BEng (Hons) in Transportation Systems Engineering

2017 – 2018

THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Bachelor of Engineering (Honours) in Transportation Systems Engineering

Full-time

Programme Code: 41481

DEFINITIVE PROGRAMME DOCUMENT

Department of
Electrical Engineering
電機工程學系


Department of
Electrical Engineering
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Bachelor of Engineering (Honours) in Transportation Systems Engineering (4-year Curriculum) 2017-18

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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.

Given the huge number of forthcoming transportation projects in Hong Kong and its neighbouring regions in the coming decades, there is an ever growing demand on the transportation engineering professionals. The 4-year Bachelor of Engineering (Hons) in Transportation Systems Engineering (BEng in TSE), being currently the only engineering degree programme of transportation systems area in Hong Kong, addresses the coming huge manpower demand of the transportation systems engineering profession, with particular emphasis on railways, highways and planning of transportation systems and related disciplines. This programme complies with the new university curriculum framework, which features a broad-based curriculum, emphasising 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 competent transportation systems engineer who can practise in their profession in Hong Kong, the Mainland China, and the neighbouring regions.

This undergraduate programme on Transportation Systems Engineering is developed to fill the gap of the imminent need of professionals in the Hong Kong Transportation Industry by the unique combinations of the expertises in the Departments of Electrical Engineering (the hosting department) and Civil and Environmental Engineering. The programme is designed to make full use of the hugely versatile applications of electrical engineering and civil engineering and to further broaden the career opportunities of our students.

2 Aims and Rationale

2.1 Programme Philosophy

In the programme, the students are to acquire a solid understanding of the fundamentals in electrical engineering and civil engineering; and apply their knowledge and techniques on the relevant areas in transportation. The philosophy of the programme focuses on incorporating the appropriate engineering knowledge into transportation systems in order to enhance the efficiency, reliability, safety and sustainability of the system infrastructure and services. The current practices in transportation industries, the latest technologies in transportation systems; and hence their integration to provide engineering solutions for practical problems constitutes the main contents of this programme.

Education is important to equip students with knowledge and skills for developing their long-term careers. Emphasis is, therefore, placed on the understanding of fundamental concepts which will always be applicable and valid. Particular techniques which may have a shorter duration of applicability, however, cannot be neglected. Applications change rapidly as technology evolves but the underlying theories remain.

Transportation always involves multi-disciplinary knowledge and techniques. The students are guided to learn the interfaces between specialist engineering areas and be prepared to work in a multidisciplinary work environment which usually involves colleagues from other engineering backgrounds. On the other hand, the students must become aware that 'a good

engineering solution' is one which fulfils economic and financial criteria as well as the engineering design specifications. This necessitates the inclusion of the study of finance, accounting, management and ethical and social responsibilities with particular reference to transportation systems engineering activities, as well as the inter-relations between such activities and the 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 lectures, seminars, discussions, in-class feedback, assessed presentations, demonstration of project work and written laboratory reports, aims to improve 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 can:

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

(ii) 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 transportation systems 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 real industrial working environment.

2.2 Programme Objectives

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

(ii) To prepare students for the professional development which requires problem-solving techniques, engineering judgements and lifelong learning.

(iii) To produce engineers with appreciation of their obligations to society in the local and international context.

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 transportation systems engineering and related disciplines.
A2 Design and conduct experiments/surveys with engineering techniques and tools; and interpret and analyse the data in the context of transportation systems engineering.
A3 Design a system, component or process according to given specifications and requirements in the areas of transportation systems engineering and related disciplines.
A4 Identify constraints, both technical considerations and business factors, which may influence engineering problems, systems or projects.
A5 Be able to keep abreast of developments in transportation systems 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 verbal, written, graphic and numeric media with proficiency in both English and Chinese.
B2 Be able to 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 Transportation Systems Engineering
運輸系統工程學(榮譽)工學士學位

3.2 Duration and Mode of Attendance

Mode	Normal Duration	Maximum Duration
Full-time	4 years	8 years

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

* The exact study duration depends on the entry qualification of individual Associate Degree / Higher Diploma admittees.

3.3 Final Award

The award is Bachelor of Engineering (Honours) in Transportation Systems 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 2 elective subjects with:

- Level 3 in English Language and Chinese Language; AND
- Level 2 in Mathematics and Liberal Studies; AND
- Level 3 in 2 Other Elective subjects [can include Extended Modules of Mathematics (M1/M2)].

There is no compulsory subject requirement. Preferred elective subjects for the programme include:

- Extended Modules of Mathematics;
- Information and Communication Technology; and
- All single and combined Science subjects

(ii) Alternative Entry Route

A Higher Diploma in 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 TSE) 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, at the start of second year of study. Students should submit their applications to their Major department, which will indicate its support or otherwise (since the taking of a Minor will increase the student's study load), before the Minor-offering department makes a final decision on the application;

(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, before the end of the add/drop period of the last Semester of study;

(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; Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major-Minor studies must not be lower than the credit requirement of the single discipline Major programme.

(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 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 Transportation Systems Engineering, they must take 18 credits of TSE 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 the vital components to meet 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 4.8 and 4.9.

3.8 Student Exchange Programme

Student exchange to overseas universities for a semester or an academic year are possible through various exchange schemes organised by the University or individual departments. With limited exchange quotas, students are encouraged to participate so as to enhance their learning experience.

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

3.9 External Recognition

The BEng (Hons) in Transportation Systems Engineering programme has been internally validated by the University. The programme has been granted provisional accreditation by the Hong Kong Institution of Engineers (HKIE).

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.

3.11 Daytime and Evening Teaching

Subjects will be offered predominantly during daytime. Some subjects, particularly the elective subjects, may be 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 received 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 onwards must meet:

(i) the University Graduation Requirements, and

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

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 for 4-Year Degree Students

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

(i) Complete successfully a minimum of 124 credits[1];

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

(iii) Complete successfully the mandatory Work-Integrated Education (WIE) component;

(iv) Satisfy the following GUR requirements:

(a) Language and Communication Requirements[2]	9 credits
(b) Freshman Seminar	3 credits
(c) Leadership and Intra-Personal Development	3 credits
(d) Service-Learning	3 credits
(e) Cluster Areas Requirement (CAR)	12 credits
(f) China Studies Requirement	(3 of the 12 CAR credits)
(g) Healthy Lifestyle[3]	Non-credit bearing
	Total = 30 credits

(v) Satisfy the residential requirement for at least one-third of the credits required for the award he/she is currently enrolled, unless professional bodies stipulate the otherwise; and

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

1 This minimum only applies to students who are admitted through the normal route.

2 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.

3 Students admitted to the programmes as Senior Year intakes are not required to take the Healthy Lifestyle Programme. Advanced Standing students are required to take Healthy Lifestyle Programme (except for those who are HD/AD holders who follow the Senior Year/Articulation Degree programme GUR curriculum).

There are subjects which are designed to fulfil the credit requirement of different types of subject. Students passing these subjects will be regarded as having fulfilled the credit requirements of the particular types of subject concerned. Nevertheless, the subject passed will only be counted once in fulfilling the credit requirements of the award, and the students will be required to take another subject in order to meet the total credit requirement of the programme concerned.

