BEng (Hons) in Electrical Engineering

2014 – 2015

2014/2015 Bachelor of Engineering (Honours) in Electrical Engineering (41470)

Aug.2014

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Bachelor of Engineering (Honours) in Electrical Engineering (4 Year)

Full-time

Programme Code : 41470

2014/2015

DEFINITIVE PROGRAMME DOCUMENT

Department of Electrical Engineering
電機工程學系

Department of
Electrical Engineering
電機工程學系

Bachelor of Engineering (Honours) in Electrical Engineering (4-year Curriculum) 2014-15

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"This Definitive Programme Document is subject to review and changes which the programme offering Faculty/Department can decide to make from time to time. Students will be informed of the changes as and when appropriate."

1 Preamble

The overarching aim of the University's 4-year undergraduate curriculum is to nurture and develop students with abilities/attributes that will prepare them to become preferred leaders for the professions and responsible global citizens in the 21st century. The 4-year Bachelor of Engineering (Honours) in Electrical Engineering (BEng in EE) is a major electrical engineering degree programme in Hong Kong. It addresses the manpower demand of the electrical engineering profession, with particular emphasis on power systems, energy utilisation and related disciplines. This programme complies with the new university curriculum framework, which features a broad-based curriculum, emphasis on fundamentals, provision of opportunities for multidisciplinary studies, freshman experience, enhanced communication skills, work-integrated education, capstone project, and outcome-based education. At the same time, the programme addresses the societal need for a new generation of competent electrical engineers who can practice in their profession in Hong Kong, Mainland China, and the neighbouring regions.

2 Aims and Rationale

2.1 Programme Philosophy

The programme aims to provide the students with a sound education in electrical engineering and to furnish an opportunity for detailed study in a choice of related specialist areas. The programme is designed to produce electrical engineers who will be able to practise their profession worldwide while being particularly competent to do so in the context of Hong Kong and Mainland China.

Modern engineers are often required to undertake different activities and may face promotion or placement in the course of their career development. The programme thus aims to prepare graduates for their entire working life rather than only for their first jobs. Emphasis is therefore placed on the understanding of fundamental concepts and theories which will always be applicable and valid. The teaching of technologies or modern tools which may have a shorter duration of applicability cannot be neglected either, but it is important not to emphasise training at the expense of education.

More and more industrial employers wish to recruit engineers who have a broad-based education, but at the same time possess adequate professional knowledge to undertake detailed technical work in design and production. Therefore, the programme is designed to produce graduates who have not only developed a thorough understanding of electrical engineering, but also acquired a broad and general appreciation of activities in other related disciplines. The students are guided to learn the interfaces between specialist engineering areas and to be prepared to work in a multidisciplinary work environment which usually involves colleagues from other engineering backgrounds.

Students must become aware that 'a good engineering solution' is one which has to fulfil economic, financial, and social criteria as well as to comply with engineering design specifications. This necessitates the inclusion of the study of economics, accounting and management with particular reference to engineering activities, as well as the inter-relations between engineering activities and society as a whole.

Language competence of students is strengthened through the English and Chinese subjects stipulated in the General University Requirements (GUR), and is further enhanced by discipline specific professional communication subjects. The teaching approach adopted in the curriculum, which involves seminars, discussions, in-class feedback, assessed presentations, demonstration of project work and written laboratory reports, aim to develop students' verbal and written communication skills.

It is important to train and educate our students not only in cognitive ability in technical areas but also in lifelong skills. Hence, students are exposed to situations where they are assisted to learn:

(i) to develop their intellectual abilities (creative thinking, critical/independent judgement making, ability to analyze and synthesize, and to cope with real-life conditions such as indeterminacy, lack of information and time pressure); and

(ii) to develop their social abilities (ethics, personal and public relations, team work, handling of responsibility/authority etc).

In this undergraduate programme, the fundamentals of science and engineering are taught in the non-deferrable subjects in Year 1 and Year 2. The core electrical engineering knowledge areas are covered in Year 3 and the advanced core areas and specialisms are introduced in Year 4. The University Core Curriculum is distributed throughout the programme to ensure a proper balance between underpinning, language, broadening and discipline specific subjects.

Students are provided with training at the Industrial Centre (IC) so that they learn the applications of engineering technologies. They are also required to undertake industrial attachment during the summer at the end of the third year of study, which gives them exposure to the workplace and the real industrial working environment.

2.2 Programme Objectives

(i) To provide students with a broad base of knowledge in the fundamentals of electrical engineering and its current applications.

(ii) To prepare students for working life including the skills needed for lifelong learning.

(iii) To produce engineers with the understanding of their obligations to society.

2.3 Programme Outcomes

Programme outcomes refer to the intellectual abilities, knowledge, skills and attributes that a graduate from this programme should possess. To attain the aim of developing all-round students with professional competence, the programme outcome statements are encompassed in the following two categories of learning outcomes.

Category A: Professional/Academic Knowledge and Skills
Upon successful completion of the programme, students will be able to:

A1 Apply fundamental principles of mathematics, science and engineering to identify, formulate and solve practical problems in the areas of electrical engineering and related disciplines.
A2 Design and conduct experiments with appropriate techniques and tools; and interpret and analyse the data.
A3 Design a system, component or process according to given specifications and requirements in the areas of electrical engineering and related disciplines.
A4 Identify constraints, other than technical considerations, which may influence engineering problems, systems or projects.
A5 Keep abreast of developments in electrical engineering and related disciplines and be aware of the need of lifelong learning.
A6 Appreciate and understand the ethical, managerial and social responsibilities of a professional engineer.

Category B: Attributes for All-roundedness
Upon successful completion of the programme, students will be able to:

B1 Communicate effectively via graphic, numeric, verbal and written media with proficiency in both English and Chinese.
B2 Reason critically and develop alternative views or solutions.
B3 Work in multi-disciplinary teams with professional interpersonal skills.

The Programme Outcomes are in line with the Programme objectives and the mapping is shown in Table 2.3.1.

		Programme Objectives		
		(i)	(ii)	(iii)
Programme Outcomes	A1	√		
	A2	√		
	A3	√		
	A4	√	√	
	A5		√	
	A6		√	√
	B1	√		
	B2	√		
	B3		√	√

Table 2.3.1 Mapping between Programme Objectives and Programme Outcomes

The Subject Learning Outcomes are designed to be in alignment with the Programme Outcomes. The Subject Learning Outcomes are given in each subject and they can be found in the Subject Description Form (SDF) in Appendix I.

The programme and subject outcomes will be assessed in stages according to a Learning Outcomes Assessment Plan (LOAP) adopted by the Departmental Learning and Teaching Committee.

Relationship between Institutional Learning Outcomes and Intended Learning Outcomes (ILO) of the programme is shown in Table 2.3.2.

		Institutional Learning Outcomes					
		Professional Competence	Critical Thinker	Effective Communicator	Innovative Problem Solver	Lifelong Learner	Ethical Leader
Programme Outcomes	A1	√			√		
	A2	√	√				
	A3	√			√		
	A4	√	√				
	A5	√				√	
	A6	√					√
	B1			√			
	B2		√		√		
	B3	√		√			

Table 2.3.2 Relationship between Institutional Learning Outcomes and Intended Learning Outcomes (ILO) of the programme

3 General Information

3.1 Programme Title

Bachelor of Engineering (Honours) in Electrical Engineering
電機工程學(榮譽)工學士學位

3.2 Duration and Mode of Attendance

The normal study duration is 4 years while that for senior year intakes is 2 years. The maximum period of registration is 8 years and 4 years respectively.

Remarks: The exact study duration and number of credits to be transferred will depend on the entry qualification of individual AD / HD admittees.

3.3 Final Award

The award is a Bachelor Degree with Honours in Electrical Engineering and it carries no speciality or stream.

3.4 Implementation Dates

September 2012 (Initial implementation)

3.5 Minimum Entrance Requirements

(i) For Entry with Hong Kong Diploma of Secondary Education (HKDSE) Examination Qualifications

The general minimum entrance requirements are 4 core subjects and 1 elective subject with:

Level 3: in English Language and Chinese Language AND
Level 2: in Mathematics, Liberal Studies and one elective subject.

The elective subject should preferably be Physics, Biology, Chemistry, Combined Science or Information & Communication Technology. Besides, applicants should preferably have studied any one of the extended modules in Mathematics.

(ii) Alternative Entry Route

A Higher Diploma in Electrical Engineering; OR

An Associate Degree in Engineering; OR

Equivalent qualifications

3.6 Study Options

In line with the University's Regulations, students in this programme are offered the option of either continuing with the single-discipline Major (i.e. BEng in EE) or a Major plus a Minor*.

Minor study will be a free choice by students and not mandatory. Students who opt for minor study will be subject to the following regulations:

(i) A Minor programme is a collection of subjects totalling 18 credits with at least 50% (9 credits) of the subjects at Level 3 or above. The subjects under a Minor should have a coherent theme introducing students to a focused area of study;

(ii) Students interested in a Minor must submit their applications to and obtain approval from the Minor-offering department, starting from their second year of study;

(iii) Students are expected to complete their approved Minor as part of their graduation requirements. Students who wish to withdraw from a Minor need to apply for approval officially from the Minor offering department, prior to the end of the add/drop period of the Semester when they indicate their intention to graduate;

(iv) Students with approved Minor will be given a higher priority in taking the Minor subjects over the students who take the subjects as free-electives;

(v) Subject to approval by the Minor-offering department, students may count up to 6 credits from their Major/General University Requirements (GUR) [including Language Communication Requirement (LCR) subjects at proficiency level] towards their chosen Minor;

(vi) Only students with a GPA of 2.5 or above can be considered for Minor study enrolment. The Minor-offering department may set a quota (normally capped at 10 students or 20% of the Major intake quota, whichever is higher) and additional admission requirements for their Minor; and

(vii) Students are required to obtain a GPA of at least 2.0 for both Major and Minor programmes, and also an overall GPA of at least 2.0 in order to satisfy the requirement for graduation with a Major plus a Minor.

Students taking the Major/Minor option will be considered for an award when they have satisfied the requirements for both the Major and Minor studies (i.e. having a GPA of 2.0 or above for the Major programme, Minor programme and overall) and have also submitted an application for graduation. If the 18 credits taken for the approved Minor study can meet the requirements for that Minor, the Major students may apply to graduate with a specific Minor, in addition to their Major. Otherwise, students will graduate with a Major only.

For other students who opt to study a 'Minor' in Electrical Engineering must take 18 credits of EE subjects, of which 9 credits must be at Level 3 or above (see Appendix II).

* Minor option is not available for those Senior Year intake students.

3.7 Summer Training/Industrial Placement

Summer Training at the Industrial Centre (IC) and practical work experience in industry are vital components to attain the programme outcomes. The training/industrial placement is credit-bearing and compulsory in the programme, constituting the Work-Integrated Education (WIE) activities as stipulated by the University. Details of the required credits, structure and assessment of the WIE and IC training are given in Sections 4.7 and 4.8.

3.8 Student Exchange Programme

Student exchanges to overseas universities for a semester or an academic year are possible through various exchange schemes organised by the University or individual departments. While the number of exchanges is limited, students are encouraged to participate to enhance their all-roundedness and broaden their experience.

Block credit-transfers may be given to exchange-out students. However, in order to ensure attaining pre-requisite knowledge for smooth integration of study, the students will be counselled on subject selections in the visiting universities before they leave for the exchange.

3.9 External Recognition

The BEng (Hons) in Electrical Engineering degree programme has been internally validated by the University. Professional accreditation by The Hong Kong Institution of Engineers (HKIE) will be sought in due course.

3.10 Summer Term Teaching

Usually, there will be no summer term teaching on engineering subjects. Industrial Centre Training and external training will take place during summers of the second and third year.

3.11 Daytime and Evening Teaching

Subjects will be offered predominantly during the day. Some subjects, particularly the elective subjects in the senior years, may be made available only in the evenings or on Saturdays.

3.12 Medium of Instruction

English is the medium of instruction (the only exceptions are for a small number of programmes/subjects which have got special approval to be taught and examined in Chinese due to the nature and objectives of the programmes/subjects concerned). Chinese could only be used in small group discussions/tutorials/practical sessions if and when necessary.

In the presence of non-Cantonese-speaking students, English should be used all the time.

4 Curriculum

4.1 University Graduation Requirements

All candidates qualifying for a 4-year Full-time Undergraduate Degree offered from 2012/13 onward must meet:

(i) the University Graduation Requirements, and

(ii) the specific graduation requirements of their chosen programme of study (Majors and Minors).

The minimum University Graduation Requirements are explained in the sections below. For the graduation requirements of specific programmes of study (majors and minors), candidates should refer to the relevant section of this Definitive Programme Document or consult the programme-offering departments concerned.

Summary of University Graduation Requirements

(i) Complete successfully a minimum of 120 credits[1];

(ii) Earn a cumulative GPA of 2.00 or above at graduation[2];

(iii) Complete successfully the mandatory Work-Integrated Education (WIE) component as specified by their Major programme;

(iv) Satisfy the following GUR requirements:

(a) Language and Communication Requirements[3]	9 credits
(b) Freshman Seminar	3 credits
(c) Leadership and Intra-Personal Development	3 credits
(d) Service-Learning *Senior Year intakes students can choose to take a 3-credit free elective subject in lieu of service learning subject	3 credits
(e) Cluster Areas Requirement (CAR)	12 credits
(f) China Studies Requirement	(3 of the 12 CAR credits)
(g) Healthy Lifestyle * Not required for Senior Year intake students	Non-credit bearing
	Total = 30 credits

(v) Satisfy the residential requirement; and

[1] This minimum only applies to students who are admitted through the normal route. Also, for passing a subject which is designed to fulfil the credit requirement of different types of subject, students will be regarded as having fulfilled the credit requirements of the particular types of subject concerned. Nevertheless, the subject itself will only be counted once in the student's total credit requirements, and the students will be required to make up the total credit requirement by taking another subject.

[2] These requirements are applicable with effect from the 2012/13 cohorts of intakes, including students on Foundation Year programmes in 2011/12 who progress to stage 1 of FT undergraduate degree programmes in 2012/13. However, these are not applicable to students admitted to Senior Years in 2012/13 either on advanced standing or under the Senior Year quota.

[3] Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the DSR - Chinese and CAR - Chinese Reading and Writing requirements. However, this group of students would still be required to take one Chinese LCR subject to fulfil their Chinese LCR.

(vi) Satisfy any other requirements as specified in this Definite Programme Document.

To be eligible for an Articulation Degree award under the 4-year full-time undergraduate curriculum, a student must:

(i) Complete successfully a minimum of 60 credits[4];

(ii) Earn a cumulative GPA of 2.00 or above at graduation;

(iii) Complete successfully the mandatory Work-Integrated Education (WIE) component as specified by their Major programme;

(iv) Satisfy the following GUR requirements:

(a) Cluster Areas Requirement (CAR)	6 credits
(b) China Studies Requirement	(3 of the 6 CAR credits)
(c) Service-Learning *Senior Year intakes students can choose to take a 3-credit free elective subject in lieu of service learning subject	3 credits
(d) Healthy Lifestyle * Not required for Senior Year intake students	Non-credit bearing
(e) Language and Communication Requirements[5]	-
	Total = 9 credits

(v) Satisfy the residential requirement as stated in Section 20 above; and

(vi) Satisfy any other requirements as specified in the Definitive Programme Document.

A student is required to graduate as soon as he/she satisfies the graduation requirements as stipulated above. The student concerned is required to apply for graduation, in the semester in which he is able to fulfil all his graduation requirements, and after the add/drop period for that semester has ended.

[4] This minimum only applies to students who are admitted through the normal route. Also, for passing a subject which is designed to fulfil the credit requirement of different types of subject, students will be regarded as having fulfilled the credit requirements of the particular types of subject concerned. Nevertheless, the subject itself will only be counted once in the student's total credit requirements, and the students will be required to make up the total credit requirement by taking another subject.

[5] This is normally not required. Only those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programmes and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement. The Programme offering department will refer to the guidelines provided by the Language Centres (ELC and CBS) to determine whether a new student has met the equivalent standard.

4.2 General University Requirements (GUR)

(i) Language and Communication Requirements (LCR)

English

All students must successfully complete two 3-credit English language subjects as stipulated by the University (Table 4.2.1). These subjects are designed to suit students' different levels of English language proficiency at entry, as determined by their HKDSE score or the English Language Centre (ELC) entry assessment (where no HKDSE score is available).

HKDSE	Subject 1	Subject 2
Level 5 or equivalent	Advanced English for University Studies (ELC1014) 3 credits	Any one of the LCR Proficient elective subject in English (see Table 4.2.2) 3 credits
Level 4 or equivalent	English for University Studies (ELC1012/ELC1013) 3 credits	Advanced English for University Studies (ELC1014) 3 credits
Level 3 or equivalent	Practical English for University Studies (ELC1011) 3 credits	English for University Studies (ELC1012/ELC1013) 3 credits

Table 4.2.1: Framework of English LCR subjects

Students who can demonstrate that they have achieved a level beyond that of the LCR proficient level subjects as listed in Table 4.2.2 (based on an assessment by ELC) may apply for subject exemption or credit transfer of the LCR subject or subjects concerned.

For students entering with HKDSE Level 5 or at an equivalent level or above	Advanced English Reading and Writing Skills (ELC2011)	3 credits each
	Persuasive Communication (ELC2012)	
	English in Literature and Film (ELC2013)	

Table 4.2.2: LCR Proficient level subjects in English

Chinese

All students are required to successfully complete one 3-credit Chinese language subject as stipulated by the University (Table 4.2.3). These Chinese subjects are designed to suit students' different levels of Chinese language proficiency at entry, as determined by their HKDSE score or the Chinese Language Centre (CLC) entry assessment (where no HKDSE score is available. Students can opt to take additional Chinese LCR subjects (Table 4.2.4) in their free electives.

Students who can demonstrate that they have achieved a level beyond that of the course "Advanced Communication Skill in Chinese" as listed in Table 4.2.3 (based on an assessment made by CLC) may apply for subject exemption or credit transfer of the LCR subject concerned.

HKDSE	Required Subject
Level 4 & 5 or equivalent	Advanced Communication Skills in Chinese (CBS1102P) 3 credits
Level 3 or equivalent	Fundamentals of Chinese Communication (CBS1101P) 3 credits

Table 4.2.3: Framework of Chinese LCR subjects

Subject	Pre-requisite/Exclusion	
Chinese and the Multimedia	• For students entering with HKDSE level 4 or above; or • students with advanced competence level as determined by the entry assessment; or • students who have completed "Fundamentals of Chinese Communication"	3 credits each
Creative Writing in Chinese	• For students entering with HKDSE level 4 or above; or • students with advanced competence level as determined by the entry assessment; or • students who have completed "Fundamentals of Chinese Communication"	
Elementary Cantonese	• For students whose native language is not Cantonese	
Putonghua in the Workplace	• Students who have completed "Fundamentals of Chinese Communication" or could demonstrate the proof with basic Putonghua proficiency • For students whose native language is not Putonghua	

Table 4.2.4: Other LCR Electives in Chinese

Students who are non-Chinese speakers (NCS), or whose Chinese standards are at junior secondary level or below, are also required to take one LCR-Chinese subject specially designed to suit their language background and entry standard (Table 4.2.5)

Subject	Pre-requisite/exclusion
Chinese I (for non-Chinese speaking students) 3 credits	• For non-Chinese speaking students at beginners' level
Chinese II (for non-Chinese speaking students) 3 credits	• For non-Chinese speaking students; and • Students who have completed Chinese I or equivalent
Chinese III (for non-Chinese speaking students) 3 credits	• For non-Chinese speaking students at higher competence levels; and • Students who have completed Chinese II or equivalent
Chinese Literature – Linguistics and Cultural Perspectives (for non-Chinese speaking students) 3 credits	• For non-Chinese speaking students at higher competence levels

Table 4.2.5: Chinese LCR Subjects for non-Chinese speakers or students whose Chinese standards are at junior secondary level or below

Writing Requirement

In addition to the LCR in English and Chinese mentioned above, all students must also, among the Cluster Areas Requirement (CAR) subjects they take (see section (v)), pass one subject that includes the requirement for a substantial piece of writing in English and one subject with the requirement for a substantial piece of writing in Chinese.

Reading Requirement

All students must, among the CAR subjects they take, pass one subject that includes the requirement for the reading of an extensive text in English and one subject with the requirement for the reading of an extensive text in Chinese.

A list of approved CAR subjects for meeting the Writing Requirement (with a "W" designation) and for meeting the Reading Requirement (with an "R" designation) is shown at: https://www2.polyu.edu.hk/as/Polyu/GUR/

Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will be exempted by default from the DSLR [Note]- Chinese and CAR-Chinese Reading and Writing Requirements. However, this group of students would still be required to take Chinese LCR subject to fulfil their LCR-Chinese.

Note: In addition to the LCR in General University Requirements, students also have to complete 4 credits of Discipline-Specific Language Requirements (DSLR) (2 credits in English and 2 credits in Chinese) as specified in the curriculum requirements of their Major.

For those Senior Year intake students who do not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programme and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement.

(ii) Freshman Seminar

All students must successfully complete, normally in their first year of study, one 3-credit Freshman Seminar offered by their chosen Broad Discipline. The purpose is to (a) introduce students to their chosen discipline and enthuse them about their major study, (b) cultivate students' creativity, problem-solving ability and global outlook, (c) give students an exposure to the concepts of, and an understanding of, entrepreneurship, and (d) engage students, in their first year of study, in desirable forms of university learning that emphasises self-regulation, autonomous learning and deep understanding.

A list of Freshman Seminars offered by the Broad Disciplines can be found at: https://www2.polyu.edu.hk/as/Polyu/GUR/

(iii) Leadership and Intra-Personal Development

All students must successfully complete one 3-credit subject in the area of Leadership and Intra-Personal Development, which is designed to enable students to (a) understand and integrate theories, research and concepts on the qualities (particularly intra-personal and interpersonal qualities) of effective leaders in the Chinese context, (b) develop greater self-awareness and a better understanding of oneself, (c) acquire interpersonal skills essential for functioning as an effective leader, (d) develop self-reflection skills in their learning, and (e) recognise the importance of the active pursuit of knowledge on an intra-personal and interpersonal level and its relationship to leadership qualities.

A list of designated subjects for meeting the leadership and intra-personal development requirement is available at: https://www2.polyu.edu.hk/as/Polyu/GUR/

(iv) Service-Learning

All students must successfully complete one 3-credit subject designated to meet the service-learning requirement, in which they are required to (a) participate in substantial community service or civic engagement activities that will benefit the service users or the community at large in a meaningful way, (b) apply the knowledge and skills acquired from their Major or other learning experiences at the University to the community service activities, and (c) reflect on their service learning experience in order to link theory with practice for the development of a stronger sense of ethical, social and national responsibility.

These subjects may take the form of:

- An open-to-all GUR service-learning subject
- A GUR service-learning subject targeted at a particular student group (e.g. a Broad Discipline), or
- A customised DSR subject (core or elective) with the Major (Minor with all the required features and components to meet the Service-Learning Requirement

Students who have satisfied the Service-Learning Requirement via a customised DSR subject will be required to take another 3-credit subject to make up total credit requirement.

For students of senior year intakes, they can choose to take a 3-credit free elective subject in lieu of service learning subject in order to fulfil the graduation requirements.

A list of designated subjects for meeting the service-learning requirement is available at: https://www2.polyu.edu.hk/as/Polyu/GUR/

(v) Cluster Areas Requirements (CAR)

To expand students' intellectual capacity beyond their disciplinary domain and to enable them to tackle professional and global issues from a multidisciplinary perspective, students are required to successfully complete at least one 3-credit subject in each of the following four Cluster Areas:

- Human Nature, Relations and Development (HRD)
- Community, Organisation and Globalisation (COG)
- History, Culture and World Views (HCW)
- Science, Technology and Environment (STE)

A list of CAR subjects under each of the four Cluster Areas is available at: https://www2.polyu.edu.hk/as/Polyu/GUR/

(vi) China Studies Requirement

Of the 12 credits of CAR described in section (v) above, students are required to successfully complete a minimum of 3 credits on CAR subjects designated as "China-related". The purpose is to enable students to gain an increased understanding of China (e.g., its history, culture and society, as well as emerging issues or challenges).

A list of approved CAR subjects for meeting the China Studies Requirement is available at: https://www2.polyu.edu.hk/as/Polyu/GUR/

(vii) Healthy Lifestyle

Healthy lifestyle is the platform for all-round development. All students* are required to successfully complete a non-credit-bearing programme in healthy lifestyle offered by the Student Affairs Office. The programme will cover: (a) fitness evaluation, (b) concepts on health and fitness, (c) sports skills acquisition, and (d) exercise practicum. More details can be found at: http://www.polyu.edu.hk/sao/hlr/.

* Students on Articulation Degree programmes and Senior Year intakes to the 4-year Undergraduate degree programmes are NOT required to take the Healthy Lifestyle Programme.

4.3 Discipline Specific Requirements (DSR)

A student in the BEng (Hons) in Electrical Engineering programme should complete 97 credits of discipline-specific requirements (DSR) as detailed below:

(i) Common underpinning subjects for Broad Discipline of Engineering (12 credits)

The following subjects must be taken:

Basic Mathematics I – Calculus and Probability & Statistics	3 credits
Basic Mathematics II – Calculus and Linear algebra	3 credits
Physics I	3 credits
Physics II	3 credits

(ii) Common DSR subjects for Broad Discipline of Engineering (31 ~ 37 credits)

The following DSR subjects of the Faculty of Engineering must be taken:

Computer Programming	3 credits
Engineering Economics	3 credits
Information Technology	3 credits
Engineering Management	3 credits
Project Management[1]	3 credits
Mathematics I and II	6 credits
Professional Communication in English	2 credits
Professional Communication in Chinese[2]	2 credits
Science (any **ONE** from Fundamentals of Materials Science and Engineering, Biology, Chemistry)	3 credits
Society and the Engineer	3 credits
Multidisciplinary Project[3]	6 credits

[1] This is a Level 4 Specialist Elective.

[2] Students who are non-Chinese speakers or those whose Chinese standard are at junior secondary level or below will be exempted from the Discipline-Specific Chinese Language requirement, the Faculty Board of Engineering has agreed that all FENG students of this category can take a replacement subject of any level to make up for credit requirement.

[3] This is an elective. Students who do not choose this subject should instead take two EE Level 3 electives.

(iii) DSR subjects in Electrical Engineering discipline (48 ~ 54 credits)

The following DSR subjects in Electrical Engineering must be taken:

	Level 2
EE2001A	Applied Electromagnetics (3)
EE2002A	Circuit Analysis (3)
EE2003A	Electronics (3)
EE2004A	Electrical Energy Systems Fundamentals (3)
	12 credits

	Level 3
EE3001A	Analogue and Digital Circuits (3)
EE3002A	Electromechanical Energy Conversion (3)
EE3003A	Power Electronics and Drives (3)
EE3004A	Power Transmission and Distribution (3)
EE3005A	Systems and Control (3)
EE3006A	Analysis Methods for Engineers (3)
	Electives (for students who do not take Multidisciplinary Project)
EE3007A	Computer System Principles (3)
EE3008A	Linear Systems and Signal Processing (3)
EE3009A	Electrical Services in Buildings (3)
	18~24 credits
	Level 4
EE4003A	Electrical Machines (3)
EE4004A	Power Systems (3)
EE4006A	Individual Project (6)
EE4xxxA	Advanced Elective 1 (3)
EE4xxxA	Advanced Elective 2 (3)
	18 credits

Table 4.3

4.4 Curriculum for Various Levels

The time-tabled student hours for each subject and the type of activity (lecture [Lt], tutorial [Tu] and laboratory [Lab]) are given in the Tables 4.4.1 - 4.4.4. The abbreviations used in these tables are:

AF	Accounting and Finance
AP	Applied Physics
AMA	Applied Mathematics
APSS	Applied Social Sciences
BSE	Building Services Engineering
CBS	Chinese & Bilingual Studies
CEE	Civil and Environmental Engineering
EE	Electrical Engineering
ELC	English Language Centre
ENG	Engineering Faculty
IC	Industrial Centre
ISE	Industrial and Systems Engineering
MM	Management and Marketing

A normal student in the BEng (Hons) programme may complete 30, 30, 34 and 30 credits in Year 1, 2, 3 and 4, respectively, as shown in the indicative progression patterns in Tables 4.5.1 to 4.5.4. In other words, a student must complete a nominal number of 124 academic credits, including the credits earned in IC training, and the other General University Requirements e.g. WIE, before graduation.

Subjects are referenced by a Departmental prefix (e.g. EE corresponds to Electrical Engineering) followed by a reference number. Each subject is also categorised as non-deferrable (Non-Def), deferrable (Def) or Elective. In the reference numbers, the first digit (i.e. 1, 2, 3 or 4) indicates the level of the subject.

'*Non-def*' are those subjects which form the backbone of the vertical integration must be taken by every student in the prescribed semester, unless prevented from doing so due to non-compliance with prerequisites.

'*Def*' are those subjects which must be satisfactorily completed before the student becomes eligible for an award but the timing of the subject is determined by the student.

'*Electives*' are those subjects which are optional. Electives give students choices in composing their study programme. All elective subjects are deferrable.

Tables in Section 4.5 show the times (semesters) in which these subjects are recommended to be taken if the programme are to be completed in the minimum time.

The Hong Kong Polytechnic University BEng (Hons) in Electrical Engineering Levels 0 and 1		Curriculum					Assessment Methods	
		Teaching Department	Contact Hours		Credits	GPA Weight (W_i)		
Subject Code	Subject Title		Lt/ Tu	Lab			Continuous Assessment	Examination
	Non-Def Subjects							
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics	AMA	39	-	3	0.2	50%	50%
AMA1120	Basic Mathematics II –Calculus and Linear Algebra	AMA	39	-	3	0.2	50%	50%
AP10001	Introduction to Physics[@]	AP	39	-	3	0.2	40%	60%
AP10005	Physics I	AP	39	-	3	0.2	40%	60%
AP10006	Physics II	AP	39	-	3	0.2	40%	60%
APSS1L01	Tomorrow's Leaders	APSS	39	-	3	0.2	100%	-
CBS1101P	Fundamentals of Chinese Communication*	CBS	tbc	-	3	0.2	tbc	tbc
CBS1102P	Advanced Communication Skills in Chinese*	CBS	tbc	-	3	0.2	tbc	tbc
ELC1011	Practical English for University Studies*	ELC	39	-	3	0.2	100%	-
ELC1012/1013	English for University Studies *	ELC	39	-	3	0.2	100%	-
ELC1014	Advanced English for University Studies*	ELC	39	-	3	0.2	100%	-
ELC2011	Advanced English Reading and Writing Skills*	ELC	39	-	3	0.2	100%	-
ELC2012	Persuasive Communication*	ELC	39	-	3	0.2	100%	-
ELC2013	English in Literature and Film*	ELC	39	-	3	0.2	100%	-
ENG1003	Freshman Seminar for Engineering	ENG	39	-	3	0.2	100%	-
	Def Subjects							
depending on the subjects taken	Cluster Areas Requirement (CAR) subjects (subjects taken must conform to the University's Cluster Area Requirements specified in Section 4.2)	Various Departments			3	0.2	depending on the subjects taken	depending on the subjects taken

Table 4.4.1

[@] For students who have not attained Level 2 in HKDSE Physics or Combined Science (with a component in Physics)

* Students will take these subjects based on their HKDSE Chinese Language / English Language results (see Section 4.2 (i))

The Hong Kong Polytechnic University BEng (Hons) in Electrical Engineering **Level 2**		**Curriculum**					**Assessment Methods**	
		Teaching Department	**Contact Hours**		**Credits**	**GPA Weight (W_i)**		
Subject Code	**Subject Title**		**Lt/ Tu**	**Lab**			**Continuous Assessment**	**Examination**
	Non-Def Subjects							
AMA2111	Mathematics I	AMA	39	-	3	0.2	40%	60%
AMA2112	Mathematics II	AMA	39	-	3	0.2	40%	60%
EE2001A	Applied Electromagnetics	EE	33	12	3	0.2	40%	60%
EE2002A	Circuit Analysis	EE	39	9	3	0.2	40%	60%
EE2003A	Electronics	EE	39	9	3	0.2	40%	60%
EE2004A	Electrical Energy Systems Fundamentals	EE	36	6	3	0.2	40%	60%
ENG2001	Fundamentals of Materials Science and Engineering[#]	ENG	39	-	3	0.2	40%	60%
ENG2002	Computer Programming	ENG	48	-	3	0.2	100%	-
ENG2003	Information Technology	ENG	39	-	3	0.2	50%	50%
	Def Subjects							
depending on the subjects taken	Cluster Areas Requirement (CAR) subjects (subjects taken must conform to the University's Cluster Area Requirements specified in Section 4.2 (v))	various departments			3	0.2	depending on the subjects taken	depending on the subjects taken
	IC Training		Duration					
IC2105	Engineering Communication and Fundamentals	IC	111 hours throughout the year		4 training credits	-	100% assessed and graded	-
IC2112	IC Training I (EE)	IC	112 hours in Summer		4 training credits		100% assessed and graded	-

Table 4.4.2

[#] Students may select a Level 2 Chemistry or Biology subject instead of "Fundamentals of Materials Science and Engineering".

The Hong Kong Polytechnic University BEng (Hons) in Electrical Engineering Level 3		Curriculum					Assessment Methods	
		Teaching Department	Contact Hours		Credits	GPA Weight (W_i)		
Subject Code	Subject Title		Lt/Tu	Lab			Continuous Assessment	Examination
	Non-Def Subjects							
EE3001A	Analogue and Digital Circuits	EE	39	6	3	0.3	40%	60%
EE3002A	Electromechanical Energy Conversion	EE	35	9	3	0.3	40%	60%
EE3003A	Power Electronics and Drives	EE	36	6	3	0.3	40%	60%
EE3004A	Power Transmission and Distribution	EE	33	12	3	0.3	40%	60%
EE3005A	Systems and Control	EE	30	9	3	0.3	40%	60%
EE3006A	Analysis Methods for Engineers	EE	36	6	3	0.3	40%	60%
AF3625	Engineering Economics	AF	39	-	3	0.3	50%	50%
ENG3002	Multidisciplinary Project[#]	ENG	-	-	6	0.3	100%	-
ENG3003	Engineering Management	ENG	39	-	3	0.3	40%	60%
ENG3004	Society and the Engineer	ENG	39	-	3	0.3	60%	40%
	Def Subjects							
CBS3241P	Professional Communication in Chinese	CBS	tbc	-	2	0.3	tbc	tbc
ELC3521	Professional Communication in English	ELC	26	-	2	0.3	100%	-
	Level 3 Electives (Def Subjects) *For students who do not take Multidisciplinary Project, they should choose any two electives.*							
EE3007A	Computer System Principles	EE	35	8	3	0.3	40%	60%
EE3008A	Linear Systems and Signal Processing	EE	39	6	3	0.3	40%	60%
EE3009A	Electrical Services in Buildings	EE	39	-	3	0.3	40%	60%
	The Department reserves the right of NOT offering all electives in each semester.							
EE3010A	Summer Practical Training	Industry	A minimum of 6 weeks		3 training credits	-	100% assessed on Pass/Fail basis	-

Table 4.4.3

The Hong Kong Polytechnic University BEng (Hons) in Electrical Engineering Levels 4 and 5		Curriculum					Assessment Methods	
		Teaching Department	Contact Hours		Credits	GPA Weight (W_i)		
Subject Code	Subject Title		Lt/Tu	Lab			Continuous Assessment	Examination
	Non-Def Subjects							
EE4003A	Electrical Machines	EE	33	12	3	0.3	40%	60%
EE4004A	Power Systems	EE	36	6	3	0.3	40%	60%
	Def Subjects							
EE4006A	Individual Project	EE	-	-	6	0.3	100%	-
	Specialist Electives*							
BSE463	Design of Mechanical Systems in Buildings	BSE	33	-	3	0.3	40%	60%
EE4002A	Digital Control and Signal Processing	EE	33	6	3	0.3	40%	60%
EE4007A	Advanced Power Electronics	EE	36	6	3	0.3	40%	60%
EE4008A	Applied Digital Control	EE	33	6	3	0.3	40%	60%
EE4009A	Electric Traction and Drives	EE	39#	-	3	0.3	40%	60%
EE4010A	Fibre Optics	EE	36	6	3	0.3	40%	60%
EE4011A	Industrial Computer Applications	EE	36	6	3	0.3	40%	60%
EE4012A	Intelligent Buildings	EE	39	-	3	0.3	40%	60%
EE4013A	Power System Protection	EE	36	6	3	0.3	40%	60%
EE4014A	Intelligent Systems Applications in Electrical Engineering	EE	33	12+	3	0.3	40%	60%
EE4015A	Electrical Engineering Materials	EE	39	9	3	0.3	40%	60%
ENG4001	Project Management	ENG	36	3	3	0.3	40%	60%
	Non-Technical Broadening Electives*							
AF5107	Accounting for Engineers	AF	39	-	3	0.3	50%	50%
CSE40462	Environmental Impact Assessment - Theory and Practice	CEE	39	-	3	0.3	50%	50%
CSE516	Urban Transport Planning – Theory and Practice	CEE	39	-	3	0.3	40%	60%
ISE404	Total Quality Management	ISE	39	-	3	0.3	55%	45%
MM4522	China Business Management	MM	39	-	3	0.3	50%	50%
	MSc Subjects as Electives* *Students must seek prior approval for enrolling on Level 5 subjects.*							
EE501A	Alternative Energy Technologies	EE	39#	-	3	0.3	40%	60%
EE502A	Modern Protection Methods	EE	33	12	3	0.3	40%	60%
EE505A	Power System Control & Operation	EE	39	-	3	0.3	40%	60%
EE509A	High Voltage Engineering	EE	39	-	3	0.3	40%	60%
EE510A	Electrical Traction Engineering	EE	39	-	3	0.3	40%	60%
EE512A	Electric Vehicles	EE	39	-	3	0.3	40%	60%
EE514A	Real Time Computing	EE	36	3	3	0.3	40%	60%
EE517A	Fibre Optic Components	EE	36	3	3	0.3	40%	60%
EE520A	Intelligent Motion Systems	EE	39	-	3	0.3	40%	60%
EE521A	Industrial Power Electronics	EE	36	6	3	0.3	40%	60%
EE522A	Optical Fibre Systems	EE	39	-	3	0.3	40%	60%
EE524A	Open Electricity Market Operation	EE	39	-	3	0.3	40%	60%
EE525A	Energy Policy and Restructuring of Electricity Supply Industry	EE	39	-	3	0.3	40%	60%
EE526A	Power System Analysis and Dynamics	EE	36	8	3	0.3	40%	60%
EE527A	Auto-tuning for Industrial Processes	EE	39	-	3	0.3	40%	60%
EE528A	System Modelling and Optimal Control	EE	30	9	3	0.3	40%	60%
EE529A	Power Electronics for Utility Applications	EE	39	-	3	0.3	40%	60%
EE530A	Electrical Energy-saving Systems	EE	39	-	3	0.3	40%	60%

Table 4.4.4

Lecture: 33 hours; plus Seminar: 6 hours

+ Mini-project: 12 hours

* The Department reserves the right of NOT offering all electives in each semester

4.5 Indicative Progression Pattern

The progression pattern in Table 4.5.1 to Table 4.5.4 is recommended for HKDSE admittees who have attained Level 4 (Basic) in both English language and Chinese language, and who have attained Level 2 in Physics or (Combined Science with a component in Physics)

A student in the First Year is advised to take the following curriculum as indicated in Table 4.5.1 below and obtain a total of 30 credits.

	Semester One
AMA1110	Basic Mathematics I – Calculus and Probability & Statistics (3)
AP10005	Physics I (3)
APSS1L01	Tomorrow's Leaders (3)
ELCXXXX	English LCR Subject* (3)
ENG1003	Freshman Seminars for Engineering (1.5 continues in Semester 2)
	13.5 credits
	Semester Two
AMA1120	Basic Mathematics II – Calculus and Linear algebra (3)
AP10006	Physics II (3)
ELCXXXX	English LCR Subject* (3)
ENG1003	Freshman Seminar for Engineering (1.5 continues from Semester 1)
ENG2003	Information Technology (3)
CAR requirement	one Cluster Area Requirement Subject (3)
	16.5 credits
GUR requirement	Healthy Lifestyle (0)
IC2105	Engineering Communication and Fundamentals (111 hours throughout the year)
	4 training credits

Table 4.5.1

* Students will take these subjects based on their HKDSE results (see Section 4.2 (i))

A student in the Second Year is advised to take the following curriculum as indicated in Table 4.5.2 below and obtain 30 credits.

	Semester One
AMA2111	Mathematics I (3)
CBSXXXX	Chinese LCR Subject* (3)
EE2002A	Circuit Analysis (3)
ENG2001	Fundamentals of Materials Science and Engineering[#] (3)
ENG2002	Computer Programming (1.5 continues in Semester 2)
	13.5 credits
	Semester Two
AF3625	Engineering Economics (3)
AMA2112	Mathematics II (3)
EE2003A	Electronics (3)
EE2004A	Electrical Energy Systems Fundamentals (3)
ENG2002	Computer Programming (1.5 continues from Semester 1)
CAR requirement	one Cluster Area Requirement Subject (3)
	16.5 credits
	Semester Three (Summer Period at the end of Year 2)
IC2112	IC Training I (EE) (112 hours in summer)
	4 training credits

Table 4.5.2

[#] Students may select a Level 2 Chemistry or Biology subject instead of "Fundamentals of Materials Science and Engineering".

* Students will take these subjects based on their HKDSE results (see Section 4.2 (i))

A student in the Third Year is advised to take the following curriculum as indicated in Table 4.5.3 below and obtain 34 credits.

	Semester One
EE2001A	Applied Electromagnetics (3)
EE3001A	Analogue and Digital Circuits (3)
EE3004A	Power Transmission and Distribution (3)
EE3006A	Analysis Methods for Engineers (3)
CAR requirement	one Cluster Area Requirement Subject (3)
ENG3002	Multidisciplinary Project (3 continue in S2)
	OR
	*any one or both of the following electives**
EE3007A	Computer System Principles (3)
EE3008A	Linear Systems and Signal Processing (3)
	18 ~ 21 credits
	Semester Two
CBS3241P	Professional Communication in Chinese (2)
EE3002A	Electromechanical Energy Conversion (3)
EE3003A	Power Electronics and Drives (3)
EE3005A	Systems and Control (3)
ELC3521	Professional Communication in English (2)
ENG3002	Multidisciplinary Project (3 continue from S1)
	OR
	*the following elective**
EE3009A	Electrical Services in Buildings (3)
	13 ~ 16 credits
	Semester Three (Summer Period at the end of Year 3)
EE3010A	Summer Practical Training (A minimum of 6 weeks)
	3 training credits

Table 4.5.3

* Students who do not take Multidisciplinary Project should choose any two EE Level 3 electives instead.

A student is advised to take the following curriculum in the final year as indicated in Table 4.5.4 and obtain 30 credits. He/she must accumulate a total of 124 academic credits to qualify for graduation.

	Semester One
EE4003A	Electrical Machines (3)
EE4004A	Power Systems (3)
EE4006A	Individual Project (3 continues in Semester 2)
ENG3003	Engineering Management (3)
CAR requirement	one Cluster Area Requirement Subject (3)
GUR requirement	Service-Learning Subject[#] (1.5 continues in Semester 2)
	16.5 credits
	Semester Two
EE4006A	Individual Project (3 continues from Semester 1)
ENG3004	Society and the Engineer (3)
GUR requirement	Service-Learning Subject[#] (1.5 continues from Semester 2)
	Electives *Out of the two electives taken in Year 4, no more than one should be a Non-technical Broadening Elective.* *The Department reserves the right of NOT offering all the electives in each year.* Two advanced elective should be taken. A number of electives from Table 4.4.4 will be offered in each semester of Year 4. (6)
	13.5 credits

Table 4.5.4

[#] Students are encouraged to take this subject at an earlier stage of study.

4.6 Subjects Support to Programme Outcomes

Table 4.6 illustrates how the subjects support the Programme Outcomes through teaching activities, practice on the part of students, and measurements.

