomena behind mathematical equations and computed results.
10. Describe a physical problem mathematically and to apply mathematical tools to analyse and solve physical problems.

Syllabus:

1. Static fields: Electrostatics
   Electric fields, Coulomb's law, Gauss's law, potential, capacitance and energy storage. Magnetostatics: Biot-Savart law, magnetic fields, Ampere's circuital law, force on a current-carrying conductor, Lorentz force and energy storage.
2. Time-varying Fields
   Faraday's Law and Lenz's Law; self-inductance, mutual inductance and stored energy.
3. Mathematical Prelemininaries
   Vectors, vector and scalar product. The operators, grad, div and curl. Concept of line, surface and volume integrals. Stokes's and divergence theorems.
4. Maxwell's Equations and EM Waves
   Maxwell’s equations in integral form as a restatement of fundamentals. Differential form. The continuity equation. The displacement current. The wave equation, plane polarized wave, velocity of propagation and energy flows.
5. Material Media
   Dipole, polarisation, permittivity, dielectrics and capacitors. MMF, ferromagnetism, permeability, reluctance and permeance, magnetisation curve and hysteresis. Magnetic circuits.

6. Solution of Static Field Problems
   Hand-mapping, method of images, numerical and computer-based methods. Field analogues. Estimation of conductance, inductance, capacitance and field quantities from field plots.

7. Electromagnetic Design
   Magnetic circuit design for inductors, actuators and rotating machines. Design of cable insulation and capacitors. Concepts of electromagnetic interference and screening.

Laboratory / Mini-project:

A number of hardware, software (use Matlab) or research mini-projects will be offered to the students. The students are ideally worked in pairs and have to select one of them. The total time allocated for the project is 18 hours.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

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

Textbook:

1. F. T. Ulaby, *Fundamentals of Applied Electromagnetics*. 5th ed., Pearson International Edition, 2007.

References:

1. W. H. Hayt, Jr. and J. A. Buck, *Engineering Electromagnetics*. 7th ed., Boston: McGraw Hill, 2006.
2. Z. Popovic & B. D. Popovic, *Introductory Electromagnetics*, Pearson, 2000.
3. D. K. Cheng, *Fundamentals of Engineering Electromagnetics*, Pearson, 1993.
4. K. E. Lonngren & S. V. Savov, *Fundamentals of Electromagnetics with Matlab*, Scitech, 2005

SUBJECT DESCRIPTION FORM

Subject Title:	English for Effective Workplace Communication	**Subject Code:**	ELC3508
Number of Credits:	2	**Hours Assigned:**	28 hours

Pre-requisite:	University English I (ELC2501) University English II (ELC2502)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

This subject aims to develop the English language skills required by students to communicate effectively in their future professional careers.

Learning Outcomes:

By the end of the subject, students should be able to communicate effectively in workplace contexts through

1. interacting professionally in a job interview,
2. writing appropriate correspondence related to engineering professions, and
3. writing logical and coherent reports.

To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, present ideas systematically and logically, and provide support for stance and opinion.

Content:

This content is indicative. The balance of the components, and the corresponding weighting, will be based on the specific needs of the students.

1. Job interviews and work-related discussions
   Practising the specific verbal and non-verbal skills required when communicating with potential employers in job-seeking interviews.

2. Workplace correspondence
   Selecting and using relevant content; organising ideas and information; maintaining appropriate tone, distance and level of formality; achieving coherence and cohesion; adopting an appropriate style, format, structure and layout.

3. Workplace reports
   Selecting and using relevant content; organising ideas and information; describing tables and graphs; discussing and analysing data; adopting an appropriate style, format, structure and layout.

4. Language appropriacy
   Using context-sensitive language in spoken and written English.

5. Language development
   Improving and extending relevant features of grammar, vocabulary and pronunciation.

Teaching and Learning Approach:

The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in their future professions.

The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. Students will be referred to information on the Internet and the ELC's Centre for Independent Language Learning.

Learning materials developed by the English Language Centre are used throughout this course. Additional reference materials will be recommended as required.

Method of Assessment:

Continuous Assessment: 100%

Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.

Indicative references:

1. J.E. Appleman, *10 Steps to Successful Business Writing*, Alexandria, VA.: ASTD, 2008.
2. A. Ashley, *A Handbook of Commercial Correspondence,* 2nd ed., Oxford: Oxford University Press, 1992.
3. T. Aspinall and G. Bethell, *Test Your Business Vocabulary in Use,* 1st ed., Cambridge: Cambridge University Press, 2003.
4. G.T. Bilbow, *Business Writing for Hong Kong*, 3rd ed., Hong Kong: Longman, 2004.
5. M.E. Guffey, *Essentials of Business Communication*, 6th ed., Mason, Ohio: South-Western College Pub., 2004.
6. C.R. Krannich and R.L. Krannich, *Interview for Success: A Practical Guide to Increasing Job Interviews, Offers, and Salaries*, Manassas Park, VA: Impact Publications, 2003.
7. J. Potter, *Common Business English Errors in Hong Kong*, Hong Kong: Longman, 1992.
8. A. White, *Interview Styles and Strategies*, Mason, Ohio: South-western/Thomson Learning, 2003.

SUBJECT DESCRIPTION FORM

Subject Title:	Engineering Management	**Subject Code:**	ENG306
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 42 hours

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

Objectives:

This subject will provide students with:

1. Skills for analysing and applying the basic principles and techniques involved in management of people and engineering activities in the production of goods and services. Techniques learned will enable students to carry out operations in an organization for the purposes of organizing, planning and control of project and process activities.
2. Skills in the use and understanding of different quality management tools and techniques in an organisation, hence enable students to interpret the quality work content of typical jobs.
3. The ability to apply ethical and business behaviours in engineering organizations in the changing environment in which they operate.
4. The ability to apply the change management techniques and enable students to evaluate the changing factors that affect the change process before implementation of any changes.