Remedial subjects are designed for new students who are in need of additional preparations in a particular subject area, and only identified students of a programme are required to take these subjects. These subjects should therefore be counted outside the regular credit requirement for award.

In addition, students may be required to take subjects that are designed to enhance their skills in particular subject areas to underpin their further advanced study in the discipline. These underpinning subjects could be of different subject areas (e.g. Mathematics, science subjects), and the number of credits each student is required to take in a particular underpinning subject area may vary according to the different academic backgrounds of the students. With effect from the 2015/16 intake cohort, the regular credit requirement for award will count the lowest number of credits taken by the students in the same subject area. For example, some students in an engineering programme are required to take 10 credits of underpinning subjects in Mathematics, whilst others in the programme are required to take 6 credits of underpinning subjects in Mathematics. Only 6 credits will be recognized for counting towards the regular credit requirement of the programme. The extra 4 credits taken by some students will be counted outside the regular credit requirement.

Senior Year intakes admitted to the 4-year Undergraduate Degree programmes on the strength of the Associate Degree/Higher Diploma qualifications are required to complete at least 70 credits in order to be eligible for a Bachelor's degree. Exemption may be given from subjects already taken in the previous Associate Degree/Higher Diploma studies. In that case, students should take other electives (including free electives) instead to make up the total of 70 credits required. For students who are exceptionally admitted before 2017/18 on the basis of academic qualification(s) more advanced than Associate Degree/Higher Diploma[4], such as the advanced stage of a 4-year degree curriculum programme, Departments can continue to grant credit transfer as appropriate, so as to give recognition to the advanced study taken, and these students can take fewer than 70 credits for attaining the award. The proportion of these students should remain low. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 70 credits to be eligible for award.

Level-0 subjects and training subjects (including clinical/field training) will not be counted to fulfill free elective requirement for graduation purpose.

[4] The admission of students to UGC-funded Articulation Degree programmes and Senior Year intakes on the basis of qualification(s) more advanced than Associate Degree/Higher Diploma is subject to the conditions stipulated by UGC governing the UGC-funded Senior Year places.

Summary of University Graduation Requirements for Senior Year Intakes Students

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 70 credits[5];

(ii) Earn a cumulative GPA of 2.0 or above at graduation;

(iii) Complete successfully the mandatory Work-Integrated Education (WIE) component;

(iv) Satisfy the following GUR requirements:

(a) Cluster Areas Requirement (CAR)	6 credits
(b) China Studies Requirement	(3 of the 12 CAR credits)
(c) Service-Learning[6]	3 credits
(d) Language and Communication Requirements[7]	-
	Total = 9 credits

(v) Satisfy the residential requirement for at least one-third of the credits required for the award he/she is currently enrolled, unless professional bodies stipulate the otherwise; and

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

There are subjects which are designed to fulfil the credit requirement of different types of subject. Students passing these subjects will be regarded as having fulfilled the credit requirements of the particular types of subject concerned. Nevertheless, the subject passed will only be counted once in fulfilling the credit requirements of the award, and the students will be required to take another subject in order to meet the total credit requirement of the programme concerned.

Remedial subjects are designed for new students who are in need of additional preparations in a particular subject area, and only identified students of a programme are required to take these subjects. These subjects should therefore be counted outside the regular credit requirement for award.

In addition, students may be required to take subjects that are designed to enhance their skills in particular subject areas to underpin their further advanced study in the discipline. These underpinning subjects could be of different subject areas (e.g. Mathematics, science subjects), and the number of credits each student is required to take in a particular underpinning subject area may vary according to the different academic backgrounds of the students. With effect

5 This minimum only applies to students who are admitted through the normal route.

6 Prior to its full implementation, students may take a 3-credit free elective in lieu of the Service Learning requirement.

7 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. 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.

from the 2015/16 intake cohort, the regular credit requirement for award will count the lowest number of credits taken by the students in the same subject area. For example, some students in an engineering programme are required to take 10 credits of underpinning subjects in Mathematics, whilst others in the programme are required to take 6 credits of underpinning subjects in Mathematics. Only 6 credits will be recognized for counting towards the regular credit requirement of the programme. The extra 4 credits taken by some students will be counted outside the regular credit requirement.

In the case that students have already taken certain subject(s) in their previous Associate Degree/Higher Diploma studies, exemption may be given from these subjects and students should take other electives (including free electives) instead to make up the minimum of 70 credits required. For students who are exceptionally admitted before 2017/18 on the basis of academic qualification(s) more advanced than Associate Degree/Higher Diploma, such as the advanced stage of a 4-year degree curriculum programme, Departments can continue to grant credit transfer as appropriate when admitting them to an Articulation Degree programme, so as to give recognition to the advanced study taken, and these students can take fewer than 70 credits for attaining the award. The proportion of these students should remain low. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 70 credits to be eligible for award.

Level-0 subjects and training subjects (including clinical/field training) will not be counted to fulfill free elective requirement for graduation purpose.

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.

4.2 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 English LCR Proficient Level subjects (see Table 4.2.2) 3 credits
Level 4 or equivalent	English for University Studies (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 (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 English LCR subjects at Proficient Level

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 (when no HKDSE score is available). Students can also opt to take additional Chinese LCR subjects (Table 4.2.4) in their free electives.

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

Students who can demonstrate that they have achieved a level beyond that of the subject "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.

	Required Subject
HKDSE Level 4 & 5 or equivalent	Advanced Communication Skills in Chinese (CBS1102P) 3 credits
HKDSE Level 3 or equivalent	Fundamentals of Chinese Communication (CBS1101P) 3 credits
For non-Chinese speaking students or students whose Chinese standards are at junior secondary level or below	One subject from Table 4.2.5 below

Table 4.2.3 Framework of Chinese LCR subjects

Subject	Pre-requisite/Exclusion	
Elementary Cantonese (Taught in English / Putonghua) CBS1153 / CBS1153P)	• For students whose native language is not Cantonese	3 credits each
Intermediate Cantonese (Taught in English) (CBS2153)	• Students who have completed "Elementary Cantonese" or meet a certain standard in a pre-course assessment	
Putonghua in the Workplace (CBS2101P)	• Students who have completed "Fundamentals of Chinese Communication" or could demonstrate with proof their basic proficiency in Putonghua • For students whose native language is not Putonghua	
Creative Writing in Chinese (CBS2102P)	• 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"	
Chinese and the Multimedia (CBS2103P)	• 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"	

Table 4.2.4 Chinese LCR Elective Subjects

Subject	Pre-requisite/exclusion	
Chinese I (for non-Chinese speaking students) (CBS1151)	• For non-Chinese speaking students at beginners' level	3 credits each
Chinese II (for non-Chinese speaking students) (CBS1152)	• For non-Chinese speaking students; and • Students who have completed Chinese I or equivalent	
Chinese III (for non-Chinese speaking students) (CBS2151)	• For non-Chinese speaking students at higher competence levels; and • Students who have completed Chinese II or equivalent	
Chinese IV (for non-Chinese speaking students) (CBS2154)	• For non-Chinese students at intermediate competence levels; and • Students who have completed Chinese III or equivalent	
Chinese Literature – Linguistics and Cultural Perspectives (for non-Chinese speaking students) (CBS2152)	• 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 explained above, all students must also, among the Cluster Areas Requirement (CAR) subjects they take (see section (v) below), 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 and the Reading Requirement is shown at: http://www.polyu.edu.hk/ogur/CAR-on-Offer.html

Non-Chinese speaking students and 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 Chinese LCR subject to fulfil their Chinese LCR.