Subjects	Programme Outcomes								
	A1	A2	A3	A4	A5	A6	B1	B2	B3
AF3625				√	√	√	√	√	√
AF5107				√	√	√	√	√	√
AMA1110	√			√				√	
AMA1120	√			√				√	
AMA2111	√			√				√	
AMA2112	√			√				√	
AP10005	√							√	
AP10006	√							√	
APSS1L01							√		√
BSE463	√		√	√	√			√	
CBS1101P					√		√		
CBS3241P					√		√		
CSE40462	√			√	√	√	√	√	
CSE516	√		√	√	√	√	√	√	
EE2001A	√		√		√		√		√
EE2002A	√	√		√				√	
EE2003A	√	√		√				√	
EE2004A	√	√		√				√	
EE3001A	√	√	√	√		√	√	√	
EE3002A	√	√					√		
EE3003A	√	√					√		√
EE3004A	√	√	√	√	√		√	√	
EE3005A	√		√				√		
EE3006A	√		√		√		√		√
EE3007A	√	√	√				√		√
EE3008A	√	√					√		
EE3009A	√			√			√	√	
EE3010A	√			√	√	√		√	
EE4001A	√			√	√	√		√	
EE4002A	√		√				√		
EE4003A	√		√	√	√		√		√
EE4004A	√	√					√	√	
EE4006A		√	√	√	√	√	√	√	√
EE4007A	√		√	√	√		√		√
EE4008A	√		√				√		
EE4009A	√		√	√	√	√	√	√	
EE4010A	√	√	√	√				√	
EE4011A	√		√		√		√		
EE4012A	√		√				√	√	
EE4013A	√	√		√			√	√	
EE4014A	√	√					√	√	√
EE4015A		√	√		√			√	
EE501A	√		√	√		√	√		√
EE502A	√				√				
EE505A	√	√					√	√	
EE509A	√	√	√	√	√		√	√	
EE510A	√		√	√	√	√	√	√	
EE512A	√		√		√		√	√	
EE514A	√	√	√						
EE517A	√		√		√		√	√	

Subjects	Programme Outcomes								
	A1	A2	A3	A4	A5	A6	B1	B2	B3
EE520A	√		√				√		
EE521A	√		√	√	√		√		√
EE522A	√	√	√	√				√	
EE524A	√			√	√		√		
EE525A	√			√	√		√		
EE526A	√	√							
EE527A	√		√				√		
EE528A	√		√		√		√		√
EE529A	√		√	√	√		√		√
EE530A	√		√	√	√		√	√	√
ELC1012/1013					√		√		
ELC1014					√		√		
ELC3521					√		√		
ENG1003				√	√	√		√	√
ENG2001	√			√				√	
ENG2002	√		√					√	
ENG2003	√		√	√	√			√	
ENG3002	√		√	√			√	√	√
ENG3003				√	√	√	√	√	
ENG3004				√	√	√	√		√
ENG4001				√		√	√	√	
IC2105		√	√	√		√	√		
IC2112		√	√	√		√	√		
ISE404			√	√		√		√	
MM4522						√	√	√	
CAR subjects					√	√	√		
Healthy Lifestyle			√	√	√	√	√		√
Service-Learning			√	√	√	√	√		√

Table 4.6 Support of programme outcomes by individual subjects

4.7 Work-Integrated Education and Summer Practical Training

Work-Integrated Education (WIE) is introduced as a University exercise. It aims to prepare students for the realities of workplaces, develop students' ability to learn in non-academic surroundings, allow students to assess their own strengths and weaknesses in a real working settings and develop students' critical thinking and problem solving capabilities.

Summer Practical Training (EE3010A) normally takes place during the summer at the end of Year Three. Students are required to undertake a minimum of 6 weeks (3 training credits) of summer training, of which at least 2 weeks (1 credit) are of valid WIE activities as recognised by the University.

WIE activities may include placement, employment or attachment relevant to the context, knowledge and skills of the Programme. The Preferred Graduate Development Programme (PGDP) organised by the Student Affairs Office (SAO) of the University is one of the main sources of placement opportunities for local students and students from Mainland China and overseas. There is no requirement on the WIE activities being paid jobs. Any payment by employers is completely at the employers' discretion. Typical examples of WIE activities are as follows:

- Summer placement in a suitable organisation participating in the Preferred Graduate Development Programme.
- Relevant placement as student helpers in University's administrative departments and the Industrial Centre.
- Assisting in the University-wide activities that have an external collaboration or service component such as, Innovation and Technology Fund projects, RAPRODS projects, IGARD projects, high-level consultancy projects, collaborative research projects that were undertaken with external organizations, jobs undertaken by the Industrial Centre as a service for an external organization.
- Placement within the International Association for the Exchange of Students for Technical Experience (IAESTE) Programme in which the student is attached to a workplace abroad during the training.
- The student works on his final-year degree project which involves an industrial partner or external client. The student need not be placed in the company but make frequent visits to ensure that the project will meet the specifications required by the company/client.

In order to ensure that students have useful experience, the summer practical training must be suitably chosen and properly organised. Students are required to initiate and formulate a training proposal or learning contract to indicate the expected work-based learning experiences, as well as a learning portfolio to review their achievements and intended learning outcomes.

Accordingly, the WIE officer will coordinate the following learning support activities:

(i) Orientation

To allow sufficient time for the formulation of training proposals and/or learning contracts, students should start their preparatory work by the commencement of the second semester of their second year study. In the orientation meeting, students will first learn the basic requirements of a good proposal in terms of learning outcomes and then, the basic skills in undertaking practical training.

- Information on search techniques to find national/international work-base employment, attachments etc.
- Life skills to be successful in the workplace
- Develop a positive attitude to work-based learning
- Planning and scheduling for successful completion of assessment instruments
- Consolidation of Training Proposal and/or Learning Contract
- Consideration of taking this chance for the preparation of Final Year Project

Students are required to submit their practical training proposals and learning contracts by end of June.

(ii) Progress Monitoring

During the practical training, students are required to maintain a weekly training journal to identify their progress of their training. If applicable, site visits will be arranged by the supervisor during the practical training.

(iii) Learning Evaluation

After returning from the practical training, students are required to submit a learning portfolio which should cover all periods of practical training. The learning portfolio is expected to demonstrate development of practical and professional skills through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject learning outcomes. The student should be able to present the learning portfolio to prospective employers, as a complement to their degree.

Learning Portfolio

In writing the portfolio, the following should be observed:

- Preliminary Information: A contents list, abstract and employment details should precede the main learning portfolio. The abstract should be a summary of the portfolio and comprise about 300 words on one page. The employment details should set out names of employing organisations, method of obtaining employment, specific periods of employment, and nature of appointments (eg. trainee engineer etc.). Also required are details of job locations, name, phone number and designation of immediate superior (for possible contact by the course coordinator), projects in which the student was directly involved, and their degree of responsibility.

- Content: The major portion of the portfolio should be set out as a technical report, divided into suitable sections, and with an introduction to each major or different aspect of work. Students need to report on all projects listed in the employment details. Noteworthy technical details of projects in which the student was directly involved, or of projects which the student observed, should also be included. These may include investigation, feasibility, design, management, commissioning or operational aspects etc. Students should openly discuss aspects of the work they have performed or observed and indicate their involvement in their work throughout the text. To be able to produce an accurate and comprehensive portfolio it is recommended that students keep a diary, along with photographs and any other information regarding their work. This diary will not be assessed; it will however be helpful in writing the final portfolio. All project data and information must be cleared by the employers for confidentiality prior to its incorporation in the portfolio. It is generally advisable to avoid all sensitive

information related to the employment by limiting the contents to the general or public aspects of each specific project. References should be made in the text to books, technical papers, standards etc., used during the training period and should be listed. Finally, a conclusion should include comprehensive comments on the type and value of experience gained, and how this relates to the student's future professional career.

A student will be given a **PASS** grade only if he/she meets the following requirements with satisfactory performance:

1. Fulfilment of at least 6 weeks of summer practical training for full time students, with at least 2 weeks of valid WIE activities as recognised by the University.
2. Punctual submission of training proposals and/or learning contracts, training journal and learning portfolio.

An academic staff will be allocated to each student as his or her training tutor to certify that all of the above requirements have been satisfactorily met. The training tutor has the right to ask the student to re-submit the training proposal and/or learning portfolio after giving the student the necessary feedback.

While the Department will be the responsible party to pursue WIE opportunities as vigorously as possible for the students so that they meet the graduation requirements, the students are expected to play their part in ensuring that they meet the WIE requirements for graduation.

4.8 Industrial Centre (IC) Training

Besides the WIE training components, students are required to undertake training at the Industrial Centre (IC), which is equivalent to 8 training credits. The training is scheduled within Year One and at the end of Year Two. The students will not pay any training fee, nor receive any stipend. IC training is however not part of WIE activities.

4.9 Language Enhancement Subjects

All students are strongly encouraged to make full use of the facilities and services provided in the ELC and CLC to improve their language proficiency throughout the programme.

4.10 Physics Enhancement Subject

Students who do not possess the requisite background knowledge in Physics (i.e. attained Level 2 in HKDSE Physics or Combined Science with a component in Physics) are required to take and pass a Physics enhancement subject (Introduction to Physics) before they can take Physics I and Physics II.

5. Management and Operation

5.1 Administration

The daily operation of the programme, such as general administration of admission, registrations, student records, preparation for Board-of-Examiners meetings and documentations, is overseen by the Programme Leader and the administrative team of the Department. All enquiries regarding registration and general administration from students on the programme should be made to the General Office as the first contact point.

The Departmental Undergraduate Programmes Committee, in which the Head of Department and the Programme Leaders of all programmes offered by the Department are members, discusses and reviews the programme structure, syllabi content, high-level integration and future directions of the programme. The Departmental Learning and Teaching Committee advises on matters related to teaching methods and learning quality and cultivates the positive mentality toward teaching and learning among teaching staff and students. WIE/Career Liaison Officer and Student-Exchange Coordinator are appointed by the Department to provide students with advice and assistance.

5.2 Academic Advisors

While the Programme Leader is available for the operation of the programme, general enquiry and counselling, Academic Advisors are in place to offer more personal contacts and to look after students' need.

The Academic Advisors, usually an academic staff member, is assigned to each newly admitted student and he/she will be with the student till graduation. Academic Advisors provide continuous and individual counselling and help guide the students through various difficulties, if any, which might affect their studies. A specific staff member from the General Office will work closely with the Programme Leaders and the Academic Advisors. All academic requirements and regulations related to academic programmes offered by the department as well as the GUR requirements will be provided to the students.

6 Academic Regulations on Admission, Registration and Assessment

The admission, registration and assessment arrangements described below are in accordance with the University policies and regulations for all 4-year full-time undergraduate degree programmes. Under the framework of the 4-year undergraduate degree programmes, students can work for either a single discipline Major, or a Major plus a Minor. These regulations shall apply to both circumstances, unless otherwise specified.

6.1 Admission

Students are admitted into the programme via the Joint University Programmes Admissions System (JUPAS). Non-JUPAS applicants are also considered on their academic merits, as well as non-academic achievements.

6.2 Re-admission

Students who have been required to withdraw on the grounds of academic failure or have been de-registered, and those who have discontinued their studies without completing the proper procedures for official withdrawal, shall not be considered for re-admission to the same programme/stream in the following academic year. However, for students de-registered/withdrawn from a 3-year full-time Bachelor's degree programme, they will be allowed to apply to the 4-year degree programme leading to the same award. Those de-registered/withdrawn from a Broad Discipline will also be allowed to apply to the constituent single discipline programmes, and vice versa, in the following academic year.

6.3 Transfer of study within the University

A student who has not completed his programme of study may apply to transfer to another programme, and may be admitted, provided that the total period of registration does not exceed the maximum period of registration of the programme with the longer duration. However, year one new students will only be considered for transfer to another programme offered in the same mode of study, starting from their second semester of registration.

Students who wish to transfer to another full-time UGC-funded programme of the same level within the University should submit an application for transfer of study, instead of a new application in the non-JUPAS application period.

All applications for transfer of study will be considered in competition with other new applications.

6.4 Concurrent Enrolment

Students are not permitted to enrol concurrently on two full-time programmes, whether or not one of the programmes is offered by another institution.

Except for programmes which do not lead to any formal award, students are not allowed to enrol concurrently on a full-time programme and a part-time programme, or on more than one part-time programmes, including those offered by another institution, without permission from the Head(s) of Department concerned.

6.5 Maximum duration for completion of a programme and the validity period of subject credits

The maximum period of registration on, and for completion of, a programme is normally twice the duration of the programme, and must not exceed 8 years. This 8 year maximum period shall apply to programmes whose specified duration is more than 4 years. This period shall exclude deferment granted for justifiable reasons such as illness or posting to work outside Hong Kong, but any semester in which the students are allowed to take zero subject will be counted towards the maximum period of registration.

A student's registration shall lapse if it is no longer possible for him to obtain an award within the maximum period of registration.

The validity period of subject credits earned is 8 years from the year of attainment, i.e. the year in which the subject is completed. Credits earned from previous study should remain valid at the time when the student applies for credit transfer.

6.6 Residential Requirement

In order to be considered for an award granted by the University, a student must complete at least 1/3 of the normal credit requirement for the award he is currently enrolled, unless the professional bodies concerned stipulate otherwise.

6.7 Subject Registration and Withdrawal

In addition to programme registration, students need to register for the subjects at specified periods prior to the commencement of the semester. An add/drop period will also be scheduled for each semester/term. Students may apply for withdrawal of their registration on a subject after the add/drop period, if they have a genuine need to do so. The application should be made to the relevant programme offering Department and will require the approval of both the subject lecturer and the host Department Programme Leader concerned. Applications must be submitted one month before the commencement of the examination period. For approved applications of subject withdrawal, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the examination result notification and transcript of studies, but will not be counted in the calculation of the GPA.

The pre-requisite requirements of a subject must have been fulfilled before a student registers for that subject. However, the subject offering Department has the discretion to waive the pre-requisite requirements of a subject, if deemed appropriate. If the pre-requisite subject concerned forms part of the requirements for award, the subject has to be passed in order to satisfy the graduation requirements for the programme concerned, despite the waiving of the pre-requisite.

Students will be allowed to take additional subjects for broadening purpose, after they fulfil the graduation requirements and for the following semester. However, they will still be subject to the maximum study load of 21 credits per semester and the availability of places in the subjects concerned, and their enrolment will be as subject-based students only.

6.8 Study Load

For students following the progression pattern specified for their programme, they have to take the number of credits and subjects, as specified in this Definitive Programme Document, for each semester. Students cannot drop those subjects assigned by the department unless prior approval has been given by the department.

The normal study load is 15 credits in a semester. The maximum study load to be taken by a student in a semester is 21 credits, unless exceptional approval is given by the Head of the programme offering department. For such cases, students should be reminded that the study load approved should not be taken as the grounds for academic appeal.

Students are not allowed to take zero subject in any semester, including the mandatory summer term as required by some programmes, unless they have obtained prior approval from the programme offering department; otherwise they will be classified as having unofficially withdrawn from their programme. Students who have been approved for zero subject enrolment (i.e. taking zero subject in a semester) are allowed to retain their student status and continue using campus facilities and library facilities. Any semester in which the students are allowed to take zero subject will nevertheless be counted towards the maximum period of registration.

6.9 Subject Exemption

Students may be exempted from taking any specified subjects, including mandatory General University Requirements (GUR) subjects, if they have successfully completed similar subjects previously in another programme or have demonstrated the level of proficiency/ability to the satisfaction of the subject offering department. Subject exemption is normally decided by the subject offering department. However, for applications which are submitted by students who have completed an approved student exchange programme, the subject exemption is to be decided by the programme offering department in consultation with the subject offering departments. In case of disagreement between the programme offering department and the subject offering department, the two Faculty Deans/School Board Chairmen concerned will make a final decision jointly on the application. If students are exempted from taking a specified subject, the credits associated with the exempted subject will not be counted towards meeting the award requirements. It will therefore be necessary for the students to consult the programme offering department and take another subject in order to satisfy the credit requirement for the award.

6.10 Credit Transfer

Students may be given credits for recognised previous studies (including mandatory General University Requirements (GUR) subjects, and the credits will be counted towards meeting the requirements for award. Credit transfer normally will be done without the grade being carried over. Subject credit transfer is normally decided by the subject offering department. However, for applications which are submitted by students who have completed an approved student exchange programme, the decision will be made by the programme offering department in consultation with the subject offering departments.

In case of disagreement between the programme offering department and the subject offering department, the two Faculty Deans/School Board Chairmen concerned will make a final decision jointly on the application. The validity period of credits previously earned, is 8 years after the year of attainment.

Normally, not more than 50% of the credit requirement for award may be transferable from approved institutions outside the University. For transfer of credits from programmes offered by the University, normally not more than 67% of the credit requirement for award can be transferred. In cases where both types of credits are being transferred (i.e. from programmes offered by the University and from approved institutions outside the University), not more than 50% of the credit requirement for award may be transferred.

Credit transfer can be applicable to credits earned by students through study at an overseas institution under an approved exchange programme. Students should, before they go abroad for the exchange programme, seek prior approval from the programme offering department on their study plan and credit transferability. In order to overcome the problems associated with subject-to-subject mappings, block credit transfer rather than subject-by-subject credit transfer can be given.

All credit transfers approved will take effect only in the semester for which they are approved. A student who applies for transfer of credits during the re-enrolment or the add/drop period of a particular semester will only be eligible for graduation at the end of that semester, even if the granting of credit transfer will immediately enable the student to satisfy the credit requirement for the award.

6.11 Deferment of Study

Students may apply for deferment of study if they have a genuine need to do so such as illness. Approval from the department offering the programme is required. The deferment period will not be counted towards the maximum period of registration.

Application for deferment of study will be entertained only in exceptional circumstances from students who have not yet completed the first year of a full-time programme. Where the period of deferment of study begins during a stage for which fees have been paid, no refund of such fees will be made. Students who have been approved for deferment are not entitled to enjoy any campus facilities during the deferment period.

6.12 General Assessment Regulations

These General Assessment Regulations shall govern all full-time 4-year undergraduate degree programmes and articulation degree programmes, except where the Senate decides otherwise. Unless otherwise specified, students who have opted for the Major/Minor route should abide by the academic regulations, including assessment regulations, stipulated in the definitive programme document applicable to students of the single-discipline Major programme.

For all programmes, students' progress by credit accumulation, i.e. credits earned by passing individual subjects can be accumulated and counted towards the final award.

(i) Subject Level

A 'level' in a programme indicates the intellectual demand placed upon students and may characterise each subject with respect to its recommended sequencing within that programme. Upper level subjects should normally build on lower level subjects. Pre-requisite requirements, if any, must therefore be spelt out on a subject basis.

A 'subject' is defined as a discrete section of the programme which is assigned a separate assessment. A list of subjects, together with their level and weightings, shall be published in the definitive programme document.

The following is the Subject Level code adopted by the University:

Level Code		***Explanation***
0	=	Pre-university level standard (and remedial subjects taken by new admittees to a 4-year degree programme, or some subjects offered to Higher Diploma students only)
1	=	Standard comparable to year 1 of a 4-year degree programme
2	=	Standard comparable to year 2 of a 4-year degree programme
3	=	Standard comparable to year 3 of a 4-year degree programme
4	=	Standard comparable to the final year of a 4-year degree programme
5	=	Master's degree level
6	=	Doctoral degree level

(ii) Language of assessment

The language of assessment for all programmes/subjects shall be English, unless approval is given for it to be otherwise.

6.13 Principles of Assessment

Assessment of learning and assessment for learning are both important for assuring the quality of student learning. Assessment of learning is to evaluate whether students have achieved the intended learning outcomes of the subjects that they have taken and have attained the overall learning outcomes of the academic programme at the end of their study at a standard appropriate to the award. Appropriate methods of assessment that align with the intended learning outcomes should be designed for this purpose. The assessment methods will also enable the teacher to differentiate students' different levels of performance within the subject. Assessment for learning is to engage students in productive learning activities through purposefully designed assessment tasks.

Assessment will also serve as feedback to students. The assessment criteria and standards should be made explicit to students before the start of the assessment to facilitate student learning, and feedback provided should link to the criteria and standards. Timely feedback should be provided to students so that they are aware of their progress and attainment for the purpose of improvement.

The ultimate authority in the University for the confirmation of academic decisions is the Senate, but for practical reasons, the Senate has delegated to the Faculty/School Boards the authority to confirm the decisions of Boards of Examiners provided these are made within the framework of the General Assessment Regulations. Recommendations from Board of Examiners which fall outside these Regulations shall be ratified by the Academic Regulations Committee (ARC) and reported to the Senate.

6.14 Assessment Methods

Students' performance in a subject can be assessed by continuous assessment and/or examinations, at the discretion of the individual subject offering department. Where both continuous assessment and examinations are used, the weighting of each in the overall subject grade shall be clearly stated in the definitive programme document. The subject offering department can decide whether students are required to pass both the continuous assessment and examination components, or either component only, in order to obtain a subject pass, but this requirement (to pass both, or either, components) shall be specified in the Definite Programme Document. Learning outcome should be assessed by continuous assessment and/or examination appropriately, in line with the outcome-based approach.

Continuous assessment may include tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. Continuous Assessment assignments which involve group work should nevertheless include some individual components therein. The contribution made by each student in continuous assessment involving a group effort shall be determined and assessed separately, and this can result in different grades being awarded to students in the same group.

Assessment methods and parameters of subjects shall be determined by the subject offering department.

At the beginning of each semester, the subject teacher should inform students of the details of the methods of assessments to be used, within the assessment framework as specified in the definitive programme document.

6.15 Progression/Academic Probation/Deregistration

(i) The Board of Examiners shall, at the end of each semester (except for Summer Term unless there are students who are eligible to graduate after completion of Summer Term subjects), determine whether each student is

(a) eligible for progression towards an award; or

(b) eligible for an award; or

(c) required to be deregistered from the programme.

When a student has a Grade Point Average (GPA) lower than 2.0, he will be put on academic probation in the following semester. If a student is able to pull his GPA up to 2.0 or above at the end of the semester, the status of "academic probation" will be lifted. The status of "academic probation" will be reflected in the examination result notification but not in the transcript of studies.

(ii) A student will have 'progressing' status unless he falls within anyone of the following categories, which may be regarded as grounds for deregistration from the programme:

(a) the student has exceeded the maximum period of registration for that programme, as specified in the Definitive Programme Document; or

(b) the student's GPA is lower than 2.0 for two consecutive semesters and his Semester GPA in the second semester is also lower than 2.0; or

(c) the student's GPA is lower than 2.0 for three consecutive semesters.

The progression of students to the following academic year will not be affected by the GPA obtained in the Summer Term, unless Summer Term study is mandatory for all students of the programme and constitutes a requirement for graduation.

A student may be de-registered from the programme enrolled before the time frame specified at (ii) or (iii) of (b) above if his academic performance is poor to the extent that the Board of Examiners deems that his chance of attaining a GPA of 2.0 at the end of the programme is slim or impossible.

Where there are good reasons, the Board of Examiners has the discretion to recommend allowing students who fall into categories as stated at (ii) or (iii) of (b) above to stay on the programme, and these recommendations should be presented to the relevant Faculty/School Board for final decision.

Under the current procedures, a student can appeal against the decision of the Board of Examiners to de-register him. If such an appeal was upheld by the Department/School concerned, the recommendation (to reverse the previous decision to de-register the student) should also be presented to the relevant Faculty/School Board for final decision.

6.16 Retaking of Subjects

Students may retake any subject for the purpose of improving their grade without having to seek approval, but they must retake a compulsory subject which they have failed, i.e. obtained an F grade. Retaking of subjects is with the condition that the maximum study load of 21 credits per semester is not exceeded. Students wishing to retake passed subjects will be accorded a lower priority than those who are required to retake (due to failure in a compulsory subject) and can only do so if places are available.

The number of retakes of a subject is not restricted. Only the grade obtained in the final attempt of retaking (even if the retake grade is lower than the original grade for originally passed subject) will be included in the calculation of the Grade Point Average (GPA). If students have passed a subject but failed after retake, credits accumulated for passing the subject in a previous attempt will remain valid for satisfying the credit requirement for award. (The grades obtained in previous attempts will only be reflected in transcript of studies.)

In cases where a student takes another subject to replace a failed elective subject, the fail grade will be taken into account in the calculation of the GPA, despite the passing of the replacement subject.

6.17 Absence from an assessment component

If a student is unable to complete all the assessment components of a subject, due to illness or other circumstances which are beyond his control and considered by the subject offering Department as legitimate, the Department will determine whether the student will have to complete a late assessment and, if so, by what means. This late assessment shall take place at the earliest opportunity, and before the commencement of the following academic year (except that for Summer Term, which may take place within 3 weeks after the finalisation of Summer Term results). If the late assessment cannot be completed before the commencement of the following academic year, the Faculty/School Board Chairman shall decide on an appropriate time for completion of the late assessment.

The student concerned is required to submit his/her application for late assessment in writing to the Head of Department offering the subject, within 5 working days from the date of the examination, together with any supporting documents. Approval of applications for late assessment and the means for such late assessments shall be given by the Head of Department offering the subject or the Subject Lecturer concerned, in consultation with the Programme Leader.

6.18 Aegrotat Award

If a student is unable to complete the requirements of the programme in question for the award due to very serious illness, or other very special circumstances which are beyond his control, and considered by the Board of Examiners as legitimate, the Faculty/School Board will determine whether the student will be granted an aegrotat award. Aegrotat award will be granted under very exceptional circumstances.

A student who has been offered an aegrotat award shall have the right to opt either to accept such an award, or request to be assessed on another occasion to be stipulated by the Board of Examiners; the student's exercise of this option shall be irrevocable.

The acceptance of an aegrotat award by a student shall disqualify him from any subsequent assessment for the same award.

An aegrotat award shall normally not be classified, and the award parchment shall not state that it is an aegrotat award. However, the Board of Examiners may determine whether the award should be classified, provided that they have adequate information on the students' academic performance.

6.19 Grading

Assessment grades shall be awarded on a criterion-referenced basis. A student's overall performance in a subject (including GUR subjects) shall be graded as follows:

Subject grade	Short description	Elaboration on subject grading description
A+	Exceptionally Outstanding	The student's work is exceptionally outstanding. It exceeds the intended subject learning outcomes in all regards.
A	Outstanding	The student's work is outstanding. It exceeds the intended subject learning outcomes in nearly all regards.
B+	Very Good	The student's work is very good. It exceeds the intended subject learning outcomes in most regards.
B	Good	The student's work is good. It exceeds the intended subject learning outcomes in some regards.
C+	Wholly Satisfactory	The student's work is wholly satisfactory. It fully meets the intended subject learning outcomes.
C	Satisfactory	The student's work is satisfactory. It largely meets the intended subject learning outcomes.
D+	Barely Satisfactory	The student's work is barely satisfactory. It marginally meets the intended subject learning outcomes.
D	Barely Adequate	The student's work is barely adequate. It meets the intended subject learning outcomes only in some regards.
F	Inadequate	The student's work is inadequate. It fails to meet many of the intended subject learning outcomes.

'F' is a subject failure grade, whilst all others ('D' to 'A+') are subject passing grades. No credit will be earned if a subject is failed.

Codes	Interpretation	Remarks
I #	Assessment to be completed	An incomplete grade must be converted to a regular grade normally in the following academic year at the latest.
N	Assessment is not required	—
P	Pass an ungraded subject	This code applies to an ungraded subject, such as industrial training.
U	Fail an ungraded subject	This code applies to an ungraded subject, such as industrial training.
M	Pass with Merit	This code applies to all General Education subjects for intake cohorts before 2010/11. The adoption or otherwise of this code to other subjects adopting a "Pass/Fail" grading system would be subject to the decision of individual Departments. The grade "Pass with Merit" can be awarded when the student's work exceeds the subject learning outcomes in the majority of regards.
L	Subject to be continued in the following semester	This code applies to subjects like "Project" which may consist of more than 1 part (denoted by the same subject code) and for which continuous assessment is deemed appropriate.
S	Absent from assessment	—
W	Withdrawn from subject	Dropping of subjects after the add/drop period is normally not allowed. Requests for withdrawal from subjects after the add/drop period and prior to examination will only be considered under exceptional circumstances. This code is given when a student has obtained exceptional approval from Department to withdraw from a subject after the "add/drop" period and prior to examination; otherwise, a failure grade (grade F) should be awarded.
Z	Exempted	—
T	Transfer of credit	—

* Entry of grades/codes for subject components is optional.

\# For cases where students fail marginally in one of the components within a subject, the BoE can defer making a final decision until the students concerned have completed the necessary remedial work to the satisfaction of the subject examiner(s). The students can be assigned an ' I ' code in this circumstance.

Note: Subjects with the assigned codes I, N, P, U, M, L, W, Z and T (if the subject is without grade transferred) will be omitted in the calculation of the GPA. A subject assigned code S will be taken as zero in the calculation.

A numeral grade point is assigned to each subject grade, as follows:

Grade	Grade Point
A+	4.5
A	4
B+	3.5
B	3
C+	2.5
C	2
D+	1.5
D	1
F	0

At the end of each semester/term, a Grade Point Average (GPA) will be computed as follows, and based on the grade point of all the subjects:

$$GPA = \frac{\sum_{n} \text{Subject Grade Point} \times \text{Subject Credit Value}}{\sum_{n} \text{Subject Credit Value}}$$

where n = number of all subjects (inclusive of failed subjects) taken by the student up to and including the latest semester/term. For subjects which have been retaken, only the grade point obtained in the final attempt will be included in the GPA calculation

In addition, the following subjects will be excluded from the GPA calculation:

(i) Exempted subjects

(ii) Ungraded subjects

(iii) Incomplete subjects

(iv) Subjects for which credit transfer has been approved, but without any grade assigned[6]

(v) Subjects from which a student has been allowed to withdraw (i.e. those with the code 'W')

Subject which has been given an "S" code, i.e. absent from assessment, will be included in the GPA calculation and will be counted as "zero" grade point. GPA is thus the unweighted cumulative average calculated for a student, for all relevant subjects taken from the start of the programme to a particular point of time. GPA is an indicator of overall performance, and is capped at 4.0.

All training credits[7] will be counted in the GPA calculation but not in the WGPA calculation.

In the event that grade is awarded to subject components, a grade point with the decimal value may be generated for the overall result of the subject. This grade point with decimal

[6] Subjects taken in the University or elsewhere and with grades assigned, and for which credit transfer has been approved, will be included in the GPA calculation.

[7] "Training credits" is used as a generic term only, and also includes clinical/field credits for programmes in different study disciplines. Laboratory experiments done as a subject/an integral part of a subject to satisfy the academic requirements is not considered to be practical training.

value will be converted to grade according to the conversion methodology for deriving the subject overall grades. The corresponding grade point for the subject overall grade, instead of the actual grade points obtained by students, will be used for GPA calculation. This methodology for deriving subject overall grades only serves as an aid to subject assessors. As assessment should be a matter of judgement, not merely a result of computation, the subject lecturer will have the discretion to assign a grade which is considered to reflect more appropriately the overall performance of the student in a subject to override the grade derived by the computer.

6.20 Different types of GPA

GPA's will be calculated for each Semester including the Summer Term. This Semester GPA will be used to determine students' eligibility to progress to the next Semester alongside with the 'cumulative GPA'. However, the Semester GPA calculated for the Summer Term will not be used for this purpose, unless the Summer Term study is mandatory for all students of the programme concerned and constitutes part of the graduation requirements.

The GPA calculated after the second Semester of the students' study is therefore a 'cumulative' GPA of all the subjects taken so far by students, and without applying any level weighting.

Along with the 'cumulative' GPA, a weighted GPA will also be calculated, to give an indication to the Board of Examiners on the award classification which a student will likely get if he makes steady progress on his academic studies. GUR subjects will be included in the calculation of weighted GPA for all programmes.

When a student has satisfied the requirements for award, an award GPA will be calculated to determine his award classification. GUR subjects will be included in the calculation of award GPA for all programmes.

For students taking the Major/Minor study route, a separate GPA will be calculated for their Major and Minor programmes. The Major GPA will be used to determine his award classification, which will be so reflected on the award parchment. The Minor GPA can be used as a reference for Board of Examiners to moderate the award classification for the Major.

Types of GPA	***Purpose***	***Rules for GPA calculation***
GPA	Determine Progression/ Graduation	(1) All academic subjects taken by the student throughout his study, both inside and outside the programme curriculum, are included in the GPA calculation. (2) For training subjects, including WIE and Clinical/Field subjects, departments can decide whether to include them in the GPA calculation. (3) For retake subjects, only the last attempt will be taken in the GPA calculation. (4) Level weighting, if any, will be ignored.
Semester GPA	Determine Progression	Similar to the rules for GPA as described above, except that only subjects taken in that Semester, including retaken subjects, will be included in the calculation.
Weighted GPA*	To give an interim indication on the likely Award GPA	(1) Similar to the rules for GPA, except that only subjects inside the programme curriculum concerned will be included in the calculation. Subjects outside the programme curriculum will be excluded. (2) Departments can decide whether the training subjects are to be counted towards the Weighted GPA. (3) For retake subjects, only the last attempt will be taken in the Weighted GPA calculation. (4) The weighted GPA will be the same as the Award GPA unless a student has taken more subjects than required.

Types of GPA	***Purpose***	***Rules for GPA calculation***
Major/Minor GPA	For reference and determination of award classification	*Major/Minor GPA* (1) Only subjects inside the curriculum of the Major/Minor Programmes will be taken in the Major/Minor GPA calculation. (2) Departments can decide whether the training subjects, are to be counted towards the Major/Minor GPA. (3) For retake subjects, only the last attempt will be taken in the Major/Minor GPA calculation. *Major GPA* Level weighting will be included in the calculation of Major GPA. *Minor GPA* Level weighting will <u>not</u> be included in the calculation of Minor GPA.
Award GPA	For determination of award classification	If the student has not taken more subjects than required, the Award GPA will be as follows: (1) For single Major: Award GPA = Weighted GPA (2) For Major/Minor programmes: Award GPA = Major GPA

6.21 Guidelines for Award Classification

The Weighted GPA will be used as a guide to help determine award classifications, and the level weighting to different subjects of all disciplines and programmes will need to be specified in the Definitive Programme Document.

Weighted GPA will be computed as follows:

$$\text{Weighted GPA} = \frac{\sum_{n} \text{Subject Grade Point} \times \text{Subject Credit Value} \times W_i}{\sum_{n} \text{Subject Credit Value} \times W_i}$$

where Wi = weighting to be assigned according to the level of the subject (see note below)

n = number of all subjects counted in GPA calculation

Same as for GPA, Weighted GPA is capped at 4.0.

Any subjects passed after the graduation requirement has been met will not be taken into account of in the grade point calculation for award classification.

For students who have completed a Major/Minor programme, a single classification will be awarded and their award classification will mainly be based on the "Major GPA", but it can be moderated by the Board of Examiners with reference to the "Minor GPA". For students who have completed a Major programme combined with free electives, their award classification will be determined by their "Major GPA" and the grades obtained for the free electives.

"Major GPA" is derived based on all subjects of the Major programme, including those meeting the mandatory General University Requirements (GUR) and programme-specific language requirement, but not necessarily including the training credits.

"Minor GPA" is derived based on the 18 credits of specific Minor programme. “Minor GPA” is unweighted.

The "Major GPA" and the "Minor GPA" will be presented separately to the Board of Examiners for consideration. The guidelines for determining award classification are applicable to programmes with Major/Minor studies.

Where a student has a high GPA for his Major but a lower GPA for his Minor, he will not be 'penalised' in respect of his award classification, which is attached to the Major. On the other hand, if a student has a lower GPA for his Major than his GPA for the Minor, the Board of Examiners may consider giving the student a higher award classification than with reference to his Major GPA.

6.22 Classification of Awards

For Honours degree programmes, the awards will be classified as follows:

- First Class Honours
- Second Class Honours (Division 1)
- Second Class Honours (Division 2)
- Third Class Honours

The following are guidelines for Boards of Examiners' reference in determining award classifications:

Honours Degrees	Guidelines
1st	The student's performance/attainment is outstanding, and identifies him as exceptionally able in the field covered by the programme in question.
2:i	The student has reached a standard of performance/attainment which is more than satisfactory but less than outstanding.
2:ii	The student has reached a standard of performance/attainment judged to be satisfactory, and clearly higher than the 'essential minimum' required for graduation.
3rd	The student has attained the 'essential minimum' required for graduation at a standard ranging from just adequate to just satisfactory.

Under exceptional circumstances, a student who has completed an Honours degree programme, but has not attained Honours standard, may be awarded a Pass-without-Honours degree. A Pass-without-Honours degree award will be recommended, when the student has demonstrated a level of final attainment which is below the 'essential minimum' required for graduation with Honours from the programme in question, but when he has nonetheless covered the prescribed work of the programme in an adequate fashion, while failing to show sufficient evidence of the intellectual calibre expected of Honours degree graduates. For example, if a student in an Honours degree programme has a Grade Point Average (GPA) of 2.0 or more, but his Weighted GPA is less than 2.0, he may be considered for a Pass-without-Honours classification. A Pass-without-Honours is an unclassified award, but the award parchment will not include this specification.

The following is a set of indicators, for Boards of Examiners' reference, which can be used in helping to determine award classification:

Honours classification	Weighted GPA
1st	3.7^{+} - 4
2:i	3.2^{+} - 3.7^{-}
2:ii	2.3^{+} - 3.2^{-}
3rd	2.0 - 2.3^{-}

Note: "+" sign denotes 'equal to and more than'; "–" sign denotes 'less than'.

There is no requirement for Boards of Examiners to produce award lists which conform to the guidelines of the above table.

6.23 Examination result announcements, transcripts, testimonials and references

At the end of each semester, where appropriate, examination results are announced online for individual students' checking. It provides information on subjects taken and grades attained, the Grade Point Average (GPA) for all subjects, and the overall result for that semester. The announcement serves as an official notification of the student's academic performance.

A formal transcript of studies will be issued by the University, upon request, to any student registered on a programme offered by the University, and it will include the following information:

(i) name and student number;

(ii) title of the programme(s) on which enrolled, or from which graduated;

(iii) medium of instruction for the programme (applicable only to programmes which are delivered in Chinese and for which both Chinese and English versions are offered);

(iv) a full academic record, giving subjects taken and grades attained, and the Grade Point Average (GPA) for all subjects;

(v) credit requirement of the student if different from the normal credit requirement of the programme;

(vi) where relevant, the final award(s) granted, with classification and year of award; and

(vii) a statement indicating that the student has completed the Work-integrated Education (WIE) activities, and the Healthy Lifestyle subject which is non-credit bearing.

Students may request for a testimonial which is a certification of their studies at the University, but without details on subjects and subject results. Students may also request for references direct from academic staff/members concerned.

Appendix I

Subject Description Forms

Content

Subject

*The Subject Description Form for CBS1101P "Fundamentals of Chinese Communication", CBS1102P "Advanced Communication Skills in Chinese" and CBS3241P "Professional Communication in Chinese" will be available for download from the Department Website in October 2014.

Subject Description Form

Subject Code	AF3625
Subject Title	Engineering Economics
Credit Value	3
Level	3
Normal Duration	1-semester
Pre-requisite / Co-requisite/ Exclusion	**Exclusion**: AF2618
Objectives	This subject aims to equip students with 1. the fundamental concepts of micro- and macroeconomics related to the engineering industry; 2. the fundamental understanding of finance and costing for engineering operations, budgetary planning and control.
Intended Learning Outcomes	Upon successful completion of this subject, students will be able to: a. understand how the relevant economic factors shape the environment within which an engineering company operates; b. evaluate the financial condition of a company based on the financial statements; c. apply the basic cost accounting techniques in the planning and control of engineering and production activities.
Subject Synopsis/ Indicative Syllabus	**Economic Environment of a Firm** **Microeconomic Factors** Scarcity, choice and opportunity cost; Demand, supply and price; Profit-maximizing behavior of the firm; Organization of industry: perfect competition, monopoly and oligopoly **Macroeconomic Factors** Government interventions: fiscal policy and monetary policy; International trade and globalization **Accounting and Engineering Economics** Financial statements; Financial ratio analysis; Return on investment; Composition of cost; Cost-volume-profit analysis; Accounting profit versus economic profit **Fundamentals of Budgetary Planning and Control** Principle types of budgets for production and service operations; Approaches to budgeting and the budgeting process; Investment and source of finance; Cost of capital; Evaluation of investment alternatives
Teaching/Learning Methodology	The two-hour lecture each week focuses on the introduction and explanation of key concepts of Engineering Economics. The one-hour tutorial provides students with directed studies to enhance their self-learning capacities. Individual and group activities including discussions and presentations are conducted to facilitate students' understanding and application of the concepts they have learned to tackling real-life problems in Engineering Economics.

Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>Continuous Assessment</td><td>50%</td><td></td><td></td><td></td></tr><tr><td>1. In-class activities</td><td>15%</td><td>√</td><td>√</td><td>√</td></tr><tr><td>2. Written assignments</td><td>15%</td><td>√</td><td>√</td><td>√</td></tr><tr><td>3. Test</td><td>20%</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Final Examination</td><td>50%</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr></table> To pass this subject, students are required to obtain Grade D or above in **both** the Continuous Assessment and Examination components.
Student Study Effort Required	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lecture</td><td>26 Hrs.</td></tr><tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Study and self-learning</td><td>48 Hrs.</td></tr><tr><td>▪ Written assignments</td><td>18 Hrs.</td></tr><tr><td>Total student study effort</td><td>105 Hrs.</td></tr></table>
Reading List and References	**Recommended Textbooks** Parkin and Bade, 2014, *Foundations of Microeconomics*, 6th Edition, Pearson. Sullivan, Wicks and Koelling, 2014, *Engineering Economy,* 16th Edition, Pearson. **References** Drury, Colin, 2008, *Management and Cost Accounting,* 7th Edition, Cengage Learning. Frank, Robert H., 2007, *The Economic Naturalist: Why Economics Explain Almost Everything?* Basic Books.

Subject Description Form

Subject Code	AF5107
Subject Title	Accounting for Engineers
Credit Value	3
Level	5
Normal Duration	One Semester
Pre-requisite/ Co-requisite/ Exclusion	None
Objectives	To orient students to the purpose and the subject matter of accounting. To provide students with the techniques and tools to understand and interpret accounting information. To stimulate students' interests in accounting.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Employ the accounting building blocks from the preparers' perspective. b. Understand accounting information from the users' perspective and be able to interpret them. c. Appreciate the role of quality accounting information in the decision making process.
Subject Synopsis/ Indicative Syllabus	**Understanding Accounting** Why accounting matters. Accounting and its building blocks. The recording process. The accounting information system. The financial statements. Corporate governance, internal control and cash. The application of accounting rules (GAAPs) in general and in particular to receivables and long-lived assets. **Interpretation of Accounts** The need for comparative analysis. Tools of financial statement analysis. Understanding the uses and limitations of the tools. Gaining meaningful insights from the numbers. **Managerial Accounting Concepts & Techniques** Understanding costs. Costing techniques. Tracking costs. Cost-Volume-Profit Analysis. **Financial Management** Basic concepts and funding needs. Capital Budgeting. Cashflow statement, budgeted income statement, budgeted balance sheet and cash budget **Accounting is Interesting** A case study of financial statements of a listed company.
Teaching/Learning Methodology	A three-hour seminar will be conducted each week to initiate students to ideas, concepts and techniques of the topics, which is then reinforced by their participation in class discussion, quiz and presentation. These are designed to consolidate and develop students' understanding and analytical ability through problem solving and working on relevant cases

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
Continuous Assessment	50%			
1. Class Participation (assignments)	5%	√	√	√
2. Quiz	15%	√	√	
3. Individual writing task	15%		√	√
4. Group project & presentation	15%	√	√	√
Final Examination	50%		√	√
Total	100 %			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: In addition to the classroom activities (1& 2), students are required to do some research and learning appraisals in assessment components 3 & 4.

Note: To pass this subject, students are required to obtain Grade D or above in BOTH the Continuous Assessment and Examination components. In addition, the specific requirements on individual assessment components discussed above could be adjusted based on the pedagogical needs of subject lecturers.

Student Study Effort Expected		
	Class contact:	
	▪ Seminar	39 Hrs.
	Other student study effort:	
	▪ Reading books and working through assigned problems	45Hrs.
	▪ Research, discussion & write-up	15Hrs.
	Total student study effort	99 Hrs.

Reading List and References

Anthony, Hawkins and Merchant, Accounting, Text and Cases, 13th edition, Mcgraw Hill.

Kimmel, Weygandt and Kieso, *Accounting, Tools for Business Decision Making*, 3rd edition, John Wiley & Sons Inc.

Larson, Wild and Chiapetta, *Fundamental Accounting Principles*, latest edition, Mcgraw-Hill Irwin.

Williams, Haka, Bettne and Meigs, *Financial & Managerial Accounting: The Basis for Business Decisions*, latest edition, McGraw-Hill/Irwin.

Glautier and Underdown, *Accounting Theory and Practice*, latest edition, Prentice Hall.

Dyson, J. R., *Accounting for Non-Accounting Students*, latest edition, Financial Times.