Student Learning Outcomes:

Category A: Professional/academic knowledge and skills
Category B: Attributes for all-roundedness

1. To analyse the organisation structure, and identify the planning and strategic management factors affecting the success of organizations in both manufacturing, and service sectors. (Objective 1 and Syllabus Item 1). Category A
2. To apply appropriate management techniques to improve organization structure and procedures, and quality management. (Objective 2 and Syllabus Item 2). Category A
3. To describe and differentiate between the project management objectives and requirements, and select an appropriate project management technique and apply it to analyze project activities. (Objective 1 and Syllabus Item 3). Category A
4. To be able to analyse factors affecting the changes in the work environment, and be able to control and manage the change activities. *(Objective 4 and Syllabus Item 4). Categories A & B*
5. To discuss the environmental factors that affect on operations of engineering organizations in Hong Kong, and to recognise ethics and business behaviours in conducting business. (Objective 3 and Syllabus Item 5). Categories A & B

Syllabus:

1. Introduction.
   General management concepts in organizations; functions & types of industrial organizations, structure, corporate objectives, strategy and policy
2. Industrial Management
   Roles of managers. Process of management, planning, organising, motivating, leading and controlling of social and engineering activities. Quality management and tools
3. Industrial Engineering Planning
   Project management, project specifications, scope and objectives, work breakdown structure and organizational breakdown structure. Tools that support engineering operations; scheduling, business process re-engineering, etc
4. The Management of Change
   Changes due to technical innovation, political-legal, economic and social issues. Factors that affect the execution of changes
5. Effects of Environmental Factors
   The effects of environmental factors on the operations of engineering organizations in Hong Kong, e.g. legal aspects of employment; professional codes of conduct for engineers; contracting; product liability; sources, effect and control of environmental pollutants.

Teaching and Learning Approach:

A mixture of lectures, tutorial exercises, and case studies will be used to deliver the various topics in this subject. Some of which will be covered in a problem-based format where this enhances the learning objectives. Others will be covered through directed study in order to enhance the students' ability of "learning to learn". Some case studies, largely based on real experience will be used to integrate these topics and thus demonstrate to students how the various techniques are inter-related and how they apply in real life situations.

Method of Assessment:

Coursework: 40% Examination: 60%

Coursework comprises assignments with individual and group components; and team work is an essential element in the Coursework assessment. All assessment components will require students to apply what they have learnt to realistic work applications.

Reference Books:

1. D.L. Babcock and L.C. Morse, *Managing Engineering and Technology: An Introduction to Management for Engineers*, 3rd ed., Prentice-Hall, 2002.
2. H. Kerzner, *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 9th ed., Wiley, 2005.
3. F.F. Mazda, *Engineering Management*, Addison-Wesley, 1998.
4. S.P. Robbins and M. Coulter, *Management*, 8th ed., Prentice-Hall International, 2005.
5. J.R. Jr. Schermerhorn, *Management*, 8th ed., Wiley, 2005.
6. J.A.F. Stoner, R.E. Freeman and D. Gilbert, *Management*, 6th ed., Prentice-Hall, 1995.

SUBJECT DESCRIPTION FORM

Subject Title:	Society and the Engineer	**Subject Code:**	ENG307
Number of Credits:	3	**Hours Assigned:**	Lecture/Case Study/ Seminar 42 hours

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

Objectives:

This subject is designed for engineering students as a complementary subject about the role of the professional engineer in practice and their responsibilities towards the profession, colleagues, employers, clients and the public. The objectives of the subject are to enable students to:

1. appreciate the historical context of modern technology and the nature of the process whereby technology develops.
2. understand the social, political, economic responsibility and accountability of a profession in engineering and the organizational activities of professional engineering institutions.
3. appreciate the relationship between technology and environment and the implied social costs and benefits.
4. be aware of the short-term and long-term effects on the use of technology relating to safety, health and welfare aspects.
5. observe the professional conduct, the legal and more constraints relating to various engineering aspects.

In class, there will be short lectures to provide essential knowledge and information on the relationship between society and the engineer under a range of dimensions. There will be discussions, case studies, seminars to engage student's in-dept analysis of the relationship.

Learning Outcomes:

Category A: Professional/academic knowledge and skills

1. Describe different types of intellectual protection and evaluate impacts of modern technology on education, business and societal development [1,5].
2. Explain the importance of professional conduct and responsibilities in various engineering activities [2,5].
3. Identify the effects on the use of technology relating to health and safety, environment and welfare of the public in real life cases [3,4].
4. Interpret the academic, training and professional experience requirement of local and overseas of professional engineering institutions. [2]

Category B: Attributes for all-roundedness

5. Discuss, in a team setting, the social problems related to engineers and present the findings. [2, 3, 4,5].

Syllabus:

1. Trend and transfer of technology. Impact of technology on society. Innovation and creativity. Quality assurance and product life-cycle.
2. Environmental protection and related issues. Role of the engineer in energy conservation, ecological balance and sustainable development.
3. The outlook of Hong Kong's industry, its supporting organizations and impact on development from the China Markets.
4. Industrial health and safety including the work of the Labour Department and the Occupational Health and Safety Council. Industrial legislation.
5. The Professional Institutions: both local and overseas. Training of engineers.
6. Professional ethics, bribery and corruption including the work of the ICAC. Social responsibilities of engineers.

7. Intellectual property right such as patents and copyright protection. Contract law for engineers.

Method of Assessment:

Continuous Assessment: 60% Examination: 40%

Students will form into groups and throughout the course, students will work on engineering cases by completing the following learning activities:

1. Case analysis;
2. Presentation;
3. Case portfolio; and
4. Final presentation.

Reference books:

1. F. Stephen Johnston, J.P. Gostelow and W. Joseph King, *Engineering and Society Challenges of Professional Practice*, Upper Saddle River, N.J.: Prentice-Hall, 2000.
2. Linda Hjorth, Barbara Eichler and Ahmed Khan, *Technology and Society Abridge to the 21st Century*, Upper Saddle River, N.J.: Prentice-Hall, 2003.

Reading material:

Engineering journals:

- Engineers by The Hong Kong Institution of Engineers
- Engineering and Technology by The Institution of Engineers and Technology

Magazines:

- Times
- Far East Economics

Current newspaper:

- South China Morning Post
- China Daily
- Ming Pao Daily

SUBJECT DESCRIPTION FORM

Subject Title:	Industrial Centre Training II	**Subject Code:**	IC367
Number of Credits:	4	**Hours Assigned:**	4 weeks (Year 2 Summer)

Pre-requisite:	Industrial Centre Training I (IC272)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

In succession to IC272, Industrial Centre Training II provided by The Hong Kong Polytechnic University Industrial Centre focus on the training for undergraduate professional engineer in the area of electronic and information engineering. The objectives of this course are:-

1. To apply and consolidate the practical skills and best practices acquired in previous training and coalesce with academic knowledge to work on engineering projects in an industrial environment.
2. To develop the technical and managerial skills of undergraduate engineer to tackle open-ended problem with preparation to participate in engineering project in their future career.