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.

Note: In addition to the LCR and Reading and Writing Requirements, students also have to complete 4 credits of discipline-specific language requirements (2 credits in English and 2 credits in Chinese) as specified in the curriculum requirements of their Major.

(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: http://www.polyu.edu.hk/ogur/ListOfFreshmanSeminars.html

(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:
http://www.polyu.edu.hk/ogur/student/4yr/gur/leadership-intra-personal-development

(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.

A list of designated subjects for meeting the service-learning requirement is available at: http://sl.polyu.edu.hk/

(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: http://www.polyu.edu.hk/ogur/CAR-on-Offer.html

(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: http://www.polyu.edu.hk/ogur/CAR-on-Offer.html

(vii) Healthy Lifestyle

Healthy lifestyle is the platform for all-round development. Students are required to successfully complete a non-credit-bearing programme in healthy lifestyle.

Students will be required to complete the following components: (a) sports training/participation, (b) e-learning modules, and (c) lectures/talks. The syllabus covers physical health, mental health, social health, spiritual health, values and priorities on health behavior with reference to competing priorities in life, reflection on healthy living and plans for self-improvement or maintenance of health behavior. Details of the programme can be found at: http://www.polyu.edu.hk/ogur/student/4yr/gur/hls/revised

Students on Articulation Degree Programmes and Senior Year Intakes to the 4-year Undergraduate degree programmes are not required to take the Health Lifestyle Programme. Advanced Standing students are required to take the Health Lifestyle Programme (except for those who are HD/AD holders who follow the Senior Year/Articulation Degree programme GUR curriculum).

4.3 Discipline Specific Requirements (DSR)

A student in the BEng (Hons) in Transportation Systems Engineering programme should complete 94 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:

AMA1110	Basic Mathematics I – Calculus and Probability & Statistics (3)
AMA1120	Basic Mathematics II – Calculus and Linear algebra (3)
AP10005	Physics I (3)
AP10006	Physics II (3)
	12 credits

(ii) Common DSR subjects for Broad Discipline of Engineering (28 credits)

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

AF3625	Engineering Economics (3)
AMA2111	Mathematics I (3)
AMA2112	Mathematics II (3)
CBS3241P	Professional Communication in Chinese* (2)
ELC3521	Professional Communication in English (2)
ENG2001	Fundamentals of Materials Science and Engineering # (3)
ENG2002	Computer Programming (3)
ENG2003	Information Technology (3)
ENG3003	Engineering Management (3)
ENG3004	Society and the Engineer (3)
	28 credits

(iii) DSR subjects (54 credits)

The following DSR subjects in Transportation Systems Engineering must be taken:

	Level 2
EE2001B	Applied Electromagnetics (3)
EE2002B	Circuit Analysis (3)
EE2003B	Electronics (3)
EE2029B	Transportation Engineering Fundamentals (3)
	12 credits
	Level 3
CSE30292	Transportation Operations and Management (3)
CSE30312	Transportation and Highway Engineering (3)
CSE30390	Transportation Systems Analysis (3)
EE3002B	Electromechanical Energy Conversion (3)
EE3003B	Power Electronics and Drives (3)
EE3004B	Power Transmission and Distribution (3)
EE3011B	Control Systems and Signal Processing (3)
	21 credits
	Level 4
CSE40407	Design of Transport Infrastructure (3)
CSE40408	Traffic Surveys and Transport Planning (3)
CSE40490	Transport Management and Highway Maintenance (3)
EE4006B	Individual Project (6)
EE4xxxB	Advanced Elective 1 (3)
EE4xxxB	Advanced Elective 2 (3)
	21 credits

Table 4.3

* 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. Students of this category can take a replacement subject of any level to make up for credit requirement.

Students may seek prior approval to select the following CAR subjects in "Biology" or "Chemistry" instead of "Fundamentals of Materials Science and Engineering":

Biology: Biotechnology and Human Health (ABCT1D03), Introductory Life Science (ABCT1D04), Bionic Human and the Future of Being Human (BME1D01)

Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)

4.4 Curricula 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 that 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 Transportation Systems 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	40%	60%
AMA1120	Basic Mathematics II – Calculus and Linear Algebra	AMA	39	-	3	0.2	40%	60%
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	39	-	3	0.2	70%	30%
CBS1102P	Advanced Communication Skills in Chinese*	CBS	39	-	3	0.2	70%	30%
ELC1011	Practical English for University Studies*	ELC	39	-	3	0.2	100%	-
ELC1013	English for University Studies *	ELC	39	-	3	0.2	100%	-
ELC1014	Advanced English for University Studies*	ELC	39	-	3	0.2	100%	-
ENG1003	Freshman Seminar for Engineering	ENG	36	-	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	39	-	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 Transportation Systems 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%
EE2001B	Applied Electromagnetics	EE	33	6	3	0.2	40%	60%
EE2002B	Circuit Analysis	EE	30	9	3	0.2	40%	60%
EE2003B	Electronics	EE	30	9	3	0.2	40%	60%
EE2029B	Transportation Engineering Fundamentals	EE	39	-	3	0.2	40%	60%
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%	-
ENG2001	Fundamentals of Materials Science and Engineering#	ENG	39	-	3	0.2	40%	60%
ENG2002	Computer Programming	ENG	39	-	3	0.2	70%	30%
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)	various departments	39	-	3	0.2	depending on the subjects taken	depending on the subjects taken
	IC Training							
IC2105	Engineering Communication and Fundamentals	IC	120 hours throughout the year		4 training credits	-	100% assessed and graded	-
IC2113	IC Training I (TSE)	IC	120 hours in Summer		4 training credits	-	100% assessed and graded	-

Table 4.4.2

@ 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))

\# Students may seek prior approval to select the following CAR subjects in "Biology" or "Chemistry" instead of "Fundamentals of Materials Science and Engineering":
Biology: Biotechnology and Human Health (ABCT1D03), Introductory Life Science (ABCT1D04), Bionic Human and the Future of Being Human (BME1D01)
Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)