Subject Description Form

Subject Code	AMA1110
Subject Title	Basic Mathematics I – Calculus and Probability & Statistics
Credit Value	3
Level	1
Pre-requisite	Nil
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: (a) apply analytical reasoning to solve problems in science and engineering; (b) make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; (c) apply mathematical modeling in problem solving; (d) demonstrate abilities of logical and analytical thinking.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	Elementary calculus: Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz's rule and L'Hopital's rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus in optimization. Elementary Probability and Statistics: Descriptive statistics, random variables, probability and probability distributions, binomial, Poisson and normal distributions, applications. Population and random samples. Sampling distributions related to sample mean, sample proportions, and sample variances. Concepts of a point estimator and a confidence interval. Point and interval estimates of a mean and the difference between two means.
Teaching/Learning Methodology *(Note 3)*	Basic concepts and elementary techniques of limit, differential calculus, probability and statistics will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.
Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1.Homework, quizzes and mid-term test	50%	✓	✓	✓	✓
2. Examination	50%	✓	✓	✓	✓
Total	100 %				

Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Homework and self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	Chung, K.C. *A Short Course in Calculus and Matrices*, McGraw Hill 2013 Hung, K.F., Kwan, Wilson, Pong, T.Y. *Foundation Mathematics & Statistics*, McGraw Hill 2013 Larson, R., Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012 Walpole, R.E., Myers, R.H., Myers, S.L. Ye, K. *Probability and Statistics for Engineers and Scientists*, Prentice Hall, 2012	

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	AMA1120
Subject Title	Basic Mathematics II –Calculus and Linear algebra
Credit Value	3
Level	1
Pre-requisite	AMA1110
Objectives	This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: (a) apply analytical reasoning to solve problems in science and engineering; (b) make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations; (c) apply mathematical modeling in problem solving; (d) demonstrate abilities of logical and analytical thinking.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	Elementary calculus: Mean Value Theorem with applications to linear approximation and curve sketching. Definite and indefinite integrals, fundamental theorem of calculus, methods of integration (integration by substitution, integration by parts, integration of rational functions using partial fractions and integration of trigonometric and hyperbolic functions), reduction formulas, applications to geometry and engineering. Linear algebra: Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer's rule, vectors in 2-space or in 3-space, applications to geometry.
Teaching/Learning Methodology *(Note 3)*	Basic concepts and elementary techniques of differential and integral calculus and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.
Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1.Homework, quizzes and mid-term test	50%	✓	✓	✓	✓
2. Examination	50%	✓	✓	✓	✓
Total	100 %				

Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

	To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: *The subject focuses on understanding of basic concepts and application of techniques in differential/integral calculus, elementary statistics and elementary linear algebra. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.*	
Student Study Effort Expected	Class contact:	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Homework and self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	Chung, K.C. *A Short Course in Calculus and Matrices*, McGraw Hill 2013 Hung, K.F., Kwan, Wilson, Pong, T.Y. *Foundation Mathematics & Statistics*, McGraw Hill 2013 Larson, R., Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012 Larson, R. *Elementary Linear Algebra*, Brooks/Cole 2013	

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	Calculus I (AMA1101) or Calculus IA (AMA1102) or Basic Mathematics I – Calculus and Probability & Statistics (AMA1110) or Basic Mathematics II –Calculus and Linear Algebra (AMA1120)
Co-requisite/ Exclusion	Nil
Objectives	This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** **(for 42375)** Category A: Professional/academic knowledge and skills • Programme Outcomes 1, 2, 4 and 5. Category B: Attributes for all-roundedness • Programme Outcomes 9 and 10. **(for 42470)** Category A: Professional/academic knowledge and skills • Programme Outcomes 4 and 5. Category B: Attributes for all-roundedness • Programme Outcomes 10 and 11.

Subject Synopsis/ Indicative Syllabus	1. Algebra of complex numbers Complex numbers, geometric representation, complex exponential functions, n-th roots of a complex number. 2. Linear algebra Review of matrices, determinants and systems of linear equations, vector spaces, inner product and orthogonality, eigenvalues and eigenvectors, applications. 3. Ordinary differential equations ODE of first and second order, linear systems, Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits. 4. Differential calculus of functions of several variables Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	**% weighting**	**Intended subject learning outcomes to be assessed (Please tick as appropriate)**				
		1	**2**	**3**	**4**	**5**
1.Homework, quizzes and mid-term test	40%	√	√	√	√	√
2. Examination	60%	√	√	√	√	√
Total	100%					

Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected	**Class contact:**	
	• Lecture	26 Hrs.
	• Tutorial	13 Hrs.

	• Mid-term test and examination	
	Other student study effort	5 Hrs.
	• Assignments and Self study	73 Hrs.
	Total student study effort:	117 Hrs.
Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2013. 2. Anton, H. *Elementary Linear Algebra* (11th edition). John Wiley, 2013. 3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley. 4. James, G. (2008). *Modern Engineering Mathematics*, 4th ed. Prentice Hall. 5. Thomas, G. B., Weir, M. D. & Hass, J. R. (2009). *Thomas' Calculus*, 12th ed. Addison Wesley.	

Subject Description Form

Subject Code	AMA2112
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite	Mathematics I (AMA2111)
Co-requisite/ Exclusion	Nil
Objectives	This subject is a continuation of AMA2111. It aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Contribution of the Subject to the Attainment of the Programme Outcomes	**Programme Outcomes:** Category A: Professional/academic knowledge and skills • Programme Outcomes 4 and 5. Category B: Attributes for all-roundedness • Programme Outcomes 10 and 11.
Subject Synopsis/ Indicative Syllabus	1. Multiple integrals Double and triple integrals, change of variables, applications to problems in geometry and mechanics. 2. Vector calculus Vector and scalar fields, the del operator, line and surface integrals, the theorems of Green, Gauss and Stokes, applications to electromagnetic theory and fluid mechanics. 3. Series expansion Infinite series, Taylor's expansion, Fourier series expansion of a periodic function. 4. Partial differential equations Formulation of PDE of mathematical physics, separation of variables, initial-boundary value problems, introduction to Fourier transforms.

Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	**% weighting**	**Intended subject learning outcomes to be assessed (Please tick as appropriate)**				
		1	**2**	**3**	**4**	**5**
1. Homework, quizzes and mid-term test	40%	√	√	√	√	√
2. Examination	60%	√	√	√	√	√
Total	100%					

Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.

To pass this subject, students are required to obtain grade D or above in both the continuous assessment and the examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.

Student Study Effort Expected		
	Class contact:	
	• Lecture	26 Hrs.
	• Tutorial	13 Hrs.
	• Mid-term test and examination	
	Other student study effort	5 Hrs.
	• Assignments and Self study	73 Hrs.
	Total student study effort:	117 Hrs.

Reading List and References

1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2013.
2. Anton, H. *Elementary Linear Algebra* (11th edition). John Wiley, 2013.
3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley.
4. James, G. (2008). *Modern Engineering Mathematics*, 4th ed. Prentice Hall.
5. Thomas, G. B., Weir, M. D. & Hass, J. R. (2009). *Thomas' Calculus*, 12th ed. Addison Wesley.

Subject Description Form

Subject Code	AP10001
Subject Title	Introduction to Physics
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This is a subject designed for students with no background in physics studies. Fundamental concepts in major topics of physics (mechanics, heat, wave and electromagnetism) will be discussed. The aim of this subject is to equip students with some basic physics knowledge, and to appreciate its applications in various branches of science and technology.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) solve simple problems in kinematics and Newton's law; (b) solve problems in heat capacity and latent heat; (c) explain phenomena related to the wave character of light; (d) apply the superposition of waves; (e) define electrostatic field and potential; (f) solve problems on interaction between current and magnetic field; and (g) apply Faraday's law to various phenomena.
Subject Synopsis/ Indicative Syllabus	**Mechanics**: scalars and vectors; kinematics and dynamics; Newton's laws; momentum, impulse, work and energy; conservation of momentum and conservation of energy. **Thermal physics**: heat and internal energy; heat capacity; conduction, convection and radiation; latent heat. **Waves**: nature of waves; wave motion; reflection and refraction; image formation by mirrors and lenses; superposition of waves; standing waves; diffraction and interference; electromagnetic spectrum; sound waves. **Electromagnetism**: charges; Coulomb's law; electric field and potential; current and resistance; Ohm's law; magnetic field; magnetic force on moving charges and current-carrying conductors; Faraday's law and Lenz's law.
Teaching/Learning Methodology	**Lecture**: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience.

	e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	g
(1) Continuous assessment	40 %	√	√	√	√	√	√	√
(2) Examination	60 %	√	√	√	√	√	√	√
Total	100%							

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected	Class contact:	
	• Lecture	33 Hrs.
	• Tutorial	6 Hrs.
	Other student study effort:	
	• Self-study	81 Hrs.
	Total student study effort	120 Hrs.
Reading List and References	John D. Cutnell & Kenneth W. Johnson, **Introduction to Physics**, 9th edition, 2013, John Wiley & Sons. Hewitt, **Conceptual Physics**, 11th edition, 2010, Benjamin Cummings.	

Subject Description Form

Subject Code	AP10005
Subject Title	Physics I
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (h) solve simple problems in single-particle mechanics using calculus and vectors; (i) solve problems in mechanics of many-particle systems using calculus and vectors; (j) define simple harmonic motion and solve simple problems; (k) explain the formation of acoustical standing waves and beats; (l) use Doppler's effect to explain changes in frequency received. (m) explain ideal gas laws in terms of kinetic theory; (n) apply the first law of thermodynamics to simple processes; and (o) solve simple problems related to the Carnot cycle.
Subject Synopsis/ Indicative Syllabus	**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; longitudinal and transverse waves; travelling wave; Doppler effect; acoustics. **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.
Teaching/Learning Methodology	**Lecture**: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)							
		a	b	c	d	e	f	g	h
(1) Continuous assessment	40%	√	√	√	√	√	√	√	√
(2) Examination	60 %	√	√	√	√	√	√	√	√
Total	100 %								

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected		
	Class contact:	
	• Lecture	33 Hrs.
	• Tutorial	6 Hrs.
	Other student study effort:	
	• Self-study	81 Hrs.
	Total student study effort:	120 Hrs.

Reading List and References

John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2010, 8th edition, Brooks/Cole Cengage Learning.

W. Bauer and G.D. Westfall, "University Physics with Modern Physics", 2011, McGraw-Hill.

Subject Description Form

Subject Code	AP10006
Subject Title	Physics II
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with fundamental knowledge in physics focusing on the topics of waves and electromagnetism. This course prepares students to study science, engineering or related programmes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) apply simple laws in optics to explain image formation; (b) explain phenomena related to the wave character of light; (c) define electrostatic field and potential; (d) use Gauss' law in solving problems in electrostatics; (e) solve problems on interaction between current and magnetic field; (f) apply electromagnetic induction to various phenomena; and (g) solve simple problems in AC circuits.
Subject Synopsis/ Indicative Syllabus	**Waves and optics**: nature of light, 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. **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.
Teaching/Learning Methodology	**Lecture**: The fundamentals in optics and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given. **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience. **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	g
(1) Continuous assessment	40%	√	√	√	√	√	√	√
(2) Examination	60%	√	√	√	√	√	√	√
Total	100%							

Continuous assessment:
The continuous assessment includes assignments, quizzes and test(s) which aim at checking the progress of students study throughout the course, assisting them in fulfilling the learning outcomes.
Assignments in general include end-of-chapter problems, which are used to reinforce and assess the concepts and skills acquired by the students; and to let them know the level of understanding that they are expected to reach.
At least one test would be administered during the course of the subject as a means of timely checking of learning progress by referring to the intended outcomes, and as means of checking how effective the students digest and consolidate the materials taught in the class.

Examination: This is a major assessment component of the subject. It would be a closed-book examination. Complicated formulas would be given to avoid rote memory, such that the emphasis of assessment would be put on testing the understanding, analysis and problem solving ability of the students.

Student Study Effort Expected		
	Class contact:	
	• Lecture	33 Hrs.
	• Tutorial	6 Hrs.
	Other student study effort:	
	• Self-study	81 Hrs.
	Total student study effort	120 Hrs.

Reading List and References

John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2010, 8th edition, Brooks/Cole Cengage Learning.

W. Bauer and G.D. Westfall, "University Physics with Modern Physics", 2011, McGraw-Hill.

Subject Description Form

Subject Code	APSS1L01
Subject Title	Tomorrow's Leaders
Credit Value	3
Level	1
GUR Requirements Intended to Fulfill	This subject intends to fulfill the following requirement(s) : ☐ **Healthy Lifestyle** ☐ **Freshman Seminar** ☐ **Languages and Communication Requirement (LCR)** ☒ **Leadership and Intra-Personal Development** ☐ **Service-Learning** ☐ **Cluster-Area Requirement(CAR)** ☐ Human Nature, Relations and Development ☐ Community, Organization and Globalization ☐ History, Cultures and World Views ☐ Science, Technology and Environment ☐ **China-Study Requirement** ☐ Yes or ☐ No ☐ **Writing and Reading Requirements** ☐ English or ☐ Chinese
Pre-requisite / Co-requisite/ Exclusion	Nil
Assessment Methods	

100% Continuous Assessment	Individual Assessment	Group Assessment
1. Class Participation	20%	
2. Peer Assessment	5%	
3. Group Project		30%
4. Individual Assignment	45%	

Objectives	Specific objectives of the subject: The course is designed to enable students to learn and integrate theories, research and concepts of the basic personal qualities (particularlyintrapersonal and interpersonal qualities) of effective leaders. This coursealso intends to help students develop and reflect on their intrapersonal qualities, interpersonal qualities and connection of learning to oneself. Finally, the course cultivates students' appreciation of the importance of intrapersonal and interpersonal qualities in effective leadership.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: a. Understand and integrate theories, research and concepts on the basic qualities (particularly intrapersonal and interpersonal qualities) of effective leaders; b. Develop self-awareness and self-understanding; c. Acquireinterpersonal skills; d. Develop self-reflection skills; e. Understand the importance of intrapersonal and interpersonal qualities in effective leadership, particularly the connection of learning in the subject to one's personal development.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. An overview of the personal attributes of effective leaders: roles of self-understanding and interpersonal relationship qualities in effective leadership. 2. Cognitive competence: different types of thinking styles; higher-order thinking; experiential learning; role of cognitive competence, critical thinkingand problem solving in effective leadership. 3. Emotional competence: awareness and understanding of emotions; emotional quotient (EQ);role of emotional management in effective leadership;mental health and stress management. 4. Resilience: stresses faced by adolescents; life adversities; coping with life stresses; role of resilience in effective leadership. 5. Morality and integrity: moral issues and moral competence; role of morality in effective leadership; ethical leadership; integrity and effective leadership. 6. Positive and healthy identity: self-identity, self-esteem and self-concept; self-discrepancies; role of self-concept in effective leadership. 7. Spirituality: meaning of life and adolescent development; role of spirituality in effective leadership; servant leadership. 8. Social competence and egocentrism: basic social competence skills; roles of social competence, care and compassion in effective leadership; egocentrism in university students. 9. Relationship building, team building and conflict management: relationship quality and effective leadership; conflict management and effective leadership. 10. Interpersonal communication: theories, concepts, skills and blocks of interpersonal communication; role of communication skills in effective leadership. 11. Self-leadership and sense of responsibility in effective leaders;life-long learning and leadership. 12. Mental health and effective leadership: stress management; importance of mental health and wellness among university students.
Teaching/Learning Methodology *(Note 3)*	Students taking this course are expected to be sensitive to their own behavior in intrapersonal and interpersonal contexts. Intellectual thinking, reflective learning, experiential learning and collaborative learning are emphasized in the course. Case studies on successful and fallen leaders will also be covered in the course. The teaching/learning methodology includes: 1. Lectures; 2. Experiential classroom activities; 3. Group project presentation; 4. Written assignment.

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
1. Class Participation	20%	√	√	√	√	√	
2. Peer Assessment	5%	√	√	√			
3. Group Project	30%	√	√	√	√	√	
4. Individual Assignment	45%	√	√		√	√	
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

1. Assessment of Class Participation: It is expected that classroom activities and preparation for lectures can help students understand the subject matter and oneself, develop social skills, connect learning to oneself and promote an appreciation of the importance of intrapersonal and interpersonal leadership qualities. Hence, marks for class participation and preparation for lectures will be given. Students will be assessed by: a) preparation for class (e.g.,complete online assignment and dig up materials before class), b) participation in class (e.g., completion of worksheets and sharing) and c) volunteering to answer questions and join discussions in class.

2. Peer Assessment: Students will be invited to rate the performance and learning of other group members in an honest and authentic manner. The marks will reflect the mastery of knowledge, self-reflection and quality of interpersonal skills (such as collaboration with other members and contribution to the group) of the group members. Peer assessment will contribute to marks in class participation.

3. Assessment of Group Project: Group project presentation can give an indication of the students' understanding and integration of theories and concepts on personal qualities in effective leadership, personal and group reflections, interpersonal skills and degree of recognition of the importance of active pursuit of knowledge covered in the course.

4. Assessment of Individual Assignment: Individual paper can give an indication of the students' understanding and integration of theories and concepts on the personal qualities in effective leadership, self-assessment, self-reflection, connection of the subject matter to oneself and degree of recognition of the importance of active pursuit of knowledge covered in the course.

Based on the implementation of this subject in the past two academic years (2010-2011; 2011-2012), evaluation findings consistently showed that this subject was able to achieve the intended learning outcomes in the students. The positive evaluation findings are documented as follows:

Shek, D.T.L. (2012a). Development of a positive youth development subject in a university context in Hong Kong.*International Journal on Disability and Human Development, 11*(3), 173-179.

Shek, D. T. L. (2012b). Post-lecture evaluation of a positive youth development subject for university students in Hong Kong. *The ScientificWorld Journal, 2012*, 8 pages. doi: 10.1100/2012/934679

Shek, D. T. L. (2012c). Reflective journals of students taking a positive youth development course in a university context in Hong Kong.*The Scientific World Journal*, *2012*, 8 pages. doi: 10.1100/2012/131560

Shek, D. T. L. (2013a). Reflections of Chinese students on a university subject on leadership and intrapersonal development. *International Journal on Disability and Human Development, 12*(2), 213-219.

Shek, D. T. L. (2013b). Promotion of holistic development in university students: A credit-bearing subject on leadership and intrapersonal development. *Best Practices in Mental Health, 9*(1), 47-61.

Shek, D. T. L., & Sun, R. C. F. (2012a). Focus group evaluation of a positive youth development course in a university in Hong Kong. *International Journal on Disability and Human Development*, *11*(3), 249-254.

Shek, D. T. L., & Sun, R. C. F. (2012b). Process evaluation of a positive youth development course in a university setting in Hong Kong. *International Journal on Disability and Human Development*, *11*(3), 235-241.

Shek, D. T. L., & Sun, R. C. F. (2012c). Promoting leadership and intrapersonal competence in university students: What can we learn from Hong Kong? *International Journal on Disability and Human Development*, *11*(3), 221-228.

Shek, D. T. L., & Sun, R. C. F. (2012d). Promoting psychosocial competencies in university students: Evaluation based on a one group pretest-posttest design. *International Journal on Disability and Human Development*, *11*(3), 229-234.

Shek, D. T. L., & Sun, R. C. F. (2012e). Qualitative evaluation of a positive youth development course in a university setting in Hong Kong. *International Journal on Disability and Human Development*, *11*(3), 243-248.

Shek, D. T. L., & Sun, R. C. F. (2013a). Post-course subjective outcome evaluation of a course promoting leadership and intrapersonal development in university students in Hong Kong. *International Journal on Disability and Human Development*, *12*(2), 193-201.

Shek, D. T. L., & Sun, R. C. F. (2013b). Post-lecture evaluation of a university course on leadership and intrapersonal development. *International Journal on Disability and Human Development*, *12*(2), 185-191.

Shek, D. T. L., & Sun, R. C. F. (2013c). Process evaluation of a leadership and intrapersonal development subject for university students. *International Journal on Disability and Human Development*, *12*(2), 203-211.

Shek, D.T.L., Sun, R. C.F., & Merrick, J. (2012). Editorial: How to promote holistic development in university students?*International Journal on Disability and Human Development, 11*(3), 171-172.

Shek, D. T. L., Sun, R. C. F., & Merrick, J. (Eds.). (2013). *University and college students:*

	Health and development issues for the leaders of tomorrow. New York: Nova Science Publishers. Shek, D. T. L., Sun, R. C. F., Chui, Y. H., Lit, S. W., Yuen, W. W., Chung, Y., & Ngai, S. W. (2012). Development and evaluation of a positive youth development course for university students in Hong Kong. *The Scientific World Journal, 2012*, 8 pages.doi: 10.1100/2012/263731 Shek, D. T. L., Sun, R. C. F., Tsien-Wong, T. B. K., Cheng, C. T., & Yim, H. Y. (2013). Objective outcome evaluation of a leadership and intrapersonal development subject for university students.*International Journal on Disability and Human Development, 12*(2), 221-227. Shek, D. T. L., Sun, R. C. F., Yuen, W. W. H., Chui, Y. H., Dorcas, A., Ma, C. M. S., Yu, L., Chak, Y. L. Y., Law, M. Y. M., Chung, Y..Y. H., & Tsui, P. F. (2013). Second piloting of a leadership and intrapersonal development subject at The Hong Kong Polytechnic University. *International Journal on Disability and Human Development, 12*(2), 107-114.	
Student Study Effort Expected	Class contact:	
	▪ Lectures and experiential learning activities	39 Hrs.
	Other student study effort:	
	▪ Group project preparation	20 Hrs.
	▪ Reading and writing term paper	73 Hrs.
	Total student study effort	132 Hrs.
Medium of Instruction	English	
Medium of Assessment	English	
Reading List and References	**Basic References:** Barki, H., &Hartwick, J. (2004). Conceptualizing the construct of interpersonal conflict. *The International Journal of Conflict Management*, *15*(3), 216-244. Catalano, R. F., Berglund, M. L., Ryan, J. A. M., Lonczak, H. S., & Hawkins, J. D. (2002). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *Prevention and Treatment, 5*(15), 1-106. Dalton, J., & Crosby, P. (2007). Being and having: Shouldn't excellence in higher education (and people) be a measure of what one does rather than what one has? *Journal of College and Character, 9*(1), 1-5. Dolbier, C. L., Soderstrom, M. & Steinhardt, M. A. (2001). The relationships between self-leaders and enhanced psychological, health and work outcomes. *Journal of Psychology*, *135*(5), 469-485. Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: W. W. Norton & Company, Inc.	

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Houghton, J. D., & Yoho, S. K. (2005). Toward a contingency model of leadership and psychological empowerment: When should self-leadership be encouraged? *Journal of Leadership and Organizational Studies, 11*(4), 65-84.

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Ma, H.K. (2012). Social competence as a positive youth development construct: A conceptual review. *The Scientific World Journal,* 2012, 7 pages. doi:10.1100/2012/287472.

Marsh, H. W. (1990). A multidimensional, hierarchical self-concept: Theoretical and empirical justification. *Educational Psychological Review, 2*(2), 77-172.

Masten, A. S., &Obradović, J. (2006). Competence and resilience in development. *Annals of the New York Academy of Sciences, 1094*(1), 13-27.

Rycek, R. F., Stuhr, S. L., McDermott, J., Benker, J., & Swartz, M. D. (1998). Adolescent egocentrism and cognitive functioning during late adolescence. *Adolescence, 33*(132), 745-749.

Salovey, P., & Mayer, J.D. (1990). Emotional intelligence. *Imagination, Cognition and Personality*, *9*(3), 185-211.

Seligman, M. E. P., &Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*(1), 5-14.

Shek, D. T. L. (2010). Nurturing holistic development of university students in Hong Kong: Where are we and where should we go? *The Scientific World Journal, 10*, 563-575.

Shek, D. T. L. (2012). Spirituality as a positive youth development construct: A conceptual review. *The Scientific World Journal*, *2012*, 8 pages. doi:10.1100/2012/458953

Sun, R.C.F., & Hui, E.K.P. (2012). Cognitive competence as a positive youth development construct: A conceptual review. *The Scientific World Journal,2012*, 7 pages. doi:10.1100/2012/210953

Supplementary References:

Adler, R.B., Rosenfeld, L.B., & Proctor II, R.F. (2010). *Interply: The process of interpersonal communication.* New York: Oxford University Press.

Bandura, A. (1986). *Social foundations of thought and action.* New Jersey: Prentice-Hall.

Bass, B. M., &Steidlmeier, P. (1999). Ethics, character, and authentic transformational leadership behavior. *Leadership Quarterly, 10*(2), 181-217.

Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning theory perspective for construct development and testing. *Organizational Behavior and Human Decision Processes, 97*(2), 117-134.

Cao, L., &Nietfeld, J.L. (2007). College students' metacognitive awareness of difficulties in learning the class content does not automatically lead to adjustment of study strategies. *Australian Journal of Educational and Developmental Psychology, 7,* 31-46.

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Kumru, A., & Thompson, R. A. (2003). Ego identity status and self-monitoring behavior in adolescents. *Journal of Adolescent Research, 18*(5), 481-495.

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Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development*, *6*(1), 111-135.

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Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	BSE463
Subject Title	Design of Mechanical Systems in Buildings
Credit Value	3
Level	4
Pre-requisite **Co-requisite** **Exclusion**	ENG2001 and EE3009 - -
Objectives	(1) To provide students with a comprehensive understanding of air conditioning system, refrigeration and indoor environmental issues for different kinds of buildings common to Hong Kong; and (2) To provide students with a comprehensive understanding in formulating practical energy policies.
Intended Learning Outcomes	Upon successful completion of the subject, students are expected to: Professional / academic knowledge and skills (a) Be able to have basic knowledge of thermal systems in buildings. (b) Be able to undertake the thermodynamic and application analysis of vapour compression refrigeration systems. (c) Be able to select a proper method for estimating operation energy use for a given building air-conditioning system on the basis of understanding the energy analysis requirement, and the calculation principles of current major building energy analysis methods. (d) Be able to undertake the design and analysis of ventilation systems for general contaminants control on the basis of understanding the function and working principles of contaminants control, and able to undertake the ventilation measurements for evaluating the ventilation of contaminants control. Attributes for all roundedness (e) Be able to communicate to others in a clear and concise manner through written reports, drawings and oral presentation; and (f) Be able to develop the skills and abilities to undertake, independently, a major piece of investigation work in a specialist subject area.
Subject Synopsis/ Indicative Syllabus	This subject provides a basic understanding of air conditioning system, refrigeration and indoor environment issues for different kinds of buildings common to Hong Kong. The syllabus includes air conditioning fundamentals, loads estimation, fan and duct sizing, ventilation for acceptable air quality and refrigeration plant exclusively designed for non BSE students.
Teaching/Learning Methodology	Students are briefed in the first lecture for the expected subject outcomes. Teaching is conducted in the form of interactive lecture, supplemented by worked examples, case study and mini project. Handouts were distributed one week before the lecture session.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1. Group assignment	15			√		√	√
2. Test	25	√	√	√	√		
3. End-of-semester examination	60	√	√	√	√		
Total	100 %						

Students are required to demonstrate presentation and communication abilities through different types of assessments, which include written report, drawings and written assessment.

Student Study Effort Required

Class contact:	
▪ Lectures	27 Hrs.
▪ Tutorials	6 Hrs.
Other student study effort:	
▪ Test & Examination	6 Hrs.
▪ Mini Project	11 Hrs.
▪ Self-study	80 Hrs.
Total student study effort	130 Hrs.

Reading List and References

Authors: Title: Publisher: PolyU Call Number:	Shan K Wang, Zalman Lavan & Paul Norton Air Conditioning and Refrigeration Engineering Boca Raton, Fla.: CRC Press, c2000 TH7687.W363 2000
Authors: Title: Publisher PolyU Call Number	A.F.E. Wise & J.A. Swaffield Water, Sanitary and Waste Services for Buildings 5th Edition, Oxford; Woburn, Mass: Butterworth – Heinemann, 2002 TD345.W5 2002
Authors: Title: Publisher: PolyU Call Number:	T.D. Eastop & A. McConkey Applied Engineering Thermodynamics for Technologists 5th Edition, Essex, England: Longman; New York: Wiley 1993 TJ265.E3 1993
Author: Title: Publisher: PolyU Call Number:	Hazim B. Awbi Ventilation of Buildings 2nd Edition, London; New York, N.Y.: Spon Press 2003 TH7653.A9 2003

Subject Description Form

Subject Code	CSE40462
Subject Title	Environmental Impact Assessment – Theory and Practice
Credit Value	3
Level	4
Exclusion	CSE462 Environmental Impact Assessment – Theory and Practice
Objectives	To provide students with an overview of the principles and current practices of environmental impact assessment (EIA), especially in Hong Kong.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. understand the EIA process; (*1,**RA) b. analyze major environmental issues for large development projects; (*6,**RA) c. conduct necessary monitoring and modeling tasks within an EIA cycle; (*12,**RA) d. function on multi-disciplinary teams; (*5,**IRA) e. understand environmental protection and sustainable development responsibility (*7,**RA)
Subject Synopsis/ Indicative Syllabus	**Keyword syllabus**: (i) Development of Environmental Impact Assessment Historical review. Environmental assessment development in the world and Hong Kong. (ii) Scope and Objectives of Environmental Impact Assessment Environmental considerations: land use, planning, development and management. EIA aims and objectives. (iii) Methodology and Assessment Techniques Methods for air, water, noise and ecology assessment. Other environmental issues (risk, visual, cultural and social-economical impacts). (iv) Monitoring and Baseline Studies Baseline studies, Environmental monitoring and audit, Environmental quality and regulatory requirements, Mitigation and control measures. (v) Environmental Impact Statement Role of Environmental Impact Statement, Statement scope & content.
Teaching/Learning Methodology	The subject teaching will include the following elements: (a) Lectures – to introduce the basic concepts and assessment methods; (b) Tutorials – to answer student questions in the learning processes; (c) Group discussion and presentations – to let students play different roles in the EIA process; (d) Reading materials and video presentations – to give students examples in local EIA case studies;

	(e) Seminars on EIA practices by invited speakers from government agencies and professional environmental consultants; and (f) Course work.
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th><th>e</th></tr><tr><td>1. Continuous assessments</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>2. Final examination</td><td>50%</td><td>√</td><td>√</td><td></td><td></td><td>√</td></tr><tr><td>Total</td><td>100 %</td><td colspan="5"></td></tr></table> **Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.** Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Written examination is evaluated by final examination.
Student Study Effort Expected	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lectures</td><td>1.85 Hrs. / week</td></tr><tr><td>▪ Tutorials / Seminars</td><td>1.15 Hrs. / week</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Coursework exercise</td><td>1.38 Hrs. / week</td></tr><tr><td>▪ Seminar reports</td><td>0.15 Hrs. / week</td></tr><tr><td>▪ Self Study</td><td>4.46 Hrs. / week</td></tr><tr><td>Total student study effort</td><td>9 Hrs. / week</td></tr></table>
Reading List and References	The following texts provide the majority of the basic materials to be covered in lectures. Students will need to study other publications, including local case studies. Barbara Caroll, 2002. *Environmental Impact Assessment Handbook: A Practical Guide for Planners, Developers and Communities*. Thomas Telford, London. Canter, L.W., 1996. *Environmental Impact Assessment*, 2nd Ed., McGraw-Hill. Christopher Wood. 2003. *Environmental Impact Assessment: A Comparative Review*. Prentice Hall, New Jersey. Riki Therivel, Peter Morris, 2001. Methods of Environmental Impact Assessment, Spon Press, London. Hong Kong Environmental Protection Department *http://www.epd.gov.hk/eia/*

Subject Description Form

Subject Code	CSE516
Subject Title	Urban Transport Planning - Theory and Practice
Credit Value	3
Level	5
Pre-requisite / Co-requisite/ Exclusion	Recommended background knowledge: It is expected that students will have a fundamental understanding of mathematics and computers consistent with undergraduate level study in civil engineering.
Objectives	To provide a comprehensive theoretically based, yet practical approach to transport planning in urban areas. Emphasis is also placed on the application of rigorous transport models and analytical techniques in case studies.
Intended Learning Outcomes	Upon completion of the subject, students will be able : a. to apply basic traffic engineering approaches to determine appropriate solutions for solving traffic problems, particularly in the planning stage for transport infrastructure projects; b. to design and conduct traffic surveys for assessment of the impacts due to transport improvement projects, and other travel demand management measures; c. to analyze and interpret data systemically from traffic and behavior surveys for strategic transport planning and travel demand forecasting; and d. to utilize the four-steps modelling techniques for forecasting future travel demand and analyzing the effects of transport infrastructure facilities on a transport system.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** i) Fundamentals of Urban Transport Planning (1 week) The fundamentals of land-use and transport planning; the planning process; planning studies; traffic problems and transport policy. ii) Travel Demand and Data Collection (2 weeks) Characteristics of travel demand;; travel demand forecasting; travel surveys. iii) Travel Demand Analysis (5 weeks) Model development; nature of modelling errors. Four step models: trip generation; trip distribution; modal split; traffic assignment. Simplified approach to small area planning. iv) Urban Transport Technology (1 week) Urban transport modes and technologies; intelligent transport systems.. v) Generation and Evaluation of Solutions (2 weeks) Evaluation techniques: economics, operation and environmental evaluation,; multi-criteria assessment;; public participation; case studies. vi) Traffic Impact Assessment TIA guidelines, methodology, and examples vii) Project and Laboratory (2 weeks)

	This course will be augmented by computer modelling and case studies for input to calibrate transport planning models: Network building; trip generation; trip distribution and modal split; traffic assignment; transport system evaluation.
Teaching/Learning Methodology	The underlying principles and techniques relating to traffic survey and transport planning will be dealt with in lectures. However, it is important that the students are exposed to the interdependence between theories and practice in transport planning. Students are therefore required to undertake survey design and data collection on sites in order to understand the associated techniques in practice. Individual assignments will consist of numerical problems on transport modelling and analysis while computer laboratory sessions will be held to demonstrate the applications of transport model and to provide opportunity for students to appreciate the difference between manual calculation and computer modelling. Professionals from government or industry will be invited to give lectures on current issues of transport planning in Hong Kong.
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr><tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td></tr><tr><td>1. Continuous Assessment</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>2. Written Examination</td><td>60%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr></table> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Continuous assessment will be based on coursework and case study discussions. Written examination is evaluated by final examination. Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.
Reading List and References	**Textbooks** Bruton, Michael J., *Introduction to Transportation Planning*, 3rd Ed., Hutchinson (1985). Ortúzar, J. de D. and Willumsen, L.G., *Modelling Transport*, 3rd Ed., John Wiley & Sons (2001). **Reference Books** Hensher, David A. and Button, Kenneth J., *Handbook of Transport Modelling*, Elsevier Science Ltd. (2000). Hutchinson, B.G., *Principles of Urban Transport Systems Planning*, McGraw -Hill (1974). Lam, W.H.K. and Bell, M.G.H., *Advanced Modeling for Transit Operations and Service Planning*, Pergamon, Elsevier Science Ltd., Oxford (2003). Sheffi, Yosef, *Urban Transportation Networks*, Prentice-Hall (1985). The official link from MIT: http://web.mit.edu/sheffi/www/selectedMedia/sheffi_urban_trans_networks.pdf **Conference Proceedings and Symposia**

	Proceedings of Hong Kong Society for Transportation Studies (http://home.netvigator.com/~hksts) Proceedings of the International Symposium on Transportation and Traffic Theory **Journals** Journal of Advanced Transportation Journal of the Transportation Research Board Journal of Transportation Engineering , American Society of Civil Engineers (ASCE) Traffic Engineering and Control Transportation Planning and Technology Transport Policy Transportation Research Transportation Science Transportmetrica **Reports** Technical reports by the Traffic and Transport Survey Division, Hong Kong Government Transportation Research Records, Transportation Research Board TRRL reports, Transport and Road Research Laboratory

Subject Description Form

Subject Code	EE2001A
Subject Title	Applied Electromagnetics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ 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.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. Understand that electromagnetism is based on Maxwell's equations. Interpret the physical meaning and phenomena behind Maxwell's equations. Know the meanings of physical quantities of electromagnetism and their basic relationships. 2. Be able to analyse electromagnetic phenomena related to electrical engineering systems by selecting the most appropriate laws/theorems/solution techniques. 3. Have had hands-on experience in electromagnetic measurements.
Subject Synopsis/ Indicative 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. 2. ***Time-varying fields*:** Faraday's Law and Lenz's Law; self-inductance, mutual inductance and stored energy. 3. ***Mathematical preliminaries*:** Vectors analysis and coordinate systems. 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*:** Dielectric material: dipole, polarisation, permittivity and capacitors. Ferromagnetism: magnetisation curve, permeability, hysteresis and saturation. Boundary conditions. Magnetic circuits: magneto-motive force, reluctance and permeance. 6. ***Solution of static field problems*:** Hand-mapping, method of images, numerical and computer-based methods. Estimation of conductance, inductance, capacitance and field quantities from field plots. **Laboratory Experiments:** Field plotting using resistance and impedance networks. Field plotting using the Electrolytic tank. Field plotting using the resistive paper.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on analysis and practical applications are given through experiments and using software, in which the students are expected to solve problems with critical and analytical thinking. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information. Software is used to help the students to understand the physical meanings of mathematical equations.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√		√	
Tutorials	√	√		
Experiments	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√		√	
2. Class Test	30%	√		√	
3. Laboratory performance & reports	10%	√		√	
Total	100 %				

It is a fundamental subject of electromagnetics. The outcomes on physical concepts and analysis are assessed by the usual means of examination and test whilst those on analytical skills and problem-solving techniques, as well as technical reporting and teamwork, are evaluated by experiments, software application and the reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Laboratory	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. W.H. Hayt, and J.A. Buck, Engineering Electromagnetics, 7th Edition, Boston: McGraw Hill, 2006
2. J. E. Parton and S.J.T. Owen, Applied Electromagnetics, The MACMILLAN PRESS LTD.
3. Nannapaneni Naraynan Rao, Elements of Engineering Electromagnetics, 6th Edition, Pearson Education International, 2004.
4. Fawwaz T. Ulaby, Fundamentals of Applied Electromagnetics, 5th Edition, Pearson Education International, 2007.
5. Fawwaz T. Ulaby, Electromagnetics for Engineers, Pearson Education International, 2005.
6. Karl E. Lonngren, etc., Fundamentals of Electromagnetics with Matlab, Second Edition, Scitech Publishing, Inc., 2007.

Subject Description Form

Subject Code	EE2002A
Subject Title	Circuit Analysis
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AP10006
Objectives	1. Introduce fundamental circuit theory. 2. Develop ability for solving problems involving electric circuits. 3. Develop skills for experimentation on electric circuits.
Subject Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Acquire a good understanding of fundamental circuit theory. 2. Solve simple problems in electric circuits. 3. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. DC Circuits Introduction to electric circuits. Voltage and current as two basic variables. Kirchhoff's current and voltage laws. Independent and dependent sources. 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. 2. Capacitance, Inductance and First Order Transients Constitutive relations of capacitor and inductor. 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. 3. 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. 4. 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.

	5. Electrical Measurement Measurement uncertainties. Resistance measurement: Four-probe measurement and Wheatstone Bridge. Capacitance and inductance measurement using AC Bridges. Power Measurement. Measuring three-phase power by two-wattmeter method. **Laboratory Experiments:** 1. Kirchhoff's laws and the maximum power transfer theorem 2. Transients in RC and RL circuits 3. AC Circuits and Transformer Tests

Teaching/ Learning Methodology

Lectures, supplemented with interactive questions and answers, and short quizzes	1, 2	In lectures, students are introduced to the *knowledge* of the subject, and *comprehension* is strengthened with interactive Q&A and short quizzes.
Tutorials, where problems are discussed and are given to students for them to solve	1, 2	In tutorials, students *apply* what they have learnt in solving the problems given by the tutor.
Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	2, 3	Students *acquire* hands-on experience in using electronic equipment and *apply* what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.
Assignment and Homework	1, 2	Through working assignment and homework, students will develop a firm understanding and *comprehension* of the *knowledge* taught.

Assessment Methods, its alignment of Intended Subject Learning Outcomes

Specific Assessment Methods/ Task	**% Weighting**	**Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)**		
		1	**2**	**3**
1. Continuous Assessment (Total 40%)				
• Assignments	10%	✓	✓	
• Laboratory works and reports	10%		✓	✓
• Mid-semester test	10%	✓	✓	
• End-of-semester test	10%	✓	✓	
2. Examination	60%	✓	✓	
Total	100%			

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: **Specific Assessment Methods/Tasks** / **Remark** Assignment/Homework: Assignments/Homeworks are given to students to assess their competence level of *knowledge* and *comprehension*. The criteria (i.e. *what* to be demonstrated) and level (i.e. the *extent*) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment/homework is given. Feedback about their performance will be given promptly to students to help them improvement their learning. Laboratory works and reports: Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignment/homework. Mid-semester test: There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignment/homework. End-of-semester test and Examination: There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignment/homework.
Student Study Effort Expected	**Class contact (time-tabled):** ▪ Lecture: 26 Hrs. ▪ Tutorial: 13 Hrs. ▪ Laboratory: 9 Hrs. **Other student study effort:** ▪ Revision and Assignments: 26 Hrs. ▪ Tutorial: 13 Hrs. ▪ Report Writing: 12 Hrs. **Total student study effort:** 99 Hrs.
Reading List and References	**Textbook:** 1. C.K. Alexander and M.N.O. Sadiku, Fundamentals of Electric Circuits, 5th Edition, New York: McGraw-Hill, 2013.

	References: 1. G. Rizzoni, Fundamentals of Electrical Engineering, First Edition, New York: McGraw-Hill, 2009. 2. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, Engineering Circuit Analysis, 7th ed., New York: McGraw-Hill, 2007. 3. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 4th ed., 2007.

Subject Description Form

Subject Code	EE2003A
Subject Title	Electronics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: Circuit Analysis (EE2002A)
Objectives	1. To introduce the principles and techniques used in the operations and analysis of fundamental classes of semiconductor-based electronic devices and circuits, including diodes and diode circuits, bipolar junction transistors (BJTs) and BJT amplifiers, metal-oxide-semiconductor field-effect transistors (MOSFETs) and MOSFET amplifiers as well as operational amplifiers (op-amps) and op-amp circuits. 2. To introduce the principles and techniques used in the implementation of frequency domain analysis on first-order ac circuits with sinusoidal driving sources.
Subject Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** 1. Describe the operating principles of the fundamental classes of semiconductor-based electronic devices and circuits. 2. Apply the appropriate techniques to analyze the fundamental classes of semiconductor-based electronic devices and circuits. 3. Implement the frequency domain analysis on first-order ac circuits with sinusoidal driving sources. 4. Conduct relevant laboratory experiments and report the findings with appropriate techniques and tools.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Diodes and Diode Circuits Semiconductor materials and properties. Properties of p-n junctions. Structure, operation and characteristics of p-n junction diodes. Ideal and practical p-n junction diodes. Analysis of basic diode circuits. Analysis of specific diode circuits: rectifiers, peak detectors, clippers, clampers, etc. Load line concept and analysis. 2. BJTs and BJT Amplifiers Structures, operations and characteristics of n-p-n and p-n-p BJTs. DC analysis, load line and design techniques of BJT circuits. DC biasing schemes. Basic configurations, operations and characteristics of BJT amplifiers. AC analysis, load line and design techniques. Small-signal equivalent circuits and parameters. Small-signal voltage gain, current gain, input resistance and output resistance. Loading effect. 3. MOSFETs and MOSFET Amplifiers Structures, operations and characteristics of n-channel and p-channel MOSFETs. DC analysis, load line and design techniques of MOSFET circuits. DC biasing schemes. Basic configurations, operations and characteristics of MOSFET amplifiers. AC analysis, load line and design techniques. Small-signal equivalent circuits and parameters. Small-signal voltage gain, current gain, input resistance and output resistance. Loading effect.

	4. Op-Amps and Op-Amp Circuits Transistor-level diagram and basic operation of op-amps. Ideal and practical op-amp equivalent circuits and characteristics. Golden rules. Basic op-amp circuits: inverting, non-inverting, summing, difference, integrating and differentiating amplifiers. Specific op-amp circuits: voltage follower, current-to-voltage converter, voltage-to-current converter, instrumentation amplifier etc. Design applications. 5. Frequency Domain Analysis Power, voltage and current gains on linear and logarithmic scales. Concepts of "bel" and "decibel". Concepts of time t, angular frequency $j\omega$ and complex angular frequency s domains. Transfer functions in $j\omega$ and s domains. Introduction to Bode plot. Derivation of transfer functions of first-order ac circuits with sinusoidal driving sources. Implementation of Bode magnitude and phase plots. Concepts of pole and zero, corner/cutoff frequency as well as bandwidth. **Laboratory Experiments:** 1. EE2003-E01: Basic Diode Circuits. 2. EE2003-E02: Design of a Small-Signal Common-Emitter BJT Amplifier. 3. EE2003-E03: Op-Amp Circuits.
Teaching/ Learning Methodology	

Lectures, supplemented with interactive questions and answers	1, 2, 3	In lectures, students are introduced to the *knowledge* of the subject, and *comprehension* is strengthened with interactive Q&A.
Tutorials, where problems are discussed and are given to students for them to solve	1, 2, 3	In tutorials, students *apply* what they have learnt in solving the problems given by the tutor.
Assignments	1, 2, 3	Through working assignments, students will develop a firm understanding and *comprehension* of the *knowledge* taught.
Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	1, 2, 4	Students *acquire* hands-on experience in using electronic equipment and *apply* what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.