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 process and develop the skills of planning, market survey, and delivery of an engineering project in addition to the technical aspects.
2. Consolidate, gain confidence and demonstrate technical competence in handling engineering projects and producing prototypes for design and development in the area of electronic and information engineering.
3. Understand the importance of safety, responsibility and regulation in the practice of engineering.
4. Apply fundamental principles and knowledge in electronic and information engineering and to develop practical solutions to solve problems in the development phase of an engineering project.
5. Deploy available resource to fabricate working prototype with relevant engineering documentation under a multidisciplinary industrial environment.

Category B: Attributes for all-roundedness

6. Communicate effectively and work in harmony with other members in a team and develop leadership capability.
7. ommunicate effectively using Internet.
8. emonstrate critical and creative thinking in electronic project development and handling.
9. ractise creativity and demonstrate initiative with a learn-by-practice approach to produce solutions for open-ended problems in an engineering context.
10. Understand the importance of training and the needs for continual professional development in professional engineering career.

Syllabus:

1. IC 1103 – Integrated Training in Electronic & Information Engineering (4 weeks)
   1.1 Industrial Centre Training II takes the form of technical projects with typically 4 to 6 students in a team working in the Industrial Centre for a minimum of 4 weeks.
   - The project approach of Integrated Training II provides an arena for students to develop their personal ability and attitude in teamwork and leadership in real world industrial environment. Projects are structured so that student can bring their training, knowledge, creativity and experience together and consolidate them into one coherent activity.
   - Project work is an important and integral part in the working lives that virtually all engineers will come across at various stages in their career path. These engineering projects may include software and hardware design, planning, costing, parts manufacture, printed circuit board (PCB) and chassis assembly, testing, documentation, evaluation and presentation.
   - The team will simulate a project team or a young company being assigned the task of design and manufacture a prototype of a consumer electronic or IT product for a client. The team has to conduct a market research to come up with an appropriate design and marketing strategy. At the

end of the training period, the team has to create a Web site and present their achievement, manufacturing plan and business plan of this product.

- A professional engineer, particularly in the role of project leader, must have a sound appreciation of all these elements. By accomplishment of a project, students should be able to polish their creativity, understand and appreciate the elements, difficulties and open-ended type problems and solutions that are common in their future career as a professional engineer.

In general, the following task or activities will be required for each project group:-

1. Create new equipment, product or service in the area of electronic and information engineering.
2. Review an existing equipment, design prototype, product or service in the area of electronic and information engineering and deliver an improved prototype.
3. Planning and utilize resources in a multidiscipline industrial environment and deliver the output of the project.
4. Produce engineering documentation for client.
5. Produce and present the project on the Internet for investors or prospective clients.

Method of Assessment:

The assessment is comprised of 100% continuous assessment based on the performance of project deliverables. In an industrial environment, student will experience the discipline and devotion of working condition of junior engineer. Personal ability including creativity, leadership, working attitude, courage, responsibility, problem solving power and presentation style of student will be assessed together with the technical part of the project.

Reference Book:

To be specified according to the nature and contents of individual project.

SUBJECT DESCRIPTION FORM

Subject Title:	VLSI & Computer-Aided Circuit Design	**Subject Code:**	EIE401
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 35 hours Laboratory 7 hours (Equivalent to 21 laboratory hours)

Pre-requisite: Electronic Circuits (EIE304) **Co-requisite:** nil **Exclusion:** nil

Objectives:

To provide students with
1. insights into the area of VLSI circuits and systems based on silicon;
2. a broad spectrum of awareness of the many facets of VLSI design using CAD tools;
3. hands-on experience on VLSI design.

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 CMOS VLSI and associated technologies.
2. Solve problems in the design of CMOS logic circuits, with particular reference to speed and power consumption.
3. Acquire hands-on skills of using CAD tools in VLSI design.
4. Appreciate the design process in VLSI through a mini-project on the design of a CMOS sub-system.

Category B: Attributes for all-roundedness
5. Communicate effectively.
6. Think critically and creatively.
7. Assimilate new technological and development in related field.

Syllabus:

1. Overview of VLSI Design
   VLSI design methodology; functional, logic and physical design; gate arrays and standard cells, programmable logic devices; system-on-chip.
2. CMOS Fabrication and Layout
   Fabrication processes in CMOS VLSI; latch-up; characteristics of devices in VLSI; mask layout techniques and design rules.
3. CMOS Logic Circuits
   Transmission gates; static and dynamic gates and flip flops; domino logic; low power design; design for testability.
4. High Speed CMOS Logic Design
   Delay estimation and transistor sizing; device and interconnect capacitance; optimal delay design of buffers; power supply grid; clock distribution.
5. CAD Techniques in VLSI Design
   Circuit and logic simulation, mask layout, layout extraction and verification; standard cell placement and routing.
6. Sub-system Design
   Examples to illustrate sub-system design in VLSI: data path in a microprocessor, random-access-memory.

Laboratory Experiment:

1. Practice of CAD tools for VLSI design: circuit simulation, mask layout, layout extraction and verification, placement and routing.
2. Mini-project: design of a sub-system for computer or communication applications.

Method of Assessment:

Continuous assessment: 50% Examination: 50%

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

Reference Books:

1. N.H. E. Weste and D. Harris, *CMOS VLSI Design – A Circuits and Systems Perspective*, 3rd ed., Reading: Addison Wesley, 2005.
2. M.M. Vai, *VLSI Design,* 1st ed., Boca Raton: CRC Press, 2001.
3. D.A. Hodges, H.G. Jackson and R.A. Saleh, *Analysis and Design of Digital Integrated Circuits,* 3rd ed., New York: McGraw-Hill, 2003.
4. W. Wolf, *Modern VLSI Design: System-on-chip Design*, 3rd ed., Englewood Cliffs: Prentice-Hall, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Power Electronics	**Subject Code:**	EIE402
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) Basic Electricity and Electronics II (ENG238) Electronic Circuits (EIE304)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

To introduce the fundamental principles, concepts, techniques, methods, and circuits of power electronics and to familiarize students with the design procedures of power electronic 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 fundamental principles and applications of power electronics circuits.
2. Solve problems and design switching regulators according to specifications.
3. Use Computer-aided techniques for the design of power converter circuits.
4. Appreciate the latest developments in power electronics.

Category B: Attributes for all-roundedness
5. Communicate effectively.
6. Think critically and creatively.
7. Assimilate new technological and development in related field.