The Hong Kong Polytechnic University BEng (Hons) in Transportation Systems 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							
AF3625	Engineering Economics	AF	39	-	3	0.3	50%	50%
CSE30292	Transportation Operation and Management	CEE	39	-	3	0.3	40%	60%
CSE30312	Transportation and Highway Engineering	CEE	30	9	3	0.3	40%	60%
CSE30390	Transportation Systems Analysis	CEE	39	6	3	0.3	40%	60%
EE3002B	Electromechanical Energy Conversion	EE	33	6	3	0.3	40%	60%
EE3003B	Power Electronics and Drives	EE	33	6	3	0.3	40%	60%
EE3004B	Power Transmission and Distribution	EE	33	6	3	0.3	40%	60%
EE3011B	Control Systems and Signal Processing	EE	33	6	3	0.3	40%	60%
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	26	-	2	0.3	100%	-
ELC3521	Professional Communication in English	ELC	26	-	2	0.3	100%	-
EE3010B	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 Transportation Systems 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							
CSE40407	Design of Transport Infrastructure	CEE	32	7	3	0.3	40%	60%
CSE40408	Traffic Surveys and Transport Planning	CEE	32	7	3	0.3	40%	60%
CSE40490	Transport Management and Highway Maintenance	CEE	39	-	3	0.3	30%	70%
	Def Subjects							
EE4006B	Individual Project	EE	-	-	6	0.3	100%	-
	Any two electives; at least one should be EE subejct							
	Level 4 Electives (Def Subjects)*							
EE4004B	Power Systems	EE	33	6	3	0.3	40%	60%
EE4005B	Engineering Project Management	EE	39	-	3	0.3	40%	60%
EE4007B	Advanced Power Electronics	EE	33	6	3	0.3	40%	60%
EE4008B	Applied Digital Control	EE	33	6	3	0.3	40%	60%
EE4009B	Electric Traction and Drives	EE	39#	-	3	0.3	40%	60%
EE4011B	Industrial Computer Applications	EE	33	6	3	0.3	40%	60%
EE4014B	Intelligent Systems Applications in Electrical Engineering	EE	39+	-	3	0.3	40%	60%
EE4016B	Energy Utilisation and Management in Transportation	EE	39	-	3	0.3	40%	60%
EE4017B	Risk and Reliability Analysis on Asset Management	EE	39	-	3	0.3	40%	60%
EE4018B	Electrical Systems in Automobiles	EE	33	6	3	0.3	40%	60%
EE4019B	Intelligent Transportation Systems	EE	39	-	3	0.3	40%	60%
EE4351B	Aircraft Electrical and Actuation Systems	EE	39	-	3	0.3	50%	50%
ENG4001	Project Management	ENG	39	-	3	0.3	40%	60%
ME45003	Aviation Systems	ME	39	-	3	0.3	40%	60%
CSE40462	Environmental Impact Assessment – Theory and Practice	CEE	39	-	3	0.3	50%	50%
CSE40475	Sustainable Development Strategy	CEE	39	-	3	0.3	50%	50%
	MSc Subjects as Electives* *Students must seek prior approval for enrolling on Level 5 subjects.*							
EE502B	Modern Protection Methods	EE	33	6	3	0.3	40%	60%
EE505B	Power System Control and Operation	EE	39	-	3	0.3	40%	60%
EE509B	High Voltage Engineering	EE	39	-	3	0.3	40%	60%
EE512B	Electric Vehicles	EE	39	-	3	0.3	40%	60%
EE526B	Power System Analysis and Dynamics	EE	33	6	3	0.3	40%	60%
EE533B	Railway Power Supply Systems	EE	39	-	3	0.3	40%	60%
EE535B	Maintenance and Reliability Engineering	EE	39^	-	3	0.3	40%	60%
EE536B	Signalling and Train Control Systems	EE	39^	-	3	0.3	40%	60%
EE537B	Railway Vehicles	EE	39@	-	3	0.3	40%	60%
EE550B	Enterprise Risk and Asset Management	EE	39	-	3	0.3	40%	60%
EE560B	Metros in Hong Kong and China	EE	39	-	3	0.3	40%	60%
EE5381B	System Assurance and Safety in Railways	EE	39	-	3	0.3	40%	60%
CSE561	Public Transport Operations and Service Planning	CEE	39	-	3	0.3	40%	60%
CSE562	Traffic Engineering and Control	CEE	39	-	3	0.3	30%	70%
LGT5013	Transport Logistics in China	LGT	39	-	3	0.3	50%	50%

Table 4.4.4

\# Lecture/Tutorial: 33 hours; plus Seminar: 6 hours

\+ Lecture/Tutorial: 33 hours; plus Mini-project presentation: 6 hours

^ Lecture/Tutorial: 36 hours; plus Seminar: 3 hours

@ Lecture/Tutorial: 33 hours; Seminar: 3 hours plus Site visit: 3 hours

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

4.5 Indicative Progression Pattern for Normal Study Duration

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 Table 4.5.1 below and obtain a total of 30 academic credits and 4 training 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 (3)
	15 credits
	Semester Two
AMA1120	Basic Mathematics II – Calculus and Linear Algebra (3)
AP10006	Physics II (3)
ELCXXXX	English LCR Subject* (3)
ENG2003	Information Technology (3)
CAR requirement	one Cluster Area Requirement Subject (3)
	15 credits
GUR requirement	Healthy Lifestyle
IC2105	Engineering Communication and Fundamentals (4) (120 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 academic credits and 4 training credits.

	Semester One
AMA2111	Mathematics I (3)
CBSXXXX	Chinese LCR Subject* (3)
EE2002B	Circuit Analysis (3)
ENG2001	Fundamentals of Materials Science and Engineering[#] (3)
ENG2002	Computer Programming (3)
	15 credits
	Semester Two
AF3625	Engineering Economics (3)
AMA2112	Mathematics II (3)
EE2003B	Electronics (3)
EE2029B	Transportation Engineering Fundamentals (3)
CAR requirement	one Cluster Area Requirement Subject (3)
	15 credits
	Semester Three (Summer Period at the end of Year 2)
IC2113	IC Training I (TSE) (4) (120 hours in summer)
	4 training credits

Table 4.5.2

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

[#] Students may seek prior approval to select the following CAR subjects^ in "Biology" or "Chemistry" instead of "Fundamentals of Materials Science and Engineering":
Biology: Biotechnology and Human Health (ABCT1D03), Introductory Life Science (ABCT1D04), Bionic Human and the Future of Being Human (BME1D01)
Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)

^ If you select one of these five subjects, you can fulfill the requirement of DSR and CAR-STE in "Science, Technology and Environment". You are required to choose any 3-credit subject (from Level 1 to Level 4) to make up for the total credit requirement.

A student in the Third Year is advised to take the following curriculum as indicated in Table 4.5.3 below and obtain 34 academic credits and 3 training credits.

	Semester One
CSE30292	Transportation Operation and Management (3)
CSE30312	Transportation and Highway Engineering (3)
EE2001B	Applied Electromagnetics (3)
EE3003B	Power Electronics and Drives (3)
EE3011B	Control Systems and Signal Processing (3)
ENG3003	Engineering Management (3)
	18 credits
	Semester Two
CBS3241P	Professional Communication in Chinese (2)
CSE30390	Transportation Systems Analysis (3)
EE3002B	Electromechanical Energy Conversion (3)
EE3004B	Power Transmission and Distribution (3)
ELC3521	Professional Communication in English (2)
CAR requirement	one Cluster Area Requirement Subject (3)
	16 credits
	Semester Three (Summer Period at the end of Year 3)
EE3010B	Summer Practical Training (A minimum of 6 weeks) (3)
	3 training credits

Table 4.5.3

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 and 11 training credits to qualify for graduation.