Assessment Methods, its alignment of Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)			
		1	2	3	4
1. Continuous Assessment	40%	✓	✓	✓	✓
2. Examination	60%	✓	✓	✓	
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Specific Assessment Methods/Tasks	Remark
Assignments	Assignments are given to students to assess their competence level of *knowledge* and *comprehension*. The criteria (i.e. *what* to be demonstrated) and level (i.e. the *extent*) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improvement their learning.
Laboratory works and reports	Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignments.
Mid-semester test	There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignments.
End-of-semester test and Examination	There will be an end-of-semester test and an examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.

Student Study Effort Expected

Class contact (time-tabled):	
▪ Lecture	30 Hrs.
▪ Tutorial	9 Hrs.
▪ Laboratory	9 Hrs.
Other student study effort:	
▪ Self-study	32 Hrs.
▪ Assignments	12 Hrs.
▪ Laboratory logbook & report writings	8 Hrs.
Total student study effort:	100 Hrs.

Reading List and References

Textbook:

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

References:

4. G. Rizzoni, *Principles and Applications of Electrical Engineering*, Fifth Edition, New York: McGraw-Hill, 2006.
5. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, *Engineering Circuit Analysis,* 7th ed., New York: McGraw-Hill, 2006.
6. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 4th ed., 2006.

Subject Description Form

Subject Code	EE2004A
Subject Title	Electrical Energy Systems Fundamentals
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide an overview of the supply, utilization, and control of electrical energy. 2. To introduce energy and environmental issues, and assist students in placing these topics and technologies in perspective.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able: a. To master the fundamental knowledge on electrical energy systems. b. To identify, analyze, and solve technical problems using mathematics and engineering techniques. c. To be aware of equipment characteristics and environment issues on modern electrical power systems. d. To be able to conduct laboratory work in teams and present the findings.
Subject Synopsis/ Indicative Syllabus	1. ***Nature of electrical energy system***: Power system layout, transmission and distribution structure, role of transformers. The interconnected power system. HVDC transmission. Layout of a substation, distribution structure, overhead lines and cables, circuit breaking, overvoltage protection, protection concepts. 2. ***Generation, energy & environment***: Principles of energy conversion, power plant and busbar layout, types of generators and turbines. Concept of generation control and operating chart. Pumped storage and wind turbine. Renewable and non-renewable sources. Sources of pollution and environmental impacts. Sustainable development. 3. ***Transformers***: Construction and operating principles. Equivalent circuits. Voltage regulation and efficiency. Parallel operation. Three-phase transformers and phase grouping. Per-phase analysis. Autotransformers. 4. ***Line & cables***: Overhead line construction including transposition and bundling. Primary (RLCG) and general (ABCD) parameter calculations. Line equations and performance charts. Corona loss and interference. Cable types and construction including void formation and cross bonding. Electrical stress calculation. Thermal characteristics. 5. ***Tariffs:*** Concepts of tariff design. Tariff structures. Conventional and new tariffs in different utilities. Dynamic tariff, marginal methods and load management concepts. Introduction to electricity deregulation. **Laboratory Experiment:** Experiments on single phase transformer. Experiments on three phase transformer. Computer exercises on transmission line parameters calculations. **Case study:** The environmental impacts of nuclear power generation. The environmental impacts of fossil fuel power generation. The environmental impacts on the development of large scale hydropower station.

	Why modern electric power systems are often interconnected. The renewable energy sources which may be used in Hong Kong.
Teaching/Learning Methodology	Lectures are the primary means of conveying the basic concepts and knowledge, teaching students the skills in identifying, analyzing and solving technical problems, and providing students feedback in relation to their learning. Laboratory experiments and case studies are designed, as supplement to the lecturing materials, for students to gain practical experiences and be aware of equipment characteristics and environment issues on the modern electrical power system.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Case studies	√	√	√	
Experiments			√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Class tests	20%	√	√	√	
3. Lab performance and report	10%			√	√
4. Case studies	10%	√	√	√	
Total	100%				

The outcomes on concepts, design and applications are assessed by examinations and tests whilst those on analytical skills, problem solving techniques and practical considerations of electrical energy systems, as well as team work and technical report writing abilities are evaluated by lab performance and reports, and assignment / case study reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	36 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation / report	12 Hrs.
	▪ Case study / Self-study	46 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Textbooks:

1. J. Grainger, W. D. Stevenson, Power System Analysis, McGraw-Hill, 1994
2. B. M. Weedy, B. J. Cory, N. Jenkins, J. B. Ekanayake, G. Strbac, Electric Power Systems, 5th Edition, Wiley, 2012
3. M. E. El-Hawary, Electrical energy systems, 2nd Edition, CRC Press, 2008

Reference books:

1. H. Saadat, Power System Analysis, 3nd Edition, McGraw Hill, 2010
2. A. R. Bergen, V. Vittal, Power System Analysis, 2nd Edition, Prentice-Hall, 2000
3. J.D. Glover, M. S. Sarma, T.J. Overbye, Power System Analysis and Design, 5th Edition, Cengage Learning, 2011

Subject Description Form

Subject Code	EE3001A
Subject Title	Analogue and Digital Circuits
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2002A & EE2003A
Objectives	1. To familiarise students with the characteristics and operation of analogue and digital circuits for analysis and design purposes. 2. To enable students to understand the common techniques used in circuit design for combinational and sequential logic circuits. 3. To provide an appreciation of advantages and limitations of different classes of power amplifiers. 4. To enable students to analyse the operation principles of different A/D and D/A approaches and match their properties to serve the purposes of different applications. 5. To enable students to appreciate the limitations of circuit design.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design basic digital combinational and sequential circuits. b. Given the requirements of an application, justify the use of suitable A/D or D/A converters and elaborate on the advantages and limitations of the selection. c. Compare the characteristics and operation of different classes of power amplifiers. d. Analyse operation of digital circuits and diagnose faults with basic equipment in the laboratory. e. Write a technical report.
Subject Synopsis/ Indicative Syllabus	**Digital Circuits** 1. ***Digital system fundamentals***: Boolean algebra, number systems and codes used in digital systems logic gates and their characteristics, truth tables. 2. ***Analysis and synthesis of combinational circuits***: Simplification techniques, Don't care terms, Karnaugh maps. Implementation of large scale circuits. Static and dynamic hazards. 3. ***Digital integrated circuits***: Digital IC families: TTL, CMOS, structure of basic logic gates, input and output V-I characteristics; transfer characteristics, switching thresholds, noise margins, power dissipation of logic gate, propagation delay, rise time, fall time. ***ential circuits***: Typical structure, operation, design and applications of flip-flops. Design and analysis of synchronous sequential circuits; states and state variable: structures of registers, counters and memory units. Design of asynchronous circuits, state machines, flow tables, stable and unstable states.

	Analogue Circuits 5. ***Large-signal transistor circuits***: Classification of power amplifiers; analysis of efficiency, power dissipation and distortion of class A, B, AB and C amplifiers. 6. ***Signal conversion***: Voltage comparator. Sample & hold circuits. A/D and D/A converters: Weighted-resistor D/A converter; R-2R Ladder D/A converter; Parallel-comparator A/D converter; Dual slope A/D converter; Successive-approximation A/D converter; **Laboratory Experiments:** Logic circuits I – Combinational logic circuits. Logic circuits II –Sequential logic circuits.
Teaching/Learning Methodology	The main teaching methods used to convey the basic concepts and fundamental theories are lectures and tutorials. The laboratory sessions are used to help the students to have an in-depth understanding of the fundamentals of analogue and digital circuits and apply the fundamental theory and knowledge learned to practice.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Lectures	√	√	√			
Tutorials	√	√	√			
Experiments	√		√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Examination	60%	√	√	√			
2. Class Test	25%	√	√	√			
3. Laboratory performance & reports	10%	√		√	√	√	√
4. Home work	5%	√	√	√			
Total	100%						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

It is a fundamental circuit design subject. The outcomes on concepts, design and applications are assessed by the usual means of examination and test whilst those on analytical skills, problem-solving techniques and practical considerations of circuit design, as well as technical reporting, are evaluated by experiments, and the reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	102 Hrs.

Reading List and References	**Textbooks:** 1. Thomas L. Floyd, "Digital fundamentals", Prentice Hall, 2003 **Reference books:** 1. William Kleitz, "Digital Electronics", Prentice Hall, 2002 2. Roger Tokheim, "Digital Electronics, principles and applications", McGraw Hill, 2002 3. Alan B. Marcovitz, "Introduction to Logic Design", McGraw Hill, 2002 4. M.M. Mano, Digital Design, 4th Edition, Prentice Hall, 2007

Subject Description Form

Subject Code	EE3002A
Subject Title	Electromechanical Energy Conversion
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students a general knowledge on common types of electric machines. 2. To provide students the basic techniques of steady-state electric machine analysis.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain the construction, operating principles, performance characteristics, control and applications of transformers and major types of rotating electric machines. b. Analyse the steady-state performance of electric machines using appropriate equivalent circuit models. c. Operate practical electric machines and to conduct relevant tests and experiments. d. Present results of electric machine studies in the form of tables, graphs, and written reports.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction*****:** Principles of motors and generators. Materials for electric machines. Types of electric machines and applications. Losses and efficiency. 2. ***Machine rating*****:** Temperature rise and cooling methods. Heating and cooling curves. Thermal ratings. Machine nameplate. 3. ***Windings*****:** Phase and commutator windings. Winding factors. E.m.f. equation. Harmonics. Production of rotating field. 4. ***D.C. machines*****:** Construction. E.m.f equation. Armature reaction and commutation. Characteristics of shunt, series and compound machines. Testing. Speed control. Universal motor. Brushless d.c. motor. 5. ***Synchronous machines*****:** Construction. Synchronous impedance. Voltage regulation. Synchronising. Performance on infinite busbars. Power/load angle relationship. Stability. Synchronous motor. 6. ***Induction machines*****:** Squirrel cage and wound-rotor types. Equivalent circuit. Torque-slip relationship. Starting, braking and generating. Testing. Speed control. Single-phase induction motors. **Laboratory Experiments:** Load test, efficiency and speed control of a d.c. motor. Performance evaluation of a three-phase cage induction motor. Synchronous motor V-curves. Temperature rise and ratings.

Teaching/Learning Methodology	Delivery of the subject is mainly through formal lectures and complemented by tutorials. Excel programmes are used to clarify concepts of electric machines learnt and for conducting 'what-if' analysis. Laboratory work provides students hands-on experience in operation and control of practical machines, while report-writing enables students to practise written and graphic presentation skills.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√		
Laboratory work		√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	√
2. Mid-term Test	20%	√	√	√	
3. Laboratory work and reports	15%		√	√	√
4. Assignment	5%	√	√		
Total	100%				

It is a fundamental subject on electric machines and transformers. The outcomes on concepts, operating principles and applications are assessed by the usual means of assignment, tests, and examination. The outcomes on practical operation of electric machines and technical communication are evaluated by laboratory work and reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	35 Hrs.
	▪ Laboratory	9 Hrs.
	Other student study effort:	
	▪ Revision, self-study, and assignment	39 Hrs.
	▪ Write-up of laboratory reports	12 Hrs.
	Total student study effort	95 Hrs.

Reading List and References

Reference books:

1. M.S. Sarma and M.K. Pathak, Electric Machines, 2nd Edition, Cengage Learning, 2010
2. S.A. Nasar, Schaum's Outline of Theory and Problems of Electric Machines and Electromechanics, 2nd Edition, McGraw-Hill, 1998

Subject Description Form

Subject Code	EE3003A
Subject Title	Power Electronics and Drives
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To understand the characteristics and operation of power electronics devices. 2. To expose the students to the conversion and utilization of large amount of electrical power using latest power semiconductor devices and modern control techniques. 3. To ensure the students develop an understanding of various drive systems.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Be able to explain both verbally and in written form major semiconductor devices that can be used as switches, and their electrical characteristics which include basic idealised models as well as extension to some important non-ideal characteristics. b. Be able to explain the processes of efficient energy conversion through the use of power semiconductor switches. c. Be able to apply the concepts of switching power conversion to analyse a variety of circuits including: i. DC to DC conversion ii. AC to DC conversion iii. DC to AC conversion d. Be able to present the results of study and experiments in the form of a technical report.
Subject Synopsis/ Indicative Syllabus	1. ***Power electronics fundamentals*:** power conversion, energy balance principle, review of fundamentals. 2. ***Power semiconductor devices*:** Diodes**,** Power Transistor, MOSFET, SCR, GTO, IGBT, switching characteristics. 3. ***DC-DC converters*:** Buck, Boost and Buck-Boost DC-DC Converter, Duty Cycle Controller, Switched Mode Power Supply. 4. ***AC-DC rectifiers*:** Uncontrolled and controlled single-phase and three-phase rectifiers, terminal characteristics, supply and load interactions. 5. ***DC/AC inverters*:** Basic Single-phase bridge inverters, voltage and frequency control, harmonic reduction. 6. ***Electric drive systems*:** Introduction to electric drives system, applications for conservation of energy, dc electric drives. **Laboratory Experiment:** DC/DC Buck Converter, Introduction to SCR circuits, PSPICE simulation of SCR Bridge.

Teaching/Learning Methodology

Lectures and tutorials are effective teaching methods:
1. To provide an overview or outline of the subject.
2. To introduce new concepts and knowledge to the students.
3. To explain difficult ideas and concepts of the subject.
4. To motivate and stimulate students interest.
5. To provide students feedback in relation to their learning.
6. To encourage students responsibility for their learning by extra reference books reading and computer-based circuit simulations.

Laboratory works is an essential ingredient of this subject:
1. To supplement the lecturing materials.
2. To add real experience for the students.
3. To provide deep understanding of the subject.
4. To enable students to organise principle and challenge ideas.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√	√	
Experiments				√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Class tests	30%	√	√	√	
3. Laboratory performance & reports	10%				√
Total	100%				

The understanding on theoretical principle and practical considerations, analytical skills and problem solving technique will be evaluated. Examination, class tests, laboratory sections and reports are an integrated approach to validly assess students' performance with respect to the intended subject learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	36 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	12 Hrs.
▪ Self-study	45 Hrs.
Total student study effort	99 Hrs.

Reading List and References

Textbooks:
1. Power Electronics, a First Course - Ned Mohan, Wiley, 2012
2. Muhammad H. Rashid, Power Electronics: Circuits, Devices and Applications, 3rd Edition, Prentice Hall, 2004

	Reference books: 1. Bimal K. Bose, Power Electronics and Variable Frequency Drives: Technology and Applications, IEEE Press 1997 2. Philip T. Krein, Elements of Power Electronics, Oxford University Press, 1998 3. R. Krishnan, Electric Motor Drives: Modeling, Analysis, and Control, Prentice-Hall, 2001 4. Ned. Mohan, Electric Drives: an Integrative Approach, Minnesota Power Electronics Research & Education, 2003

Subject Description Form

Subject Code	EE3004A
Subject Title	Power Transmission and Distribution
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	
Objectives	To introduce students to the fundamental knowledge which is essential for all electrical power engineers. It leads to a deeper insight into the design, planning, operation, equipment characteristics and environmental impacts of modern electrical power systems.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired the fundamental knowledge and analytical techniques on electrical power systems. b. Be able to identify, analyze, and solve technical problems to power system design, planning, and operation, making use of mathematics and engineering techniques. c. Be able to work in teams when conducting laboratory investigations. d. Be able to write a technical report and present the findings.
Subject Synopsis/ Indicative Syllabus	1. ***Reactive power and voltage control*:** Voltage drop and power loss calculation. Voltage control using tap-changing and booster transformer, regulator, series and shunt compensation. Reactive power flow. Power factor improvement and bulk tariff. 2. ***Surges*:** Travelling wave, surge impedance and standing voltage. Lightning and switching surges. Surge mitigation, reflection and refraction. Use of lattice diagram. Protection against overvoltage. 3. ***Fault analysis*:** Use of per unit notation. Balanced 3-phase fault calculation. Fault current limiting concepts. Unbalanced fault calculation by symmetrical components method including line-to-ground, line-to-line, and double-line-to-ground faults. Sequence current and voltage measurements. 4. ***Switchgear and protection*:** Construction and application of different types of switching devices. Arc extinction and transient recovery voltages. AC and DC current interruption, current chopping. Role and component of protection systems. Coordination, selection and zoning of protection. Overcurrent relays. Differential and distance protection schemes. 5. ***Tariffs:*** Concepts of tariff design. Tariff structures. Conventional and new tariffs in different utilities. Dynamic tariff, marginal methods and load management concepts. **Laboratory Experiment:** Voltage regulation and reactive power compensation for short and medium length transmission lines. Static and electromechanical current measuring relays. Studies of surges on transmission lines. Symmetric and Asymmetric fault using interactive package "Powerworld". Symmetrical components. Effects of different earthing methods in distribution system. Grading of overcurrent relays.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on system analysis, design and practical applications are given through experiments, in which the students are expected to solve the power system design, planning, and operation problems with practical constraints and to attain pragmatic solutions with critical and analytical thinking. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√		
Tutorials	√	√		
Experiments			√	√

Assessment Methods, its alignment of Intended Subject Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√		
2. Class Test	25%	√	√		
3. Laboratory Performance & Report	15%			√	√
Total	100%				

The outcomes on concepts, design and applications are assessed by the usual means of examination and test Experiments and written reports assess those on analytical skills, problem-solving techniques and practical considerations of power system design, as well as technical reporting and teamwork.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Laboratory	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Textbooks:

1. C.R. Bayliss and B.J. Hardy, Transmission and Distribution Electrical Engineering, Kindle, 3rd Edition, 2007
2. W.D. Stevenson, Elements of Power System Analysis, McGraw Hill, 4th Edition or later, 1982 or later
3. B.M. Weedy, Electric Power Systems, Wiley, 3rd Edition or later, 1988 or later

Reference Books:

1. L. Grigsby, Electric Power Generation, Transmission and Distribution, Electric Power Engineering Handbook, 2nd Edition, CRC Press, 2007
2. A.R. Bergen and V. Vittal, Power System Analysis, Prentice Hakk, 2nd Edition, 2000
3. T. Gönen, Modern Power System Analysis, Wiley, 1988 or later

Subject Description Form

Subject Code	EE3005A
Subject Title	Systems and Control
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2111 / AMA201
Objectives	1. To introduce the principles and techniques used in the analysis and design of feedback control systems. 2. To provide the foundation for the later subjects in the areas of power systems, drives and control.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Analyse the stability, transient response and steady-state response of continuous time systems. b. Design compensators and controllers for control systems. c. Model systems using block diagram and signal flow graph and evaluate the properties of the overall systems. d. Write technical reports and present the findings.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction to control system analysis*:** Open-loop control systems, Closed-loop control systems, Effects of feedback, Examples of control systems. 2. ***Mathematical modelling of dynamic systems*:** Electrical and electro-mechanical system components, Transducers and actuators, Laplace transform, Transfer functions. 3. ***System diagrams and simulations*:** Block diagram, Signal flow graphs, Mason's formula, Simulation of continuous systems using Matlab. 4. ***Time domain analysis of linear systems*:** First-order systems, Second-order systems, Transient response, Steady-state response, Routh-Hurwitz stability criterion. 5. ***Frequency domain analysis of linear systems*:** Frequency response, Bode Diagrams, Gain margin and phase margin, Polar plots, Nyquist stability criterion, Nichols plots. 6. ***Compensators and PID controllers:*** Compensators, PID controllers, Controller tuning. 7. ***State-space analysis*:** State-space models, Transfer matrix, State transition matrixt. **Laboratory Experiment:** Three-term controller Open-loop frequency response Modular position control system

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiments are designed to supplement the lecturing materials. The students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√	√	
Experiments	√	√		√

Assessment Methods, its alignment of Intended Subject Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Class tests	30%	√	√	√	
3. Laboratory reports	10%	√	√		√
Total	100%				

The outcomes on analysis and design are assessed by the usual means of examination and tests whilst those on technical reporting and presentation are evaluated by the experiments and reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	30 Hrs.
	▪ Laboratory	9 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	49 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. K. Ogata, Modern Control Engineering, 5th Edition, Prentice-Hall, 2010
2. B.C. Kuo, Automatic Control Systems, 8th Edition, Prentice-Hall, 2002
3. R.C. Dorf and R.H. Bishop, Modern Control Systems, 12th Edition, Prentice-Hall, 2010
4. M. Gopal, Control Systems: Principles and Design, 3rd Edition, McGraw-Hill, 2008

Subject Description Form

Subject Code	EE3006A
Subject Title	Analysis Methods for Engineers
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2111 / AMA201
Objectives	1. To familiarise students with the essential numerical techniques and operations research methods which are applicable in most engineering problems. 2. To enable students to analyse the advantages and limitations of the commonly adopted numerical techniques and operations research methods. 3. To prepare students for tackling practical engineering problems, with a combination of strong theoretical background and sound engineering sense.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Match the numerical techniques and operations research techniques with the corresponding mathematical theories and compare their advantages and limitations. b. Given an engineering problem, justify the application of an appropriate technique, formulate the solution process and evaluate the results. c. Analyse essential features of different statistical problems in engineering. d. Apply computer software to develop iterative numerical algorithms. e. Write technical reports and present the findings in logical and organised manner.
Subject Synopsis/ Indicative Syllabus	1. ***Basics*:** Error propagation, numerical stability, solutions by iterations, Newton's method, finite difference and interpolation, Lagrange interpolation; solution of non-linear simultaneous equation; numerical differentiation and integration. 2. ***Differential equations*:** Numerical solutions of ordinary differential equations, Euler and Runge-Kutta methods, convergence and stability; finite difference methods for partial differential equations, boundary value problems. 4. ***Operations research*:** Linear programming, simple Simplex algorithms, sensitivity analysis, shortest path and maximum flow problems, integer programming, combinatorial optimisation problems, applications in power systems and transportation. 5. ***Optimisations***: Direct search and simple gradient methods; optimisations with constraints. 6. ***Probability & statistics:*** Random variables, probability distributions, sample distributions and means, Central Limit Theorem, significance and hypothesis testing, stochastic processes. **Laboratory Experiments:** • Numerical analysis and algorithm implementation through Matlab • Numerical evaluation of partial differential equations of voltage or heat distribution • Optimization and sensitivity analysis in electrical systems

Teaching/Learning Methodology	Basic concepts and theories are taught in lectures and tutorials. When conducting the experiments, the students are expected to solve practical problems with critical and analytical thinking. Interactive assignments and on-the-spot discussions are conducted in both lectures and laboratory sessions. Experiments are designed so that the students should use the references in the instruction sheets to look for the supplementary information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Experiments			√	√	√

Assessment Methods, its alignment of Intended Subject Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√		
2. Tests	20%	√	√	√		
3. Assignments & class works	10%	√	√	√	√	
4. Laboratory performance & reports	10%			√	√	√
Total	100%					

The outcomes on concepts, design and applications are assessed by the usual means of examination and tests. The outcomes on analytical skills, problem-solving techniques, technical reporting and teamwork, are evaluated by experiments and the reports.

Student Study Effort Expected		
	Class contact:	39 Hrs.
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study and assignments	46 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Textbooks:

1. S.C. Chapra, Applied numerical methods with MATLAB for engineers and scientists, McGraw Hill, 2008
2. F.S. Hillier, Introduction to operations research, McGraw Hill, 2005
3. R.E. Walpole, R.H. Myers, S.L. Myers and K.Y. Ye, Probabilities and Statistics for Engineers and Scientists, Prentice Hall, 2002

Reference books:

1. J.H. Mathews, Numerical methods using MATLAB, Pearson Prentice Hall, 2004
2. A.V. Balakrishnan, Introduction to random processes in engineering, John Wiley & Sons, 2005

Subject Description Form

Subject Code	EE3007A
Subject Title	Computer System Principles
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: ENG2003
Objectives	1. To enable students to establish a broad knowledge of the organization and components included in a small computer system. 2. To enable students to understand and apply assembly language programming. 3. To enable students to develop a simple embedded computer system
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Given specifications of an application and the instruction set of the microprocessor, design an assembly program to carry out the necessary operations. b. Appreciate advanced features of the latest microprocessors and understand functions of basic computer peripherals. c. Given a set of conditions, design a basic computer system. d. Think logically and be able to analyze data as well as present results in writing.
Subject Synopsis/ Indicative Syllabus	**Computer Systems Hardware and Operations** 1. ***Processor operation and internal architecture*:** Operations of data registers, buses and data path, operations of ALU, arithmetic hardware, and general pipeline architecture. Introduction to structure and operation of a modern microprocessor. 2. ***Memory organization*:** Characteristics of current memory technologies. Memory hierarchies and memory decoding mechanism. 3. ***Input and output systems*:** Direct I/O system and memory mapped I/O, interrupt and polling mechanisms. Protocol for serial data communications. 4. ***Microprocessor hardware and interfacing*:** System bus organization and interfacing techniques, CPU bus timing, system bus structure, design of input/output system. **Assembly Language Programming** 5. ***Memory addressing space and data representation*:** Internal registers of 8086, Addressing modes in 8086 soft-ware model. 6. ***Assembly language program*:** Basic elements of an assembly language program, instruction mnemonics and directives, arithmetic operations and logical operations. 7. ***Programming techniques*:** Arithmetic manipulations, elementary programming constructs, parameter passing, data initialization. 8. ***Coding and debugging*:** Conversion of source programs to machine codes, use of software debugging monitor, Compilation of assembly source program, linking of object files. **Laboratory Experiment:** Perform basic input/output operations of a microcontroller by assembly language programming. Control of different types of motors using a microcontroller and assembly language programming.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design, practical applications and programming are given through experiments, in which the students are expected to solve design problems with real-life constraints and to attain feasible solutions with critical and analytical thinking. Interactive laboratory sessions are introduced to encourage better preparation and hence understanding of the experiments. On-the-spot assessments are conducted in the laboratory to provide additional incentives for student learning. Experiments are designed to supplement the lecturing materials, especially in assembly language programming, so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√	√	
Experiments	√			√

Assessment Methods, its alignment of Intended Subject Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Mid-term quiz	15%	√	√		
3. Laboratory performance & report	15%	√			√
4. Assignments and in-class activities	10%	√		√	√
Total	100%				

It is a fundamental computer architecture subject. The outcomes on concepts, design and applications are assessed by the usual means of examination and test whilst those on analytical skills, problem-solving techniques and practical considerations of programming, as well as technical reporting are evaluated by experiments, and the report.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	35 Hrs.
	▪ Laboratory	8 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	11 Hrs.
	▪ Self-study	50 Hrs.
	Total student study effort	100 Hrs.

Reading List and References	**Textbooks:** 1. C. Hamacher, Z. Vranesic, S. Zaky, and N. Manjikian, Computer Organization and Embedded Systems, 6th Edition, McGraw-Hill, 2012 2. J.L. Hennessy and D.A. Patterson, Computer Architecture: A Quantitative Approach, 5th Edition, Elsevier, 2012 3. B. B. Brey, The Intel Microprocessors Architecture, Programming, and Interfacing. 8th Edition, Prentice Hall, 2008 **Reference books:** 1. A.K. Ray, Advanced Microprocessors & Peripherals, McGraw-Hill, 2006 2. K.R. Irvine, Assembly Language for Intel-Based Computers, 5th Edition, Prentice Hall, 2006

Subject Description Form

Subject Code	EE3008A
Subject Title	Linear Systems and Signal Processing
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide a broad treatment of the fundamentals of telecommunication systems.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the fundamentals of signals and linear systems. b. Undersatnd and analyze problems in different disciplines of engineering (with an emphasis on communication systems) under the framework of signals and linear systems c. Understand the characteristics, operating principles, performance metrics and limitations of typical tele-communication systems.
Subject Synopsis/ Indicative Syllabus	1. ***Signal representation and analysis:*** Mathematical representation of a signal; time-domain representation. Classification of signal and systems; Special functions. Linear and Time-Invariant Systems; Convolution; 2. ***Fourier series and Fourier Transforms:*** Complex exponentials; Frequency domain representation of signals; Fourier Series; Fourier transform; Fourier Transform pairs; Fourier Transform properties; Parsavel's theorem; Transfer functions; filters. Applications to music and electromagnetic radiation; 3. ***Sinusoidal carrier modulation:*** Amplitude and frequency modulation; Operating principle; Double side-band suppressed carrier, Conventional (Standard) AM, single side-band; Frequency division multiplexing; generation and detection circuitry; Modulation system performance comparison. 4. ***Pulse modulation:*** Sampling theorem. Pulse amplitude modulation. Timedivision-multiplexing. Pulse code modulation: quantization, encoding. Quantization noise. Differential pulse code modulation. Delta modulation. Pulse amplitude modulation; Pulse width modulation; 5. ***Digital communications:*** Digital transmission. Intersymbol interference; Eye diagram. Coding (source, error control, line). Digital carrier modulation; Pulse shaping; modulation format and spectral efficiency; probability and random variables; bit error ratio (BER) characterization and system performance 6. ***Introductions to copper-wire, wireless and optical fiber communications:*** Historical developments; channel characterizations; Electromagnetic radiation in wireless systems; multi-path interference; Light sources in optical communication systems. Light transmission in optical fibers. Light detection. Communication networks; **Laboratory Experiments:** Amplitude modulation (AM) System Pulse code modulation (PCM)

Teaching/Learning Methodology	The main teaching methods used to convey the basic concepts and fundamental theories are lectures and tutorials. The laboratory sessions are used to help the students to have an in-depth understanding of the fundamentals of telecommunication systems and apply the theory learned to practice.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	√	√	
Tutorials	√	√	
Experiments	√		√

Assessment Methods, its alignment of Intended Subject Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	60%	√	√	
2. Class test	24%	√	√	
3. Laboratory	10%	√		√
4. Home work or in-class exercises	6%	√	√	
Total	100%			

The outcomes on understanding the fundamentals of telecommunication systems and their characteristics are mainly assessed by examination, test and exercises, whilst the capability of applying theory to practice is evaluated through the laboratory work.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	6Hrs.
▪ Self-study	49 Hrs.
Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. A.V. Oppenheim and A. S. Willsky, "Signals and systems," Prentice Hall
2. B.P. Lathi, Modern Digital and Analogue Communication Systems, Oxford University Express, 2009
3. J.M. Senior, Optical Fiber Communications: Principle and Practice, 3rd Edition, Prentice Hall, 2009
4. J. G. Proakis and M. Salehi, "Digital Communications," 5th edition, McGraw-Hill

Subject Description Form

Subject Code	EE3009A
Subject Title	Electrical Services in Buildings
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to understand the major design features, operating characteristics and functions of electrical and electronic equipment used in building services. 2. To enable students to implement technical data, regulations, standards and guidance notes prepared by statutory bodies in the design of reliable, safe and efficient electrical power distribution, lightning protection, vertical transportation, lighting and fire fighting systems in buildings.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Be able to plan efficient, safe and high quality distribution systems for domestic, commercial and industrial buildings. b. Be proficient to assess the suitability of different vertical transportation systems and fire fighting systems for a building. c. Be able to design and evaluate the effectiveness of lightning protection systems. d. Be able to integrate the lighting requirements and operating characteristics of light sources to the design of interior lighting and exterior lighting. e. Be able to search for information in solving technical problems.
Subject Synopsis/ Indicative Syllabus	1. ***Power distribution in buildings*:** System planning. Incoming supply arrangement for domestic, commercial and industrial installations. Economics of HV/LV distributions. Tariffs, maximum demand, load factors and diversity. Earthing systems. Applications of standby generator sets and uninterruptible power supplies. 2. ***Requirements for safe design*:** Overview of Supply Rules and Regulations. Electric shock, overcurrent and earth fault protection. Fuse, MCB, MCCB, ACB design and selection criteria. Co-ordination of protection systems. Cable and wiring systems design. 3. ***Interference and power quality*:** Installation requirements, grouping, interference, noise suppression and power supply in communication systems. Electromagnetic compatibility. Harmonics and voltage dips issues. 4. ***Lightning protection systems*:** Lightning phenomena. Estimation of exposure risk. Requirements for system components. Standards for protection of structures against lightning. 5. ***Vertical transportation systems*:** Lift. Hoist and escalator drives. Safety requirements and drive characteristics. Grade of service and round trip time. 6. ***Lighting*:** Characteristics of light sources. Classification of luminaries. Lighting control. Interior lighting design. Glare index calculation. Color rendering. Utilization of daylight. Exterior lighting design. 7. ***Fire Fighting Systems*:** Outline, regulations, requirements and components of fire fighting systems. Fire sprinkler systems. Heat and smoke detector systems. Fire-fighting gases.

	Case Study: 1. Distribution systems design for typical buildings in Hong Kong 2. Applications of Overcurrent and earth fault protection 3. Co-ordination of various types of protective devices 4. Electrical power quality issues in building services 5. Lightning protection systems design 6. Interior lighting and exterior lighting designs 7. Fire protection for domestic, commercial and industrial buildings
Teaching/Learning Methodology	In lectures and tutorials, materials that emphasize practical problem-solving methods are balanced with materials that emphasize fundamental understanding. Students are expected to take initiative to learn through the process of engagement and participation in lectures and tutorial sessions. Practical designs used in industry, where appropriate, are discussed interactively in class. Mini-Projects are used to enhance students learning experiences and practical applications. They provide students with the opportunity to develop independent design/planning and technical report writing skills pertinent to the field of electrical services in buildings.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Mini-projects	√	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√	√	
2. Class Test/Quiz	25%	√	√	√	√	
3. Mini-project & report	15%	√	√	√	√	√
Total	100%					

The subject outcomes on planning, design, effectiveness evaluation of electrical services in buildings are assessed by means of examination, quizzes and tests. The outcomes on engineering skills, applications, problem solving techniques, as well as technical writing, are evaluated by mini-project and reports.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Mini-project discussion/report	20 Hrs.
▪ Self-study	41 Hrs.
Total student study effort	100 Hrs.

Reading List and References

Textbooks and Reference books:

1. R. Barrie, Design of Electrical Services for Buildings, Spon Press, 4th Edition, 2005
2. G. Stokes, Handbook of Electrical Installation Practice, Blackwell Scientific Publication, 4th Ed., 2003
3. G.C. Barney, Elevator Traffic Handbook: Theory and Practice, Spon Press, 2003
4. J.R. Coaton, Lamps and Lighting, Wiley, 1997
5. F. Hall, Building Services Handbook, Routledge , 7th Edition, 2013
6. D.C. Pritchard, Lighting, Longman, 6th Edition 1999

Subject Description Form

Subject Code	EE3010A
Subject Title	Summer Practical Training
Credit Value	3 training credits (not counted towards GPA)
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To give the students an exposure to the industrial/engineering working environments before they complete their formal education. 2. To explore and extend their understanding of engineering study in a broader perspective. 3. To enrich students' all-round and/or global learning experience.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Develop and deliver a learning portfolio for presenting learning experiences and outcomes. b. Demonstrate the awareness of the practical contexts in engineering. c. Appreciate the work of others in an industrial/engineering working. d. Demonstrate good working practices to show a developing maturity and sense of responsibility.
Subject Synopsis/ Indicative Syllabus	**INDICATIVE CONTENT** In order to ensure that students have useful experience, the summer practical training must be suitably chosen and properly organized. Students are expected to carry out a minimum of 6 weeks (3 credits) industrial training with at least 2 weeks (1 credit) of valid WIE activities as recognized by the University. Students are required to indicate the expected training experiences prior to the commencement of their placement, as well as to submit a learning portfolio to report on the learning outcomes and achievements. Accordingly, the following learning support activities will be coordinated. **(I) Orientation** Students should start their preparatory work by the commencement of the second semester of their third-year of study. An orientation will be provided for the following: ◆ Basic skills in undertaking practical training ◆ Planning and scheduling for successful completion of assessment instruments ◆ Information on searching national/international work-base employment, attachments etc. Students are required to indicate the expected training experiences prior to the commencement of their placements. **(II) Progress Monitoring** During the practical training, students should maintain a training journal to identify their progress of their training. The journal may include: ◆ **Location**: Summarize where practical training took place and where the work team fits into the overall host organization.

	◆ **Responsibilities**: Describe the actual responsibilities. Explain the role in terms of the mission of the immediate work team. ◆ **Skills and Knowledge**: Describe the skills and knowledge needed to fulfill the work responsibilities. Describe how the knowledge and skill set evolved during the work experiences. Explain how these are relevant to the academic studies and future goals. ◆ **Outcome**: Describe the placement experiences and major achievements with concrete examples. **(III) Learning Evaluation** After returning from the practical training, students are required to submit a learning portfolio about the work term experience. It provides an opportunity for the student to reflect upon the learning gained at the work site. The framework of the portfolio includes: ◆ A summary or an abstract to highlight major issues included in the portfolio ◆ Detail description of activities carried out during the work term. ◆ A self-reflection: students articulate their thinking about each piece in the portfolio, as well as on the entire portfolio. Through this process of reflection, students draw connections between work experience and university-based learning, construct new knowledge, and become increasingly aware of themselves as learners. ◆ Conclusion: after reflection on their workplace experience, students set goals and directions for future learning, such as formulate the objectives of their Final Year Project. **Examples of valid WIE activity** ◆ Full-time placement in a suitable organization as part of a sandwich programme. ◆ Any other placement in any suitable external organization for a specified period of time. ◆ Relevant placement as student helpers in PolyU administrative departments and the Industrial Centre. ◆ Assisting in PolyU activities that have an external collaboration or service component such as, Innovation and Technology Fund projects, RAPRODS projects, IGARD projects, high-level consultancy projects, collaborative research projects that were undertaken with external organizations, jobs undertaken by the Industrial Centre as a service for an external organization. ◆ Placement within the IAESTE (International Association for the Exchange of Students for Technical Experience) Programme in which the student is attached to a workplace abroad during the training. The student works on his final-year degree project which involves an industrial partner or external client. The student need not be placed in the company but make frequent visits to ensure that the project will meet the specifications required by the company/client.
Teaching/Learning Methodology	Through on-the-job work placements, students learn to connect classroom theory with practical workplace applications, prepare themselves for the realities of workplaces and develop their generic skills in a real working setting. In addition to the orientation, students consult with teaching staff on a one-to-one basis.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Industrial placement	√	√	√	√	√

<table>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td colspan="2">
<table>
<tr><td>Specific assessment methods/tasks</td><td>% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr>
<tr><td></td><td></td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>1. Learning Portfolio</td><td>80%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Placement Questionnaire</td><td>20%</td><td></td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="5"></td></tr>
</table>
The outcomes on this subject are assessed by means of student learning portfolios as well as questionnaire to industrial supervisors.
</td></tr>
<tr><td rowspan="5">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>N/A</td><td></td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Industrial Placement</td><td>6 weeks</td></tr>
<tr><td>Total student study effort</td><td>6 weeks</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Nil</td></tr>
</table>

Subject Description Form

Subject Code	EE4002A
Subject Title	Digital Control and Signal Processing
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3005A / EE3051
Objectives	1. To introduce the fundamentals and design techniques in digital control, filtering and signal processing. The analysis and design of these digital systems will be described with the aid of practical examples and CAD packages.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Analyse the stability, transient response and steady-state response of sampled-data systems. b. Design digital controllers for sampled-data systems. c. Analyse discrete-time signals and extract features using different digital signal processing techniques. d. Design a range of FIR and IIR filters. e. Write technical reports and present the findings.
Subject Synopsis/ Indicative Syllabus	1. ***Stability and transient analysis*:** Sampling and z-transform, Sampled-data systems, Stability of closed-loop systems, Transient and steady state responses. 2. ***Digital control design*:** Translation of analogue design to digital design, Designs based on frequency response methods, Analytical design method. 3. ***Design in state space*:** Controllability, Observability, Pole placement, State observer, Output feedback, Servo problem. 4. ***Digital filters*:** Forms of realization, Design of nonrecursive and recursive filters, Finite word length effect. 5. ***Spectrum analysis*:** DFT, FFT, Power spectrum, Windowing. Computation of convolution and correlation, Estimation of signal in noise. **Laboratory Experiment:** Digital controllers Digital signal analysis and filter design
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiments are designed to supplement the lecturing materials. The students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Experiments	√	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes	The outcomes on analysis and design are assessed by the usual means of examination and tests whilst those on technical reporting and presentation are evaluated by the experiments and reports.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√	√	
2. Class tests	30%	√	√	√	√	
3. Laboratory reports	10%	√	√	√	√	√
Total	100%					

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	49 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. G.F. Franklin, J.D. Powell and M.L. Workman, Digital Control of Dynamic Systems, 3rd Edition, Addison-Wesley, 1997
2. B.C. Kuo, Digital Control Systems, 2nd Edition, Oxford University Press, 1995
3. K. Ogata, Discrete-time Control Systems, 2nd Edition, Prentice Hall, 1995
4. E. Ifeachor and B. Jervis, Digital Signal Processing: A Practical Approach, 2nd Edition, Addison-Wesley, 2002
5. R. Kuc, Introduction to Digital Signal Processing, McGraw Hill, 1988
6. J. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1989

Subject Description Form

Subject Code	EE4003A
Subject Title	Electrical Machines
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3002A / EE3021
Objectives	1. After completing an elementary subject on electromechanical energy conversion, the students are exposed to the more challenging topics such as electrical machine design, transient and unbalanced operations of electrical machines in this course. 2. This course is designed to ensure the students developing an in-depth understanding of various drive systems in the local industry. 3. To give the knowledge various electrical machines such as AC, DC and power electronic driven.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: 1. Have acquired a good understanding of the basic design methods of electric machines. 2. Have had experience in synchronous machines including load characteristics, oscillations equations, and displacement stability. 3. Be able to analyse the unbalanced and dynamic operation, condition monitoring and temperature-rise for the single and 3-phase induction machines. 4. Be able to understand the drives for induction machines and their harmonics analysis for drives. Be aware of various switched-mode driven machines. 5. Be capable to understand the control method for induction machines including closed loop and vector control.
Subject Synopsis/ Indicative Syllabus	1. ***Winding parameters and transformation*****:** Inductance parameters. Winding Transformation. Circuit equations, conversion process, torque, equation of motion. 2. ***Appreciation of machine design*****:** Appreciation of the economic and basic technological factors. Winding design. 3. ***Synchronous machines*****:** Load characteristics of isolated generator. Linearized equations of small oscillations. Natural frequency. Transient and sub-transient reactance, field transient. 4. ***Induction machines*****:** Performance analysis of single- and three-phase induction machines. Unbalanced operation. Dynamic Operation. Temperature-rise tests. Condition monitoring. 5. ***Drives for induction machines*****:** Induction motor drives fed from stepped wave/PWM inverters. Harmonics analysis for drives. 6. ***Control of machines*****:** Open loop and closed loop control. Concept of vector control, torque control. 7. ***Switched mode driven machines*****:** Power electronics interfacing to machines, switched reluctance machines, DC brushless machines. **Laboratory/Mini-project Experiments:** The students are required to team up to work on laboratory session or mini-project. The mini-project is problem-based learning type and they are required to research for information, and do the design and analysis on the topics selected.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on analysis, control, design and practical applications are given through mini-projects, in which the students are expected to solve control and design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking. The mini-projects are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	√
Tutorials	√				
Mini-projects	√	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√		√		
2. Class Test	24%	√		√		
3. Mini-project & report	16%	√	√	√	√	√
Total	100%					

It is a subject of the specific topics of electrical machines. The outcomes on concepts, design and applications are assessed by the usual means of examination and test whilst those on analytical skills, problem-solving techniques and practical considerations of electrical machine control and design, as well as technical reporting and teamwork, are evaluated by mini-project and the reports.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	33 Hrs.
▪ Laboratory/Mini-project	12 Hrs.
Other student study effort:	
▪ Mini-project/report	12 Hrs.
▪ Self-study	45 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. G.K. Dubey, Power Semiconductor Controlled Drives, Prentice Hall, 1989
2. B.K. Bose, Power Electronics and AC Drives, Prentice-Hall, 2002
3. P. Vas, Vector control of AC machines, Clarendon Press: Oxford University Press, 1990
4. D. Hanselman, Brushless Permanent Magnet Motor Design, The Writers' Collective, 2003
5. R. Krishnan, Switched Reluctance Motors Drives: Modeling, Simulation, Analysis, Design, and Applications, CRC Press, 2001.