Syllabus:

1. Introduction to Power Electronics
   Overview of power electronics systems: applications and areas of future development.
2. Basic Switching Regulator Topologies
   Basic operations. Critical inductance criterion. Continuous- and discontinuous-conduction modes. Practical considerations. Merits and drawbacks.
3. State-Space Averaging and Linearization
   State equations. State-space models. State-space averaging for continuity. Small-signal approximation for linearity. Applications of approximation techniques. Switching regulator transfer functions.
4. Switching Regulators with Transformer Isolation
   Flyback converter. Forward converter. Half- and full-bridge converters. Push-pull converter. Areas of application.
5. Feedback Control Design
   Classical control design. Bode plot and Nyquist stability criterion. Voltage- and current-mode controls.
6. Magnetic Components
   Inductor. Transformer. Saturation, hysteresis, and residual flux.
7. Latest Development in Power Electronics

Laboratory Experiments:

1. Computer-aided design of switching regulator.
2. Design of a buck converter.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

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

Reference Books:

1. Y.S. Lee, *Computer-Aided Analysis and Design of Switch-Mode Power Supplies*, Marcel Dekker, New York, 1993.
2. J.P. Agarwal, *Power Electronic Systems: Theory and Design*, Prentice-Hall, 2001.
3. S. Cuk and R.D. Middlebrook, *Advances in Switched-Mode Power Conversion, Vol. 1, 2 and 3*, Teslaco, 1983.
4. J.G. Kassakian, M.F. Schlecht and G.C. Verghese, *Principles of Power Electronics*, Addison-Wesley, 1991.
5. A.I. Pressman, *Switching Power Supply Design*, 2nd ed., McGraw-Hill, 1999.

SUBJECT DESCRIPTION FORM

Subject Title:	High Frequency Circuit Design	**Subject Code:**	EIE403
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)
Basic Electricity and Electronics II (ENG238)
Electronic Circuits (EIE304)

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

Objectives:

Designing electronic circuits in the tens and hundreds of MHz range can be a challenge because the presence of parasitics poses a lot of problems in the physical circuits. This makes designing high-frequency circuits a rather specialized subject, although much can still be resolved under the lumped circuit assumption. But as the frequency moves up to the GHz range, the use of lumped circuit models can be seriously handicapped because voltage and current change within the physical boundary of the circuit as a result of the wavelength being comparable to the dimension of the physical circuits. A different approach must be used to look at the problem. This course will look mainly at circuit design in the tens to hundreds MHz range and will touch upon some basics for the GHz range design.

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 characteristics of transistor devices at high frequencies
2. Analyze high-frequency roll-off problems in transistor amplifiers
3. Design amplifier circuits for high-frequency applications
4. Design matching filters
5. Solve design problems using Smith charts, e.g., transmission line and antenna matching
6. Understand the stability problems in power amplifiers

Category B: Attributes for all-roundedness
7. Communicate effectively
8. Think critically and creatively
9. Assimilate new technological development in related field

Syllabus:

1. Analogue Circuit Fundamentals
   Review of BJT and MOSFET characteristics and models. Basic amplifier configurations and building blocks. Frequency response of transistor amplifiers. Pole splitting. Basic feedback configurations and compensations methods. Review of op-amp circuits and non-ideal behaviours.
2. Radio Frequency Circuit Design
   Effects of load capacitance and feedback capacitance (Miller effect). Important characteristics of transistor capacitances. Choice of transistors for high-frequency design. Configurations of high-frequency amplifiers. e.g., shunt-series pair, follower plus CE, CE plus CB (cascode), follower plus CB (DA). Equivalent ac models for calculation of amplifier response roll-off. Design examples: wideband differential amplifiers and op-amps.
3. High-frequency Filter Design
   Operational Transconductance Amplifier (OTA or gm). OTA design principles. BJT and MOS OTAs. Gm-C filter design principles. Method of signal flow graphs.
4. Distortion Analysis
   Power series analysis of frequency-independent circuits (due to only resistive nonlinearity). Harmonic distortion. Gain expansion and compression. Effects of odd and even order terms. Typical spectra of input and output signals. Inter-modulation (IM) under two sinusoids. Generation of sum and difference components. Interaction of third IM with fundamental frequencies. Problems in receiver design.

5. Impedance Matching
   Principles of narrowband impedance matching. Maximum power transfer. Methods via Q-factor. L-circuits, T-circuits, pi-circuits, tapped capacitor circuits, double-tuned circuits.

6. Transmission Line Matching
   Modelling of transmission lines. Telegraphic equations. Use of Smith chart for matching. Matching of antennae.

7. Power Amplifier Design
   Basic principles of tuned amplifiers. Design procedures. Use of scattering parameters and other 2-port parameters. Concept of power gains. Stability factors. Neutralization and internal feedback.

Mini-project:

Each student is required to complete a mini-project on either one of the following topics:
Topic 1: High frequency roll-off of transistor amplifiers
Topic 2: Design of matching circuits
Topic 3: Transmission line matching

Method of Assessment:

Continuous assessment: 40% Examination: 60%

The continuous assessment consists of assignments, mini-projects, and a test.

Textbooks:

1. Paul R. Gray, Paul J. Hurst, Stephen H. Lewis and Robert G. Meyer, *Analysis and Design of Analog Integrated Circuits,* New York: Wiley, 2001.
2. K.R. Laker and W.M.C. Sansen, *Design of Analog Integrated Circuits and Systems*, New York: McGraw-Hill, 1994.

Reference Books:

1. Herbert L. Krauss, Charles W. Bostian and Frederick H. Raab, *Solid State Radio Engineering,* New York: Wiley, 1980. (Classic reference)
2. W. Alan Davis and Krishna K. Agarwal, *Radio Frequency Circuit Design,* New York: Wiley, 2001.
3. P. Horowitz and W. Hill, *The Art of Electronics,* New York: Cambridge University Press, 1989. (Classic reference)

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 (AMA201) Mathematics II (AMA202) 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, the students 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.
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.
3. Ulrich Karrenberg, *An Interactive Multimedia Introduction to Dingal Processing*, 2nd ed., Springer, 2007.