	Semester One
CSE40407 CSE40490 EE4006B	Design of Transport Infrastructure (3) Transport Management and Highway Maintenance (3) Individual Project (3 continues in Semester 2)
GUR requirement	Service-Learning Subject[#] (1.5 continues in Semester 2)
CAR requirement	one Cluster Area Requirement Subject (3)
Elective subject*	one Elective Subject from Table 4.4.4 (3) 16.5 credits
	Semester Two
CSE40408 EE4006B ENG3004	Traffic Surveys and Transport Planning (3) Individual Project (3 continues from Semester 1) Society and the Engineer (3)
GUR requirement	Service-Learning Subject[#] (1.5 continues from Semester 2)
Elective subject*	one Elective Subject from Table 4.4.4 (3) 13.5 credits

Table 4.5.4

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

* Out of the two electives taken in Year 4, at least one should be an EE subject. The Department reserves the right of NOT offering all the electives in each year.

4.6 Indicative Progression Pattern for Senior Year Students

Total Credits Required for Graduation: 70 academic credits + 11 training credits

The progression pattern in Table 4.6.1 to Table 4.6.2 is recommended for Senior Year students[@].

A student in the First Year is advised to take the following curriculum as indicated Table 4.6.1 below and obtain a total of 37 academic credits and 7 training credits.

	Semester One
CSE30292	Transportation Operation and Management (3)
CSE30312	Transportation and Highway Engineering (3)
EE2001B	Applied Electromagnetics (3)
EE3011B	Control Systems and Signal Processing (3)
ENG2001	Fundamentals of Materials Science and Engineering[#] (3)
ENG3003	Engineering Management (3)
	18 credits
	Semester Two
AF3625	Engineering Economics (3)
CBS3241P	Professional Communication in Chinese (2)
CSE30390	Transportation Systems Analysis (3)
EE2029B	Transportation Engineering Fundamentals (3)
EE3004B	Power Transmission and Distribution (3)
ELC3521	Professional Communication in English (2)
ENG2003	Information Technology (3)
	19 credits
	Semester Three (Summer Period at the end of Year 1)
EE3010B	Summer Practical Training (A minimum of 6 weeks) (3)
	3 training credits
IC2105	Engineering Communication and Fundamentals (4) (120 hours throughout the year)
	4 training credits

Table 4.6.1

[@] The exact study pattern for senior year intakes varies from student to student depending on the number of subject approved for credit transfer.

[#] Students may seek prior approval to select the following CAR subjects[^] in "Biology" or "Chemistry" instead of "Fundamentals of Materials Science and Engineering":
Biology: Biotechnology and Human Health (ABCT1D03), Introductory Life Science (ABCT1D04), Bionic Human and the Future of Being Human (BME1D01)
Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)

[^] If you select one of these five subjects, you can fulfill the requirement of DSR and CAR-STE in "Science, Technology and Environment". You are required to choose any 3-credit subject (from Level 1 to Level 4) to make up for the total credit requirement.

A student is advised to take the following curriculum in the final year as indicated in Table 4.6.2 and obtain 33 academic credits and 4 training credits. He/she must accumulate a total of 70 academic credits and 11 training credits to qualify for graduation.

	Semester One
CSE40407 CSE40490 EE4006B	Design of Transport Infrastructure (3) Transport Management and Highway Maintenance (3) Individual Project (3 continues in Semester 2)
CAR requirement	one Cluster Area Requirement Subject (3)
GUR requirement	Service-Learning Subject[#] (1.5 continues in Semester 2)
Elective subject*	one Elective Subject from Table 4.4.4 (3) 16.5 credits
	Semester Two
CSE40408 EE4006B ENG3004	Traffic Surveys and Transport Planning (3) Individual Project (3 continues from Semester 1) Society and the Engineer (3)
CAR requirement	one Cluster Area Requirement Subject (3)
GUR requirement	Service-Learning Subject[#] (1.5 continues from Semester 2)
Elective subject*	one Elective Subject from Table 4.4.4 (3) 16.5 credits
	Semester Three (Summer Period at the end of Year 2)
IC2113	IC Training I (TSE) (4) (120 hours in summer) 4 training credits

Table 4.6.2

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

* Out of the two Electives taken in Year 2, at least one should be an EE subject. The Department reserves the right of NOT offering all the electives in each year.

Note 1 This is an example only which shows a possible study pattern for graduates with relevant Higher Diploma/Associate Degree from a recognized institution. The exact study pattern for senior year intakes varies from student to student depending on the number of subject approved for credit transfer.

Note 2 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.

4.7 Subject Support to Programme Outcomes

Table 4.7 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				√	√	√	√	√	√
AMA1110	√			√				√	
AMA1120	√			√				√	
AMA2111	√			√				√	
AMA2112	√			√				√	
AP10001	√							√	
AP10005	√							√	
AP10006	√							√	
APSS1L01							√		√
CBS1101P					√		√		
CBS1102P					√		√		
CBS3241P					√		√		
CSE30292	√		√				√	√	
CSE30312	√	√	√	√			√	√	
CSE30390	√	√	√	√	√		√	√	
CSE40407	√	√	√	√	√	√	√	√	
CSE40408	√	√	√	√			√	√	√
CSE40462	√			√	√	√	√	√	
CSE40475	√			√	√	√	√	√	√
CSE40490	√		√	√			√	√	
CSE561	√	√	√	√		√	√	√	√
CSE562	√	√	√	√		√	√	√	
EE2001B	√		√		√		√		√
EE2002B	√	√		√				√	
EE2003B	√	√		√				√	
EE2029B	√		√				√	√	
EE3002B	√	√					√		
EE3003B	√	√					√		√
EE3004B	√	√	√	√	√		√	√	
EE3010B	√			√	√	√		√	
EE3011B	√		√					√	
EE4004B	√	√					√	√	
EE4005B				√		√	√	√	
EE4006B		√	√	√	√	√	√	√	√
EE4007B	√		√	√	√		√		√
EE4008B	√		√				√		
EE4009B	√		√	√	√	√	√	√	
EE4011B	√		√		√		√		
EE4014B	√	√					√	√	√
EE4016B	√	√		√	√			√	
EE4017B	√	√		√	√	√		√	
EE4018B	√		√	√	√		√	√	
EE4019B	√		√	√				√	
EE4351B	√		√	√				√	

Subjects	Programme Outcomes								
	A1	A2	A3	A4	A5	A6	B1	B2	B3
EE502B	√				√				
EE505B	√	√					√	√	
EE509B	√	√	√	√	√		√	√	
EE512B	√		√		√		√	√	
EE526B	√	√							
EE533B	√		√	√	√			√	
EE535B				√	√	√		√	√
EE536B	√		√	√	√			√	
EE537B	√		√	√	√			√	
EE550B				√	√	√		√	√
EE560B	√		√	√	√			√	
EE5381B				√	√	√		√	√
ELC1011					√		√		
ELC1013					√		√		
ELC1014					√		√		
ELC2011					√		√		
ELC2012					√		√		
ELC2013					√		√		
ELC3521					√		√		
ENG1003				√	√	√		√	√
ENG2001	√			√				√	
ENG2002	√		√					√	
ENG2003	√		√	√	√			√	
ENG3003				√	√	√	√	√	
ENG3004				√	√	√	√		√
ENG4001				√		√	√	√	
IC2105		√	√	√		√	√		
IC2113		√	√	√		√	√		
LGT5013	√			√	√	√		√	
ME45003	√		√	√	√		√	√	
CAR subjects					√	√	√		
Healthy Lifestyle			√	√	√	√	√		√
Service-Learning			√	√	√	√	√		√