Subject Description Form

Subject Code	EE4004A
Subject Title	Power Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: Power Transmission and Distribution (EE3004A)
Objectives	1. To provide students with a sound knowledge of modern power systems that is essential for the understanding of the operation and control of power systems. 2. To provide a continuation of study of power systems in level 3 subject EE3004A "Power Transmission and Distribution" and lead to more advanced topics of power systems study in final year electives.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired in-depth understanding of power system analysis, stability and operation. b. Have acquired skills in identification, formulation and solution of power system analysis, operation and control problems. c. Have acquired ability to evaluate the design and operational performance of basic power systems. d. Have acquired skills in presentation and interpretation of experimental results and communication with others in a team environment.
Subject Synopsis/ Indicative Syllabus	1. ***Power flow analysis*:** Load flow concepts and formulation. Solution methods, including Gauss-Seidal, Newton-Raphson and Fast Decoupled Methods. Applications of load flow study to system operation. 2. ***Economic operation*:** Generation costs. Equal incremental cost. B coefficients. Penalty factor. Multi-area coordination. Unit commitment. AGC and coordination. 3. ***Power system control*:** Generator control systems. Speed governor systems. Load sharing. Load frequency control. Interconnected area system control. Voltage control loop. Automatic voltage regulator. AVR models and response. 4. ***Power system stability*:** Steady state and transient stability. Equal area criterion. Time domain solution of swing curves. Multi-machine stability. Stability improvement. Excitation and governor control effects. Dynamic equivalents. 5. ***Power system operation*:** Power system control functions. Security concepts. Scheduling and coordination. Supervisory control and data acquisition. Computer control, communication and monitoring systems. Man-machine interface. Load forecasting. Energy management systems. **Laboratory Experiment:** Power system load flow and security operation simulation. Transient stability assessment of power system.

Teaching/Learning Methodology	Lectures are the primary means of conveying the basic concepts and theories. Experiences on system analysis, design and practical applications are given through experiments and mini-projects, in which students are required to solve the power system planning, operation and control problems with practical constraints and to attain pragmatic solutions with critical and analytical thinking. Experiments and mini-projects are designed to supplement the lecturing materials and encourage students to take extra readings and practice specialty software tools for power system planning, operation and control.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Mini-projects	√	√	√	√
Experiments			√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Class tests	20%	√	√	√	
3. Lab performance and report	10%			√	√
4. Mini-project and report	10%	√	√	√	√
Total	100%				

This comprises an examination, class tests, written assignment in the form of laboratory report and mini-project report. Examination and tests assess the technical competence of students in power system analysis methods and methods of power system operation and control whilst written reports assess the students' ability to apply the theories learned in class to practical experiments, to interpret the experimental results obtained and to communicate in written form.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	36 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation / report	12 Hrs.
	▪ Mini-project / self-study	46 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Reference Books:

1. J. Grainger, W. D. Stevenson, Power System Analysis, McGraw-Hill, 1994
2. B. M. Weedy, B. J. Cory, N. Jenkins, J. B. Ekanayake, G. Strbac, Electric Power Systems, 5th Edition, Wiley, 2012
3. H. Saadat, Power System Analysis, 3nd Edition, McGraw Hill, 2010
4. A. J. Wood, B. F. Wollenberg, G. B. Sheble, Power Generation, Operation and Control, 3rd Edition, Wiley, 2014
5. A. Gomez-Exposito, A. J. Conejo, C. Canizares, Electric Energy Systems: Analysis and Operation , CRC Press, 2009

Subject Description Form

Subject Code	EE4006A
Subject Title	Individual Project
Credit Value	9
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide an opportunity for students: 1. to apply specialized professional engineering knowledge independently in the creative design, implementation, monitoring and evaluation of an engineering project, and 2. to achieve this goal, students are required to identify key engineering problems, to solve them and to communicate the findings in oral and written report format.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able: a. To apply specialized knowledge independently. b. To identify key engineering problems, to solve them and to communicate what is achieved orally and in a written report. c. To develop a project which is creative, rich in intellectual content and sufficiently challenging. d. To monitor the progress of project from concept to final implementation and testing, through problem definition and the selection of alternative solutions. e. To synthesize and apply their knowledge and analytical skills gained in various engineering domains. f. To build self confidence, demonstrate independence, and develop professionalism by successfully completing the project in a competent manner.
Subject Synopsis/ Indicative Syllabus	**Choice of Project** Projects are expected to be proposed by the students. They may also be proposed by academic members of staff, or jointly by student and staff. Industrial experience and staff research and consultancy activities are fertile ground for ideas. Project proposals must include an objective, describe the method of approach, describe any innovative features, and provide an estimate of cost. The suitability of a proposal may be judged by factors such as its intellectual level, relevance to the aims of the Programme, practicality in terms of time, funding and availability of resources. **Project Plan** At the beginning of the project, students are required to submit a clear project plan (formal project proposal). The plan should not be too long but should cover such matters as: – problem statement – brief literature research – initial problem identification – preliminary suggestion on methodology – division outline of hardware and software – preliminary time schedule – cost estimate

	Interim Report At the middle of the project period, each student has to submit an Interim Report to summarise their progress to date. This gives the supervisor a more formal opportunity than at discussions to indicate his assessment of student progress and to eliminate discrepancies if necessary. Problem cases are brought to the notice of the subject coordinator by supervisors. **Final Project Report** A good project schedule includes adequate time for preparing a report of the appropriate standard. The final report should be submitted, before the examination period, and will be given to the Assessment Panel (see Assessment below) for understanding of the student's work and for assessment purposed. To ensure that the project reports are prepared properly and of appropriate standard, students must first submit a draft of the report to the supervisor for comments before final submission. At the end of the project period, each project is assessed by an Assessment Panel of three members, including a Chairman, an independent examiner and the project Supervisor. The Chairman and the independent examiner should have sufficient knowledge of the subject area, so as to form an independent opinion of the technical merit of the project and to independently assess achievements. The Project Supervisor will provide information on student's progress, originality, initiative and ability to work independently. The Supervisor will also be in a position to contribute views on the student's technical achievement. All members of the Assessment Panel will read the project report before the assessment meeting. The Assessment Panel will reach their decision after: – listening to the student's presentation (can be a video clip), – examining him orally on his work, and – seeing a demonstration of the project's outcome (can be a video clip). **Assessment** In assessing the project, the panel will typically consider the following aspects: a. Intellectual achievement; b. Depth of understanding of the topic and the relevant allied topics; c. Quantity and quality of work done, including design and construction of equipment, experimentation, mathematical models, program writing, verification; d. Presentation including the written report, seminar presentation and response to questions. The Chairman will ensure that all aspects of the study are thoroughly discussed by the Panel before arriving at a consensus on an overall grade to be awarded to the project. In arriving at their decision, the Panel will bear in mind their experiences in respect of the achievements in other projects in the Department in the current and previous years. If no consensus arises as to the overall grade to be awarded to the project, each panel member (i.e. the Chairman, the project supervisor and the independent examiner) will independently award grades to the project on an assessment form with written justification for their grades. A grade from the Assessment Panel will then be derived by averaging (with the same weight) the conversion marks for the grades given by the three academics constituting the Assessment Panel.

Method of Assessment: **100% continuous assessment**

(I) Formal Project Proposal

Students are required to submit a formal project proposal when the project is started. **This will contribute to 5% of the final grade.**

The contents of the proposal should include:

A. Aims of the project
B. Proposed specifications of the product (no matter it is a hardware or software project)
C. Summary of the literature search done up-to-date.
D. Proposed approach/methodology to be used
E. Some brief descriptions on the theory of the approach/methodology
F. Time table / schedule of your work of the entire project

Assessment Criteria

1. *Literature research.*
2. *Problem definition.*
3. *Writing quality.*

(II) The Interim Progress Report

Students are also required to submit an interim report at about the middle of project duration. **This will contribute to 15% of the final grade.**

The contents of the progress report should include:

A. Aims of the project (especially any change from the original aims).
B. Brief outline of the theory.
C. Work that has been carried out up to the date.
D. The system design and the block diagram of the system, plus some brief descriptions on the theory.
E. Difficulties encountered and the measures taken to solve them.
F. Proposed time table / schedule for the rest of the work up to the end of the project.
G. Difficulties expected in the coming period.

Assessment Criteria

1. *Method: innovation and feasibility.*
2. *Design / Implementation / Results.*
3. *Project management.*
4. *Writing quality.*

(III) The Final Report

The final project report should contain all the work carried out by the student in the project. The students are advised to form a framework for the report first, then proceed to the formation of the titles of the chapters. The titles and structure of the sections within each chapter are then decided. Continuing the process, each section may be further expanded into appropriate sub-sections, divisions and sub-divisions etc., until a complete framework is formed. ***The final report will contribute to 50% of the final grade.***

The content of the final report includes:

A. Aims of the project (especially any change from the original aims).
B. The motivation behind the project and a brief outline of the project work.
C. A summary of work done or developed in the project (not work done by others).
D. The system design and the block diagram of the system, plus some brief descriptions on the theory.
E. Testing and simulation results.
F. Comments on results obtained.
G. Difficulties encountered and the measures taken to solve them.
H. The achievement of the project, the conclusions from the work and suggestions for further work.
I. Materials which are closely related to the contents of the report, and which are themselves self-contained, may be included in the report as appendixes.
J. A list of the references referred to the source of information in the report. This is compulsory.

Assessment Criteria

1. *Literature research*
2. *Technical concept/knowledge/application, intellectual level*
3. *Problem identification, initiative and progress*
4. *Organization and writing quality*

(IV) The Presentation and Demonstration

The student should keep the presentation concise and interesting through good use of visual aids and multimedia, logic flow of ideas, and appropriate control of the pace. Show good mastering of topics and avoid undue pauses. The student should be able to elaborate on technical details in answering questions. Good pronunciation and intonation are desirable. Be courteous during the presentation.

Hardware must be neatly built and laid out and there is good engineering sense in hardware implementation. Circuits /software should function properly, and experiments should be able to support fulfillment of project objectives.

The student should show good mastering of topics during the question session of the presentation by providing satisfactory answers to questions.

The presentation and demonstration will contribute to 30% of the final grade.

Assessment Criteria

1. *Technical concept/knowledge/application*
2. *Intellectual level, response to questions*
3. *Demonstration and engineering accomplishment*
4. *Presentation skill and language competence.*

Note 1: Each student has to submit/carry out all the above four components before he/she is considered to complete the FYP.

Note 2: The final grade for the FYP will be calculated by taking the weighted average of the grades from the above four components.

Teaching/Learning Methodology

As the nature of the subject implies, there will not be many formal lectures in the subject, other than a few of Hrs. of briefings on general information, some official procedures in administration of the project and some techniques on information/components searching. Students learn the technical contents by a substantial number of individual discussions with their project supervisors and a large number of Hrs. of self-learning. The planning of the project will be carried under the direction of the supervisor. Through the execution of the project plan with guidance from the supervisor, the student should be able to achieve the learning outcomes.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Discussion with the project Supervisor	√		√			
Wiring of the project proposal	√	√	√		√	
Writing of the interim report	√	√	√	√	√	
Writing of the final report	√	√	√	√	√	√
Presentation and demonstration		√				√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Formal project proposal	5%		√	√			
2. Interim progress report	15%		√	√	√		
3. Final report	50%	√	√	√	√	√	√
4. Presentation and demonstration	30%	√	√				√
Total	100%						

Assessment criteria for each of the above assessment methods are as listed in one of above sections.

Student Study Effort Expected

Class contact:	
▪ Briefings	3Hrs.
▪ Individual discussions with supervisor	17 Hrs.
Other student study effort:	
▪ Information search, self study, execution of the project, report writing, preparation of presentation	190 Hrs.
Total student study effort	210 Hrs.

Reading List and References

Nil

Subject Description Form

Subject Code	EE4007A
Subject Title	Advanced Power Electronics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3003A / EE3031
Objectives	1. To provide the students with the knowledge of advanced power electronic conversion. 2. To ensure the students having an in-depth understanding of the design and control of various power electronics converters. 3. To give the knowledge of AC switched-mode conversion. 4. To provide a concept of impact of power electronics on power quality.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired a good understanding of basic switched-mode DC/DC topologies, operation, performance and modelling. b. Have acquired a basic understanding of resonant converter and its method of loss reduction. c. Be able to apply the switched mode techniques to inverters. d. Be able to perform study on power electronics circuit simulation. e. Be aware of the impact of electromagnetic interference (EMI) and the reduction of EMI using power electronics techniques. f. Be able to present results of study in the form of simulation, design equation and basic model and work independently and in teams when conducting laboratory investigations and power electronics circuit design.
Subject Synopsis/ Indicative Syllabus	1. ***Pulse-Width-Modulated DC/DC converters*:** Basic topologies and higher order converters, transformer-isolated topologies, snubbers, discontinuous conduction modes of operation, ripple analysis. 2. ***Resonant-Mode DC/DC converters*:** Classification, zero-current switching and zero-voltage switching techniques, quasi-resonant converters, resonant transition converters. 3. **Control and *CAD for power electronics:*** Small-signal model and control, analog and digital circuit simulation for power electronics, simulation techniques. 4. ***Switched-Mode inverters*:** Single-phase and three-phase voltage-source inverters, AC-AC conversion, Resonant inverters. 5. ***Electromagnetic interference*:** Generation of EMI, power factor, switched-mode EMI filter, International Standards, Reduction of EMI. **Laboratory Experiments:** Switched-mode power converters with parasitic components and snubbers. Resonant converters Mixed-mode circuit simulation

Teaching/Learning Methodology	Lectures and tutorials are effective teaching methods: 1. To provide an overview or outline of recent development of power electronics. 2. To introduce new concepts and knowledge in advantage power electronic converter design, soft switching technique, control method and electromagnetic interference (EMI) aspect. 3. To explain difficult ideas and concepts. 4. To provide students feedback in relation to their learning. 5. To encourage students responsibility for their learning by extra reference books reading and computer-based circuit simulations. Laboratory works is an essential ingredient of this subject: 1. To supplement the lecturing materials. 2. To provide power converter design experience for the students. 3. To provide deep understanding of various power converter design aspects. 4. To enable students to organise principle and challenge ideas.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Lectures	√	√	√		√	
Tutorials	√	√	√		√	
Experiments	√	√	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Examination	60%	√	√	√		√	
2. Class tests	20%	√	√	√		√	
3. Laboratory reports & assignments	20%	√	√	√	√	√	√
Total	100%						

The understanding on theoretical principle and practical considerations, analytical skills and problem solving technique will be evaluated. Examination, class tests, laboratory sections and reports are an integrated approach to validly assess students' performance with respect to the intended subject learning outcomes.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	46 Hrs.
	Total student study effort	100 Hrs.

Reading List and References	**Textbooks:** 1. Ned. Mohan, Tore M. Undeland, William P. Robins, Power Electronics: Converters, Applications & Design, 3rd Edition, Wiley, 2003 2. K.W.E.Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002 **Reference books:** 1. N. Mohan, Power Electronics: A First Course, John Wiley & Sons, 2012. 2. A.M. Trzynadlowski, Introduction bto Modern Power Electronics, John Wiley & Sons, 2010.

Subject Description Form

Subject Code	EE4008A
Subject Title	Applied Digital Control
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3051
Objectives	1. To facilitate a working knowledge of principles of reduced-order modelling, digital control algorithms, system identification, and adaptive control. 2. To enable students designing industrial control systems for applications in different engineering areas.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the concepts of reduced-order modelling, deadbeat control algorithm, system identification and adaptive control. b. Understand the notions of offline and online system identification. c. Design conventional and adaptive controllers based on user specifications. d. Use CAD package for design and simulation. e. Effectively communicate experimental results in written and oral reports.
Subject Synopsis/ Indicative Syllabus	1. ***Process control*:** Process modelling, Performance Specification, Industrial controller, Ziegler & Nichols tuning, Advanced process control, Reduced order modelling. 2. ***Direct digital control algorithms*:** Modified z-transform, PID algorithm, Cascade control, Finite-settling time control, Dead-time compensation, Internal model control. 3. ***Computer control methods*:** Hierarchical control configurations, Distributed approach, Description of representative systems, Programmable logic controllers (PLC). 4. ***System identification*:** Discrete-time and continuous-time systems, identification by correlation, principle of least squares, Recursive least squares. 5. ***Self-tuning control*:** Introduction to adaptive control, Self-tuning controller. **Laboratory Experiment:** There will be three laboratory experiments on the topics of reduced order modeling, digital control design and system identification by least-squares technique. **Case study:** Individual assignment related to above methods. Students will write a report and present their finding to the class.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiments and case study are designed to supplement the lecturing materials. The students are encouraged to take extra readings and to look for relevant information. Teaching/Learning Methodology — Outcomes: a / b / c / d / e Lectures: √ / √ / √ / / Tutorials: √ / √ / √ / / Experiments and case study: / / √ / √ / √
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks — % weighting — Intended subject learning outcomes to be assessed (a / b / c / d / e) 1. Examination — 60% — √ / √ / √ / / 2. Class test — 20% — √ / √ / √ / / 3. Laboratory and case study reports — 20% — / / √ / √ / √ Total — 100% The outcomes on concepts, analysis and design are assessed by the usual means of examination and tests whilst those on technical reporting and presentation are evaluated by the case study and experiments.
Student Study Effort Expected	Class contact: — ▪ Lecture/Tutorial — 33 Hrs. ▪ Laboratory — 6 Hrs. Other student study effort: — ▪ Laboratory preparation/report — 12 Hrs. ▪ Case study preparation/report — 14 Hrs. ▪ Self-study — 35 Hrs. Total student study effort — 100 Hrs.
Reading List and References	**Reference books:** 1. D.E. Seborg, Process Dynamics and Control, Hoboken, N.J.: Wiley, 2011 2. C.A. Smith, Automated Continuous Process Control, New York, John Wiley & Soncs, 2002 3. J.R. Leigh, Applied Digital Control: Theory, Design, and Implementation, New York, Prentice-Hall, 1992 4. P.E. Wellstead and W. Zarrop, Self-tuning Systems: Control and Signal Processing, Cichester, England: New York, Wiley, 1991 5. R. Isermann, Adaptive Control Systems, New York, Prentice Hall, 1992

Subject Description Form

Subject Code	EE4009A
Subject Title	Electric Traction and Drives
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3003A and EE4003A / EE3031 and EE4021
Objectives	1. To enable students to develop a sound understanding of operation of modern electrified railway systems. 2. To provide an appreciation of the design and application of electric drives and operation principles of railway signalling. 3. To enable students to understand the implications of design of traction and signalling systems on railway operations and traffic control. 4. To introduce to students the vital problems of electromagnetic interference and hardware design of enhanced electromagnetic compatibility. 5. To enhance students' awareness on the use of computer simulation in railway planning and operation, as well as the future technologies in railway systems.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Outline the operation principles of the sub-systems and their components in an electrified railway system and compare their advantages and limitations with reference to practical railway lines. b. Elaborate on the impacts of the performance and properties of the sub-systems to the overall system safety and reliability. c. Engage in self-learning on latest technologies on railway systems at this advanced level of study.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction*:** The trends of modernisation of railway systems. Technical and design aspects of railway electrification. Fundamentals of design and construction of rolling stock. Power supply systems: rectifier substations, distance and load sharing between substations, reduction of supply unbalance in single-phase traction. 2. ***D.C. drives*:** Single-phase dual-converter drives; Three-phase full-converter drives. Chopper drives: line filter design, chopping frequency selection; principles of powering and regenerative braking. Multiphase chopper, automatic variable field chopper. Case studies on local traction industry. 3. ***A.C. drives*:** Performance characteristics of induction motors: VVVF control, PWM control: mode transition, pulse dropping; CVVF control; Vector Control. 4. ***Railway signalling*:** Basic functions. Fixed and moving block signalling schemes. Route and cab signalling. Principles of headway and block length. Factors affecting signal layout. Track circuits: principles, operation and function. Interlocking. Traffic control. Automatic train control. 5. ***Train movement and simulation*:** Train operation modes. Factors determining train movement: resistance, speed restriction, gradient and curvature of tracks. Movement control: Precise stopping at stations and inter-station runs. Computer simulation: time-based and event-based models, simulation levels, applications. 6. ***Electromagnetic compatibility*:** Track circuit interference. Substation harmonics. Hardware designs with enhanced electromagnetic compatibility.

	7. ***Future trends of transit systems*:** Guided vehicles under computer control. Magnetic levitation and suspension techniques. Advanced automatic train control of registers, counters and memory units. Design of asynchronous circuits, flow tables, stable and unstable states. **Laboratory Experiments:** Traction power load flow simulation **Case Study:** HK MTR systems
Teaching/Learning Methodology	Video clips together with computer animations are used to supplement conventional lectures. Case studies will be used extensively to highlight the practicality of the subject materials being covered. Practitioners are also invited to have experience sharing sessions with the class. A group project is to be carried out to demonstrate and integrate the knowledge learned. Teaching/Learning Methodology: Outcomes a / b / c Lectures: √ / √ / Tutorials: √ / / √ Experiments: / / √ Mini-Projects: √ / √ / √
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks; % weighting; Intended subject learning outcomes to be assessed (a / b / c) 1. Mini-project (group project): 20%: / / √ 2. Tests: 20%: √ / √ / 3. Examination: 60%: √ / √ / Total: 100% This is an advanced and yet appreciation subject for students who are interested in railway engineering. The subject encompasses all the important elements in a typical railway and a number of case studies are used to supplement the analytical discussions. The outcomes are assessed through a mini-project (which aims to integrate the various aspects learnt), tests and written examinations.
Student Study Effort Expected	Class contact:
	▪ Lecture/Tutorial: 33 Hrs.
	▪ Seminar: 6 Hrs.
	Other student study effort:
	▪ Assignment and self-studies: 65 Hrs.
	Total student study effort: 104 Hrs.

Reading List and References	**Textbooks:** 1. M.H. Rashid, Power Electronics: Circuits, Devices and Applications, 3rd Edition, Prentice Hall 2004 2. Managing railway operations & maintenance: best practices from KCRC / edited by Robin Hirsch ; technical co-editors, Felix Schmid, Michael Hamlyn. A & N Harris ; Birmingham : University of Birmingham Press, 2007 **Reference books/journals:** 1. J. Pachl, Railway Operation and Control. VTD Rail Publishing, Mountlake Terrace (USA) 2004. 2. Bonnett, Clifford F. Practical railway engineering, London : Imperial College Press, 2005. 3. O.S. Lock, Railway Signalling, 3rd Edition, A & C Black, 1993 4. Selected papers from IEE Proceedings – Electric Power Applications

Subject Description Form

Subject Code	EE4010A
Subject Title	Fibre Optics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3008A or EIE331
Objectives	1. To introduce to students the physical laws that govern the behaviour of fibre-optics components. 2. To give students an understanding of the principles of fibre-optic sensing and optical fibre communications. 3. To equip students with the knowledge to design simple fibre-optics sensor systems.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the attenuation and dispersion of optical fibres and their physical meaning and phenomena behind mathematical equations and computed results. b. Understand the most appropriate passive and active fibre-optic components for fibre-optic sensor systems and communication links. c. Use the appropriate fibre-optic equipment/instrument to perform optical power and spectrum measurements and have had hands-on experience in the use fusion splicer to make low-loss fibre joints. d. Apply fibre optic sensors for temperature and strain measurement in pratical engineering applications. e. Appreciate recent developments and the importance of fibre optics technologies for communications and fibre-optic sensors.
Subject Synopsis/ Indicative Syllabus	1. ***Optical fibres*****:** Propagation theory. Wave-guiding. Fibre types. Optical loss. Fibre dispersion. Mechanical properties. Special fibres. Fibre-optic cables and cable design examples. 2. ***Fibre optic connections and test methods*****:** Coupling losses. Splices. Connectors. Coupling devices and techniques. Distribution systems. Devices for wavelength-division-multiplexing. Power measurements. Fibre loss and dispersion measurements. Optical time-domain reflectometry. Reliability. 3. ***Optical fibre sensors*****:** Extrinsic, evanescent, intrinsic sensors. Optical components for fibre sensor systems. Power transmission, actuation and safety aspects of design. Applications. 4. ***Optical sources*****:** Wavelength considerations. Emitter materials. Light-emitting-diodes. Laser diodes. Emitter lifetime. Modulation of LED and laser diodes. Drive circuits. Formats for digital modulation. Direct and coherent transmission systems. Noise and error mechanisms. Receiver sensitivity and circuit design. 5. ***Optical detectors*****:** Photo-detectors: noise, response time, materials. PIN and avalanche photodiodes. Receivers. 6. ***Fibre optic systems design*****:** Fibre optic communication system design considerations. Attenuation and dispersion budgets. Digital system design. 7. ***Applications of fibre optics in electrical engineering*****:** Optical groundwire. Enhancing power system telecommunications and control with overhead and underground fibre optic cables. Fibre optic sensors for measuring voltage, current, temperature. Location of cable faults by using optical fibre sensing. **Laboratory Experiments/Demonstrations:** • Insertion loss measurement of optical fibres using optical power meters and optical spectrum analyzers • Optical spectrum analyzer for spectral measurements of light sources • Fibre Bragg grating sensors
Teaching/Learning Methodology	Lectures, quizzes, tests, laboratory experiments, mini-projects, and examination.

Teaching/Learning Methodology	Outcomes									
	a	b	c	d	e	f	g	h	i	j
Lectures	√	√	√	√	√			√	√	√
Tutorials			√		√					√
Experiments/Demonstration						√	√	√		√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed									
		a	b	c	d	e	f	g	h	i	j
1. Quizzes	2%	√	√	√		√				√	
2. Tests	28%	√	√	√	√	√	√		√		√
3. Laboratory experiment report	5%			√	√	√	√	√	√		√
4. Mini-projects	5%	√	√		√	√	√	√		√	
5. Examination	60%		√	√	√				√		√
Total	100%										

This subject introduces the physical laws that govern the behaviour of optical fibres, semiconductor light sources and detectors, and how to employ them to design simple fibre-optics sensor systems. The outcomes are assessed by quizzes, tests, mini-projects, laboratory experiments and examination.

Student Study Effort Expected		
	Class contact:	39 Hrs.
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Mini-projects	20 Hrs.
	▪ Self-study	38 hrs.
	Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. J.M. Senior, Optical Fiber Communications-Principles and Practice, 3nd Edition, Prentice Hall, 2008
2. J.C. Palais, Fiber Optic Communications, 5th Edition, Prentice Hall, 2005
3. G. Keiser, Optical Fiber Communications, 3rd Edition, McGraw-Hill, 2000
4. G.P. Agrawal, Fiber-optic Communication Systems, 3rd ed., Wiley, 2002.
5. J. Hecht, Understanding Fiber Optics, 5th edn., Prentice Hall, 2006

Subject Description Form

Subject Code	EE4011A
Subject Title	Industrial Computer Applications
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To introduce the applications of computing techniques in solving industrial problems and the following topics are included: Computer process control; Industrial instrumentation and systems; Image processing; Multimedia concepts.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design and develop digital controllers. b. Understand the use of industrial networks on process data acquisition and control. c. Apply image processing techniques in industrial automation. d. Understand the mobile communication techniques and the Android development applications.
Subject Synopsis/ Indicative Syllabus	1. ***Computer process control*:** Modelling of the computer process control system, practical approaches to digital control implementation, PLC and microcomputer-based control systems. 2. ***Intelligent instrumentation and systems*:** Embedded microcontrollers, industrial process controllers, applications of distributed digital control algorithms, industrial networks and SCADA system. 3. ***Image processing*:** Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation. 4. ***Multimedia concepts and applications*:** Multimedia fundamentals, image compression, video compression, hardware peripherals and software tools. **Mini-project Experiment:** PC based digital controller for temperature control Power failure monitoring using embedded controller Automatic meter reading using computer vision Jelly Bean IDE and the Andriod Devloper Tools (ADT)
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	√
Tutorials	√	√	√	√
Experiment	√	√		

Assessment		
Specific assessment	%	Intended subject learning outcomes to be

Methods in Alignment with Intended Learning Outcomes	methods/tasks	weighting	assessed			
			a	b	c	d
	1. Examination	60%	√	√	√	√
	2. In-class Test (x2)	20%	√	√	√	√
	3. Mini-project Report	10%	√	√		
	4. Mini-project Demo/Presentation	10%	√	√		
	Total	100%				
	One end-of-semester written examination; one mid-semester-test; one end-of-semester test; a mini-project on a small micro-processor based application; and a report/demonstration/presentation to accompany the mini-project.					
Student Study Effort Expected	Class contact:					
	▪ Lecture/Tutorial					36 Hrs.
	▪ Laboratory (mini-project)					6 Hrs.
	Other student study effort:					
	▪ Mini-project report and preparation					12 Hrs.
	▪ Self-study					45 Hrs.
	Total student study effort					99 Hrs.
Reading List and References	**Reference books:** 1. J.A. Rehg and G.J. Sartori, Industrial Electronics, Pearson Prentice Hall, 2006 2. A.V. Deshmukh, Microcontrollers: Theory and Applications, Tata McGraw-Hill, 2006 3. R.C. Gonzalez and R.E. Woods, Digital Image Processing, 3rd Edition, Prentice Hall, 2008 4. T. Vaughan, Multimedia: Making It Work, 7th Edition, McGraw-Hill, 2008					

Subject Description Form

Subject Code	EE4012A
Subject Title	Intelligent Buildings
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3009A /EE321
Objectives	1. To enable students to establish a broad knowledge on the concepts of intelligent buildings. 2. To enable students to understand that intelligence of a building can be achieved by integration and optimization of building structure, services systems, information technology, management and valued-added services. 3. To enable students to understand basic features of an intelligent building and the required services system to support these features. 4. To enable students to understand the operation principle and characteristics of various service systems/technologies of an intelligent buildings; such as the building automation system, intelligent vertical transportation systems, communications, structured cabling and etc. 5. To enable student to understand the impacts these services systems/ technologies on the building and people.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify benefits, impacts and driving forces of intelligent buildings, and its subsystems. b. Describe design philosophy at system level, system configurations, system sub-modules of vertical modern vertical transportation systems and building automation systems, including the out-stations, etc. c. Describe general design concept and principles of communication systems in intelligent building, such as voice communication system, video communication systems, LAN, wireless LAN, mobile phone system, data networks, office automation systems, etc. d. Describe the general principle, concepts and system configurations of structure cabling, including the features, characteristics and applications of different categories of cables. e. Given a technical topic, carry out literature search and present the findings in a technical report.
Subject Synopsis/ Indicative Syllabus	1. ***Intelligent building characteristics*:** Features and benefits of intelligent buildings. The anatomy of intelligent buildings. Environmental aspect. The marketplace and other driving forces behind the emergence of intelligent buildings. (6 Hrs.) 2. ***Building automation systems & controls*:** Philosophy, system configuration, system modules, distributed systems, communication protocol and on-line measurements. Fire protection, security and energy management. Control objectives. Sensors, controllers and actuators. Control system schematics system design. Microprocessor based controllers & digital controls. Examples of sub-systems such as: Digital Addressable Lighting Interface (DALI) (9 Hrs.) 3. ***Modern intelligent vertical transportation systems:*** Sky lobby, double-deck lifts, twin lifts, advanced call registration systems, large scale monitoring systems, applications of artificial intelligence in supervisory control, energy saving measures related to lift systems/escalator systems, other modern vertical transportation systems, such as: gondola systems, materials handling systems, etc. (6 Hrs.) 4. ***Communication system*:** Voice communication systems, local area network, wireless LAN, public address, Digital TV, CCTV, teleconferencing, cellular phone system, radio paging and CABD. SMATV. Data networking. Short- and long-haul networks. Wideband network. Office automations. Public Address/Sound reinforcement systems (10 Hrs.) 5. ***Structured cabling systems*:** Characteristics and benefits. Standards, configurations and physical media. EMI/EMC issues, grounding problems. System design. Different Categories of cables. (6 Hrs.) 6. ***Integrating the technologies and systems*:** The impact of information technology on buildings and people. Shared tenant services. Interaction and integration between building structure, systems, services, management, control and information technology. Application & design software packages. (5 Hrs.) **Case study:** International Financial Centre II, International Commerce Centre, Central Plaza and similar buildings
Teaching/Learning Methodology	Lectures and tutorials are effective teaching methods: 1. To provide an overview or outline of the subject. 2. To introduce new concepts and knowledge to the students. 3. To explain difficult ideas and concepts of the subject. 4. To motivate and stimulate students interest. 5. To provide students feedback in relation to their learning. Mini-project works/Assignments are essential ingredients of this subject: 1. To supplement the lecturing materials. 2. To add real experience for the students. 3. To provide deep understanding of the subject. 4. To enable students to organise principle and challenge ideas.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Mini-project					√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√	√	
2. Class tests	20%		√	√	√	
3. Mini-project/Assignments	20%	√				√
Total	100%					

The understanding on theoretical principle and practical considerations, analytical skills and problem solving technique will be evaluated. Examination, class tests and mini-project report are an integrated approach to validly assess students' performance with respect to the intended subject learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Mini-project/Assignments	20 Hrs.
	▪ Self-study	41 Hrs.
	Total student study effort	100 Hrs.
Reading List and References	**Reference books:** 1. Clements-Croome, Derek, Intelligent Buildings: An introduction, Routledge, 20142. Shengwei Wang, Intellgient Buildings and Building Automation, Spon Press, 2010 3. Jim Sinopoli, Smart Building Systems for Architectures, Owners and Builders, Elsevier, 2010 4. P. Manolescue, Integrating Security into Intelligent Buildings, Cheltenharn, 2003 5. B.L. Capehart, Information Technology for Energy Mangers, Fairmont Press, 2004 6. L. Chow, The Intelligent Building Index: (IBI) manual: version 3.0, Hong Kong: Asian Institute of Intelligent Buildings, 2004 7. B.L. Capehart and L. C. Capehart, "Web based enterprise energy and building automation systems", Fairmont Press ; Boca Raton : CRC Press 2007 8. Robert Shimonski, Network Cabling Illuminated, Jones and Barlett, 2006	

Subject Description Form

Subject Code	EE4013A
Subject Title	Power System Protection
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3004A / EE3041
Objectives	1. To introduce students the modern knowledge of power system protection. 2. To enable students to understand the design philosophy and working principle of different protective schemes, and how they are applied to power systems.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired a good understanding of knowledge, techniques and skills of power system protection. b. Have the ability to apply and adapt applications of mathematics, engineering skills in the analysis, comparison, and interpretation of various power system protection schemes. c. Be able to interpret nameplate data and able to select the most appropriate transducers for various protection schemes. d. Be able to carry out tests and analyse the performance of transducers and protection relays. e. Be able to present technical results in the form of a technical report.
Subject Synopsis/ Indicative Syllabus	1. ***Philosophy of protection*:** General considerations. Components of protection. Structure of protective relays. Trend of protection development. 2. ***Transducers*:** Input sources for protection system. Current and voltage transformers; sources of error; their performance under normal and abnormal conditions. 3. ***Non-unit protection*:** Non-unit protection for distribution networks – overcurrent and directional protection, techniques used to analyze their performances. Non-unit protection for transmission networks – distance relays, distance protection schemes, protection characteristics and impedance seen by distance relays. 4. ***Unit protection*:** Principles of unit protection. High impedance and low impedance differential protection and their applications. Bias differential protection and its application to transformers. 5. ***Digital protection*:** Principles of digital relaying. Digital relay architecture. Recent development of digital relaying techniques. **Laboratory Experiment:** Current Transformer Saturation. Directional Overcurrent Protection. Low Impedance and High Impedance Busbar Protection. Fault Simulation and Simulation of Digital Relay in EHV Transmission Line.

	Case study: 1. Explain how source impedance and fault location affect the performance of protective relays. 2. What do you understand about the terms reliability and stability of protective relays? 3. How protective relays achieve selectivity? Give examples and explain. 4. Explain the meaning of sensitivity of protective relays. How to decide a suitable sensitivity for protective relays? 5. What factors will affect CT accuracy and how to control them? 6. How to choose a suitable CT for protective relays? 7 Describe the voltage measurement methods in different voltage levels in a power network. 8. Pros and cons of using Capacitive Voltage Transformer (CVT). 9. How to achieve discrimination between overcurrent relays installed in radial feed feeders in distribution system? 10. When we grade overcurrent relays of different time / current characteristics, what precautions should we take? Give examples. 11. What are directional relay schemes? Explain how the relays are connected and how they are used. 12. Will directional relays mal-operate? Give one example. 13. What is the effect of load on distance relay operation? 14. What will affect the accuracy of measurement on distance protection relays? 15. Describe the communication methods used for protective relays in a power network. 16. What is the effect of power swing on distance protection relays? 17. How differential protection is applied in feeders, busbars, and transformers? 18. What is the difference between low impedance and high impedance differential protection? How can we achieve through fault stability in both protection systems? 19. How the inrush current on power transformer is formed and what is its effect on transformer protection? 20. Why bias is required in transformer differential protection? What is its effect on the range of windings to be protected? 21. Explain the working principle of harmonic bias used in transformer differential protection. 22. What is restricted earth fault protection and what is unrestricted earth fault protection? Why are they needed? What is the range of winding they can protect comparing to the bias differential protection? 23. Why digital relay is different from conventional protective relays? What additional features a digital relay can offer? 24. Compare the performance of the two basic digital relay algorithms, the sample and derivative algorithm, and the differential equation algorithm. What is the problem when they are applied in a power system? 25. Explain the working principle of the Fourier algorithm in digital relay technology. Why it has better performance than other algorithm? What is its drawback?

Teaching/Learning Methodology

Both the fundamental understanding and practical problem-solving methods would be emphasized in lectures. Students shall take initiative to learn through the process of engagement and participation in lectures. Practical protection schemes used in industry, where appropriate, are discussed interactively in class. In laboratory classes, experiments are planned to let students design and carry-out an experimental strategy, record and critically analyze their results, reach conclusions about the interpretation and performance of power system protective schemes. Students would have to make preparations such as information gathering before laboratory classes. Mini-Projects are used to enhance students learning experiences and practical applications. They provide students with the opportunity to develop independent design/planning and technical report writing skills pertinent to the field of power system protection.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√		
Experiments	√			√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√		
2. Class Test/Quiz	20%	√	√	√		
3. Laboratory performance & reports	10%	√	√		√	√
4. Mini-project & report	10%	√	√	√		√
Total	100%					

The subject outcomes on concepts understanding, interpretation, analysis and applications of power system protection schemes are assessed by means of examination, quizzes and tests. The outcomes on engineering skills and applications, performance testing and analysis, as well as technical writing techniques, are evaluated by experiments, mini-project and reports.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	36 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	12 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. Network Protection and Automation Guide, Edition May 2011, Alstom Grid, 2011
2. P.M. Anderson (Editor in Chief), Power System Protection, McGraw Hill 1st Edition, 1999
3. W.A. Elmore, Protective Relaying Theory and Applications, Marcel Dekker, 2nd Edition, 2004
4. A.T. Johns & S.K. Salman, Digital Protection for Power Systems, IEE Power Series, 1995
5. Power System Protection, Vol. 1, 2, & 3, The Electricity Training Association, 1995

Subject Description Form

Subject Code	EE4014A
Subject Title	Intelligent Systems Applications in Electrical Engineering
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To introduce students to the fundamentals of intelligent systems and their applications in Electrical Engineering including electrical power systems, control and utilization.
Subject Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired a good understanding of the fundamental concepts and characteristics and methodologies of intelligent systems. b. Be able to appreciate the power and usefulness of intelligent techniques. c. Be able to know the design of artificial intelligence systems, evolutionary computation algorithms, uncertainty representation and reasoning mechanisms. d. Be able to integrate the intelligent system approaches in real-life electrical power engineering problems and control problems. e. Have acquired skills in presentation and interpretation of mini-project results and communicate in written form
Subject Synopsis/ Indicative Syllabus	1. ***Knowledge-based intelligent systems*:** Concepts and theory. Knowledge representation techniques. Structure of a rule-based expert system. Forward and backward chaining inference techniques. 2. ***Fuzzy systems*:** Concepts of Fuzzy reasoning. Membership Functions and Fuzzy sets. Fuzzy rules. Defuzzification methods. Fuzzy inference. Building a fuzzy expert system. 3. ***Artificial neural networks*:** Concepts of ANN. Neuron and perception. Multilayer neural networks. Forward and Backward Propagation. Neural Network Training. Hopfield network. 4. ***Evolutionary computation*:** Concepts of Evolutionary computing. Genetic algorithms. Chromosomes, fitness function, cross-over and mutation. Evolutionary Programming. 5. ***Hybrid algorithms*:** Simulated Annealing. Combined Genetic Algorithm and Simulated Annealing. Fuzzy Neural Systems. Fuzzy Genetic Algorithm. 6. ***Applications in power system problems in planning, operation and control*:** Applications in Control and Utilization – Intelligent process control. Intelligent robot control and Utilization. **Mini-project:** Performance of Genetic Algorithm **Case study:** To study the performance of genetic algorithm on solving different functions such as De Jong problems and Colville problems. To investigate the effects of parameter setting on the performance of genetic algorithm. To investigate the effect of solution acceleration technique on the performance of genetic algorithm. To apply genetic algorithm to different Electrical Engineering problems.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on system analysis, design and practical applications are given through mini-projects, in which the students are expected to solve the electrical engineering problems using intelligent techniques with critical and analytical thinking. Mini-projects are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Mini-projects		√			√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√		
2. Class Test	20%	√	√	√		
3. Mini-project Report and Presentation	20%	√			√	√
Total	100%					

The outcomes on concepts, design and applications are assessed by the usual means of examination and test Min-projects and written reports assess those on analytical skills, problem-solving techniques and practical considerations of intelligent technique applications, as well as technical reporting, teamwork and presentation skill.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Mini-project	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Reference books:

1. K.Y. Lee and M.A. El-Sharkawi, Modern Heuristic Optimization Techniques: Theory and Applications to Power Systems, Wiley-IEEE Press, 2008
2. M. Negnevitsky, Artificial Intelligence-A Guide to Intelligent Systems, Addison-Wesley, 2002
3. K. Warwick, A. Ekwue and R. Aggarwal, Artificial Intelligence Techniques in Power Systems, IEE Power Engineering Series 22, UK, IEE Press, 1997
4. L.L. Lai, Intelligent System Applications in Power Engineering, Wiley, 1998
5. T.S. Dillon and M.A. Laughton, Expert System Applications in Power Systems, Prentice Hall, 1990
6. Selected reference papers in IEEE Transactions and IEE Proceedings

Subject Description Form

Subject Code	EE4015A
Subject Title	Electrical Engineering Materials
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: Engineering Materials (ENG2001)
Objectives	To introduce the students of electrical engineering or related discipline the basic electrical engineering materials. An introduction to materials in electrical engineering design and an advanced topic on smart materials will also be given.
Subject Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Acquire some understanding in basic and advanced electrical engineering materials. 2. Solve basic problems in electrical engineering materials. 3. Acquire better skills in performing laboratory experiments. Category B: Attributes for all-roundedness 4. Perform independent learning in electrical engineering materials. 5. Work as a team in laboratory sessions.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Types and Applications of Materials Materials for engineering. Classification of materials. Types and applications of engineering metals, ceramics, polymers and composites. 2. Conducting, Semiconducting, Insulating and Superconducting Materials Electrical conduction. Electrical conductors. Conduction in ionic materials. Semiconduction. Semiconductors. Hall effect. Polarization. Dielectric constant and losses. Dielectric strength and breakdown. Electrical insulators. Superconduction. Superconductors. 3. Magnetic Materials Diamagnetism. Paramagnetism. Ferromagnetism. Antiferromagnetism. Ferrimagnetism. Magnetic domains. Magnetization. Magnetic hysteresis. Permeability. Magnetic anisotropy. Soft magnetic materials. Hard magnetic materials. 4. Materials in Electrical Engineering Design Corrosion, oxidation and degradation. Selection of materials for electrical engineering design (case studies). 5. Smart Materials Ferroelectricity and ferroelectric smart materials. Piezoelectricity and piezoelectric smart materials. Magnetostriction and magnetostrictive smart materials.

	Laboratory Experiments: 1. Electrical conduction and dielectric behavior of materials. 2. Ferromagnetic behavior and Hall Effect in materials. 3. Ferroelectric, piezoelectric, and magnetostrictive behaviors of materials.
Teaching/Learning Methodology	See table below

Lectures, supplemented with interactive questions and answers	1, 2, 4	In lectures, students are introduced to the *knowledge* of the subject, and *comprehension* is strengthened with interactive Q&A.
Tutorials, where problems are discussed and are given to students for them to solve	1, 2, 4	In tutorials, students *apply* what they have learnt in solving the problems given by the tutor.
Laboratory sessions, where students will perform experimental verifications. They will have to record results and write a report on one of the experiments.	2, 3, 5	Students *acquire* hands-on experience in using electronic equipment and *apply* what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.
Assignments	1, 2, 3, 4	Through working assignments, students will develop a firm understanding and *comprehension* of the *knowledge* taught.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		1	2	3	4	5
1. Continuous assessment	40 %	✓	✓	✓	✓	✓
2. Examination	60 %	✓	✓		✓	
Total	100 %					

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Specific Assessment Methods/Tasks	Remark
Assignments	Assignments are given to students to assess their competence level of *knowledge* and *comprehension*. The criteria (i.e. *what* to be demonstrated) and level (i.e. the *extent*) of achievement will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improvement their learning.
Laboratory works and reports	Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignments.
Mid-semester test	There will be a mid-semester test to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignments.
End-of-semester test and Examination	There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.