SUBJECT DESCRIPTION FORM

Subject Title:	Computer Architecture and Systems	**Subject Code:**	EIE414
Number of Credits:	3	**Hours Assigned:**	Lecture/Tutorial 39 hours Laboratory 3 hours (Equivalent to 9 laboratory hours)

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

Objectives:

To provide students with
1. Concepts and design techniques of high performance computer architectures
2. Techniques to analyze performance in time domain

Student Learning Outcomes:

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

1. An ability to apply knowledge of microprocessor appropriate to the degree discipline
2. An ability to design and conduct experiments, as well as to analyze different microprocessors
3. An ability to identify and evaluate the performance of different microprocessors.
4. An ability to write efficient programs along with understanding the limitations and mechanisms of different microprocessors
5. An ability to present their ideas and observation effectively

Syllabus:

1. Introduction to Computer Architectures
   - 1.1 Revision on different computer architectures: ISA and HAS, Von Neumann, RISC and CISC
   - 1.2 Performance issues
2. Basic Processor Designs
   - 2.1 Data path: Data movement
   - 2.2 Control path: Instruction decode and branching
   - 2.3 Multi-cycle Implementation
   - 2.4 Microprogramming
   - 2.5 Exception
3. Pipelined Processors
   - 3.1 Pipelined data-paths
   - 3.2 Pipelined control
   - 3.3 Data hazards
   - 3.4 Branch hazards
4. Superscalar Processing
   - 4.1 Parallel decoding
   - 4.2 Superscalar instruction issue: shelving and register renaming
   - 4.3 Speculative execution: preserving processor consistency
5. Branching Processing
   - 5.1 Branch checking
   - 5.2 Branch processing: delayed branching and multi-way branching
   - 5.3 Speculative execution: early detection and prediction
6. Cache Organization
   - 6.1 Cache mapping: direct mapping and associative mapping
   - 6.2 Replacement algorithm
   - 6.3 Cache miss and performance
   - 6.4 Cache coherence
7. Memory System
   - 7.1 Memory system hierarchy
   - 7.2 Paging

7.3 Segmentation
7.4 Virtual memory

Laboratory Experiments:

1. Superscalar simulation tool.
2. Tracing the operation of superscalar CPU by simulation.

Method of Assessment:

Continuous Assessment: 40% Examination: 60%

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

Reference Books:

1. D. Sima, T. Fountain and P Kasuk, *Advanced Computer Architectures: A Design Space Approach*, Addison-Wesley, 1997.
2. J.L. Hennessy and D.A. Patterson, *Computer Architecture - A Quantitative Approach*, 4th ed., Morgan Kaufmann, 2006.
3. A. Siberschatz and P. Galvin, *Operating System Concepts*, 8th ed., Addison-Wesley, 2008.
4. John Paul Shen and Mikke H. Lipasti, *Modern Processor Design – Fundamentals of Superscalar Processors,* McGraw-Hill, 2004.
5. David Patterson and John Hennessy, *Computer Organization & Design: The Hardware/Software Interface*, 3rd ed., The Morgan Kaufmann Series of Computer Architecture and Design, 2004.

SUBJECT DESCRIPTION FORM

Subject Title: Multimedia Technology	**Subject Code:** EIE415
Number of Credits: 3	**Hours Assigned:** Lecture/Tutorial 37 hours Laboratory 5 hours (Equivalent to 15 laboratory hours)

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

Objectives:

This subject provides students with thorough understanding of multimedia technologies. After the completion of the subject, the student should be able to appreciate a wide range of techniques and standards adopted in the multimedia industry.

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 requirements of a multimedia system and the formats of different multimedia signals.
2. Understand the different multimedia standards and the technologies.
3. Design simple systems for multimedia retrieval and management.
4. Perform multimedia authoring, and to process and integrate different types of signals to form multimedia presentations.
5. Understand, describe, the technologies for streaming multimedia content over the Internet.
6. Appreciate the architectures and technologies of various multimedia systems, such us Video-on-Demand (VoD), multimedia conferencing, etc.

Category B: Attributes for all-roundedness

7. Communicate effectively.
8. Think critically and creatively.
9. Assimilate new technological and development in related fields.

Syllabus:

1. Introduction to Multimedia Systems
   Perspective of multimedia computing and communications, review of the key enabling technologies, overview of multimedia system requirements and multimedia software tools.
2. Multimedia Signal Representations
   Basics of audio/image/video file formats, introduction to MIDI (Musical Instrument Digital Interface), basics of digital video and color processing.
3. Multimedia Standards
   Image and video compression standards: JPEG, H.261/263/264, MPEG-1 and -2, MPEG-4 Facial animation.
4. Multimedia Information Indexing and Retrieval
   MPEG-7, Content-based retrieval (CBR) in image database, some existing CBR systems/applications. Digital libraries.
5. Optical Storage Media
   CD-Audio, CD-ROM, and Digital Video Disc (DVD).
6. Multimedia Authoring and Integration
   Multimedia authoring: authoring metaphors, multimedia production and presentation, SMIL: concept, structure, timelines, synchronization, implementation.
7. Multimedia Communications
   Quality of Service (QoS) requirements for multimedia communications, traffic modelling of multimedia sources, multiplexing, loss concealment, transport protocol support for multimedia communications. Multimedia on Internet: resource reservation protocol (RSVP), MBone.

8. Case Studies
   Multimedia conferencing, video-on-demand (VOD), set-top box and interactive TV, digital TV and high definition TV (HDTV).

Laboratory Experiments:

1. Analysis of MPEG video coding
2. Audio signal processing
3. Developing simple multimedia applications using SMIL
4. Multimedia production
5. Multimedia integration

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. M. Mandal, *Multimedia Signals and Systems*, Kluwer Academic Publishers, 2003.
2. F. Halsall, *Multimedia Communications: Applications, Networks, Protocols and Standards*, Addison-Wesley, 2001.
3. Z.N, Li and Mark S. Drew, *Fundamentals of Multimedia*, Prentice-Hall, 2004.
4. C.H. Wu and J.D. Irwin, *Emerging Multimedia Computer Communication Technologies*, Prentice-Hall, 1998.
5. B. Furht, S.W. Smoliar and H.J. Zhang, *Video and Image Processing in Multimedia Systems*, Kluwer Academic Publishers, 1995.

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, 2nd ed., 2004.

SUSUBJECT DESCRIPTION FORM

Subject Title:	Honours Project	**Subject Code:**	EIE433
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 successful 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:	Image and Audio Processing	**Subject Code:**	EIE435
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 42 hours Laboratory 9 hours

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

Objectives:

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

Student Learning Outcomes:

1. To understand the fundamentals of image and audio signal processing and associated techniques.
2. To be able to solve practical problems with some basic image and audio signal processing techniques.
3. To be able to design simple systems for realizing some multimedia applications with some basic image and audio signal processing techniques.