Table 4.7 Support of programme outcomes by individual subjects

4.8 Work-Integrated Education and Summer Practical Training

Work-Integrated Education (WIE) is defined as a structured and measurable learning experience which takes place in an organizational context relevant to a student's future profession. 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 (EE3010B) 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 is valid for 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 Job Board arranged by the Office of Careers and Placement Services (CAPS) of the University is one of the main sources of placement opportunities for local students and students from Mainland China and overseas. The WIE activities may or may not involve any payment. 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.
- 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 students 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

Students should start their preparatory work by the commencement of the second semester of their third year 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 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 advised 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.

A teaching 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 report/training proposal and/or report/learning portfolio after giving the student the necessary feedback.

4.9 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.

4.10 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.

4.11 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 students 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.

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.

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 PolyU full-time UGC-funded programme of the same level should submit an application for transfer of study, instead of a new application in the non-JUPAS application period.

6.4 Concurrent enrolment

Students are not permitted to enrol concurrently on two full-time/sandwich 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/sandwich 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. For Senior Year intakes, students are normally expected to complete their study in 2 years, with a maximum period of registration of 4 years.

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 a PolyU award, 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. This 1/3 requirement is also applicable to Minor programme. Students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor.

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 submitted after the commencement of the examination period will not be considered. 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 assessment 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.

To help improve the academic performance of students on academic probation, these students will be required to take a reduced study load load in the following semester (Summer Term excluded). The maximum number of credits to be taken by the students varies according to the policies of individual Departments and will be subject to the approval of the authorities concerned.

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.

For students admitted to an Articulation Degree or Senior Year curriculum which is already a reduced curriculum, they should not be given credit transfer for any required GUR subjects, and they must complete at least 70 credits to be eligible for award. Students exceptionally admitted to an Articulation Degree or Senior Year curriculum before 2017/18 based on qualification more advanced than Associate Degree/Higher Diploma may be given credit transfer for the required GUR subjects if they had completed comparable components in their earlier studies. These students can take fewer than 70 credits for attaining the award. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 70 credits to be eligible for award.

For credit transfer of retaken subjects, the grade attained in the last attempt should be taken in the case of credit transfer with grade being carried over. Students applying for credit transfer for a subject taken in other institutions are required to declare that the subject grade used for claiming credit transfer was attained in the last attempt of the subject in their previous studies. If a student fails in the last attempt of a retaken subject, no credit transfer should be granted, despite the fact that the student may have attained a pass grade for the subject in the earlier attempts.

Students should not be granted credit transfer for a subject which they have attempted and failed in their current study.

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 assessment 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/her 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.

When a student falls within the categories as stipulated above, the Board of Examiners shall de-register the student from the programme without exception.

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 (b) or (c) of (ii) above if his academic performance is poor to the extent that the Board of Examiners considers that there is not much of a chance for him to attain a GPA of 2.0 at the end of the programme.

If the student is not satisfied with the de-registration decision of the Board of Examiners, he/she can lodge an appeal. All such appeal cases will be referred directly to Academic Appeals Committee (AAC) for final decision. Views of Faculties/Schools/Departments will be sought and made available to AAC for reference.

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. However, students who have passed a General University Requirements (GUR) subject are not allowed to re-take the same GUR subject for the purpose of improving their 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.[8]

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 Assessment to be completed

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 remedial work must not take the form of re-examination.

6.19 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.

[8] In these circumstances when students do not have a choice to retake a failed subject, such as when the failed subject has been phased out, a 'tie-subject' arrangement can be made with the approval of the Faculty/School Board. Under the arrangement, another appropriate subject can be taken as equivalent to the subject which is not offered. Upon passing the equivalent subject, the fail grade of the original subject will be replaced by the latest grade of the retake subject and the failure grade of the original subject will not be taken into account in the calculation of the GPA.

6.20 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 to Denote Overall Subject Assessments (and subject components, if deemed appropriate)

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	—
#	Disqualification of result due to academic dishonesty	This code applies to failure (i.e. F and U grades) arising from disqualification of subject result due to academic dishonesty. The code will be removed subsequently when the student leaves the University.

^ 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. The remedial work must not take the form of re-examination.

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[9]

(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[10] will be counted in the GPA calculation but not in the WGPA calculation.

[9] 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.

[10] "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.

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 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.

6.21 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.

When a student has satisfied the requirements for award, an award GPA will be calculated to determine his award classification.

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) A weighting of 2 for Level 1 and 2 subjects, and a weighting of 3 for Level 3 and 4 subjects, will be included in the calculation to determine the Honours classifications. (5) 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. (4) Up to 6 credits from the Major/GUR [including Language Communication Requirements (LCR) subjects at proficiency level] can be counted towards the chosen Minor. Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major-Minor studies must not be lower than the credit requirement of the single discipline Major programme. *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

6.22 Guidelines for Award Classification

The Weighted GPA will be used as a guide to help determine award classifications.

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 W_i = weighting to be assigned according to the level of the subject

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" which includes grades obtained for the free electives, if appropriate.

"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.

6.23 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.

Students who have committed academic dishonesty will be subject to the penalty of the lowering of award classification by one level. For undergraduate students who should be awarded a Third class Honours degree, they will be downgraded to a Pass-without-Honours. The minimum of downgraded overall result will be kept at a Pass. In rare circumstances where both the Student Discipline Committee and Board of Examiners of a Department consider that there are strong justifications showing the offence be less serious, the requirement for lowering the award classification can be waived.

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

Honours Degrees	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.

6.24 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) (including information on the Minor award, if appropriate), with classification and year of award;

(vii) a statement indicating that the student has completed the Graduating Students' Language Proficiency Assessment (GSLPA) / Work-integrated Education (WIE) activities / Co-curricular Activities / Healthy Lifestyle / e-learning course in Putonghua (to be offered as an option with effect from the 2018/19 intake cohort), as appropriate;

(viii) a statement showing the duration of supervised training (applicable to sandwich programmes); and

(ix) information on the partner institution, if the award is for a joint programme with another institution and leads to dual/joint awards.

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.

6.25 Recording of disciplinary actions in students' records

With effect from Semester One of 2015/16, disciplinary actions against students' misconducts will be recorded in students' records.

Students who are found guilty of academic dishonesty will be subject to the penalty of having the subject result concerned disqualified and be given a failure grade with a remark denoting 'Disqualification of result due to academic dishonesty'. The remark will be shown in the students' record as well as the assessment result notification and transcript of studies, until their leaving the University.