Student Study Effort Expected	**Class contact:**	
	▪ Lecture	26 Hrs.
	▪ Tutorial	13 Hrs.
	▪ Laboratory	9 Hrs.
	Other student study effort:	
	▪ Revision	34 Hrs.
	▪ Tutorial & assignments	15 Hrs.
	▪ Laboratory logbook & report writings	8 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Textbooks:

3. William D. Callister, Jr., *Materials Science and Engineering: An Introduction*, 8th ed., New York: John Wiley & Sons, 2010.

References:

7. James F. Shackelford, *Introduction to Materials Science for Engineers*, 7th ed., New Jersey: Pearson Prentice Hall, 2008.
8. Ian P. Jones, *Materials Science for Electrical and Electronic Engineers*, New York: Oxford University Press, 2001.
9. T. K. Basak, *Electrical Engineering Materials*, Kent: New Age Science, 2009.
10. Bhadra P. Pokharel and Nava R. Karki, *Electrical Engineering Materials*, Oxford: Alpha Science, 2007.
11. Rob Zachariason, *Electrical Materials*, USA: Thomson Delmar Learning, 2007.
12. C. Vittoria, *Magnetics, Dielectrics, and Wave Propagation with MATLAB Codes,* CRC Press 2011

Subject Description Form

Subject Code	EE501A
Subject Title	Alternative Energy Technologies
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to establish a broad concept on alternative energy techniques in engineering. 2. To provide an in-depth knowledge on selected topics of alternative energy systems in engineering. 3. To enable students to understand typical alternative energy technologies, its associated issues of application and related technical considerations. 4. To enable students to understand the potential of alternative energy and characteristics & performance of various types of alternative energy systems. 5. To enable students to understand various techniques and systems for control and monitoring of alternative energy technologies, as well as the related communication protocol and interfacing requirements.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the operation principle & control strategy of various alternative energy systems and topologies of these systems. b. Identify benefits & impacts of the applications of these alternative energy systems; such as their effects on environment and utility energy efficiencies. c. Describe the operation principle, characteristics and performance of various alternative energy devices/systems. d. Identify different alternative energy technologies for industrial & commercial plants and multi-storey buildings, including giving examples. e. Able to carry out literature search and report the findings in a presentation, when given a technical topic.
Subject Synopsis/ Indicative Syllabus	1. ***Energy resources and types*:** Renewable and non-renewable energy resources. World potential and trends. Environmental effects. Alternative energy types and present developments. Role and importance of alternative energy. 2. ***Wind and solar energy*:** Wind characteristics. Extraction characteristics. Windmill aerodynamics. Design and materials of windmills. Wind turbines. Types of wind turbines and connection. Siting and designs. Wind farms. Case study. On-shore and off-shore wind farms. Solar characteristics. Solar cells and solar thermal power. Photovoltaic conversion systems. Case study. Design and monitoring techniques. New developments. 3. ***Wave and tidal energy*:** Wave and tide characteristics for energy extraction. Tidal schemes. Tidal sites. Single and multiple basin schemes. Case study. Wave energy schemes. Case study. Ocean energy conversion. 4. ***Geothermal energy and fuel cells*:** Geothermal energy sources and methods. Characteristics. Hot dry rock technology. Case study. Fuel cells types and principles. Biomass energy types and case study. Future potentials. 5. ***Co-generation and combine-cycle plants*:** New technologies for co-generation and CCGT. Efficiency and environmental benefits. Case study examples. Future development potentials.

	6. ***Better utilization of energy resources*:** Pollution reduction techniques. Clean coal technologies. Nuclear power. Environmental impacts of better utilization of energy. **Case study:** Selections of practical alternative energy systems in Hong Kong and overseas.
Teaching/Learning Methodology	Lectures and tutorials are effective teaching methods: 1. To provide an overview or outline of the subject contents. 2. To introduce new concepts and knowledge to the students. 3. To explain difficult ideas and concepts of the subject. 4. To allow students to feedback on aspects related to their learning. Mini-project works/Assignments are essential ingredients of this subject: 1. To supplement the lecturing materials. 2. To add real experience for the students. 3. To provide deeper understanding of the subject. 4. To enable students to organise principles and challenge ideas. Case studies: 1. To give real example for some of the concept presented in the lectures. 2. To explain some practical considerations when applying technologies in real projects 3. To motivate and stimulate students interest. Seminars from industrial experts may also be arranged, this will give student up-to-date status of the development in alternative energy area, as well as market trends.
Assessment Methods in Alignment with Intended Learning Outcomes	The understanding on theoretical principle and practical considerations, analytical skills and problem solving technique will be evaluated. Examination, class tests, assignments, presentations and mini-project report are an integrated approach to validly assess students' performance with respect to the intended subject learning outcomes.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√		
Tutorials	√	√	√		
Case studies			√	√	√
Mini-project/Assignments/Presentations				√	√

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Class tests	20%	√	√	√		
2. Mini-project/Assignments/ Presentations	20%				√	√
3. Examination	60%	√	√	√	√	
Total	100%					

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Seminar/Case studies	6 Hrs.
	Other student study effort:	
	▪ Mini-project/Assignments	18 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	99 Hrs.
Reading List and References	**Reference books:** 1. J. Twidell, Renewable Energy Sources, E&F N Spon 2. G. Boyle, Renewable Energy, Oxford, 2004 2. L.L. Freris, Wind Energy Conversion Systems, Prentice Hall 3. Diamant, Total Energy, Pergamon Press 5. W. Avery and C. Wu, Renewable Energy From the Ocean, A Guide to OTEC , Oxford University Press, 1994 6. CDM Consultancy Stage 1 Report, Study on the Potential Applications of Renewable Energy in Hong Kong, 2003 (from website of EMSD-EEO of HKSAR Government). 7. R. Messenger, Photovoltaic Systems Engineering, CRC Press, 2004 8. G.N. Tiwari, Solar Energy: Fundamental, Design, Modelling and Applications, CRC Press 2002 9. Biofuels for Transport: an International Perspective, International Energy Agency, 2004 10. Geothermal Energy Resources for Developing Countries, A.A. Balkema Publishers, 2002 11. M. Stiebler, Wind Energy Systems for Electric Power Generation, Springer 2008 12. J. Cruz, Ocean Wave Energy: Current Status and Future Perspectives, Springer-Verlag 2008	

Subject Description Form

Subject Code	EE502A
Subject Title	Modern Protection Methods
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the concept of modern power system protection to students. 2. To integrate theory and practical knowledge of power system protection. 3. To understanding the working principle of power system protection. 4. To master the analytical techniques. 5. To apply protective relaying in power systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Be able to master the concept and philosophy on power system protection. b. Apply and adapt applications of mathematics, engineering skills in the analysis, comparison, interpretation of various protection schemes in the power system. c. Integrate and justify techniques to be used in the planning and operation of power system protection. d. Be able to solve technical problems for power system protection.
Subject Synopsis/ Indicative Syllabus	1. ***Overview of protection systems and its development*:** General considerations. Components of protection. Structure of protective relays. Trend of protection development. 2. ***Fault and transient in power systems*:** Fault transient behaviour of power system. The use of Electro-Magnetic Transient Program (EMTP) and MATLAB software to simulate the transient behaviour of power system. 3. ***Current and voltage transducers*:** Requirement of transducers for measurement and protection. Their features and characteristics under steady state and transient conditions. 4. ***Protection systems for distribution networks*:** Protection criteria for distribution system. Features of directional and non-directional protection schemes for distribution system. 5. ***Protection systems for transmission networks*:** Distance protection system and characteristics. Differential line protection. Phase comparison line protection. Use of line carrier and communication for protection systems. 6. ***Busbar, transformer and generator protection systems*:** High impedance and low impedance differential protection schemes. Protection schemes for busbar, transformer, and generator. 7. ***Digital protection relaying technique*:** Features of digital protection relay. Digital relay architecture. Digital relaying algorithms. Adaptive and intelligent relays. Recent development.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Knowledge on system analysis, design and practical applications are given through case studies in the assignments, in which the students are expected to integrate and justify modern techniques to be used in the planning and operation of power system protection with critical and analytical thinking. Case studies are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√		√
Tutorials	√	√		√
Case studies			√	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	√
2. Class Test	25%	√	√	√	√
3. Assignments	15%			√	
Total	100%				

The examination and tests assess the technical competence of students in power system protection analysis methods and methods of protection design, planning, and operation. Case studies and written reports assess those on analytical skills, problem-solving techniques and practical considerations of protection design, as well as technical reporting.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Laboratory	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	99 Hrs.

Reading List and References

Reference books:

1. L. Hewitson, M. Brown and R. Balakrishnan, Practical Power System Protection, Newnes, 2005
2. Network Protection and Automation Guide, AREVA T & D Ltd., 2002
3. P.M. Anderson, Power System Protection, IEEE Press or McGraw Hill, 1999
4. A.E. Walter, Protective Relaying Theory and Applications, ABB Power T & D Co. Inc., Dekker, 1994
5. A.T. Johns and S.K. Salman, Digital Protection for Power Systems, IEE Power Series, 1995
6. Microprocessor Relays and Protection Systems – IEEE Tutorial Course, Publication No. 88EH0269-1-PWR, 1987
7. Advancements in Microprocessor Based Protection and Communication – IEEE Tutorial Course, Publication No. 97TP120-0, 1997
8. Power System Protection, Vol. 1, 2, & 3, The Electricity Council, Peter Peregrinus, 1981

Subject Description Form

Subject Code	EE505A
Subject Title	Power System Control and Operation
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the concept of modern power system control & operation to students; 2. To integrate theory and practical knowledge of power system control & operation; 3. To understand the working principle of power system control and operation; 4. To apply the theory in power system control & operation; and 5. To understand the industrial practice and tools used in power system control and operations
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Ability to analyse power system security control & operation; b. Ability to analyse interconnected power system interchange and economic operation. c. Ability to analyse power system computer control and applications; d. Understand the functionalities and able to use to appropriate level of competence of selected specialty software for power system control and operation purpose; e. To be aware of new technologies development trends and environmental impacts of modern power system control and operation techniques; and f. Ability to write technical reports and present the findings through individual effort as well as team work
Subject Synopsis/ Indicative Syllabus	1. ***Power system operational security and dispatch*:** Power system security concepts. Contingency analysis. Static and dynamic security. States of operation. Prevention of blackouts. Power system state estimation concepts. Application of state estimation. 2. ***Frequency control & AGC*:** Frequency control and voltage control concepts. Control loops and analysis. Automatic generation control methodology and implementation. 3. ***Interconnected systems operation*:** System interconnection merits and problems. Economic interchange and control. Multi-area operation. 4. ***Unit commitment and economic dispatch*:** Priority lists. Methodologies for large system economic dispatch and unit commitment. Programming methods. 5. ***Energy management and real-time control*:** Energy management systems. Software systems. Computer hardware resources and configurations. Data management. Communication and distributed computing. Load forecasting. Contingency and security assessment. System restoration and emergency control concepts. **Case Study:** 1. Local system control centre arrangement. 2. Case study of past system blackout in overseas countries. 3. AGC and voltage control case studies. 4. Power system developments in HK and China as well as overseas countries. 5. Applications of computer technology in power system control and monitoring

Teaching/Learning Methodology

Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on real world cases and associated analysis are given through case studies, in which the students are expected to power system control and operation problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking. Guest lecture / industrial seminars will be given to provide hands-on experience and knowledge on this subject from industry practice. Mini-project is designed to supplement the lecturing materials so that the students are encouraged to take extra readings and practice specialty software tools for power system operation and control.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Lectures	√	√	√	√		
Tutorials	√	√	√	√		
Report	√	√	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Exam	60%	√	√	√		√	
2. Class test	20%	√	√	√		√	
3. Mini project and report	20%	√	√	√	√	√	√
Total	100 %						

The assessment methods include an examination, a class test, and written assignment in the form of mini-project report. The examination and class test assess the technical competence of students in power system analysis methods and methods of power system operation and control. The written reports assess the students' ability to apply the theories learned in class to practical project, and to communicate in written form.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Mini-project preparation/report	10 Hrs.
▪ Self-study	50 Hrs.
Total student study effort	99 Hrs.

Reading List and References

Reference books:

1. W.D. Stevenson, Elements of Power System Analysis, McGraw Hill
2. Wood & Wollenberg, Power Generation, Operation and Control, J. Wiley.
3. Weedy and Cory, Electric Power Systems, 4th Edition, Wiley
4. Grainger & Stevenson, Power System Analysis, McGraw Hill
5. H. Saadat, Power System Analysis, McGraw Hill
6. Antonio Gomez-Exposito, Antonio J. Conejo, and Claudio Canizares, Electric Energy Systems: Analysis and Operation, CRC Press, 2009

Subject Description Form

Subject Code	EE509A
Subject Title	High Voltage Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with knowledge to understand the techniques of analysis and design pertaining to high voltage engineering including causes and manner of insulation failure and problems encountered in practice.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the insulation breakdown mechanisms so as to identify the failure phenomena of different insulation systems. b. Be aware the design features of high voltage equipment so as to understand the application of common high voltage practices in the industry.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction to electrical insulation*:** Electric fields; dielectric breakdown; electrical insulating materials; industrial applications of electrical insulating materials. 2. ***Breakdown of gaseous insulation*:** Ionization processes; Townsend breakdown mechanism; breakdown in electronegative gases; streamer breakdown mechanism; Paschen's law; corona discharges; breakdown in non-uniform fields; post-breakdown phenomena and applications; vacuum insulation and breakdown. 3. ***Breakdown of liquid insulation*:** Breakdown in pure liquids; breakdown in commercial liquids; purification and breakdown test. 4. ***Breakdown of solid insulation*:** Breakdown due to treeing; breakdown due to surface flashover; breakdown due to surface tracking; breakdown in composite insulation. 5. ***Partial discharges*:** Classification of partial discharges by origin; partial discharge measurements. 6. ***High-voltage equipment*:** Applications of the above sections to the design of bushings, transformers, overhead lines, cables and circuit breakers. 7. ***Generation of high voltages*:** Cascade and series resonant methods for alternating voltages; doubler and multistage rectifiers for direct voltages; single-stage and Marx generators for impulse voltages. 8. ***High-voltage measurements*:** Measurement of leakage current; hv voltmeters; measurement of impulse voltages (peak voltage and wave-shape); Schering bridge. 9. ***High-voltage Applications Outside of T&D*:** Electrostatic hazards (such as dust explosions, oil-tanker explosions, integrated-circuit damage); applications such as in electrostatic precipitator, paint spraying (and powder coating), ore separation; lightning protection of buildings.

Teaching/Learning Methodology	Lectures are the primary means of conveying the fundamental knowledge to understand the techniques of analysis and design pertaining to high voltage engineering. Experiences on design and practical applications are given and demonstrated, and the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking. Students will be required to form groups to work through cases covering practice on high voltage engineering applications and learn through active participation in the presentation of their findings.

Teaching/Learning Methodology	Outcomes	
	a	b
Lectures	√	√
Case study		√
Demonstration	√	

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed	
		a	b
1. Examination	60%	√	√
2. Continuous assessment	30%	√	√
3. Case study	10%		√
Total	100%		

The assessment methods include end of subject examination (60 %), continuous assessment (30 %) and case study (10 %). Examination and continuous assessment cover intended subject learning outcomes 1 and 2, while case study involves intended subject learning outcome 2. Examination is in form of three-hour, closed book examination; continuous assessment contains classwork, homework, class test, etc.; and case study provides practice on high voltage engineering applications.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Case study/Demonstration	39 Hrs.
	Other student study effort:	
	▪ Case study	12 Hrs.
	▪ Self-study	51 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Reference Books:

1. M. S. Naidu and V. Kamaraju, High Voltage Engineering, 3rd Edition, Tata McGraw-Hill, 2004
2. V. IA Ushakov, Insulation of High-Voltage Equipment, Springer, 2004
3. E. Kuffel, W. S. Zaengl and J. Kuffel, High Voltage Engineering: Fundamentals, 2nd Edition, Newnes, 2000
4. C. L. Wadhwa, High Voltage Engineering, 3rd Edition, New Age Science, 2010
5. A. Ravindra and M. Wolfgang, High Voltage and Electrical Insulation Engineering, Wiley: IEEE Press, 2011
6. F. H. Kreuger, Partial Discharge Detection in High-Voltage Equipment, Butterworths, 1989
7. IET Digital Library, Lightning Protection, Edited by C. Vernon, Institution of Engineering and Technology, 2010

Subject Description Form

Subject Code	EE510A
Subject Title	Electrical Traction Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3031 & EE4021 Exclusion: EE4251
Objectives	1. To provide students with a comprehensive understanding of traction systems from a systems engineering viewpoint. 2. To provide an appreciation of the current state-of-the-art design and applications of electric drives and railway signalling systems. 3. To enable students to understand the implications of design of traction and signalling systems on railway operations and traffic control. 4. To introduce the quality indicators of railway operations and their relationships with the performance of traction drives, power supply and signalling systems. 5. To identify the necessary future technologies to improve the service quality in railway systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Analyse the operation principles of the sub-systems in an electrified railway system in the state-of-the-art approaches and criticise their advantages and limitations with reference to practical railway lines. b. Identify the railway service quality parameters and evaluate the impact of the performance of the sub-systems to the overall system reliability, availability, safety and maintainability. c. Recognise the importance to engage in self-learning on latest technologies on railway systems at this advanced level of study.
Subject Synopsis/ Indicative Syllabus	1. ***General aspects of traction system*:** Technical and design aspects of railway electrification. Train dynamics and speed-time characteristics. AC and DC railways, power supplies and interference. Supply system requirements: performance under normal and emergency feeding conditions. 2. ***Traction drives and railway signalling*:** Single-phase drives; chopper drives; inverter drives. Requirement of Inverter substations. Principles of powering and regenerative braking; blended regenerative and rheostatic brake control. Induction motor control: VVVF control, PWM control and CVVF control. Philosophy of railway signalling; route capacity; track circuits; principles and equipment; layout of signals and track circuits; interlocking and control; train description; train protection and control. 3. ***Computer-aided design and operation of traction systems*:** Elements of design and analysis of traction systems: cost/benefit analysis; digital simulation of AC/DC power converter drives and traction equipment; computer-based design of block layouts and track circuits; power-factor, control, maximum-demand and energy-efficient operation; digital simulation of train performance for optimum headway, schedule speed and energy consumption; use of expert systems for system control and train scheduling. Computer modeling of non-linear source and traction load. Power quality issues of single phase AC traction: imbalance, harmonics and voltage dip; impact to traction system and public. Corrective measures and filter design. 4. ***Maglev and linear drives*:** Principle and limitations of electromagnetic techniques of suspension and levitation. Levitation using permanent magnet, superconducting magnets and eddy currents induced by mains frequency excitation. Suspension using controlled DC electromagnets. Operation of single-sided linear induction motors. Application of linear drives in high speed transit systems. **Laboratory Experiment:** Load-flow analysis in traction power system **Case Study:** 1. Traction drive systems 2. Feeding systems in AC traction 3. Signalling system installation
Teaching/Learning Methodology	Video clips together with computer animations are used to supplement conventional lectures. Case studies will be used extensively to highlight the practicality of the subject materials being covered. Practitioners are also invited to have experience sharing sessions with the class. A group project is to be carried out to demonstrate and integrate the knowledge learned. Teaching/Learning Methodology: Outcomes a / b / c Lectures: √ / √ / Tutorials: / √ / √ Project Work: √ / √ / √
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks: % weighting: Intended subject learning outcomes to be assessed (a / b / c) 1. Mini-project (group project): 20%: / / √ 2. Tests: 20%: √ / √ / 3. Examination: 60%: √ / √ / Total: 100% This is an advanced and yet introductory subject for students, particularly practicing engineers in the railway industry. The subject encompasses all the important elements in a typical railway and a number of case studies are used to supplement the analytical discussions. The outcomes are assessed through a mini-project (which aims to integrate the various aspects learnt), tests and written examinations.
Student Study Effort Expected	Class contact: ▪ Lecture/Tutorial: 36 Hrs. ▪ Invited lecture: 3 Hrs. Other student study effort: ▪ Assignment and self-studies: 65 Hrs. Total student study effort: 104 Hrs.
Reading List and References	**Textbooks:** 1. M.H. Rashid, Power Electronics: Circuits, Devices and Applications, 3rd Edition, Prentice Hall 2004 2. Managing railway operations & maintenance: best practices from KCRC / edited by Robin Hirsch: technical co-editors, Felix Schmid, Michael Hamlyn. A & N Harris; Birmingham: University of Birmingham Press, 2007

	Reference books/journals: 1. J. Pachl, Railway Operation and Control. VTD Rail Publishing, Mountlake Terrace (USA) 2004. 2. Bonnett, Clifford F. Practical railway engineering, London: Imperial College Press, 2005. 3. Petros A. Ioannou, Intelligent Freight Transportation (Automation and Control Engineering), CRC Press, Taylor and Francis Group, 2008 4. O.S. Lock, Railway Signalling, 3rd Edition, A & C Black, 1993 5. M.E. Leach, Railway Control System, 2nd Edition, A & C Black, 1993 6. Selected papers from IEE Proceedings – Electric Power Applications

Subject Description Form

Subject Code	EE512A
Subject Title	Electric Vehicles
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: EE543
Objectives	1. To acquire a broad knowledge on modern electric vehicles (EVs). 2. To understand the development of EVs from technological, environmental, and societal perspectives.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the importance of EVs for environment, energy sustainability and climate change. b. Understand various underpinning technologies for modern EVs, including electric motor drives, energy storage, batteries, charging methods, infrastructure and auxiliary systems. c. Explain the emerging technologies such as hybrid electric vehicles (HEVs), fuel cell electric vehicles (FEV) and energy storage methods.
Subject Synopsis/ Indicative Syllabus	1. ***Introduction to electric vehicles (EVs)*****:** Historical perspective. EV advantages and impacts. EV market and promotion: infrastructure needs, legislation and regulation, standardization. 2. ***Electric vehicle (EV) design options*****:** EV configurations: fixed vs. variable gearing, single- vs. multiple-motor drive, in-wheel drives. EV parameters, driving cycles and performance specifications. Choice of system voltage levels: electrical safety and protection. 3. V***ehicle dynamics and motor drives*****:** Road load: vehicle kinetics; effect of velocity, acceleration and grade. EV drivetrain and components. EV motor drive systems: DC drives, induction motor drives, permanent-magnet synchronous motor drives, switched reluctance motor drives. Control strategies. 4. ***Batteries*****:** Battery parameters. Types and characteristics of EV batteries. Battery testing and maintenance; charging schemes. Battery monitoring techniques. Open-circuit voltage and ampere-hour estimation. Battery load levelling. 5. ***Auxiliaries*****:** On-board and off-board battery chargers. Energy management units. Battery state-of-charge indicators. Temperature control units. Power steering. 6. ***Emerging EV technologies*****:** Hybrid electric vehicles (HEVs): types, operating modes, torque coordination and control, generator/motor requirements. Fuel cell electric vehicles (FEVs): fuel cell characteristics, hydrogen storage systems, reformers. Alternative sources of power: super- and ultra-capacitors, flywheels.

Teaching/Learning Methodology	Delivery of the subject is mainly through formal lectures, complemented by tutorials and worked examples. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made. A term paper and a related presentation enable students to develop skills in literature survey and writing. Oral presentation sessions develop students' skills in spoken communication and peer evaluation.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	√	√	√
Tutorials	√	√	√
Assignment and oral presentation	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	60%	√	√	√
2. Test	30%	√	√	√
3. Term paper	5%	√	√	√
4. Oral presentation	5%	√	√	√
Total	100%			

It is an advanced elective on electric vehicles. The outcomes on electric vehicle technology and its impacts are assessed by the usual means of test and examination, and partly by the term paper. The outcomes on technical communication and presentation skills are evaluated by the term paper and a related oral presentation.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	30 Hrs.
	▪ Presentation/Tests	9 Hrs.
	Other student study effort:	
	▪ Self-study and revision	44 Hrs.
	▪ Report – Case Study	15 Hrs.
	Total student study effort	98 Hrs.

Reading List and References

Reference books:

1. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, London: Oxford University Press, 2001
2. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, New York: RC Press, 2003
3. M. Ehsani, Y. Gao, S.E. Gay and A. Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004
4. Selected papers from relevant journals and conference proceedings, such as EVS

Subject Description Form

Subject Code	EE514A
Subject Title	Real Time Computing
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To understand the properties of real time languages, operating systems, associated hardware. 2. To apply real time system software in engineering applications. 3. To test and verify real time systems and software.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Appreciate the important issues in real time computing systems, and their relations in engineering applications. b. Identify and understand the real time issues in a computing OS system, and their mechanism of overcoming these obstacles. c. Communicate effectively during discussions and presentations. d. Equip individual the ability to analyse related issues and identify the proper solution in a real-time computing design.
Subject Synopsis/ Indicative Syllabus	1. ***Real time computing systems concepts*:** Characteristics of Real Time Computing. Properties and Speed Requirements of Real Time Systems. Synchronous Real Time Systems: Polled, Main Polled Loop with Interrupts, Cyclic Schedulers. Multi-Processors Real Time Systems: Multi-Processor Structures, Process Dispatch Latency, Inter CPU Communication, Hierarchical Approach to Real Time Systems. Process Scheduling Architecture of Cloud Computing. Example: a Real Time Control System in Coal-Fired Power Plant. 2. ***Real time systems design issues*:** Time Handling: Representation of Time, Time constraints, Time Service and Synchronization, the Master-Slave algorithm and the Time Distributed Clock algorithm. Real Time System Life Cycle: Requirement Specification,. Structured Design Approaches: Event Based Model, Process-Based Model.. Real Time System Modelling Example: Autonomous Robot Control. 3. ***Real time software*:** Real Time Programming Discipline, Asynchronous and Synchronous Real Time Language. Verification and Validation of Real Time Software: Testing Real Time Properties, Simulation as a Verification Tool, Testing Control and Data flow. Languages for real-time systems; real-time software analysis and design. Properties of Real Time Operating Systems; Allocation and Scheduling, Inter-process and Inter-processor communication; Distributed and Fault Tolerance Systems, Case Study: Real Time Linux. 4. ***Real time system applications*:** System supervision in Power System Process Operation. Implementation of Cloud technology to resolve the real-time system operation issues. Integration of high-speed communication network in favourable of speed performance in system operation. **Laboratory Experiment:** Appreciation of real time Linux and its application in Motor Control

	Case study: Real time power system simulation and data logging/queuing theory investigation in multi-servers system application.
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through a practical case study, in which the students are expected to understand design problems with real-life constraints and to attain pragmatic solutions.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√	√	
Experiments	√		√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√		
2. Tests (x2)	20%	√	√		
3. Assignment/Presentation	10%	√	√	√	
4. Laboratory experiments/Mini project/Report	10%	√	√		√
Total	100%				

The outcomes on concepts, design and applications of real-time systems are assessed by the usual means of examination and test whilst those on analytical skills, problem-solving techniques and practical considerations, as well as technical reporting and teamwork, are evaluated by experiments, mini-project and the reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Seminar	36 Hrs.
	▪ Laboratory demo	3 Hrs.
	Other student study effort:	
	▪ Case Study	15 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	99 Hrs.

Reading List and References

Textbooks:

1. P. Laplante, Real-Time Systems Design and Analysis - An Engineer's Handbook, IEEE Computer Society Press, 1993

Reference books/materials:

1. S.T. Levi and A.K. Agrawala, Real Time System Design, McGraw-Hill, 1990
2. J.E. Cooling, Software Design for Real-time Systems, Chapman & Hall, 1991
3. J.A. Stankovic and K. Ramamritham, Advances in Real-Time Systems, IEEE Computer & Society Press, 1993
4. Selected papers from Proceedings of Real-time Systems Symnposium (IEEE)
5. Chris Moyer, Building Applications in the Cloud, Pearson Education, 2011

Subject Description Form

Subject Code	EE517A
Subject Title	Fibre Optic Components
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to understand the fundamentals of light emission, detection, amplification, and light propagation in optical fibres. 2. To learn the operation principles of key fibre components and apply the knowledge learned to design fibre components and devices.. 3. To appreciate the applications of fibre components in communication and sensing systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Appreciate the importance of optic fibre development from a historical perspective; understand the important role of advanced fibre components in enhancing the performance of modern fibre systems. b. Understand the operating principle of various fibre components and analyze/characterize the performance of fiber components. c. Understand the same function may be achieved by using different technology (e.g., electro-optic and acoustic modulation) and understand the advantage and limitations of each technology. d. Select the most appropriate principles/techniques to design a fibre optic component with required specification, read the data sheet of various fibre optic components.
Subject Synopsis/ Indicative Syllabus	1. ***Review of optics*****:** Wave/quantum nature of light. Polarization, index of refraction, reflection and refraction. 2. ***Optical fibres and cables*****:** Propagation of light in optical fibres. Different types of fibres. Fibre attenuation and dispersion. Optical fibre measurement. 3. ***Modulation of light*****:** Phase modulation, frequency modulation, intensity modulation. Birefringence and polarization modulation. Electro-optic, magneto-optic and acousto-optic effects. 4. ***Optical sources*****:** Emission and absorption of radiation. Population inversion. Optical feedback. Threshold condition. Laser modes. Light emitting diodes, semiconductor lasers, tunable lasers. 5. ***Optical amplifiers*****:** Rare-earth doped fibres, optical fibre amplifiers, semiconductor amplifiers. 6. ***Photo-detectors*****:** Photomultipliers, photoconductive detectors, junction detectors (p-i-n diode, avalanche photodiode). 7. ***Passive devices*****:** Fused bi-conical taper couplers. Thin-film multilayer interference filters. Wavelength division multiplexing (DWDM) devices. Fiber Bragg gratings and their fabrication techniques. Tunable Fabry-Perot filters. Optical isolators and circulators. Integrated optic devices. **Laboratory Demonstration:** Observation of fibre modal patterns Characterization of single mode fibres: loss, dispersion, polarization dependent loss Measurement of source (LED, multi and single mode diode lasers) spectrums and power-current relations

	Group-project Topics: To choose from a list of 15 topics and write a study report and give a presentation
Teaching/Learning Methodology	Lectures are the primary means of teaching the basic concepts and theories. The understanding of basic principle is further enhanced through tutorials and laboratory demonstrations. Experiences and knowledge on design and applications of various integrated/fiber optic components, and on the use of alternative technologies to realise similar functionalities are gained through the use of examples during lectures and discussions during tutorials, and through assignments and group-study projects.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials		√	√	√
Experiments		√		√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Tests and assignments	25%	√	√	√	√
3. Lab report	5%		√		
4. Group-project & report	10%		√	√	√
Total	100%				

The outcomes on concepts, design and applications are assessed by examinations, test and assignments whilst those on practical considerations of optical components and systems design, as well as team work and technical report writing abilities are evaluated by group projects and the reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory demo	3 Hrs.
	Other student study effort:	
	▪ Self study and assignments	50 Hrs.
	▪ Group project and Report	10 Hrs.
	Total student study effort	99 Hrs.

Reading List and References

Reference books:

1. E. Hecht, Optics, 4th Edition, Addison-Wesley, 2002
2. G. Keiser, Optical Fiber Communications, 3rd Edition, McGraw-Hill, 2000
3. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, 2nd Edition, Wiley Interscience, 2007
4. D.K. Mynbaev and L.L. Scheiner, Fiber-Optic Communications Technology, Prentice-H 2001
5. Selected papers from relevant journals

Subject Description Form

Subject Code	EE520A
Subject Title	Intelligent Motion Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To describe an in depth knowledge on the design and operation of intelligent motion systems. 2. To relate and compare numerous application examples, which ranges from CD players and hard disc drives to robots and component insertion machines. 3. To enable the students to have the ability to design motion control systems for industry and domestic purposes.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Be able to contrast and compare different motion control system configurations, and select the most appropriate one for the task. To comprehend and understand numerous motion control examples for domestic and industrial applications. b. Understand the in-depth knowledge of motion drive and sensing techniques, and the ability to use them in real engineering applications. c. Have a broad understanding of motion control platform hardware and a visionary perspective on the future developments of computing/control hardware.
Subject Synopsis/ Indicative Syllabus	1. ***Structures of intelligent motion systems*:** Specifications and requirements of intelligent motion systems. Operating modes: point to point motion, trajectory path tracking, velocity path tracking, force and tension control, compliance control, vibration damping. Switching between operation modes. 2. ***Motion actuators and driving techniques*:** Using Voice Coil Motors and DC brush motors in motion control. AC brushless motors, linear direct drive AC brushless motors and their driving techniques. Stepping motors and their limitations in motion tracking systems. Microstepping and electronic damping of stepping motors. 3. ***Motion sensing and estimation techniques*:** Optical encoders: working principle, decoding method, and resolution enhancement through interpolation. Syncro-resolvers: working principle and interface electronics. Velocity estimation and position estimation methods for large speed range actuators. 4. ***Motion control platform*:** Computer hardware requirements. Tightly coupled systems versus distributed systems. Application of DSPs in motion control. Communication methods in motion systems. Real time operating system for motion control. 5. ***Intelligent algorithms for motion control and trajectory generation*:** PID controllers and their variations. Servo tuning methods. Motion control systems based on state space configuration. States observation and Kalman filters. Using Notch filters in non-rigid systems. Profile generation and motion planning algorithms. 6. ***Issues in multi-axis intelligent motion systems*:** co-ordinate mapping and dynamics transformation. Multi-axis motion planning and profile generation. Motion synchronisation between axis. Decoupling inter-axis motion interference. Applying MIMO structure in tightly coupled system. 7. ***Case studies in intelligent motion systems*:** Three examples will be selected from the following list: a. Optical based position tracking in CD-ROMs and Laser discs. b. Magnetic head positioning in hard disk drives. c. Motion control system design in multi-axis robot manipulators. d. Gantry robot motion systems for SMT component insertion machines. e. Motion systems in high precision CNC tooling machines. **Case study:** Report on a high performance motion control application example
Teaching/Learning Methodology	Delivery of the subject is mainly through formal lectures, complemented by tutorials and worked examples. Self-learning on the part of students is strongly encouraged and extensive use of web resources will be made. A term paper and a related presentation enable students to develop skills in literature survey and writing. Oral presentation sessions develop students' skills in spoken communication and peer evaluation.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	√	√	√
Tutorials	√	√	√
Assignment and oral presentation	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	60%	√	√	√
2. Test	30%	√	√	√
3. Report	5%	√	√	√
4. Oral presentation	5%	√	√	√
Total	100%			

One end-of-semester written examination; one mid-semester-test; one end-of-semester test; a report on an assigned topic; and a power point presentation for the particular topic.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	30 Hrs.
▪ Presentation/Test	9 Hrs.
Other student study effort:	
▪ Case study	15 Hrs.
▪ Self-study	45 Hrs.
Total student study effort	99 Hrs.

Reading List and References	**References books:** 1. S. Meshkat, Advanced Motion Control, PCIM reference series in Power Conversion and Intelligent Motion, 1988 2. M.M. Gupta, Intelligent Control Systems: Concepts and Applications, IEEE Press, 1996 3. K. Rajashekara, Sensorless Control of AC Motors, IEEE Press, 1996 4. P.H. Garrett, Advanced Instrumentation and Computer I/O Design: Real Time Systems Computer Interface Engineering, Prentice Hall, 1994 5. Y. Oshima and Y. Akiyama, Servo Sensors Elements and Applications, PCIM reference series in Power Conversion and Intelligent Motion, 1988 6. W.S. Levine, The Control Handbook, CRC Press, 1996

Subject Description Form

Subject Code	EE521A
Subject Title	Industrial Power Electronics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide power electronics engineers with in depth knowledge of the industrial power electronics. 2. To provide latest development in power supplies, industrial power electronics system and more electric aircraft will be covered. 3. To give industrial concern in power electronics design including passive components, packaging and standards
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire a good understanding of power supply concept and design and be able to analyse the industrial needs for static power conversion. b. Understand the international standards on power electronics design. c. Have a global view on recent development on power electronics and be aware of applications of power electronics in various industries d. Work in teams and independently when conducting power electronics design and testing.
Subject Synopsis/ Indicative Syllabus	1. ***Industrial power systems:*** Static power systems, battery systems, AC systems, DC systems and AC-DC power conversion. 2. ***Power conversion:*** Soft-switching, power factor correction, inverter configurations and static converters. 3. ***Special environment power electronics:*** Power electronics distribution system, industrial guidelines, variable speed and constant frequency systems, actuation systems, brushless drives and other applications of power electronics in industry 4. ***Industrial power supplies:*** Converter topologies, decentralized power, power modules, electro-magnetic compatibility, international standards and reliability. 5. ***Devices and packaging:*** Hermetic and plastic packages, wire bonding, power devices, high temperature effect and substrates. 6. ***Magnetics and capacitors:*** High frequency inductors and transformers, winding techniques, core loss analysis, optimization of magnetics and power capacitors. **Laboratory Experiments:** Computer aided design for power electronics Power electronics for DC brushless motor Power Factor correction

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through experiments and mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking. Interactive laboratory sessions are introduced to encourage better preparation and hence understanding of the experiments. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√		
Experiments				√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Test	20%	√	√	√	
3. Laboratory performance/report	20%				√
Total	100%				

One end-of-semester written examination; one mid-semester-test; one end-of-semester test; laboratory performance evaluation (including punctuality, initiative, and technical reasoning); and laboratory report on a particular experiment.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	30 Hrs.
▪ Tutorial/Student presentation	6 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Laboratory and presentation preparation/report	15 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. A. M. Trzynadlowski, Introduction to Modern Power Electronics, Wiley, 2010.
2. M.Cirrincione, M. Pucci, G. Vitale, Power Converters and AC Electrical Drives with Linear Neural Networks, CRC Press, 2012.
3. N. Mohan, Power Electronics: A First Course, John Wiley & Sons, 2012.
4. F.P. McCluskey, High temperature Electronics, CRC Press, 1997
5. K.W.E. Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

Subject Description Form

Subject Code	EE522A
Subject Title	Optical Fibre Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce to students the theory and application of optical fibre communication and sensing technology. 2. To introduce to students the state-of the-art and future techniques for higher-performance fibre-optic systems. 3. To equip students the ability to analyse fibre-optic digital communication systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Appreciate recent developments in fibre optic communication systems, importance of fibre optic technology to the development of communications, engineering applications of fibre-optic technologies, and advantages of fibre-optic sensors to the electrical engineering industry. b. Know the principles of different types of optical fibre sensors, multiplexing techniques, and system applications. c. Select the most appropriate passive and active fibre-optic components to design fibre-optic sensor systems and fibre optic communication links d. Calculate the bit-error-rate performance of optical fibre communication systems; and the power budgets of fibre-optic links. e. Have hands-on experience in the use of fusion splicer to make low-loss fibre joints, optical spectrum analyzer to perform spectral measurements, and fibre grating sensors for temperature and strain measurements.
Subject Synopsis/ Indicative Syllabus	1. ***Overview of optical fibre communications*:** Historical perspective, basic concepts, lightwave systems and components, channel capacity. 2. ***Optical transmitters*:** Modulation response of laser diodes and LEDs; External modulation. Driving circuitry. 3. ***Optical receivers*:** Receiver components. Receiver design and performance. 4. ***System design and performance*:** System architectures. Operating wavelength and system limitations. Power and rise-time budgets. Noise effects and other source of power penalty. 5. ***Advanced systems and techniques*:** Wavelength division multiplexers. System performance aspects of semiconductor laser amplifiers and optical fibre amplifiers. Soliton transmission systems. Photonic switching. Coherent lightwave systems. 6. ***Basics of fibre optic sensors*:** Intrinsic and extrinsic sensors. Intensity modulation sensors. Phase modulation sensors. Polarisation modulation sensors. Wavelength and frequency modulation sensors. Fibre grating sensors. 7. ***Multiplexed and distributed fibre optic sensors*:** Time division multiplexing. Wavelength division multiplexing. Frequency division multiplexing. Coherence division multiplexing. Optical time domain reflectometry. Optical frequency domain reflectometry. 8. ***Fibre sensor systems and applications:*** Fibre optic acoustic sensors, current sensors, temperature and strain sensors. Fibre optic gyroscopes. Fibre sensors for structural monitoring. Chemical sensors.

	Laboratory Experiments/Demonstrations: Optical spectrum analyzer for the observation of nonlinear effects and laser spectrum Insertion loss measurement of optical fibres Fibre Bragg grating sensors Optical fibre amplifiers
Teaching/Learning Methodology	Lectures, quizzes, tests, laboratory experiments, mini-projects, and examination.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials		√	√	√	
Demonstration/Experiments			√		√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1.Tests/Quizzes/Assignments	30%	√	√	√	√	
2. Lab and report	5%			√		√
3. Mini-project and report	5%	√	√	√		
4. Examination	60%		√	√	√	
Total	100%					

This subject introduces the theory and applications of optical fibre communication and sensor technology. The outcomes are assessed by quizzes, tests, mini-projects, laboratory experiments and examination.

Student Study Effort Expected	Class contact:	
	▪ Lectures/Tutorials/Seminar	39 Hrs.
	Other student study effort:	
	▪ Mini-projects	30 Hrs.
	▪ Self-study	33 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Reference books:

1. J.M. Senior, Optical Fiber Communications-Principles and Practice, 3rd Edition, Prentice Hall, 2008
2. J.C. Palais, Fiber Optic Communications, 5th Edition, Prentice Hall, 2005
3. G.P. Agrawal, Fiber-optic Communication Systems, 3rd Edition, Wiley, 2002
4. G. Keiser, Optical Fiber Communications, 3rd Edition, McGraw-Hill, 1999
5. J. P. Dakin and B. Culshaw, Optical Fibre Sensors, Artech House, Vols.1&2, 1989, and Vols.3&4, 1997.

Subject Description Form

Subject Code	EE524A
Subject Title	Open Electricity Market Operation
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to establish a broad knowledge of open electricity market operation and to understand the major market models in the world. 2. To enable students to understand the key issues in open electricity market operation including deregulated power system operation, transmission pricing, procurement of ancillary services, congestion management, available transmission capacity so that students are provided with knowledge and techniques they need to meet the electric industry's challenges in the 21st century.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire a good understand of different power market models and financial tools to hedge risks used in electricity supply industries. b. Analyse the available transmission capacity and formulate equitable transmission pricing in electricity markets. c. Assess ancillary services requirements based on security and economic considerations. d. Present technical results in the form of technical report and verbal presentation
Subject Synopsis/ Indicative Syllabus	1. ***Introduction*:** Background. Competition and electricity industry structuring. Retail access and wheeling. Poolco and British model. Bilateral-contract and multilateral-contract models. Role of existing players. Power exchange. Independent system operators. Marketers, brokers and aggregators. 2. ***Electricity market*:** Purchasing electricity in an open market. Evaluating load and risk. Coordinating power suppliers. Use of financial tools. Managing risk. Derivatives and electricity futures. Transmission congestion management in electricity market. Security considerations. 3. ***Transmission and ancillary services*:** Transmission ownership and restructuring. Measuring available transmission capacity in energy markets. Purchasing transmission capacity. Network and point to point transmission services. Fixed and firm transmission rights. Ancillary services. 4. ***Transmission pricing*:** The costs of transmission services. Locational prices. Embedded cost allocation methods. Stranded assets. Game theory approach. Short-run marginal cost. Long-run marginal cost. Integrated approach of transmission pricing.

Teaching/Learning Methodology

The concept of electricity market modelling and economic analysis framework will be presented through lectures and tutorials with reference to real-life market environment. Students will be required to form groups to work through cases covering the market structure and operational aspects so as to develop ability to critically evaluate principles and operation of electricity markets. Tutorials will be structured on different sessions for better understanding on the theoretical concepts which require sufficient contribution from students. Students will also learn through active participation in the presentation of finding of their case studies.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	√
Case Studies & Presentation	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. In-class Test	20%	√			
3. Cases study & presentation	20%	√	√	√	√
Total	100%				

The outcomes on the concepts of modelling, analysis and applications are assessed by the usual means of examination and test whilst those on problem-solving techniques and presentation of findings, as well as technical reporting and teamwork, are evaluated by the case study exercise.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	36 Hrs.
▪ Presentation	3 Hrs.
Other student study effort:	
▪ Case study and report	12 Hrs.
▪ Self-study	48 Hrs.
Total student study effort	99 Hrs.