Syllabus:

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

2. Audio processing
   - 2.1 Fundamentals of digital audio: Sampling; Dithering; Quantization; psychoacoustic model.
   - 2.2 Basic digital audio processing techniques: Anti-aliasing filtering; Oversampling; Analog-to-digital converion; Dithering; Noise shaping; Digital-to-analog Conversion; Equalisation.
   - 2.3 Digital Audio compression: Critical bands; threshold of hearing; Amplitude masking; Temporal masking; Waveform coding; Perceptual coding; Coding techniques: Subband coding and Transform coding.
   - 2.4 Case Study of Audio System/Codecs: MP3; MP3-Pro; CD; MD; DVD-Audio; AC-3; Dolby digital; Surround; SRS Surround system; Digital Audio Broadcasting, etc.

Laboratory Experiments:

1. Image processing techniques
2. Image compression
3. Audio compression
4. Psychoacoustic behavior

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. Ken C. Pohlmann, *Principles of Digital Audio*, 4th ed., McGraw-Hill, 2000.

Reference Books:

1. Ze-Nian Li and Mark S. Drew, *Fundamentals of Multimedia*, Pearson Prentice-Hall, 2004.
2. M. Mandal*, Multimedia Signals and Systems,* Kluwer Academic Publishers, 2003.

SUBJECT DESCRIPTION FORM

Subject Title:	Telecommunication Networks	**Subject Code:**	EIE443
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:

This subject aims at introducing to the students the knowledge about the telecommunication industry: its services and market, the theoretical basis about performance (queuing theory) and operation (multiplexing, switching, routing, and signaling).

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills
1. Describe and relate fundamentals of telecommunication networks and associated technologies.
2. Apply the principles of queuing theory in evaluating the performance of telecommunication networks.
3. Solve problems and design simple systems related to telecommunications.
4. Appreciate the reasons for switching, and the relative merits of the possible switching modes, e.g. packet and circuit switching
5. Understand the principles of the internal design and operation of communication switches, and the essence of the key protocols that are used with switched networks

Category B: Attributes for all-roundedness
6. Communicate effectively
7. Think critically and creatively
8. Assimilate new technological development in related field

Syllabus:

1 Overview of Telecommunication Networks and Industry
- 1.1 Trends, technologies and network elements in telecommunication networks.
- 1.2 Telecommunication industry in Hong Kong: Regulatory bodies, major telecommunication operators, major telecommunication services and activities.

2. Queuing Theory and Traffic Engineering
- 2.1 Poisson source characteristics.
- 2.2 Analysis of different queuing systems: M/M/1, M/M/2, M/M/N/N queues.
- 2.3 Traffic engineering: Erlang's formula, blocking probability.

3. PCM and Digital Multiplexing Hierarchy
- 3.1 Telecommunication network hierarchy.
- 3.2 Digital multiplexing hierarchies: T1, E1, T2, and T3 carrier systems.
- 3.3 Plesiochronous and synchronous multiplexing, SONET and SDH transmission systems.

4. Switching Systems Design
- 4.1 Switching fabrics: Switch architecture, performance evaluation; Time division switches: shared memory switch, time-slot-interchange switch; Space division switches: Crossbar, Clos and Banyan.
- 4.2 Traffic management and scheduling in a switch.
- 4.3 Optical switching: wavelength division multiplexing (WDM)
- 4.4 Signalling principles: SS7 signalling and public telephone networks.

Laboratory Experiments:

1. Poisson source properties and their characterization.
2. Simulation study on queueing properties.
3. Design of an N-trunk telephone switch.

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. Leon-Garcia & Widjaja, Communication Networks, *Fundamental Concepts and Key Architectures*, McGraw-Hill, 2006.
2. R.L. Freeman, *Fundamentals of Telecommunications*, John Wiley, 1999.
3. W. Goralski, *SONET/SDH,* McGraw-Hill, 2002.
4. M. Cole, *Introduction to Telecommunications: Voice, Data and the Internet*, Prentice-Hall, 2002.
5. J. Salrand, *High-performance Communication Networks,* Morgan Kaufmann, 2000.
6. S.K. Bose, *An Introduction to Queuing Systems*, Kluwer Academic/Plenum Publishers, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Mobile Communications	**Subject Code:**	EIE447
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 36 hours Project/presentation 6 hours (Equivalent to 18 laboratory hours)

Pre-requisite: Communication Fundamentals (EIE331) **Co-requisite:** nil **Exclusion:** nil

Objectives:

1. To introduce the fundamental design principles & issues in cellular & mobile communications.
2. To enable the student to understand the basic features of cellular-mobile communication systems and digital radio: TDMA (GSM) and DS-CDMA (IS-95, CDMA2000, WCDMA).

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills

1. To understand the basic network-architecture of a mobile-communication system.
2. To realize the importance of frequency-reuse concept in mobile communications and to be able to analyze its effect on interference, system capacity and grade of service.
3. To understand various large-scale and small-scale fading-channel models and to be able to analyze their influence on a mobile-communication system's performance.
4. To appreciate various multiple-access techniques used in mobile communications and their pros/cons.
5. To recognize the relative pros/cons of various digital modulation schemes and to be able to select the appropriate modulation-scheme under a given channel environment.
6. To understand the basic features of mobile communication systems and digital radio: GSM and CDMA (IS-95, CDMA 2000, W-CDMA).
7. To recognize the frequency spectra allocated for mobile communications in Hong Kong.

Category B: Attributes for all-roundedness

8. Ability to coordinate work among group members and to work as a team.
9. Ability to present ideas and results in front of an audience.

Syllabus:

1. Introduction to Cellular-Mobile Radiowave Wireless-Communication Systems
   Cellular structure, frequency reuse & cells splitting. Channel assignment. Co-channel interference, adjacent-channel interference, system capacity, and power control.
2. Radiowave Propagation's Macroscopic-Fading Models
   Free-space radio-wave propagation. Reflection, diffraction, and scattering. model. Various path-loss models: ground-reflection, log-distance, lognormal, Okumura, Hata, EURO-COST extension of Hata.
3. Radiowave Propagation's Microscopic-Fading Models
   Lognormal, Rician and Rayleigh fading models. Doppler frequency, delay spread, coherence bandwidth, level crossing rate. Characterisation of multipath phenomena. Fading effects due to multi-path time delay spread. Fading effects due to Doppler spread. Simulation of Rayleigh fading channel.
4. Modulations for Mobile Radiowave Communications
   Phase-shift Keying: BPSK, DPSK, QPSK, OQPSK, $\pi/4$ DQPSK. Frequency-shift keying (FSK). Minimum-shift keying (MSK), Gaussian MSK. Direct-sequence spread-spectrum (DS-SS), frequency-hop spread-spectrum (FH-SS). Various modulations' performance over Rayleigh-fading channels.