Students who have committed disciplinary offences (covering both academic and non-academic related matters) will be put on 'disciplinary probation'. The status of 'disciplinary probation' will be shown in the students' record as well as the assessment result notification, transcript of studies and testimonial during the probation period, until their leaving the University. The disciplinary probation is normally one year unless otherwise decided by the Student Discipline Committee.

The University reserves the right to withhold the issuance of any certificate of study to a student who has unsettled matters with the University, or subject to disciplinary action.

Appendix I

Subject Description Forms

Content

Subject

Subject Description Form

Subject Code	AF3625
Subject Title	Engineering Economics
Credit Value	3
Level	3
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 and monopoly **Macroeconomic Factors** 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><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed</td></tr><tr><td>a</td><td>b</td><td>c</td></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 Hr.</td></tr><tr><td>▪ Written assignments</td><td>18 Hr.</td></tr><tr><td>Total student study effort</td><td>105 Hrs.</td></tr></table>
Reading List and References	**Recommended Textbooks** 1. Parkin and Bade, 2015, *Foundations of Microeconomics*, 7th Edition, Pearson. 2. Sullivan, Wicks and Koelling, 2014, *Engineering Economy,* 16th Edition, Pearson. **References** 1. Drury, Colin, 2008, *Management and Cost Accounting,* 7th Edition, Cengage Learning. 2. Frank, Robert H., 2007, *The Economic Naturalist: Why Economics Explain Almost Everything?* Basic Books.

Subject Description Form

Subject Code	AMA1110
Subject Title	Basic Mathematics I – Calculus and Probability & Statistics
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	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	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	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. 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	Basic concepts and elementary techniques of differential and integral calculus, elementary statistics 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	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
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 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	

Subject Description Form

Subject Code	AMA1120
Subject Title	Basic Mathematics II – Calculus and Linear Algebra
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	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	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	Elementary calculus: Mean Value Theorem with applications to optimization 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 physics. Improper Integrals. 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	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	See table below

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
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 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	

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA1101 / AMA1102 / AMA1120 / AMA1500 Exclusion: AMA2007 / AMA2308 / AMA2380 / AMA2511 / AMA2882 / AMA290
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:** a. apply mathematical reasoning to analyze essential features of different problems in science and engineering; b. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; c. develop and extrapolate the mathematical concepts in synthesizing and solving new problems d. demonstrate abilities of logical and analytical thinking; e. search for useful information in the process of problem solving.
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 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

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
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 Hours
	• Tutorial	13 Hours
	• Mid-term test and examination	
	Other student study effort	
	• Assignments and Self study	78 Hours
	Total student study effort:	**117 Hours**

Reading List and References

1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2015.
2. Anton, H. *Elementary Linear Algebra* (11th edition). Wiley, 2014.
3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley.
4. James, G. (2015). *Modern Engineering Mathematics*, 5th ed. Pearson Education Limited
5. Thomas, G. B., Weir, M. D. & Hass, J. R. *Thomas' Calculus*, 14th ed. Pearson Education 2017

Subject Description Form

Subject Code	AMA2112
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2111
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.
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	<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</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>1. Homework, quizzes and mid-term test</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>60%</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> 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	<table><tr><td>**Class contact:**</td><td></td></tr><tr><td>• Lecture</td><td>26 Hours</td></tr><tr><td>• Tutorial</td><td>13 Hours</td></tr><tr><td>• Mid-term test and examination</td><td></td></tr><tr><td>**Other student study effort**</td><td></td></tr><tr><td>• Assignments and Self study</td><td>78 Hours</td></tr><tr><td>**Total student study effort:**</td><td>**117 Hours**</td></tr></table>
Reading List and References	1. C.K. Chan, C.W. Chan and K.F. Hung, *Basic Engineering Mathematics*, McGraw-Hill, 2015. 2. Anton, H. *Elementary Linear Algebra* (11th edition). Wiley, 2014. 3. Kreyszig, E. (2011). *Advanced Engineering Mathematics*, 10th ed. Wiley. 4. James, G. (2015). *Modern Engineering Mathematics*, 5th ed. Pearson Education Limited 5. Thomas, G. B., Weir, M. D. & Hass, J. R. *Thomas' Calculus*, 14th ed. Pearson Education 2017

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 Newton's law and Energy; 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. understand electrostatic field and potential; f. solve problems on interaction between current and magnetic field; and g. describe and demonstrate the phenomenon of electromagnetism.
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	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="7">Intended subject learning outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th><th>e</th><th>f</th><th>g</th></tr><tr><td>1. Continuous assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="7"></td></tr></table> **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	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lecture</td><td>33 Hrs.</td></tr><tr><td>▪ Tutorial</td><td>6 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Self-study</td><td>81 Hrs.</td></tr><tr><td>Total student study effort</td><td>120 Hrs.</td></tr></table>
Reading List and References	1. John D. Cutnell & Kenneth W. Johnson, **Introduction to Physics**, 9th edition, 2013, John Wiley & Sons. 2. 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: a. solve simple problems in single-particle mechanics using calculus and vectors; b. solve problems in mechanics of many-particle systems using calculus and vectors; c. understand simple harmonic motion and solve simple problems; d. solve problems related to acoustic standing waves; e. calculate changes in frequency received due to Doppler's effect; f. apply ideal gas laws to solve problems; g. apply the first law of thermodynamics to simple processes; and h. solve simple problems related to the cyclic processes.
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; gravitational force; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave and standing wave; Doppler effect; sound waves and beats. **Thermal physics**: conduction, convection and radiation; black body radiation; 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	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="8">Intended subject learning outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th><th>e</th><th>f</th><th>g</th><th>h</th></tr><tr><td>1. Continuous assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="8"></td></tr></table> **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	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lecture</td><td>33 Hrs.</td></tr><tr><td>▪ Tutorial</td><td>6 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Self-study</td><td>81 Hrs.</td></tr><tr><td>Total student study effort:</td><td>120 Hrs.</td></tr></table>
Reading List and References	1. John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2014, 9th edition, Brooks/Cole Cengage Learning. 2. Hafez A. Radi, John O. Rasmussen, "Principles of physics: for scientists and engineers", 2013, Springer. 3. 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. understand phenomena related to the wave character of light; c. solve problems in electrostatics; d. solve problems on interaction between current and magnetic field; e. apply electromagnetic induction to various phenomena; and f. solve problems in simple circuits.
Subject Synopsis/ Indicative Syllabus	**Waves and optics**: nature of light, reflection and refraction; Snell's law; image formation by mirrors and lenses; compound lens; microscope and telescope; superposition of waves; Huygen's principle; interference and diffraction; diffraction grating; Rayleigh's criterion and optical resolution; 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; Lorentz force; magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere's law; Faraday's law and Lenz's law; induction; 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	<table><tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed</td></tr><tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td></tr><tr><td>1. Continuous assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Examination</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td colspan="6"></td></tr></table> **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	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lecture</td><td>33 Hrs.</td></tr><tr><td>▪ Tutorial</td><td>6 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Self-study</td><td>81 Hrs.</td></tr><tr><td>Total student study effort</td><td>120 Hrs.</td></tr></table>
Reading List and References	1. John W. Jewett and Raymond A. Serway, "Physics for Scientists and Engineers", 2014, 9th edition, Brooks/Cole Cengage Learning. 2. Hafez A. Radi, John O. Rasmussen, "Principles of physics: for scientists and engineers", 2013, Springer. 3. 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) : **Leadership and Intra-Personal Development**
Pre-requisite/ Co-requisite/ Exclusion	Nil
Assessment Methods	100% Continuous Assessment / Individual Assessment / Group Assessment 1. Class Participation — 20% — -- 2. Group Project — -- — 30% 3. Term Paper — 50% — -- Note: • The grade is calculated according to the percentage assigned; • The completion and submission of all component assignments are required for passing the subject
Objectives	The course is designed to enable students to learn and integrate theories, research and concepts of the basic personal qualities (particularly intrapersonal and interpersonal qualities) of effective leaders. This subject also intends to help students develop and reflect on their intrapersonal qualities, interpersonal qualities and connection of learning to oneself. Finally, the subject cultivates students' appreciation of the importance of intrapersonal and interpersonal qualities in effective leadership.
Intended Learning Outcomes	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. acquire interpersonal 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	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 thinking and 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	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	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Class Participation^	20%	✓	✓	✓	✓	✓
2. Group Project*	30%	✓	✓	✓	✓	✓
3. Term Paper^	50%	✓	✓		✓	✓
Total	100%					