Reading List and References

Textbooks books:

1. Daniel S. Kirschen and Goran Strbac, Fundamentals of Power System Economics, Wiley 2004
2. Mohammad Shahidehpour, Hatim Yamin, and Zuyi Li, Market Operations in Electric Power Systems, John Wiley & Sons, 2002

Reference books:

1. S. Hunt and G. Shuttleworth, Competition and Choice in Electricity, Wiley, 1996
2. P.C. Christensin, Retail Wheeling, a Guide for End-users, Penn Well Publishing Co., 1998
3. M. Ilic, F. Grliana, and L. Fink, Power System Restructuring, Kluwer Academic Publishers, 1998
4. Utility Negotiating Strategies for End-users, Penn Well Publishing Co., 1998
5. K. Bhattacharya, M.H.J. Bollen, and J.E. Daalder, Operation of Restructured Power System, Kluwer Academic Publishers, 2001

Subject Description Form

Subject Code	EE525A
Subject Title	Energy Policy and Restructuring of Electricity Supply Industry
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students with a comprehensive knowledge in formulating practical energy policies for sustainable energy utilization. 2. To develop a conceptual framework for understanding key and practical issues of restructuring electricity supply industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify, evaluate and formulate energy polices for sustainable energy utilization. b. Identify the rationale and key issues for restructuring electricity supply industry. c. Explain the market structures and regulatory framework for electricity supply industry. d. Explain and evaluate different pricing concepts and pricing contracts in restructured electricity supply industry. e. Present the results of study in the form of written technical reports and oral presentation.
Subject Synopsis/ Indicative Syllabus	1. ***Energy policy*****:** Scope and limit of energy policy. Policy responses: environmental control and clean energy technology, energy efficiency and alternative energy sources. Policy instruments and their evaluation. Sustainable energy concept: trade-off between energy consumption, resources availability and environment deterioration. 2. ***Energy conservation and demand side management*****:** Energy conservation policy: efficient utilization and transformation, recycling of materials and waste heat extraction. Load management: energy and load growth, direct and indirect load control. Integrated Resources Planning: system cost, end-use development and environment cost. 3. ***Restructuring of the ESI*****:** Electricity supply industry structures; Privatisation and competition; Market structures and architectures; Regulation of Electricity Markets; Key issues for China and Hong Kong. 4. ***Electricity pricing and management*****:** Short range marginal cost. Real time and time-of-day pricing applications. Analysis of BOT option. Transmission contracts pricing. Futures and forward markets. **Case Study:** 1. Functional analysis on energy policies 2. Practical application of sustainable energy measures 3. Analysis on key issues of ESI restructuring 4. Implementation issues on ESI restructuring

Teaching/Learning Methodology	The concept of energy policy, identifications and discussions of ways of restructuring electricity supply industry will be presented through lectures and tutorials on case studies and international experiences. Students are expected to take initiative to learn through the process of engagement and participation in lectures and tutorial sessions. Mini-Projects are used to enhance students learning experiences and practical applications. They provide students with the opportunity to develop independent evaluation, formulation and technical report writing skills pertinent to the field of energy policy and restructuring electricity supply industry.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Mini-projects	√	√		√	√

Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√	√	
2. Class Test/Quiz	25%	√	√	√	√	
3. Mini-project & report	15%	√	√		√	√
Total	100 %					

The subject outcomes on concepts, evaluations and formulations are assessed by means of examination, quizzes and tests. The outcomes on practical formulations, implementation and evaluations of energy polices, restructuring electricity supply industry and electricity pricing, as well as technical writing, are assessed by mini-project and reports.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	30 Hrs.
	▪ Case studies/Group discussion	9 Hrs.
	Other student study effort:	
	▪ Mini-project discussion/report	18 Hrs.
	▪ Self-study	40 Hrs.
	Total student study effort	97 Hrs.

Reading List and References

Reference books:

1. M. Chick, Electricity and Energy Policy in Britain, France and the United States since 1945, Cheltenham, Northampton, Mass: Edward Elgar, 2007
2. J. Glachant, Competition, Contracts and Electricity Markets: A New Perspective, Edward Elgar, 2011
3. A. Kerstin, Energy Policy Instruments: Perspectives on their Choice, Combinations and Evaluation, Lund University Press, 2006
4. International Energy Agency, Electricity Supply Industry, OECD/IEA, 1994
5. M. Shahidehpour, Restructured Electrical Power System, Operation, Trading and Volatility, Marcel Dekker. 2001
6. H. Khatib, Economic Evaluation of Projects in the Electricity Supply Industry, IEE, 2003

Subject Description Form

Subject Code	EE526A
Subject Title	Power System Analysis and Dynamics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the students to the advanced concepts and analytical skills for the stability analysis in modern power systems. 2. To understand the impact due to different system instabilities. 3. To analyse and provide solutions to the power system stability problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire in-depth understanding of different types of power system stability problems. b. Model the dynamic behaviours of system components under disturbances. c. Apply and adapt applications of mathematics and engineering skills in the analysis of stability problems. d. Discuss the causes and effects of instabilities and recommend possible solutions. e. Acquire skills in presentation and interpretation of experimental results and communicate in written form
Subject Synopsis/ Indicative Syllabus	1. ***Reactive power compensation*:** System Q-V Characteristics. Reactive support theory. Load Characteristics. Synchronous condensers; Static Var Compensators (SVS); Thyristor Switched Capacitor (TSC); Thyristor controlled Reactor (TCR). 2. ***Voltage stability*:** Fundamental concepts. Singularities and multiple load flow techniques, eigenvalue methods. Load modelling, tap-changer effects, voltage controllability and voltage compensation. Proximity of collapse, Measures against collapse. Practical experience. 3. ***Dynamic stability & power system stabilisers*:** Eigenvalue and modal analysis. Generator and load modelling. Power system stabiliser. Small-signal stability of multi-machine systems. PSS Design and commissioning. 4. ***AC/DC systems and FACTS devices*:** HVDC link operation. Control of the d.c. terminals to damp a.c. dynamic instability and improve transient stability. Flexible AC transmission devices; power angle control. **Laboratory Experiment:** Power system stability analysis using Power System Stability Tools "DST".

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on system analysis, design and practical applications are given through experiments, in which the students are expected to solve the power system stability and control design problems with practical constraints and to attain pragmatic solutions with critical and analytical thinking. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials			√		
Experiments		√			√

Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√	√	
2. Class Test	30%	√	√	√	√	
3. Laboratory Performance & Report	10%				√	√
Total	100%					

The outcomes on concepts, design and applications are assessed by the usual means of examination and test Experiments and written reports assess those on analytical skills, problem-solving techniques and practical considerations of power system stability and control design as well as technical reporting.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory	8 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	44 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Reference Books:

1. P. Kundur, Power System Stability and Control, McGraw Hill, 1994
2. P.M. Anderson and A.A. Fouad, Power System Control and Stability, Wiley-IEEE Press, 2nd Edition, 2002
3. G. Rogers, Power System Oscillations, Springer, 1999
4. Voltage Stability of Power Systems: Concepts, Analytical Tools and Industry Experience, IEEE Publication 90th 0358-2-PWR, 1990
5. Y.H. Song, and A.T. Johns, Flexible AC Transmission Systems, IEE, 1999
6. T.V. Cutsem, and C. Vournas, Voltage Stability of Electric Power Systems, Springer, 2nd Edition, 2007

Subject Description Form

Subject Code	EE527A
Subject Title	Auto-tuning for Industrial Processes
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To facilitate a solid understanding of system identification. 2. To provide students with a solid knowledge of adaptive control. 3. To present a detailed survey of different auto-tuning methods used in industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Conduct parametric and non-parametric estimation for unknown processes. b. Design self-tuning and adaptive controllers. c. Design auto-tuning control systems based on relay auto-tuner. d. Use CAD package for design and simulation.
Subject Synopsis/ Indicative Syllabus	1. ***System identification***: Lower-order modelling, Frequency response identification, Continuous-time and discrete-time identification, Identification by correlation, Least-squares algorithm, Recursive least-squares, Extended least-squares. Computer implementation of these algorithms. 2. ***Auto-tuning***: PID auto-tuning, Relay auto-tuning, Applications in industry. 3. ***Self-tuning control***: Self-tuning algorithms, Minimum variance and generalised minimum variance, Pole-placement algorithms, Model reference adaptive systems. **Case study:** Individual assignment related to above methods. Students will write a report and present their finding to the class.
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Case studies are designed to supplement the lecturing materials. The students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	√	√	√	
Tutorials	√	√	√	
Case studies	√	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	√	√	√	
2. Case studies	40%	√	√	√	√
Total	100%				

The outcomes on concepts, analysis and design are assessed by the usual means of examination.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	30 Hrs.
	▪ Case study	9 Hrs.
	Other student study effort:	
	▪ Case study preparation/report	19 Hrs.
	▪ Self-study	44 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Reference books:

1. L. Ljung, System Identification: Theory for the User, Upper Saddle River, N.J., Prentice Hall, 1999
2. C.C. Hang, T.H. Lee and W.K. Ho, Adaptive Control, Research Triangle Park, N.C. Instrument Society of America, 1993
3. Selected papers from IEEE Transactions and IEE proceeding and other relevant journals
4. P.E. Wellstead and W. Zarrop, Self-tuning Systems: Control and Signal Processing, Cichester, England: New York; Wiley, 1991
5. K. J. Astrom abd B. Wittenmark, Adaptive control, Reading: Mass., Addison-Wesley, 1995.

Subject Description Form

Subject Code	EE528A
Subject Title	System Modelling and Optimal Control
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. Provide students with a sound knowledge of system modelling techniques in areas of prediction and control. In addition, modern control design techniques will also be introduced.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Model systems using State Variable and Transfer Functions. b. Design optimal controllers for system models. c. Apply computer packages for control system modelling and design. d. Report and present the technical findings in logical and organised manner. e. Practice their knowledge in team work.
Subject Synopsis/ Indicative Syllabus	1. ***System models*****:** State Space Models, State Space Representations of Transfer Functions. 2. ***Optimisations***: Multivariables optimisations; Optimisations with constraints. 3. ***Optimal control*****:** Calculus of variations, Formulation of optimal control problems, Pontryagin maximum principle, Riccati equation, Application to linear regulator, Application to time and fuel optimal systems, Bang Bang control. 4. ***Case Studies*****:** Application of the above topics in the solution of engineering problems. **Laboratory Experiments:** Matlab Fundamentals Transformation of System Models with Matlab Simulations of optimal control systems
Teaching/Learning Methodology	Basic concepts and theories are taught in lectures and tutorials. When conducting the experiments, the students are expected to solve practical control problems with critical and analytical thinking. Interactive assignments and on-the-spot discussions are conducted in both lectures and laboratory sessions. Experiments are designed so that the students should use the references in the instruction sheets to look for the supplementary information.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√		
Tutorials	√	√	√		
Experiments			√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√		
2. Tests	20%	√	√	√		
3. Laboratory performance & reports	10%			√	√	√
4. Assignments & class works	10%	√	√	√		
Total	100%					

The outcomes on concepts, design and applications are assessed by the usual means of examination and tests. The outcomes on analytical skills, problem-solving techniques and practical considerations of designing control systems, as well as technical reporting and teamwork, are evaluated by experiments and the reports.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	30 Hrs.
	▪ Laboratory	9 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	15 Hrs.
	▪ Self-study and assignments	48 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Reference books:

1. M. Gopal: Control Systems, 3rd Edition, Tata McGraw-Hill, 2008.
2. K. Ogata, Modern Control Engineering, Prentice-Hall, 2010
3. F.S. Hillier, Introduction to operations research, McGraw Hill, 2010
4. A.C. Chiang, Elements of Dynamic Optimization, McGraw Hill, 1992

Subject Description Form

Subject Code	EE529A
Subject Title	Power Electronics for Utility Applications
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to understand the problems faced by modern power utilities and how power electronics can overcome these problems. 2. To introduce to students to the various topologies of the power electronics circuits. 3. To provide basic understanding of the emerging power electronics technologies for power utility applications. 4. To enable students to understand the harmonics issues in power utility and means of controlling it using power electronics. 5. To enable students to design power electronics circuit that can control active and reactive power flow.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain why power electronics are needed in modern power system and understand of various emerging power electronics technologies for power utility applications. b. Explain the main topologies of power electronic circuits used in utility applications and how these differ from low power applications. c. Determine the harmonic filter required to satisfy the harmonic standard for a given harmonic load in a power system. d. Identify power electronics topologies for used in controlling active and reactive power in a power system. e. Communicate and work effectively on why and how power electronics can be used for power utility applications in terms of written reports and oral presentations
Subject Synopsis/ Indicative Syllabus	1. Power electronics revolutions in utility applications: High power devices, Power Electronics and utility needs, control of power flow in the utility grid, distributed generation, improvement of electrical energy efficiencies, power quality, an overview of power electronics systems and their applications. 2. Inverters for high power applications: Basic principles of current and voltage source inverters for high power applications, Multi-level Inverters, Analysis of their performance, AC and DC harmonics, Interaction with power grid. 3. Transmission systems: High power issues, Source side model, Power transfer and voltage control issues, Damping of oscillation issues, Power Electronics solutions. 4. Power system harmonic elimination techniques: Harmonics measures, Harmonic models, Harmonics standards, Propagation of Harmonics, Passive Filters, Source side issues, Active Filters. 5. Reactive power compensations: concepts of reactive power, traditional means of controlling reactive powers, Power electronics applications for Static VAr Compensation (SVC), control of SVC, Harmonic issues, Analysis of performance and instabilities, Voltage Source Static Condensers (STATCON). 6. New applications of power electronics for power system controls: Power Electronics for HVDC system, High Power DC-DC Converter, Topology Analysis of HVDC conversion, Flexible AC Transmission Devices, Unified Power Flow Controller (UPFC), Battery Energy Storage Systems, Analysis of performance and Control strategies.

Teaching/Learning Methodology

Lectures and tutorials are the primary means of conveying the basic concepts and theories. Mini-projects are designed to supplement the lecturing materials so that the students are given a design. They are given in the beginning of the study. Students are encouraged to form group to jointly investigate an power electronics utilization problem and they have to present the projects in front of the class.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Tutorials	√	√	√	√	
Mini-project	√				√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Examination	60%	√	√	√	√	
2. Class Test	20%	√	√	√	√	
3. Mini-project & Report	20%	√	√	√	√	√
Total	100%					

It is a high power electronics application subject. The outcomes on concepts, design and applications are assessed by the usual means of examination and test whilst those on analytical skills, problem-solving techniques and practical considerations of power design, as well as technical reporting and teamwork, are evaluated by mini-project and the reports.

Student Study Effort Expected

Class contact:	
▪ Lecture	30 Hrs.
▪ Tutorial/Student presentation	9 Hrs.
Other student study effort:	
▪ Mini-project/report	15 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	100 Hrs.

Reading List and References

Textbooks:

1. V.K. Sood, HVDC and FACTS Controllers: Applications of Static Converters in Power Systems, Kluwer Academic Publishers, 2008.
2. Ghosh and Ledwich, Power Quality Enhancement Using Custom Power Devices, Kluwer, 2002

Reference books:

1. Zhang, Rehtanz and Pal, Flexible AC Transmission Systems: Modelling and Control, Springer, 2006
2. M.H. Rashid, Power Electronics Handbook: Devices, Circuits and Applications, Elsevier, 2005
3. K.W.E.Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002
4. E.Acha, V.Agelidis, O. Anaya-Lara, T. Miller, Power Electronic Control in Electrical Systems, Newnes, 2002.
5. Xi-Fan Wang, Yonghua Song and Malcolm Irving, Modern Power Systems Analysis (Power Electronics and Power Systems), Springer, 2008.

Subject Description Form

Subject Code	EE530A
Subject Title	Electrical Energy-saving Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To enable students to establish a broad concept on energy saving using techniques of electrical engineering. 2. To provide an in-depth knowledge on selected topics of energy-saving systems in electrical engineering. 3. To enable students to understand typical energy storage systems, its associated issues of grid connection and related technical considerations. 4. To enable students to understand the potential of solar energy and characteristics & performance of various kinds solar energy systems. 5. To enable students to understand various techniques and systems for control and monitoring of energy saving, as well as the related communication protocol and interfacing requirements. 6. To enable students to understand control gears for lighting systems and variable speed drives for HVAC systems & elevators.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the operation principle & control strategy of various energy storage systems and topologies of these systems and identify their benefits & impacts. b. Describe the principle and characteristics of various solar energy devices, and identify the potentials of solar energy. Calculate available solar irradiation for a given location. c. Describe the operation principle and characteristics of typical control and monitoring systems for energy saving, including the communication protocols. d. Identify different energy saving control for industrial plants and multi-storey buildings, including giving examples. e. Describe the operation principle and characteristics of typical control gear for lighting and variables speed drives. f. Given a technical topic, carry out literature search and report the findings in a presentation and be able to work and communicate effectively in a team setting.
Subject Synopsis/ Indicative Syllabus	1. ***Energy storage systems:*** Utility Load Factor, peak lopping and valley filling, energy storage systems, battery energy storage, power electronics topologies, control strategy, grid connection, voltage support, power quality improvement, environmental impact, improvement of utility energy efficiencies. 2. ***Solar energy utilization:*** Solar irradiation on earth, potentials of solar energy, solar thermal system systems, photovoltaic systems, characteristics and performance of typical BIPV systems and estimation of its energy output, passive solar devices on buildings for energy saving, and case study. 3. ***Energy saving control and monitoring systems:*** Theory of energy saving, concept of building energy efficiency, control and monitoring systems and some of its related communication protocols. Application examples. 4. ***Lighting, ballast, and variable speed drives:*** Magnetic ballast, electronic ballast, lighting design, fluorescent, LED and HID lamps, variable speed drives for HVAC systems and elevators, harmonics implications. **Laboratory Experiments, Seminars, Site Visits:** Demonstration on operating principles of some selected energy-saving systems. **Case study:** Selections of practical real life energy-saving systems in Hong Kong.
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Practical experiences on power electronics design, energy saving and applications are given through mini-projects. Mini-projects are given in the beginning of the study. Students are encouraged to form group to jointly investigate an industrial problem and they have to present the projects in front of the class.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Lectures	√	√	√	√	√	
Tutorials	√	√	√	√	√	
Mini-project						√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d	e	f
1. Examination	60%	√	√	√	√	√	
2. Class Test	30%	√	√	√	√	√	
3. Mini-project & Report	10%	√	√	√	√	√	√
Total	100%						

It is a fundamental energy saving subject. The outcomes on concepts, design and applications are assessed by the usual means of examination and test whilst those on analytical skills, problem-solving techniques and practical considerations of circuit design, as well as technical reporting and teamwork, are evaluated by experiments, mini-project and the reports.

Student Study Effort Expected	
Class contact:	
▪ Lecture/Tutorial	30 Hrs.
▪ Seminar/Case study	9 Hrs.
Other student study effort:	
▪ Mini-project/report	15 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	100 Hrs.

Reading List and References

Reference books:

Battery Storage Systems

1. D. Andrea, Battery Management Systems for Large Lithium Ion Battery Packs, Artech House, 2010.
2. P.W. Parfomak, Energy storage for Power Grids and Electric Transportation: A Technology Assessment, Congressional Research Service, 2012,
3. Y. Brunet, Energy storage, Wiley, 2010
4. F. S. Barnes, J.G. Levine, Large Energy Storage Systems Handbook, CRC Press, 2011

Solar Energy Utilisation
5. S. Yannas, Solar Energy and Housing Design, Architectural Association, 2005/2006
6. R. Messenger, Photovoltaic Systems Engineering, CRC Press, 2000
7. C. Prapanavarat, Investigation of the Performance of a Photovoltaic AC Module, Generation, Transmission and Distribution, IEE Proceedings, Vol: 149, Issue 4, Jul 2002
8. Web site of Energy Efficiency and Renewable Energy from the Dept. of Energy of USA, http://www.eere.energy.gov/
9. Web site of the Key Centre of Photovoltaic Engineering in University of New South Wales, http://www.pv.unsw.edu.au/

Energy Saving Control and Monitoring Systems
10. EMSD of HKSAR Govt, Code of Practice for Energy Efficiency of Building Services Installation, 2012
11. EMSD of HKSAR Govt, Code of Practice for Building Energy Audit, 2012
12. M. Wiebe, A Guide to Utility Automation: AMR, SCADA, and IT Systems for Electric Power, c1999
13. Bela Liptak, Instrument Engineers' Handbook, 4th Edition, Volume Two: Process Control and Optimization, CRC 2005.

Lighting, Ballast, and Variable Speed Drives
14. J.R. Benya, D.J. Leban, Lighting Retrofit and Relighting: A Guide to Energy Efficient Lighting, John Wiley & Son, 2011
15. M.H. Rashid, Power Electronics Handbook: Devices, Circuits and Applications, Academic Press, 2010
16. Guidelines on Energy Efficiency of Lift and Escalator Installations, 2000 Edition, Electrical and Mechanical Services Department (EMSD), the Government of the HKSAR, Hong Kong
17. K.W.E.Cheng, Design and Fabrication of Electronics and Optical Systems for Advanced Automotive Lighting Systems, The Hong Kong Polytechnic University, 2007

Subject Description Form

Subject Code	ELC1012/ELC1013
Subject Title	English for University Studies (This subject will be offered in two versions for students who will primarily be using (1) APA/Harvard referencing styles or (2) IEEE/Vancouver referencing styles in their university studies.)
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Students entering the University with Level 5 from the HKDSE will be exempted from this subject. They can proceed to Advanced English for University Studies (ELC1014).
Objectives	This subject aims to help students study effectively in the University's English medium learning environment, and to improve and develop their English language proficiency within a framework of university study contexts.
Intended Learning Outcomes *(Note 1)*	Upon successful completion of the subject, students will be able to: a. refer to sources in written texts and oral presentations b. paraphrase and summarise materials from written and spoken sources c. plan, write and revise expository essays with references to sources d. deliver effective oral presentations To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present information logically and coherently.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. Written communication Analysing and practising common writing functions; improving the ability of writing topic sentences and strategies for paragraph development; understanding common patterns of organisation in expository writing; taking notes from written and spoken sources; practisingsummarising and paraphrasing skills; improving coherence and cohesion in writing; developing revision and proofreading skills. 2.Spoken communication Recognising the purposes of and differences between spoken and written communication in English in university study contexts; identifying and practising the verbal and non-verbal interaction strategies in oral presentations; developing and applying critical thinking skills to discussions of issues. 3.Language development Improving and extending relevant features of grammar, vocabulary and pronunciation.
Teaching/Learning Methodology *(Note 3)*	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. The process approach to writing is adopted, and students make use of elearning resources to engage in academic discussions and to reflect on their learning.

	Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.
Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Academic essay 1	30%	√	√	√	
2. Academic essay 2	30%	√	√	√	
3. Oral presentation	40%	√	√		√
Total	100 %				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assessments 1 and 2 necessitate achievement of LOs (a), (b) and (c) in order to write an effective academic essay via the process of extending and improving the essay for assessment 1. In order for students to present an effective academic oral presentation, as demanded in assessment 3, they will need to read, note and synthesise from a variety of sources, and refer to those sources in their presentation (ref. LOs (a), (b) and (d)).

In addition to these assessments, students are required to complete further language training, through web-based language work, reading tasks and online reflections. The additional language training offered in online tasks is aligned with all the four LOs. In some of the tasks, students to critically read and summarise information contained in a variety of sources, as required in LOs (a) and (b).

Student Study Effort Expected	Class contact:	
	▪ Seminars	39Hrs.
	Other student study effort:	
	▪ Self study/preparation	78Hrs.
	Total student study effort	117Hrs.

Reading List and References

Course material

Learning materials developed by the English Language Centre

Recommended references

Comfort, J. (2001). *Effective presentations*. Oxford: Cornelsen& Oxford University Press.

Hung, T. T. N. (2005). *Understanding English grammar: A course book for Chinese learners of English*. Hong Kong: Hong Kong University Press.

McWhorter, K. T. (2012). *The successful writer's handbook*. (2nd ed.). Boston: Longman.

Zwier, L. J. (2002). *Building academic vocabulary*. Ann Arbor, MI: University of Michigan Press.

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	ELC1014
Subject Title	Advanced English for University Studies
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: English for University Studies (ELC1012/ELC1013) (unless exempted)
Objectives	This subject aims to help students study effectively in the University's English medium learning environment, and to improve and develop their English language proficiency within a framework of university study contexts.
Intended Learning Outcomes *(Note 1)*	Upon successful completion of the subject, students will be able to: a. use academic sources appropriately and effectively b. plan, write and revise position argument essays (i.e. one-sided discursive essays) with appropriate referencing; and c. present views effectively and critically in spoken communication 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 logically and persuasively.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. Written communication Developing logical and persuasive arguments; applying a variety of organisation patterns in discursive writing, including the writing of explanatory and evaluative texts; selecting information critically; supporting stance; maintaining cohesion and coherence in discursive writing; achieving appropriate style and tone. 2. Spoken communication Enhancing and practising the specific oral and aural skills required to participate effectively in academic discussions and to present views in a formal academic context. 3. Reading and listening Understanding the content and structure of information in oral and written texts; comprehending, inferring and evaluating messages and attitude. 4. Language development Improving and extending relevant features of grammar, vocabulary and pronunciation.
Teaching/Learning Methodology *(Note 3)*	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. The process approach to writing is adopted, and students make use of elearning resources to engage in academic discussions and to reflect on their learning. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's

	Centre for Independent Language Learning. Additional reference materials will be recommended as required.
Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th></tr><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>1. Position Argument Essay (draft)</td><td>20%</td><td>√</td><td>√</td><td></td></tr><tr><td>2. Position Argument Essay (final)</td><td>45%</td><td>√</td><td>√</td><td></td></tr><tr><td>3. Academic presentation & discussion</td><td>35%</td><td>√</td><td></td><td>√</td></tr><tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr></table> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Assessments 1 and 2 assess the students' abilities in producing a coherent academic text which requires effective use and referencing of sources (ref. LOs (a) and (b)). Assessment 3 assesses their abilities to plan and present their ideas, in two different academic contexts (ref. LOs (a) and (c)). In addition to these assessments, students are required to complete further language training through working on their ePortfolio throughout the course. This will involve students in reading texts and subsequent online writing and discussion that will parallel the process writing approach involved in assessments 1 and 2, and align with all three LOs.
Student Study Effort Expected	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Seminars</td><td>39 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Self study/preparation</td><td>78 Hrs.</td></tr><tr><td>Total student study effort</td><td>117 Hrs.</td></tr></table>
Reading List and References	*Course material* Learning materials developed by the English Language Centre *Recommended references* Faigley, L. (2008). Backpack writing: Reflecting, arguing, informing, analyzing, evaluating. New York, NY: Pearson/Longman. Madden, C. and Rohlck, T. N. (1997). *Discussion and interaction in the academic community*. Ann Arbor, MI: University of Michigan Press. Oshima, A. & Hogue, A. (2006). *Writing academic English* (4th ed.). White Plains, NY: Pearson/Longman. Reinhart, S. M. (2002). *Giving academic presentations.* Ann Arbor, MI: University of Michigan Press. Wood, N. V. (2009). *Perspectives on argument* (6th ed). Upper Saddle River, NJ: Pearson/Prentice Hall.

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	ELC2011
Subject Title	Advanced English Reading and Writing Skills
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: Advanced English for University Studies (ELC1014)
Objectives	This subject aims to help students become more effective readers. It focuses on developing students' facility to read a variety of texts in a critical manner, and to be able to discuss the stance of the writer as well as their own reflective response to a text.
Intended Learning Outcomes	Upon successful completion of the subject, students will be able to examine a variety of texts, including literary texts, and: a. identify salient ideas and implications, and distinguish unsupported claims from supported ones, and fallacies from valid arguments b. produce critical or interpretative texts which discuss and evaluate texts and writer positions c. write and discuss critical responses to various texts 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.
Subject Synopsis/ Indicative Syllabus	1. Reading strategies Reading intensively to investigate a particular topic and develop an in-depth understanding of issues and stances; reading critically to extract implications, distinguish fact from opinion and fallacies from valid arguments, and to identify writers' assumptions and purposes; analysing issues raised in texts written from different perspectives, including literary texts; reading extensively to appreciate the use of language, acquire information, promote understanding and develop empathy. 2. Writing strategies Presenting views and arguments to educated readers; describing and analysing the structure, meaning and characteristics of a variety of texts; discussing writer intentions.

Teaching/Learning Methodology	The study method is primarily seminar-based. Following a blended learning approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations and discussions. The process approach to writing is adopted, and students make use of elearning resources to engage in academic discussions and to reflect on their learning. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Reflective writing	20%			√
2. Analysing texts written in different styles and from various perspectives	40%	√		√
3. Writing a feature article	40%	√	√	√
Total	100%			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assessment 1 requires students to write reflective responses to texts and/or books they have read, and is aligned with LO (c). Assessments 2 and 3 assess LO (a) and involve students employing effective critical reading and thinking skills. Assessment 3 requires students to conduct library/online search and produce a critical text, thus integrating the receptive critical reading skills with the production of a written text which critically assesses the texts they have read. All three assessments assess students' abilities with regard to LO (c) but in different ways, and require students to present and support their interpretation of their reading.

Student Study Effort Expected		
	Class contact:	
	▪ Seminars	39 Hrs.
	Other student study effort:	
	▪ Self study/preparation	78 Hrs.
	Total student study effort	117 Hrs.

Reading List and References	*Course material* Learning materials developed by the English Language Centre *Recommended references* Best, J. (2001). *Damned lies and statistics: Untangling numbers from the media, politicians, and activists.* Berkeley, CA: University of California Press. Cooper, S. & Patton, R. (2010). *Writing logically, thinking critically.* New York, NY: Longman. Damer, T. E. (2009). *Attacking faulty reasoning: A practical guide to fallacy-free arguments.* Belmont, CA: Wadsworth Cengage Learning. Kennedy, X. J. & Gioia, D. (2010). *Literature: An introduction to fiction, poetry, drama, and writing* (11th ed.). New York, NY: Longman. Mefcalfe, M. (2006). *Reading critically at university.* Thousand Oaks, CA: Sage.

Subject Description Form

Subject Code	ELC2012
Subject Title	Persuasive Communication
Credit Value	3
Level	2
Pre-requisite / **Co-requisite/** **Exclusion**	Pre-requisite: Advanced English for University Studies (ELC1014)
Objectives	This subject aims to help students become more persuasive communicators in a variety of contexts that they may encounter at university and in the workplace.
Intended Learning Outcomes *(Note 1)*	By the end of the subject, students should be able to communicate effectively in an English-medium environment through: a) writing persuasive texts intended for a variety of audiences b) communicating persuasively in oral contexts c) make persuasive arguments in formal discussions To achieve these, students are expected to use language and text structure appropriate to the context, select information critically, and present and support stance and opinion.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. Preparing for effective persuasion Assessing the situation; selecting relevant content; organising ideas and information; selecting an appropriate tone, distance and level of formality to support the communication of messages. 2. Persuasion through writing Developing and practising appropriate language, tone, style and structure; achieving cohesion and coherence. 3. Persuasion through speaking Developing and practising appropriate verbal and non-verbal skills for persuasive oral communication; improving and extending relevant pronunciation features, including articulation, pausing, intonation, word stress and sentence stress.
Teaching/Learning Methodology *(Note 3)*	The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving reading and appreciating texts, discussions and presentations of ideas. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes
(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c			
1. Speech	30%		√				
2. Persuasive written text	40%	√		√			
3. Debate	30%		√				
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assessment 1 is an individual speech. Assessment 2 concentrates on persuasive writing. Assessment 3 examines a different aspect of persuasion, the debate.

Student Study Effort Expected	
Class contact:	
▪ Seminars	39 Hrs.
Other student study effort:	
▪ Self study/preparation	78 Hrs.
Total student study effort	117 Hrs.

Reading List and References

Required readings

ELC-provided subject materials.

Other readings

Breaden, B. L. (1996). *Speaking to persuade.* Fort Worth, TX: Harcourt Brace College.

Covino, W.A. (1998). *The elements of persuasion.* Boston: Allyn and Bacon.

Edwards, R. E. (2008). *Competitive debate: The official guide.* New York: Alpha Books.

Leanne, S. (2008). *Say it like Obama: The power of speaking with purpose and vision.* New York: McGraw Hill.

Rogers, W. (2007). *Persuasion: messages, receivers, and contexts.* Lanham, MD: Rowman & Littlefield Publishers.

Stiff, J. B. (2003). *Persuasive communication* (2nd ed.). New York: Guilford Press.

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	ELC2013
Subject Title	English in Literature and Film
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: Advanced English for University Studies (ELC1014)
Objectives	This subject aims to introduce students to a range of literary genres in English as well as to enable them to consider differences in media representations of genres, and to appreciate and negotiate the meanings of a variety of literary texts. It is also intended that the subject will help students further develop literacy, as well as higher order thinking and life-long learning skills.
Intended Learning Outcomes *(Note 1)*	Upon successful completion of the subject, students will be able to: a. examine and analyse literary texts from different perspectives b. discuss literary techniques employed by writers c. appreciate and articulate differences in textual and visual media representations 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.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	1. Written communication Describing and interpreting content and language in literary texts; employing appropriate grammatical structures and vocabulary. 2. Spoken communication Presenting critical evaluation of literary works effectively and convincingly. 3. Reading Developing understanding of and competence in using literary devices such as metaphor, simile and symbolism, via reading literary texts and viewing film versions. 4. Language development Improving fluency and pronunciation, and extending grammatical and lexical competence.

Teaching/Learning Methodology *(Note 3)*	The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving listening to and viewing a variety of audio-visual sources, reading and drafting texts, conducting internet research, making mini-presentations, participating in discussions, and comparing various representations of literature. Students will make use of elearning resources and web-based work to further improve their English literacy skills. Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC's Centre for Independent Language Learning. Additional reference materials will be recommended as required.
Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Individual paper	30%	√	√	
2. Written test	40%	√	√	√
3. Group project	30%	√	√	√
Total	100 %			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

In assessment 1, students are required to write an individual paper in which they critically reflect on their reading of prose, and by so doing, demonstrate their achievement of LO (a). Assessments 2 and 3 are aligned with all three LOs. Assessment 2 assesses students' understanding of a literary drama and requires comparison of the merits of its textual and theatrical versions. Assessment 3 is a group project that requires reading and interpretation of more creative literature and presentation of audio-visual sources.

Student Study Effort Expected	Class contact:	
	▪ Seminars	39 Hrs.
	Other student study effort:	
	▪ Self study/preparation	78 Hrs.
	Total student study effort	117 Hrs.

Reading List and References	*Recommended reading* The PolyU library retains either hardcopies or electronic copies of the following titles. The titles can also be found online. Stam, R., and Raengo, A. (eds.). (2004). *A companion to literature and film*. [electronic source] Blackwell reference online. Malden: Blackwell. Call number PN1995.3.C65 2004eb http://www.blackwellreference.com/subscriber/uid=262/book?id=g9780631230533_9780631230533&authstatuscode=202 Other readings will be specified by the ELC teacher, and may contain short fiction, novelettes, plays and poetry.

Note 1: Intended Learning Outcomes
Intended learning outcomes should state what students should be able to do or attain upon completion of the subject. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/ Indicative Syllabus
The syllabus should adequately address the intended learning outcomes. At the same time over-crowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method purports to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

Subject Description Form

Subject Code	ELC3521
Subject Title	Professional Communication in English
Credit Value	2
Level	3
Pre-requisite / Co-requisite	English LCR subjects
Objectives	This subject aims to develop the language competence for professional communication in English required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals.
Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in English, students will be able to: a. plan, organise and produce professionally acceptable project proposals with appropriate text structures and language for different intended readers b. plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences c. adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences
Subject Synopsis/ Indicative Syllabus	1. Project proposals in English • Planning and organising project proposals • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the literature to substantiate project proposals • Describing the methods of study • Describing and discussing project results, including anticipated results and results of pilot study • Presenting the budget, schedule and/or method of evaluation • Writing executive summaries/abstracts 2. Oral presentations of projects in English • Selecting content for audience-focused presentations • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in team presentations • Using effective verbal and non-verbal interactive strategies
Teaching/Learning Methodology	<u>Learning and teaching approach</u> The subject is designed to develop the students' English language skills, both oral and written, that students need to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects. The study approach is primarily seminar-based. Seminar activities include instructor input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations. The learning and teaching activities in the subject will focus on a course-long project which will engage students in proposing and reporting on an engineering-related project to different intended readers/audiences. During the course, students will be involved in: - planning and researching the project - writing project-related documents such as project proposals - giving oral presentations to intended stakeholders of the project <u>Collaboration of input/support from the English Language Centre and the Engineering discipline</u> Students of this subject will also take the subject *Professional Communication in Chinese*, and will work on the same project in both subjects. In producing professionally acceptable documents and delivering effective presentations, students will be engaged in the use of appropriate Chinese and English language and skills, as well as applying knowledge learned in their Engineering subjects. As such, the planning, design and implementation of the teaching and learning activities and assessments will involve collaboration between the teaching staff from the CLC, the ELC, and staff from the Engineering discipline.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Project proposal in English	60%	✓		✓
2. Oral presentation of project proposal in English	40%		✓	✓
Total	100 %			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

1. The assessments will arise from the course-long engineering-related project.
   - Students will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students' ability to select content and use language and style appropriate to the purposes and intended readers/audiences.
   - Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. The written proposals will be individual work to ensure that students will be rigorously engaged in the application of language skills for the entire document.
2. There will be collaboration between the teaching staff from the English Language Centre and the discipline in assessing students' performances. It is expected that the teaching staff of the Engineering discipline will provide support in assessing students' application of discipline knowledge. They will be involved in assessing the oral presentations intended for experts rather than those for laymen.

<table>
<tr><td></td><td>3. Hence the assessment pattern will be as follows:
<table>
<tr><th>Assessment type</th><th>Intended readers/audience</th><th>Timing</th><th>Assessors</th></tr>
<tr><td>(English)
Written proposal in English
– Document of around 1,500 words for the initial proposal</td><td>Mainly engineering experts</td><td>Week 8</td><td>ELC and Engineering staff</td></tr>
<tr><td>(English)
Oral presentation of project in English
– Team presentation of 30 minutes, in groups of 4
– Simulating a presentation of the final proposal</td><td>Mainly non-experts</td><td>Weeks 12-13</td><td>ELC</td></tr>
</table></td></tr>
<tr><td rowspan="5">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Seminars</td><td>26 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Researching, planning, writing, and preparing the project</td><td>52 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>78 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Beer, D. F. (Ed.). (2003). Writing and speaking in the technology professions: A practical guide (2nd ed.). Hoboken, NJ: Wiley.
Johnson-Sheehan, R. (2008). Writing proposals (2nd ed.). New York, NY: Pearson/Longman.
Kuiper, S. (2007). Contemporary business report writing (3rd ed.). Cincinnati, OH: Thomson/South-Western.
Lawrence, M. S. (1975). Writing as a thinking process: Teacher's manual. Ann Arbor, Mich: University of Michigan Press.
Reep, D. C. (2006). Technical writing: Principles, strategies and readings (6th ed.). New York, NY: Pearson/Longman.</td></tr>
</table>

Subject Description Form

Subject Code	ENG1003
Subject Title	Freshman Seminar for Engineering
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: (1) Introduce students to the engineering broad discipline and enthuse them about their major study (2) Cultivate students' creativity and problem-solving ability, and global outlook (3) Introduce students to the concept of entrepreneurship (4) Engage the students in desirable forms of learning at university that emphasizes self-regulation, autonomous learning and deep understanding
Intended Learning Outcomes	Upon completion of the subject, students will: (a) Be able to demonstrate an understanding and an enthusiasm about the engineering broad discipline and their major study (b) Develop their problem-solving ability and global outlook (c) Be able to demonstrate an understanding of entrepreneurship (d) Be able to search for information, formulate a project plan, and manage a project with initiative *(e)* Be able to demonstrate an understanding of academic integrity.
Subject Synopsis/ Indicative Syllabus	***1. Online Tutorial on Academic Integrity (3 Hrs.*)*** Students will be required to complete successfully an Online *Tutorial on Academic Integrity* on or before week 5 of the first semester. The students will understand the importance of academic integrity by completing the Online Tutorial. ***2. Renowned Speaker Seminars (6 Hrs.*)*** The Renowned Speaker Seminar will be given by a renowned speaker to introduce to students the engineering broad discipline and to enthuse them about their major study. The seminars will also cultivate students' global outlook. ***3. Departmental Seminar (12 Hrs.*)*** The Departmental Seminar will be delivered by senior academic staff and/or reputable professionals in the engineering broad discipline to arouse students' interests in engineering and to cultivate their understanding of and sense of belonging to the discipline and the engineering profession. ***4. Freshman Project (42 Hrs.*)*** There will be practical workshops, presentation and demonstration sessions for the Freshman Project. The freshman project aims at developing students' creativity, problem-solving skills, and team-work abilities through practical and hands-on tasks at a level commensurate with their first-year engineering backgrounds. Students will work in small groups under the guidance of teachers/instructors to design and implement an engineering solution to some given problems. ***5. Entrepreneurship Project (42 Hrs.*)*** The entrepreneurship project is designed to develop students' appreciation and understanding about entrepreneurship and the commercialization process by attending lectures, workshops and tutorials. In the course of the Entrepreneurship Project, students will identify technology opportunities and learn the skills of preparing a simple business plan. (* Note: Hrs. indicate total student workload)
Teaching/Learning Methodology	***Online Tutorial on Academic Integrity*** The *Online Tutorial on Academic Integrity* is developed by the University to help the students understand the importance of academic integrity. By going through the Online Tutorial, students will be aware of the importance of upholding academic integrity during University study. They will also learn good practices by which to stay clear of dishonest behaviors and academic plagiarism. ***Seminars*** The renowned speaker seminars and departmental seminars are designed to arouse students' interest about engineering. The delivery mode will be *interactive* and *engaging*. Students will be motivated to make preparation by searching for information and doing background reading. They will be encouraged to raise questions and discuss with the presenters. Assessment tasks (quizzes) will be designed to measure students' learning outcomes as well as to encourage participation and interaction. ***Freshman Project*** For the Freshman Project, students will work collaboratively with their group members to design and implement an engineering solution to a given problem under the guidance of instructors. There will be close staff-students and students-students *interaction*. Students will be given opportunities to develop creativity, problem-solving skills and team-work abilities. Assessment tasks will consist of demonstration, presentation, reports, and reflective essay writings. These are designed to evaluate individual student's performance and achievement as well as to encourage active participation. ***Entrepreneurship Project*** There will be lectures, workshops, and tutorials. A general overview of the concepts required to conduct the project will be provided to students through lectures. They will then work in small groups in a workshop to appreciate the essential elements in the development of a business plan and subsequently to produce a simple business plan and to present it to fellow classmates. Assessment will focus towards students' understanding about entrepreneurship, innovation and creativity.

Assessment Methods in Alignment with Intended Learning Outcomes

Students' performance in this subject will be assessed by using a letter-grading system in accordance with the University's convention from grade F (failure) to A+. The relative weights of the different assessment components are as follows:

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
Online Tutorial on Academic Integrity	0%					✓
Seminars Quizzes	20%	✓				
Freshman Project Project demonstration, presentation, report and reflective essay writing	40%		✓		✓	
Entrepreneurship Project Business plan	40%			✓	✓	
Total	100 %					

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Quizzes (online or paper-based) can measure the students' *understanding* about the engineering discipline. Through reflective essays, students can reflect on their appreciation and understanding about the *engineering* discipline. Through project demonstration, presentation and project reports, students can demonstrate their *creativity*, *problem-solving skills* and *team-work abilities*. They can also demonstrate their *ability to search for information*, *formulate a project plan*, and *manage a project with initiative*. Through business plan, students can demonstrate their understanding about *entrepreneurship*.

Pass Conditions

In order to pass this subject, students must obtain a Grade D or above for total marks comprising the Seminars, Freshman Project and Entrepreneurship Project as described here AND pass the Online Tutorial on Academic Integrity on or before week 5 of semester 1 as described in the previous section.

Student Study Effort Expected

Class contact:	
▪ Introduction and pre-seminar meeting	3 Hrs.
▪ Freshman project: 3 Hrs. per week for 5 weeks	15 Hrs.
▪ Entrepreneurship project: 3 Hrs. per week for 5 weeks	15 Hrs.
▪ Renowned Speaker Seminar and Departmental Seminars	3 Hrs.
Other student study effort:	
▪ 69 Hrs. (for Online Tutorial on Academic Integrity; background information search, project work, preparing and doing quizzes after seminars, meeting and discussion, preparation for presentation and demonstration, and report writing.)	69 Hrs.
Total student study effort	105 Hrs.

Reading List and References

H. Scott Fogler and Steven E. LeBlanc, *Strategies for creative problem solving*, Upper Saddle River, N.J. : Prentice Hall, 2008

N.J. Smith (ed), *Engineering project management*, Oxford, UK; Malden, MA: Blackwell, 2008

Gene Moriaty, *The engineering project: its nature, ethics, and promise,* University Park, Pa.: Pennsylvania State University Press, 2008.