5. Current Cellular-Mobile Communication Multiple-Access Schemes & Standards
   Multiple-access schemes: frequency-division multiple-access (FDMA), time-Division multiple-access (TDMA), code-division multiple-access (CDMA), hybrid schemes, space-division multiple-access (SDMA). Capacity of CDMA. Current cellular-mobile wireless-communication standards: Global System for Mobile Communications (GSM). IS-95, CDMA 2000, W-CDMA.

Project: Either one of the followings:

1. To orally present an advanced topic in mobile communications, or
2. To test well-known formulas of outdoor radio-wave propagation path-loss, using empirically measured data.

Method of Assessment:

Continuous Assessment: 30% Examination: 70%

The continuous assessment will consist of a test and a project

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Reference Book:

1. Theodore S. Rappaport, *Wireless Communications: Principles and Practice*, Prentice-Hall PTR, 2nd ed., 2002. ISBN: 0-13042232-0.

SUBJECT DESCRIPTION FORM

Subject Title:	Bioengineering Signals and Systems	**Subject Code:**	EIE448
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 36 hours Laboratory 9 hours

Pre-requisite: Mathematics II (AMA202) **Co-requisite:** nil **Exclusion:** nil

Objectives:

To introduce
1. a broad range of bioengineering systems
2. the engineering foundation of bio-signal data collection,
3. a sample of data analysis techniques for biomedical engineering.

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills
4. Briefly describe the basics of human physiology and biology with an emphasis on coronary and neurological dynamics.
5. Perform quantitative measurement and analysis of typical bio-signals
6. Describe the operational details of various medical monitoring and data collection devices
7. Demonstrate an understanding of mathematical foundations of population dynamics, epidemiology and transmission of communicable diseases
8. Describe and synthesize the computational process of various contemporary medical devises.

Category B: Attributes for all-roundedness
1. Communicate effectively.
2. Think critically and creatively.
3. Work in a team collaboratively.
4. Demonstrate an ability to think logical as well as laterally.

Syllabus:

1. Introduction
   1.1 Introduction to bioengineering. A historical perspective.
2. Bioelectric phenomena
   2.1 Cardiovascular system: the human heart, the cardiac cycle, cardiac mechanics, biological oscillators and reaction-diffusion
   2.2 Neurophysiology: The neuron, action potential, ionic concentrations and channels, Hodgkin-Huxley and FitzHugh-Nagumo equations.
3. Biomedical instrumentation and measurement
   3.1 Electroencephalography: EEG signal and its characteristics, EEG rhythms (δ, θ, α and β) EEG analysis (linear methods)
   3.2 Electrocardiography: 12-lead and 3-lead ECG, ECG morphologies, QRS detection, Estimation of RR interval, ECG data compression
   3.3 Brief overview of other signals: Electromyography, Inductance Plethysmography. Imaging: Ultrasound, Computed Tomography, Nuclear Magnetic Resonance and Magnetic Resonance Imaging,
4. Epidemiology
   4.1 Population dynamics: predator-prey dynamics, Lotka-Volterra systems, symbiosis, chaos.
   4.2 Epidemic models: SIR, SEIR, SIS. Geographical spread of disease.
   4.3 Examples/Case studies selected from: Black death, Venereal diseases, Gonorrhoea, HIV, Influenza, SARS, Avian Influenza and emergent diseases.

Laboratory Experiment:

Experiment/Mini Project:

A selection from the following topics (minimum 9 hours work) to be completed in small groups:

1. Instrumentation development for measurement of Galvanic Skin Response (GSR).
2. EEG measurement and rhythm detection
3. Automated sleep staging from pre-recorded data library
4. Analysis of transmission parameters for SARS epidemic in Hong Kong.
5. GSR, Pulse and Respiration for detection of psychological stress.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

Text/Reference Books:

1. J.D. Murray, *Mathematical Biology*, 2nd ed., Springer, 1993.
2. J. Enderle, S. Blanchard and J. Bronzino, *Introduction to Biomedical Engineering*, Academic Press, 2000.
3. Jerry L. Prince and J. M. Links, *Medical Imaging: Signals and Systems*, Pearson Prentice-Hall Bioengineering, 2006.
4. D.C. Reddy, *Biomedical Signal Processing: Principles and Techniques*, McGraw-Hill, 2005.

SUBJECT DESCRIPTION FORM

Subject Title:	Optical Communication Systems and Networks	**Subject Code:**	EIE449
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 36 hours Laboratory 6 hours

Pre-requisite: Communication Fundamentals (EIE331) **Co-requisite:** nil **Exclusion:** nil

Objectives:

The aim of this course is to introduce to the students the design and operation principles of modern optical communication systems and networks. Upon completion of the subject, students are expected to be familiar with commonly used components and subsystems in optical communication and network systems, and be able to design a point to point optical communication link.

Student Learning Outcomes:

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

1. Understand the basic operating principles of single mode and multimode fibres.
2. Understand the basic operating principles of light emitting devices including Light Emitting Diodes(LEDs) and semiconductor lasers .
3. Understand the basic principles of optical detectors, amplifiers and modulators.
4. Understand the principles of passive optical devices including couplers, isolators and circulators.
5. Understand the principles of an optical communication system and be able to design a simple point to point link.
6. Understand the principles of wavelength division multiplexing(WDM) and WDM networks.

Syllabus:

1. Optical fibre
   Principles of optical waveguiding, single mode and multimode fibres and their transmission characteristics.
2. Active components
   LEDs and Semiconductor lasers: operation principles and different types. Semiconductor optical detectors: PINs and APDs. Optical amplifiers: Erbium doped fibre amplifiers (EDFA).
3. Passive components
   Coupler, isolator, Wavelength division multiplexer and demuiltiplexer.
4. Optical communication systems
   Optical receivers and Q factor. Transmission impairments: noise, dispersion, nonlinearity and crosstalk. Point to point link design: power budget and dispersion budget. Wavelength Division Multiplexing(WDM). Design of multi-span WDM links.
5. Optical communication networks
   WDM add/drop multiplexer, WDM optical crossconnect, Optical access networks: passive optical networks.

Laboratory Experiment:

1. Optical fiber and passive component measurements.
2. Erbium doped fiber amplifier characterization.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

The continuous assessment will consist of a number of assignments and test.