K. Allen, *Entrepreneurship for scientists and engineers*, Upper Saddle River, N.J. : Prentice Hall, 2010.

Subject Description Form

Subject Code	ENG2001
Subject Title	Fundamentals of Materials Science and Engineering
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To realize the impact of the development of engineering materials on human civilization; 2. To enable students to establish a broad knowledge base on the structure and properties of materials for solving engineering problems. 3. To enable students to understand the applications and selection of engineering materials based on the consideration of properties, cost, ease of manufacture, environmental issues and their in service performance.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. comprehend the importance of materials in engineering and society; b. explain the properties and behaviour of materials using fundamental knowledge of materials science. c. apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials; d. select appropriate materials for various engineering applications taking into consideration of issues in cost, quality and environmental concerns.
Subject Synopsis/ Indicative Syllabus	1. Introduction Historical perspective; Evolution of engineering materials; Materials science and engineering; Classification of materials 2. Atomic Structure and Structures of Materials Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystalline and non-crystalline materials; Phase diagram and microstructure of alloys 3. 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 photovoltaics; Light propagation in optical fibers; Liquid crystal; Photoelasticity 4. Mechanical Properties of Materials Concept of stress and strain; Stress-strain behaviour; Elastic and plastic properties of materials; Concepts of dislocations and strengthening mechanisms; Tensile properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Impact energy, Fracture toughness; Design and safety factors

	5. Introduction to Failure Analysis and Prevention Fundamentals of fracture: ductile, brittle, fatigue and creep; Corrosion; Nondestructive testing; Techniques for failure analysis and prevention 6. Selection of Engineering Materials Characteristics of metallic, polymeric, ceramic, electronic and composite materials; Economic, environmental and recycling issues
Teaching/Learning Methodology	The subject will be delivered mainly through lectures but tutorials, case studies and laboratory work will substantially supplement which. Practical problems and case studies of material applications will be raised as a focal point for discussion in tutorial classes, also laboratory sessions will be used to illustrate and assimilate some fundamental principles of materials science. The subject emphasizes on developing students' problem solving skills.
Assessment Methods in Alignment with Intended Learning Outcomes	(see table below)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Assignments	15%	√	√	√	√
2. Test	20%		√	√	√
3. Laboratory report	5%		√	√	
3. Examination	60%		√	√	√
Total	100 %				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The assignments are designed to reflect students' understanding of the subject and to assist them in self-monitoring of their progress.

The laboratory report is designed to assess the capability of students in analyzing and reporting experimental data relates to learning outcome (b).

The test and examination are for determining students' understanding of key concepts as well as for assessing their achievement of the learning outcomes.

Student Study Effort Expected		
	Class contact:	
	▪ Lectures, tutorials, practical	39Hrs.
	Other student study effort:	
	▪ Guided reading, assignments and reports	37Hrs.
	▪ Self-study and preparation for test and examination	47Hrs.
	Total student study effort	123Hrs.

Reading List and References	1. William D. Callister, Jr., David G. Rethwisch, *Fundamentals of materials science and engineering,* 4th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-53126-6 2. William D. Callister, Jr., David G. Rethwisch, *Materials Science and Engineering*, 8th edition, *E-Text* John Wiley & Sons; ISBN: 978-1-118-37325-5 3. Materials World (Magazine of the Institute of Materials, Minerals and Mining)

Subject Description Form

Subject Code	ENG2002
Subject Title	Computer Programming
Credit Value	3
Level	2
Pre-requisite / Co-requisite / Exclusion	Nil
Objectives	(i) To introduce the fundamental concepts of computer programming (ii) To equip students with sound skills in C/C++ programming language (iii) To equip students with techniques for developing structured and object-oriented computer programs (iv) To demonstrate the techniques for implementing engineering applications using computer programs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: Category A: Professional/academic knowledge and skills 1. Familiarize themselves with at least one C/C++ programming environment. 2. Be proficient in using the basic constructs of C/C++ 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. Be able to solve problems by using systematic approaches in a team.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Introduction to programming - Components of a computer; Programming environment; Process of application development. 2. Bolts and Nuts of C/C++ - Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators. 3. Program Flow Control - Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables. 4. Program Design and Debugging - Structured program design; Modular programming; Exceptions and debugging. Case study: Using the Visual C++ debugger. 5. Basic Object Oriented Programming - Objects and classes; Private versus public; Implementing class methods; Constructors and destructors.

	6. Pointer and Array - Stack and Free store; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command-line processing. 7. Stream I/O - Input and output as streams; File I/O using streams. 8. Using C/C++ in Engineering Applications - Solving practical problems using C/C++; Developing graphical user interfaces for engineering applications.
Teaching/Learning Methodology	

Teaching and Learning Method	**Intended Subject Learning Outcome**	**Remarks**
Lectures, supplemented with short quizzes	2,3,4	Students are introduced to the knowledge of computer programming through explanation and illustrative examples. Comprehension of the knowledge is strengthened with short quizzes. Students will be able to monitor the skills of using C/C++ and apply the techniques of developing structured object-oriented applications.
Laboratories/tutorials where problems are given to students for them to solve	1,2,3,4,5	Students apply what they have learnt in lectures and solve problems in exercises. The purpose is to ensure students have captured the important points. Tutors will aid the lecturer in helping the students finishing the exercises, and interactive Q&A will take place.
Homework, and tests	1,2,3,4,5	Through working homework, students will develop a firm understanding and comprehension of the knowledge taught. They will analyse given C/C++ applications and apply knowledge in solving problems. For some design type of problems, they will have to synthesize solutions by evaluating different alternatives. To assure students' understanding of fundamental concepts, closed-book tests are arranged regularly. To enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly.
Mini-project	1,2,3,4,5,6	After all the subject materials have been delivered, students are asked to finish a mini-project in a team. The project involves a practical engineering problem of some stated specification.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		1	2	3	4	5	6
1. In-class exercises	10%	√	√	√	√	√	
2. Short-quizzes	10%		√	√	√		
3. Closed-book tests	20%	√	√	√	√	√	
4. Programming tests	30%	√	√	√	√	√	
5. Mini-project	30%	√	√	√	√	√	√
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The short-quizzes are for assessing the understanding of fundamental concepts. The in-class exercises, closed-book tests and programming tests are conducted to help students familiarized with the programming language and skills. The problems to be solved by the students are typically presented as practical engineering problems. Through conducting a mini-project that lasts for several weeks, students would be able to experience how to solve problems by using a systematic approach in a team.

Student Study Effort Expected (Within TWO semesters)		
	Class contact:	63 Hrs.
	▪ Lecture	29 Hrs.
	▪ Tutorial	19 Hrs.
	▪ Test/Quiz	14 Hrs.
	▪ Mini-project presentation	1 Hrs.
	Other student study effort:	58 Hrs.
	▪ Self-studying	37 Hrs.
	▪ Homework	13 Hrs.
	▪ Mini-project/Report	8 Hrs.
	Total student study effort	121 Hrs.

Reading List and References

Reference Books:

1. S. Rao, Sams Teach Yourself C++ in One Hour a Day. Indianapolis, IN: Sams, 2012.
2. P.J. Deitel and H.M. Deitel, *C++ How To Program*, 8th ed. Boston, MA: Prentice Hall, 2012.
3. J. Liberty and R. Cadenhead, Sams Teach Yourself C++ in 24 Hrs. (5th ed.) Indianapolis, IN: Sams, 2011.
4. I Horton, Ivor Hortons Beginning Visual C++ 2010 [electronic resource]. Indianapolis, IN: Wiley, 2010.

Subject Description Form

Subject Code	ENG2003
Subject Title	Information Technology
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To provide the foundation knowledge in internet applications, computer networks and database management that is essential to modern information system design
Intended Learning Outcomes	Upon completion of the subject, students will be able to: Category A: Professional/academic knowledge and skills 1. Understand the functions and features of modern computers and operating systems. 2. Understand the client-server architecture and be able to set up multiple internet applications. 3. Understand the principles of computer networks and be able to set up simple computer networks. 4. Understand the basic structure of a database system and be able to set up a simple database system. Category B: Attributes for all-roundedness 1. Solve problems using systematic approaches.
Subject Synopsis/ Indicative Syllabus	1. Introduction to computers Introduction to information technology using Cloud Computing as a real life example. Introduction to modern computers (Personal Computers/Computer Clusters) and operating systems (Resource Management/Privilege Control). 2. Computer Networks Introduction to computer networks (Client-Server Architecture). Study different internet applications (HTTP/FTP/DNS). Explain basic concepts on packet routing (Data Encapsulation/IP Addressing/Functions of Router). Introduction to basic network security measures. 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 design, implementation and management.
Teaching/Learning Methodology	There will be a mix of lectures, tutorials and laboratory sessions/workshops to facilitate effective learning. Students will be given case studies to understand and practice the usage of modern information systems.

Assessment Methods in Alignment with Intended Learning Outcomes	See table below

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		A1	A2	A3	A4	B1
1. Continuous Assessment	50%	√	√	√	√	
2. Examination	50%	√	√	√	√	√
Total	100 %					

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The assessment methods include an end-of-subject examination (50%), quizzes in lectures (20%), five laboratory sessions/workshops (20%), and quizzes in tutorial sessions (10%). The examination and quizzes cover intended subject learning outcomes A1, A2, A3, A4 and B1. The laboratory sessions/workshops cover intended subject learning outcomes A2, A3, A4, and B5.
The examination is a 2-hour, closed-book examination, quizzes in lectures are open-book quizzes, and quizzes in tutorial sessions are closed-book quizzes. The laboratory sessions/workshops give students hands-on experience on setting up internet-applications, building up computer networks, and constructing database.

Student Study Effort Expected	Class contact:	
	▪ Lectures (18), tutorials (6), and workshops (15)	39 Hrs.
	Other student study effort:	
	▪ Workshops preparation (6/workshop)	30 Hrs.
	▪ Self study (3/week)	39 Hrs.
	Total student study effort	108 Hrs.

Reading List and References

1. B. Williams and S. Sawyer, *Using Information Technology: A Practical Introduction to Computers and Communications*, 10th ed., McGraw-Hill, 2013.
2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 6th ed., Pearson, 2012.
3. D. E. Comer, *Computer Networks and Internets: with Internet Applications*, 5th ed., Prentice-Hall, 2008.
4. B. A. Forouzan, *TCP/IP Protocol Suite*, 4th ed., McGraw-Hill, 2009.
5. W. Stalling, *Data and Computer Communications*, 9th ed., Prentice-Hall, 2011.
6. P. Rob and C. Coronel, *Database Systems: Design, Implementation, and Management*, 9th Edition, Thomson, 2011.
7. M. Mannino, *Database Design, Application Development, & Administration*. 5th ed., McGraw-Hill, 2011.

Subject Description Form

Subject Code	ENG3002
Subject Title	Multidisciplinary Project
Credit Value	6
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	Engineering practice is often conducted in groups of professionals with different backgrounds. Hence students will be benefited from doing a multidisciplinary project with members from different fields. This provides them with the chance to apply knowledge and skills in a more realistic setting involving group work. The objectives of this course are: 1. To provide students with opportunities to operate in a multidisciplinary team to accomplish specific tasks in the project. 2. To enable students to analyze engineering problems and synthesize solutions while considering various constraints. 3. To provide students with opportunities to operate within a multidisciplinary group for the accomplishment of the overall objectives of the project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> 1. Understand the background, objectives (time, cost, and technical requirements), and deliverables of the project. 2. Realize applicable constraints, and produce optimal results, when designing a solution to an engineering problem. 3. Apply professional skills and knowledge in engineering to achieve the objectives of the project and to produce the deliverables. 4. Use the appropriate tools and facilities to develop the product/prototype for the project. <u>Category B: Attributes for all-roundedness</u> 5. Communicate effectively. 6. Work in a multidisciplinary team with people from different backgrounds.
Subject Synopsis/ Indicative 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 students 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
	Structured Study • *Project definition: time, cost, and technical requirements; constraints, values and challenges; project scope, deliverables and process* • *The stakeholders; project organization; roles of the Project Manager* • *Project life cycle; strategies for managing multi-projects* • *Project planning; project scheduling: critical path method; resource levelling; time-cost trade-off* **Project Execution** This is the major part of the project. The contribution of each individual within the group will be specified before implementation of the project plan. After the specification is done, the project team will work towards achievement of the project objectives and produce the project deliverables in accordance with the schedule and budget constraints. The students and the project supervisor(s) will meet regularly to discuss the progress. In particular the following should be demonstrated: 1. Adherence to the schedule 2. Division of labour and collaboration among students towards accomplishing the overall objectives of the project 3. The group meets regularly to review progress of the project. These meetings are led by the students 4. Initiatives of the students to work, design, and to solve problems 5. Inquisitiveness of the student (e.g. to probe into different phenomena or to try different approaches) 6. Tenacity and resourcefulness of the students to achieve the project objectives 7. Systematic documentation of data, design, results, …etc. throughout the project process ***Structured Study*** • *Key performance indicators. Project problems. Risk management* • *Work break down structure. Project cost control.* **Project Report** On completion of the project, it is important that the student is able to disseminate the results for others to review. 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 to be kept by each individual student 2. Project report (hardcopy and softcopy) 3. Presentation and Oral Examination
Teaching/Learning Methodology	Structured study will be provided to the students so that they learn how to plan, design, and evaluate a project. Then, the project team will meet the project supervisor regularly to discuss their project design, information searching, implementation, testing, trouble-shooting, report writing, and presentation. The students in a group will meet more frequently themselves to conduct the project. The students' progress will be documented in their log-books and the supervisor will give them continuous feedback and comments with regard to the extent to which the students have adhered to the schedule, and the quality of their works over time.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		1	2	3	4	5	6
Group Assessment:							
1. Communication and progress management	10%					√	√
2. Product/prototype development and demonstration	15%	√	√	√	√		
Individual Assessment:							
3. Structured study	15%	√	√				
4. Teamwork skills, originality and resourcefulness	10%		√	√	√	√	√
5. Project proposal, log-book, oral presentation, project report	15%	√	√	√	√	√	√
6. Technical competence	35%		√	√	√		
Total	100%						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Students are evaluated based on their performances working as a group member and their individual contributions to their projects.

1. Through the evaluation of the students' performance in terms of communication and progress management, they can demonstrate their communication skills and their ability to work with people in a multidisciplinary team. This addresses learning outcomes (5) and (6).
2. Through the development of a product/prototype and the set-up of a demonstration, students can show their understanding of the project and the ways to accomplish its goals. This addresses learning outcomes (1) to (4).
3. Through the structured study provided to the students, they can demonstrate how to plan, implement, and evaluate their projects. This addresses learning outcomes (1) and (2).
4. Through the assessment of leadership skills, teamwork skills, originality and resourcefulness in the development of the product/prototype, students can demonstrate their ability in the design of the solution to an engineering problem, the application of their knowledge, the use of appropriate tools, and working as an effective member of a team. All these address learning outcomes (2) to (6).
5. Through the project proposal, log-book, presentations, and project report, students will demonstrate their understanding of the project. They will document the progress of the project throughout the entire project period, can give detailed explanations of their design, solution, use of tools and results, and can communicate their achievement to an audience. Hence, all 6 learning outcomes can be assessed.
6. Through the technical competence of the individual students, their capability in designing and implementing a project can be assessed. This will address learning outcomes (2) and (3).

Student Study Effort Expected	Class contact:	
	▪ Structured study (2 Hrs. per week for 6 weeks)	12 Hrs
	▪ Meeting with project supervisor (1 Hrs. per week)	26 Hrs.
	▪ Meeting among the group members (3 Hrs. per week) - search for information, study the background knowledge, design, implement solutions, testing, trouble-shooting	78 Hrs.
	Other student study effort:	
	▪ Reports writing, preparing for presentation and oral examination	94 Hrs.
	Total student study effort	**210 Hrs.**

Reading List and References

General Text:

N.J. Smith (ed), *Engineering project management*, Oxford, UK ; Malden, MA : Blackwell, 2008

Gene Moriaty, *The engineering project: its nature, ethics, and promise*, University Park, Pa.: Pennsylvania State University Press, 2008.

Weissman, Jerry, *The power presenter: technique, style, and strategy from America's top speaking coach*, Hoboken, N.J.: Wiley, c2009.

Specific Text:

To be prescribed by the project supervisor.

Subject Description Form

Subject Code	ENG3003
Subject Title	Engineering Management
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with: 1. A practical introduction to management and a comprehensive guide to the tools and techniques used in managing people and other resources. 2. Opportunities to trace the historical development and describe the functions of management, from planning, and decision making to organizing, staffing, leading, motivating, and controlling. It also includes a discussion on engineering ethics. 3. Opportunities to explore the core business strategy, technology, and innovation, and exam how these functions intertwine to play a central role in structural design, as well as supporting an organization's overall success.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. perform tasks in an organization related to organizing, planning, leading and controlling project and process activities; b. select appropriate management techniques for improving organizational structures, work procedures, and quality performance of operational tasks; c. analyze the factors that affect changes in the work environment, and be aware of the approaches in implementing change in an organization; d. be aware of the imperatives of ethical and business behaviors in engineering organizations in a fast-changing business environment.
Subject Synopsis/Indicative Syllabus	1. Introduction General management concepts in organizations; Functions and types of industrial organizations; Organizational structures; Corporate objectives, strategy, and policy 2. Industrial Management Roles of managers: Process of management, leadership, planning, organizing, motivating, and control of social and engineering activities; Quality management: Related tools and techniques 3. Project Management Project scope and objectives; Network analysis; Tools that support engineering operations and task scheduling 4. Management of Change Strategic leadership and innovation; Organizational change; Leading planned change; Organizational development; Stress management; Factors that affect the execution of change
	5. Effects of Environmental Factors The effects of extraneous factors on the operations of engineering organizations, such as ethics and corporate social responsibilities issues
Teaching/Learning Methodology	A mixture of lectures, tutorial exercises, and case studies are used to deliver various topics in this subject. Some topics are covered by problem-based format whenever applicable in enhancing the learning objectives. Other topics are covered by directed study so as to develop students' "life-long learning" ability. The case studies, largely based on real experience, are designed to integrate the topics covered in the subject and to illustrate the ways various techniques are inter-related and applied in real life situations.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Coursework • Group learning activities (20%) • Final presentation (individual presentation and group report) (20%)	40%	√	√	√	√
2. Final examination	60%	√	√	√	√
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The coursework of this subject involves students working in groups to study cases that reflect the realities of management situations in an engineering setting. Through such exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their written reports on these case studies. A written final examination is also designed to assess the intended learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lectures and review	27 Hrs.
▪ Tutorials and presentations	12 Hrs.
Other student study effort:	
▪ Research and preparation	30 Hrs.
▪ Report writing	10 Hrs.
▪ Preparation for oral presentation and examination	37 Hrs.
Total student study effort	116 Hrs.

Reading List and References	1. Introduction to Management, Schermerhorn, 12th Edition, John Wiley, 2013 2. Fundamentals of Management - Global 8th ed by Robbins, De Cenzo and Mary, Pearson, 2013 3. Morse, L C and Babcock, D L, 2010, Managing Engineering and Technology: an Introduction to Management for Engineers, 5th Ed., Prentice Hall 4. White, M A and Bruton, G D, 2010, The Management of Technology and Innovation: A Strategic Approach, 2nd Ed., , Cengage Learning

Subject Description Form

Subject Code	ENG3004
Subject Title	Society and the Engineer
Credit Value	3
Level	3
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject is designed for engineering students as a complementary subject on the role of the professional engineer in practice and their responsibilities toward 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 and its relationship between technology and the environment, as well as the implied social costs and benefits; 2. understand the social, political, legal, and economic responsibilities and accountability of the engineering profession and the organizational activities of professional engineering institutions; 3. be aware of the short-term and long-term effects related to safety and health of technology applications; 4. observe the professional conduct as well as the legal and other applicable constraints related to various engineering issues.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify and evaluate the effects of technology applications in the social, cultural, economic, legal, health, safety, environment, and dimensions of the society; b. explain the importance of local and international professional training, professional conduct, ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord; c. evaluate in a team setting the implications of a specific project in the eight dimensions of project issues related to engineers, and present the findings to laymen and peers.
Subject Synopsis/ Indicative Syllabus	1. Impact of Technology on Society Innovation and creativity; History and trends of technology on social and cultural developments of society 2. Environmental Protection and Related Issues Roles of the engineer in energy conservation, ecological balance, and sustainable development 3. Outlook of Hong Kong's Industry Support organizations and impacts on economic development in Greater China and the Pacific Rim
	4. Industrial Health and Safety The Labour Department and the Occupational Health and Safety Council; Legal dimensions such as contract law and industrial legislation 5. Professional Institutions Local and overseas professional institutions; Washington Accord and the qualifications and criteria of professional engineers 6. Professional Ethics Prevention of bribery and corruption; The work of the Independent Commission Against Corruption (ICAC); Social responsibilities of engineers
Teaching/Learning Methodology	Class comprises short lectures to provide essential knowledge and information on the relationships between society and the engineer under a range of dimensions. Other methods include discussions, case studies, and seminars to develop student's in-depth analysis of the relationship. Students form groups; throughout the course, they will work on engineering cases by completing the following learning activities: 1. Case analysis where students provide weekly summary reports on the relationships between society and the engineering issues of a project under specific dimensions; 2. The final report as a case portfolio which includes i. Presentation slides ii. Feedback critique iii. Weekly summary report iv. Reflection 3. Final presentation

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Continuous assessment	60%			
• Group weekly learning activities	(24%)	√	√	√
• Individual final presentation	(18%)	√		
• Group report, individual reflection report	(18%)	√	√	√
2. Examination	40%	√	√	
Total	100%			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

	The coursework requires students to work in groups to study cases from the perspectives of the eight dimensions in an engineering setting. Through these exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their portfolio reports on the case studies. The open-book examination is used to assess students' critical thinking and problem-solving skills when working on their own.	
Student Study Effort Expected	Class contact:	
	▪ Lectures and review	27 Hrs.
	▪ Tutorial and presentation	12 Hrs.
	Other student study efforts:	
	▪ Research and preparation	63 Hrs.
	▪ Report writing	14 Hrs.
	Total student study effort	116 Hrs.
Reading List and References	**Reference Books & Articles:** 1. Education for Sustainable Development - An Expert Review of Processes and Learning, UNESCO, 2011 2. Engineering-Issues, Challenges and Opportunities for Development, USECO, 2010 3. Engineering for Sustainable Development: Guiding Principles, Royal Academy of Engineering, 2005 4. Securing the future: delivering UK sustainable development strategy, 2005 5. Johnston, F S, Gostelow, J P, and King, W J, 2000, *Engineering and Society Challenges of Professional Practice*, Upper Saddle River, N.J.: Prentice Hall 6. Hjorth, L, Eichler, B, and Khan, A, 2003, *Technology and Society A Bridge to the 21st Century*, Upper Saddle River, N.J.:Prentice Hall 7. The Council for Sustainable Development in Hong Kong, http://www.susdev.gov.hk/html/en/council/ 8. Poverty alleviation: the role of the engineer, http://www.arup.com/_assets/_download/download67.pdf **Reading materials:** Engineering journals: - Engineers by The Hong Kong Institution of Engineers - Engineering and Technology by The Institution of Engineers and Technology Magazines: Time, Far East Economic Review Current newspapers: South China Morning Post, China Daily, Ming Pao Daily	

Subject Description Form

Subject Code	ENG4001
Subject Title	Project Management
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Nil
Objectives	This subject provides students with knowledge in: 1. engineering project management tools in business organizations, taking into account the time-cost relationships, resources, processes, risks, the project life cycle, organization, and management principles; 2. project management methodologies and their application; 3. choosing project variables for effective project management; and 4. various developments of project management.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. develop suitable project methodologies and techniques in various phases of the project life cycle; b. select appropriate project variables and practices that are applicable to engineering projects; c. propose project management solutions, taking into consideration the project objectives and constraints; and d. measure and report project progress.
Subject Synopsis/ Indicative Syllabus	1. <u>Project Overview, Management Principles, and the Systems Approach</u> Characteristics of projects and project management. Management principles. Project organisation. Team development. Systems concepts and principles. Conflict management. 2. <u>Project Methodologies, Project Templates, and Planning Techniques</u> Constraints: time, cost, and technical performance. Work breakdown structure. Management of scope. Scheduling tools: Gantt charts, network analysis techniques, time-phased networks, CPA, PERT, and resource smoothing. 3. <u>Pricing, Estimation, and Cost Control for Projects</u> Pricing process. Types of estimates. Budgeting project costs. Experience curve. Cost schedules and forecasts. Cost control systems. 4. <u>Assessment and Control of Projects</u> Earned value measurement system. Managing project risks. Computer-aided project management. Status reporting. Project closeout and termination. Project management maturity.

Teaching/Learning Methodology	A mixture of lectures, tutorial exercises, case studies, and laboratory work are used to deliver the various topics in this subject. Some material is covered using a problem-based format where this advances the learning objectives. Other material is covered through directed study to enhance the students' "learning to learn" ability. Some case studies are from best practices of projects, based on a literature review. They are used to integrate the topics and demonstrate to students how the various techniques are interrelated and applied in real-life situations.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Continuous assessment	40%	√	√	√	√
2. Written examination	60%	√	√	√	√
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous assessment: short tests, written reports, and tutorial exercises are used to assess students' understanding and application of the knowledge that they have learnt relative to learning outcomes (a), (b), (c), and (d).

Written examination: questions are designed to assess learning outcomes (a), (b), (c), and (d). Students are required to answer five questions, each of which covers at least one of the learning outcomes.

Student Study Effort Expected			
	Class contact:		
	▪ Lectures	2 Hrs./week for 12 weeks	24 Hrs.
	▪ Tutorials	1 hour/week for 9 weeks	9 Hrs.
	▪ Case studies	3 Hrs./week for 1 week	3 Hrs.
	▪ Laboratory work	3 Hrs./week for 1 week	3 Hrs.
	Other student study effort:		
	▪ Preparation for assignments, short tests, and the written examination		79 Hrs.
	Total student study effort		118 Hrs.

Reading List and References	1. Kerzner, H 2009, *Project Management: a Systems Approach to Planning, Scheduling, and Controlling*, John Wiley, New York 2. Meredith JR and Mantel SJ 2009, *Project Management: a Managerial Approach*, Wiley, Hoboken NJ 3. Smith, NJ (ed.) 2008, *Engineering Project Management*, Blackwell, Oxford

Subject Description Form

Subject Code	IC2105
Subject Title	Engineering Communication and Fundamentals
Credit Value	4 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject offers a wide spectrum of fundamental engineering practice that are essential for a professional engineer. This subject includes Engineering Drawing and CAD, Industrial Safety and Electronic Product Safety Test and Practice, Basic Mechatronic Practice and Basic Scientific Computing with MATLAB that aims at providing fundamental and necessary technical skills to all year 1 students interested in engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) explain the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice with application in mechanical, industrial systems and electrical engineering; b) explain basic occupational health and industrial safety requirements for engineering practice; c) explain common electronic product safety tests; d) design and analyze practical controller hardware, software, actuation devices and human-machine interface for simple mechatronic systems including basic practice in hydraulic, pneumatic and electric systems with common engineering components such as motor drives, mechanical drives, gears, cams, belts, pulleys, couplings, bearings, seals and fasteners; and e) apply scientific computing software for computing in science and engineering including visualization and programming;
Subject Synopsis/ Indicative Syllabus	Syllabus: 1. (TM8057) Engineering Drawing and CAD 1.1. Fundamentals of Engineering Drawing and CAD Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing. Introduction to CAD; features of 2D CAD system (layer; draw; modify; block & attributes; standard library); techniques for the creation of titleblock; setup of 2D plotting; general concepts on 3D computer modeling; parametric feature based solid modeling; construction and detailing of solid features; solid model modification and its limitations; concepts of assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly; virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, and part list.

	1.2. Electrical Drawing 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. 2. (TM2009) Industrial Safety 2.1. Safety Management: Overview, essential elements of safety management, safety training, accident management, and emergency procedures. 2.2. Safety Law: F&IU Ordinance and principal regulations, OSH Ordinance and principal regulations. 2.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling. 2.4. Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, personal protective equipment. 3. (TM1116) Electronic Product Safety Test and Practice 2.1 Use of basic electronic test instruments, current and voltage measurements, waveform measurement, power supply and signal sources; 2.2 Electronic product safety test method; High Voltage Isolation Test, Insulation Resistance Test, Continuity Test, Leakage Current Measurement, Electrostatic Discharge (ESD) Test. 2.3 4. (TM0510) Basic Mechatronic Practice 4.1. Definitions of mechatronics; design and operation of typical mechatronic systems; appreciation of measurement system, actuator system, motor drives, mechanical drives, gear train and linkage, pneumatic and hydraulic systems, signal conditioning, and human-machine interfaces. 4.2. Integration of system components using appropriate controller hardware and software such as PLC, PAC, and Microcontroller system; use of simulation software packages for pneumatic and hydraulic circuit design. 5. (TM3014) Basic Scientific Computing with MATLAB 5.1. Overview to scientific computering; introduction to MATLAB; interactive calculations, random number generators, variables, vectors, matrices and string; mathematical operations, polynomial operation, data analysis and curve fitting, file I/O functions. Basic 2D and 3D plots. 5.2. M-file programming & debugging; scripts, functions, logic operations, flow control, introduction to graphical user interface.

Learning Methodology	The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials are aimed at enhancing students' in-depth knowledge and ability in applying the knowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem solving in a unified activity.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
		a	b	c	d	e
Continuous Assessment						
1. Assignment / Project	Refer to individual Module Description Form	√	√	√	√	√
2. Test			√		√	√
3. Report / Logbook				√	√	
Total	100%					

Assessment Methods	Remarks
1. Assignment / Project	The project is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.
2. Test	Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.
3. Report / Logbook	Report / Logbook is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

Student Study Effort Expected

Class Contact	**TM8057**	**TM2009**	**TM1116**	**TM0510**	**TM3014**
▪ Mini-lecture	12 Hrs.	7 Hrs.	3 Hrs.	6 Hrs.	6 Hrs.
▪ In-class Assignment / Hands-on Practice	36 Hrs.	8 Hrs.	6 Hrs.	24 Hrs.	12 Hrs.
Other Study Effort					
▪ Nil					
Total Study Effort					**120 Hrs.**

Reading List and References	**Reference Software List:** 1. AutoCAD from Autodesk Inc. 2. SolidWorks from Dassault Systèmes Solidworks Corp. 3. MATLAB from The Mathworks Inc. **Reference Standards and Handbooks:** 1. BS8888 Technical Product Specification (TPS) Specification. 2. Cecil H. Jensen, et al, Engineering Drawing and Design, McGraw-Hill, 2008. 3. Warrendale, SAE fastener standards manual, Society of Automotive Engineers, 1997. 4. Timothy H Wentzell, et al, Machine Design, Delmar Learning, 2004. 5. Czernik, Daniel, Gaskets: Design, Selection, and Testing, McGraw-Hill, 1995. 6. Michael M. Khonsari, E. Richard Booser, Applied Tribology: Bearing Design and Lubrication, Wiley-Interscience, 2001. 7. IEEE Standard 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols for Electrical and Electronics Diagrams. 8. IEC 61082 Preparation of Documents used in Electrotechnology. **Reference Books:** Training material, manual and articles published by Industrial Centre.

Subject Description Form

Subject Code	IC2112
Subject Title	IC Training I (EE)
Credit Value	4 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1) To provide trainees with simulated working environments and training of industrial practices in Electrical Engineering. 2) This subject covers a wide range of fundamental electrical engineering application technology that including electrical installation practice, lighting and electrical system design, LV switchboard and power monitoring, integral building system and basic electronic practice.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) identify relevant engineering theories and principles and to apply them in hands-on training exercises to determine system feasibility; b) compare and contrast conceptual design, develop actual work sequences and methods for various electrical installations; c) undertake the design, construction, testing and commissioning electrical distribution system in buildings on the basis of recognize the engineering standards, regulations and practices; d) apply intelligent building control technology effectively and evaluate new building automation/intelligent control schemes; and e) apply their knowledge and skills for system analysis.
Subject Synopsis/ Indicative Syllabus	(TM0367) Lighting and Electrical System Design Interior lighting design and calculation; daylight illumination consideration; lumens and reflectors; T5, T8 and T11 lamps; energy conservation. Introduction of low-voltage power distribution system and code of practices of electrical design in Hong Kong; examine architectural drawings; design lighting and electrical services; prepare layout drawings and schematics. (TM0389) Low-voltage Switchboard and Power Monitoring, AC Control and PLC Specifications, standards and requirements of LV switchboard; IDMTL and electronic protection relays; schematic diagram, testing, commissioning and maintenance. Power monitoring and analysis, noise and harmonics; active filters and real-time capacitor bank. Introduction of programmable controller systems, sensors, actuators, drives, timers, counters, ladder logic programming and testing. (TM0383) Integrated Building Systems Proprietary and open systems (BMS, EIB and DALI); sensors and actuators; wiring circuit, scenes control; system design, programming and commissioning; intelligent building system integration.

	(TM0373) Electrical Installation and Basic Electronic Practice Wiring for conventional low voltage installations and intelligent building control systems (EIB and DALI); final lighting and power circuits, control gears and protective devices; inspection, testing, Identification of electronic circuit components, soldering and de-soldering, Dry film process, Etching process.
Learning Methodology	The teaching and learning methods include lectures, workshop tutorials, and practical works to convey general principles, techniques and related technologies to students. Their learning knowledge will be strengthened through the practical exercises and case studies in a problem-based format for the development of system integration skills, and to effectively apply those on real world environments.
Assessment Methods in Alignment with Intended Learning Outcomes	

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
TM0367 Lighting and Electrical System Design		a	b	c	d	e
1. Assignment	40%	√	√	√		√
2. Test	30%	√	√			
3. Training Report	30%	√	√	√		√
Total	100%					

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
TM0389 Low-Voltage Switchboard and Power Monitoring, AC Control and PLC		a	b	c	d	e
1. Assignment	40%	√	√	√	√	√
2. Test	30%	√	√			
3. Training Report	30%	√	√	√	√	√
Total	100%					

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
TM0373 Electrical Installation and Basic Electronic Practice		a	b	c	d	e
1. Assignment	40%	√	√	√		√
2. Test	30%	√	√			
3. Training Report	30%	√	√	√		√
Total	100%					

Assessment Methods	Weighting (%)	Intended Learning Outcomes Assessed				
TM0383 Integrated Building Systems		a	b	c	d	e
1. Assignment	40%	√			√	√
2. Test	30%	√				
3. Training Report	30%	√			√	√
Total	100%					

The assignment is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.

Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.

Training Report is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

Student Study Effort Required	**Class Contact**	
	▪ Lecture / Tutorial / Demonstration	28 Hrs.
	▪ Workshop Practice	82 Hrs.
	▪ Test	2 Hrs.
	Other Study Effort	0 Hrs.
	Total Study Effort	**112 Hrs.**

Reading List and References	1. Training material, manual and articles published by the Industrial Centre. 2. EMSD, Code of Practice for the Electricity (Wiring) regulations, 2003 Edition. 3. IEE wiring regulation, 16th Edition.

Subject Description Form

Subject Code	ISE404
Subject Title	Total Quality Management
Credit Value	3
Level	4
Pre-requisite/Co-requisite/Exclusion	Students who do not have background knowledge in quality control and quality engineering should be prepared to do additional reading.
Objectives	This subject provides students with the knowledge to 1. understand the philosophy and core values of Total Quality Management (TQM); 2. determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; 3. apply and evaluate best practices for the attainment of total quality.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies; b. measure the cost of poor quality and process effectiveness and efficiency to track performance quality and to identify areas for improvement; c. understand proven methodologies to enhance management processes, such as benchmarking and business process reengineering; d. choose a framework to evaluate the performance excellence of an organization, and determine the set of performance indicators that will align people with the objectives of the organization.
Subject Synopsis/ Indicative Syllabus	1. Principles of Total Quality Concepts of quality; Core values and paradigms for TQM, including corporate citizenship and protection of the environment; Models for performance excellence: Deming Prize, Baldrige Quality Award, European Quality Award 2. Customer Needs Internal and external customers; Voice of the customer; Customer satisfaction; Customer loyalty; Service recovery; Crisis management 3. Economics of Quality Classification and analysis of quality costs; Implementing quality costing systems; Economic value of customer loyalty and employee loyalty 4. TQM Methodologies Quality Function Deployment (QFD); Benchmarking; Business process reengineering; Process improvement 5. Learning and Growth Organizational learning; Organizational renewal; Change management; Employee empowerment

	6. Strategic Quality Management Vision, strategy, goals, and action plans; Measurement of organizational performance
Teaching/Learning Methodology	A mixture of lectures, group discussions (tutorials), and mini-case studies are used to achieve the objectives of this subject. Some topics are taught in the classroom environment; students have to learn these topics by themselves in the process of writing problem-based assignments. Directed study is also used to develop the self-learning ability of students.
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="4">Intended subject learning outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>1. Assignments</td><td>35%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>2. Tests</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>3.Examination</td><td>45%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Total</td><td>100%</td><td colspan="4"></td></tr></table> The assignments, reflective journals, essays, and case studies facilitate the application of concepts and skills learned in analyzing and attaining total quality while emphasizing factors that may affect decisions. Examination/tests allow students to demonstrate the extent of their understanding of concepts, as well as their abilities to analyze and solve problems related to the subject.
Student Study Effort Expected	<table><tr><td colspan="2">Class contact:</td><td></td></tr><tr><td>▪ Lecture/Tutorial</td><td>2 Hrs./week for 13 weeks</td><td>26 Hrs.</td></tr><tr><td>▪ Tutorial/Case Study</td><td>1 Hrs./week for 13 weeks</td><td>13 Hrs.</td></tr><tr><td colspan="2">Other student study effort:</td><td></td></tr><tr><td colspan="2">▪ Studying and self learning</td><td>50 Hrs.</td></tr><tr><td colspan="2">▪ Assignment and report writing</td><td>28 Hrs.</td></tr><tr><td colspan="2">Total student study effort</td><td>117 Hrs.</td></tr></table>
Reading List and References	1. Besterfield, DH, et.al. 2003, *Total Quality Management*, 3rd edn, Prentice Hall 2. Goetsch, DL & Davis, B 2006, *Quality Management: Introduction to Total Quality Management for Production, Processing and Services*, 5th edn, Pearson 3. Gryna FM 2001, *Quality Planning & Analysis*, 4th edn, Jr., McGraw-Hill 4. Selected articles in Quality Progress and the web site of American Society for Quality

Subject Description Form

Subject Code	MM4522
Subject Title	China Business Management
Credit Value	3
Level	4
Normal Duration	1-semester
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: China Trade Management (MM4521)
Role and Purposes	This course covers the business environment and key issues about doing business in China. The course offers a broad survey of a wide range of topics related to China business rather than in-depth study of particular aspects. The primary objectives are to introduce the students to the broad terrain, and help them to explore those aspects in their future pursuit.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. understand, analyse, and evaluate the nature and changing shape of business connection between Hong Kong and the Chinese Mainland. b. explain and assess the institutional and legal issues of doing business in China.(BBA Outcome 3) c. describe, analyse and evaluate business strategies and practices in China. (BBA Outcome 3) d. develop critical thinking about how different contextual and cultural factors affect business success, and learn to better communicate with people in different institutional environment.(BBA Outcome 3) e. have further developed their oral and written communication skills (BBA Outcome 1)
Subject Synopsis/ Indicative Syllabus	- The economic system and economic reforms in China - Understanding the Chinese bureaucracy - China's integration into the global economy - China - Hong Kong Business relations - The regulations of China's foreign trade - China's tax system - Foreign direct Investment and management - Marketing strategies in China
Teaching/Learning Methodology	Lectures, tutorial discussion, group project (presentation and written report)

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
Continuous Assignments	**50%**					
1. Group Projection	30%					
2. Presentation	15%	√	√	√	√	
3. Written Report	15%					√
4. Class Participation	20%				√	
Examination	**50%**	√	√	√	√	
Total	100%					

**Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.*

To pass this subject, students are required to obtain Grade D or above in **BOTH** the Continuous Assessment and Examination components.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: the various methods are designed to ensure that all students taking this subject

The assessments are designed to motivate the students to read the recommended materials and participate in the required activities to achieve the learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	26 Hrs.
	▪ Tutorial	13 Hrs.
	Other student study effort:	
	▪ Studying and self learning	20 Hrs.
	▪ Assignment and report writing	48 Hrs.
	Total student study effort	107 Hrs.
Reading List and References	This course does not have a textbook. Readings are drawn from *China Hand*, a data base compiled and edited by the Economist Intelligence Unit, and *China Business Review*, a publication of the US-China Business Council, and other sources. The readings have been uploaded to WebCT.	

	References Tim Clissold's ***Mr. China*** (Constable & Robinson, 2004) Pete Engardio (ed.), ***Chindia: How China and India are Revolutionizing Global Business,*** McGraw-hill, 2007 James McGregor, ***One Billion Customers: Lessons from the Front Line of Doing Business in China,*** (Nicholas Brealey Publishing, 2005). Edward Tse, ***The China Strategy: Harnessing the Power of the World's Fastest-growing Economy***, Basic Books, 2010. Sheryl WuDunn, ***China Wakes: The Struggle for the Soul of a Rising Power,*** Vintage Books, 1995

Appendix II

Minor Programme
in Electrical Engineering

1 Objective

The present-day engineering profession has become more and more multi-disciplinary in nature. The possession of adequate knowledge in electrical engineering will be an asset for engineering personnel whose major is in other disciplines. The objective of the programme is to provide a working knowledge on selected topic areas in electrical engineering for students with non-electrical-engineering background.

2 Programme Outcomes

After completing the programme, students should be able to

(i) Apply fundamental principles of mathematics, science and engineering to solve practical problems in selected areas of electrical engineering.

(ii) Conduct experiments with appropriate techniques and tools and interpret and analyse the data.

(iii) Keep abreast of developments in certain areas of electrical engineering.

3 Eligibility

Full-time students pursuing a four-year undergraduate degree in Faculty of Engineering or Faculty of Civil & Structural Engineering (excluding a Major in Transportation Systems Engineering or a Major in Electrical Engineering) may choose this programme. Only students with a GPA of 2.5 or above can be considered for Minor study. The department may set a quota for admitting students into this Minor programme.

4 Curriculum

The student has to complete 18 credits of discipline-specific subjects in Electrical Engineering as shown in the following table, with at least 9 credits at level 3 or above.

Subject code	Subject Title	Number of Credits
EE2001A	Applied Electromagnetics	3
EE2002A	Circuit Analysis	3
EE2003A	Electronics	3
EE2004A	Electrical Energy Systems Fundamentals	3
EE3001A	Analogue and Digital Circuits	3
EE3002A	Electromechanical Energy Conversion	3
EE3003A	Power Electronics and Drives	3
EE3004A	Power Transmission and Distribution	3
EE3005A	Systems and Control	3
EE3007A	Computer System Principles	3
EE3008A	Linear Systems and Signal Processing	3
EE3009A	Electrical Services in Buildings	3
EE4002A	Digital Control and Signal Processing	3
EE4003A	Electrical Machines	3
EE4004A	Power Systems	3
EE4007A	Advanced Power Electronics	3
EE4008A	Applied Digital Control	3
EE4009A	Electric Traction and Drives	3
EE4010A	Fibre Optics	3
EE4011A	Industrial Computer Applications	3
EE4012A	Intelligent Buildings	3
EE4013A	Power System Protection	3
EE4014A	Intelligent Applications in Electrical Engineering	3
EE4015A	Electrical Engineering Materials	3

Note: The Department reserves the right of NOT offering all these subjects in each semester.

5 Award Classification

For students who have completed a Major/Minor programme, a single classification will be awarded and their award classification will mainly be based on the "Major GPA", but it can be moderated by the Board of Examiners with reference to the "Minor GPA". For students who have completed a Major programme combined with free electives, their award classification will be determined by their "Major GPA" and the grades obtained for the free electives.

"Major GPA" is derived based on all subjects of the Major programme, including those meeting the mandatory General University Requirements (GUR) and programme-specific language requirement, but not necessarily including the training credits.

"Minor GPA" is derived based on the 18 credits of specific Minor programme.

The "Major GPA" and the "Minor GPA" will be presented separately to the Board of Examiners for consideration. The guidelines for determining award classification are applicable to programmes with Major/Minor studies.

Where a student has a high GPA for his Major but a lower GPA for his Minor, he will not be 'penalised' in respect of his award classification, which is attached to the Major. On the other hand, if a student has a lower GPA for his Major than his GPA for the Minor, the Board of Examiners may consider giving the student a higher award classification than with reference to his Major GPA.