Reference Books:

1. G. Kaiser, *Optical Fiber Communications*, 3rd ed., McGraw-Hill, 2000.
2. Jeff Hecht, *Understanding Fiber Optics*, 4th ed., Prentice-Hall, 2002.

SUBJECT DESCRIPTION FORM

Subject Title:	Nanoscience and Technology for Electronic Engineering	**Subject Code:**	EIE450
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 36 hours Laboratory 9 hours

Pre-requisite: Mathematics II (AMA202)
Probability and Engineering Statistics (AMA302)
Engineering Science (ENG232)
Applied Electromagnetics (EIE338)

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

Objectives:

To provide electronic engineering students with the basic concept and scientific foundation to enter the world of nanomaterials and nanotechnology

Student Learning Outcomes:

On successful completion of this subject, the students will:

Category A: Professional/academic knowledge and skills

1. Be able to describe the basic structure of materials down to the nanometer (atomic) level, with particular emphasis on crystal structure, nano-defects and their kinetics.
2. Achieve a conceptual understanding of the laws of nature in the nanoscale governing electronic, magnetic, photonic, mechanical and thermodynamic properties of materials
3. Possess the basic knowledge of quantum technology based on magnetism, electron and nuclear spin and superconductivity in the nanoworld
4. Understand the functional properties of various nanostructures, such as quantum dots, nanowires, ultrathin films and various nanocomposite structures.

Category B: Attributes for all-roundedness

5. Communicate effectively.
6. Think critically and creatively.
7. Work in a team collaboratively.
8. Demonstrate an ability to think logical as well as laterally.

Brief Syllabus:

1. Introduction
2. Structure of real Materials: Atoms, Crystals and Crystal Defects.
3. Interatomic forces, electronic structure of atoms and physical properties of materials.
4. Mechanics of electrons. Electronic, magnetic, and optical properties and superconductivity.
5. Nanoelectronics.
6. Nanotechnologies based on Magnetism, electron and nuclear spin, and superconductivity.

Laboratory Experiment:

Experiment/Mini Project:

A selection from 3 topics (minimum 9 hours work) to be completed in small groups.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

Text/Reference Book:

1. Edward L. Wolf, *Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience*, 2nd ed., Wiley-Vch Verlag GmbH & Co. KGaA.

SUBJECT DESCRIPTION FORM

Subject Title:	Circuits for Telecommunications	**Subject Code:**	EIE451
Number of Credits:	3	**Hours Assigned:**	Lecture/tutorial 36 hours Mini-projects 9 hours

Pre-requisite:	Basic Electricity and Electronics I (ENG237) Basic Electricity and Electronics II (ENG238) Electronic Circuits (EIE304)	**Co-requisite:**	nil	**Exclusion:**	nil

Objectives:

To study the operating principles and design of telecommunication circuits.

Student Learning Outcomes:

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

Category A: Professional/academic knowledge and skills
1. Comprehend the design of analog electronic circuits for telecommunications applications;
2. Analyze the performance of telecommunication circuits under real-world environments, i.e., in the presence of noise and nonlinear device characteristics;
3. Appreciate the problems associated with the design of telecommunication circuits;
4. Design the basic building blocks of telecommunication systems.

Category B: Attributes for all-roundedness
1. Communicate effectively.
2. Think critically and creatively.
3. Demonstrate an ability to think logically as well as laterally.

Syllabus:

1. Review of Analog Circuits and Overview of Communication Systems
   Bipolar junction transistor, MOS field effect transistor, device models, major device parameters, review of building blocks, amplifier configurations, small-signal models, frequency responses, high-frequency limitations, overview of radio communication systems, architecture of communication receivers and transmitters.
2. Noise and Distortion
   Thermal noise, shot noise, flicker noise, avalanche noise, noise figure, noise analysis of analog circuits, intermodulation distortion, harmonic distortion, distortion in amplifiers, dynamic range.
3. Filters and Transformers
   Series resonant circuits, parallel resonant circuits with transformers, frequency selection principles, impedance matching overview.
4. Phase-locked Loops and Frequency Synthesizers
   Basic model of phase-locked loop (PLL), VCO, loop filter, phase detection, operating and design principles, transient performance, applications, PLL frequency synthesizer, fractional-N loop frequency synthesizer, direct digital synthesis (DDS).
5. Mixers and Oscillators for Communications
   Single-ended mixers, balanced mixers, design principles of oscillators, quartz oscillators, dielectric resonant oscillators, tuned oscillators, applications in modulation and demodulation.
6. Power amplifiers
   Class A, B, C, D, S, E, F power amplifiers, operating principles and applications, performance overview.

Laboratory Experiment:

Experiment/Mini Project:

Possible mini-projects include
- Construction and design of mixer circuits, oscillators, or phase-locked loops.
- In-depth simulation study of the behavior of phase-locked loops.
- Detailed analysis of noise in feedback amplifiers.

Method of Assessment:

Continuous assessment: 40% Examination: 60%

Text/Reference Books:

1. J.R. Smith, *Modern Communication Circuits,* 2nd ed., New York: McGraw Hill, 1998.
2. P.R. Gray, P.J. Hurst, S.H. Lewis and G.R. Meyer, *Analysis and Design of Analog Integrated Circuits*, 4th ed., New York, Wiley, 2001.
3. H.L. Krauss, C.W. Bostian and F.H. Raab, *Solid State Radio Engineering,* New York: Wiley, 1980.
4. R. Ludwig and P. Bretchko, *RF Circuit Design,* New Jersey: Prentice-Hall, 2000.
5. B. Razavi, *RF Microelectronics,* New Jersey: Prentice-Hall, 1998.
6. T.H. Lee, *The Design of CMOS Radio-Frequency Integrated Circuits,* Cambridge University Press, 1998.
7. A. Leven, *Telecommunication Circuits and Technology,* Newnes, 2000.
8. J.C. Pedro and N.B. Carvalho, *Intermodulation Distortion in Microwave and Wireless Circuits,* Norwood: Artech House, 2003.
9. R.E. Best, *Phase-Locked Loops: Design, Simulation, and Applications,* New York: McGraw-Hill, 2003.
10. F.M. Gardner, *Phaselock Technique,* 3rd ed., New York: Wiley, 2005.
11. G. Bianchi, *Phase-Locked Loop Synthesizer Simulation,* New York: McGraw-Hill, 2005.
12. Q. Gu, *RF System Design of Transceivers for Wireless Communications,* New York: Springer, 2006.
13. F. Losee, *RF Systems, Components, and Circuits Handbook,* 2nd ed., New York: Artech House, 2005.