*assessment is based on group effort
^assessment is based on individual effort

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

1. Assessment of Class Participation (20%): 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. Also, 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.

2. Assessment of Group Project (30%): 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.

3. Assessment of Term Paper (50%): 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 four academic years (2010-2011; 2011-2012; 2012-2013; 2013-2014), 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 Scientific World Journal.* Article ID 934679, 8 pages, doi:10.1100/2012/934679

Shek, D. T. L. (2013). 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., & Law, M. Y. M. (2014). Evaluation of a subject on leadership and intrapersonal development: views of the students based on qualitative evaluation. *International Journal on Disability and Human Development.*doi:10.1515/ijdhd-2014-0339

Shek, D. T. L., & Leung, H. (2014). Post-lecture subjective outcome evaluation of a university subject on leadership and positive youth development in Hong Kong. *International Journal on Disability and Human Development.*doi:10.1515/ijdhd-2014-0343

Shek, D. T. L., & Leung, J. T. Y. (2014) Perceived benefits of a university subject on leadership and intrapersonal development. *International Journal on Disability and Human Development.*doi:10.1515/ijdhd-2014-0345

Shek, D. T. L., & Ma, C. M. S. (2014). Do university students change after taking a subject on leadership and intrapersonal development? *International Journal on Disability and Human Development.* doi:10.1515/ijdhd-2014-0341

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. (2013). 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. (2013). 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., & 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., 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.

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

Shek, D. T. L., & Wu, F. K. Y. (2014). The role of teachers in youth development: Reflections of students. *International Journal on Disability and Human Development.* doi:10.1515/ijdhd-2014-0344

Shek, D. T. L., Wu, F. K. Y., & Law, M. Y. M. (2014). Perceptions of a university subject on leadership and intrapersonal development: Reflections of the scholarship recipients. *International Journal on Disability and Human Development.* doi:10.1515/ijdhd-2014-0340

Shek, D. T. L., & Yu, L. (2014). Post-course subjective outcome evaluation of a subject on leadership and intrapersonal development for university students in Hong Kong. *International Journal on Disability and Human Development.* doi:10.1515/ijdhd-2014-0342

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	76 Hrs.
	Total student study effort	135 Hrs.
Medium of Instruction	English	
Medium of Assessment	English	

Reading List and References

Basic References:

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

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Subject Description Form

Subject Code	CBS1101P
Subject Title	Fundamentals of Chinese Communication（大學中文傳意）
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Remarks: For students entering with HKDSE Chinese subject result at Level 3 or equivalent
Objectives	This subject aims to foster students' communicative competence in using both written and spoken Chinese to communicate effectively, appropriately, flexibly and politely in real situated social settings.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) develop effective communication skills in written Chinese required for basic usage in the workplace such as email-letter, notice, news release, report, discussion, presentation and negotiation; (b) master the written format, organization, language and style of expression of various genres of Chinese practical writing such as official correspondences, publicity materials, reports and proposals for communication; (c) give formal presentation in Putonghua effectively and appropriately; (d) engage in formal discussion in Putonghua effectively and politely.
Subject Synopsis/ Indicative Syllabus	1. Enhancement of Basic Competence in Written Chinese and Skill of Summarizing 2. Written Chinese for Practical Purposes • Format, organization, language of each genre; • Coherence in Chinese writing • Style of expression of different genres such as official correspondences, publicity materials; • Context dependent stylistic variation • Appropriateness in communication 3. Enhancement of Basic Skills in Putonghua Pronunciation 4. Formal Presentation in Putonghua • Choice of words in Putonghua • The flow of speaking • Manner of speaking and gesture 5. Formal Discussion in Putonghua • Identification of main idea and key messages • Evaluation of relevancy of information in a message • Skills of summarizing • Agreeing/disagreeing/answering to questions politely
Teaching/Learning Methodology	The subject will be conducted in Putonghua, in highly interactive seminars. The subject will motivate the students' active participation by assigning group presentation /discussion in class. In a forum-like format, students are guided to : (1) present to the class, their understanding of each genre designed for the syllabus for discussions and improvement; (2) modify passages in a given genre/style into other genres/styles for addressing different audiences and purposes; (3) give a power-point presentation in Putonghua in front of the whole class, then receive on spot feedback for discussion and improvement; (4) prepare a written report/proposal on the same topic; (5) engage in formal discussion in Putonghua on topics related to current issues and/or business operation; (6) produce a written document on the same topic using a chosen genre. E-learning materials for enhancing students' proficiency in both Putonghua and written Chinese are included in Chinese LCR teaching. Students are expected to follow teachers' guidelines and get access to the materials on e-Learning platform for self-study on voluntary basis.
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. Written Assignment	45%	√	√		
2. Oral Presentation	25%			√	√
3. Final Examination	30%	√	√	√	√
Total	100%				

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

Both written assignments and oral presentation will focus on the functions of communication and the appropriateness of language used in authentic social settings. The final examination aims to obtain an objective measurement of students' basic competence in the use of Putonghua and written Chinese. It emphasizes on the accuracy of expression in both spoken and written forms. Explanations and exercises are provided in classroom teaching.

Students obtaining a subject pass must pass both components, i.e. the continuous assessment and examination of the subject. Students will get failure of the subject if he/she fails in either one of the two components.

Student Study Effort Expected	Class contact:	
	▪ Seminar	39 Hrs.
	Additional activity:	
	▪ e-Learning in Putonghua and Written Chinese	9 Hrs.
	Other student study effort:	
	▪ Outside Class Practice	39 Hrs.
	▪ Self-study	39 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	1. 于成鯤、陳瑞端、秦扶一、金振邦主編：《當代應用文寫作規範叢書》，復旦大學出版社，2011年。 2. 鍾文佳：《漢語口才學》，西南師範大學出版社，2004年。 3. 李白堅、丁迪蒙：《大學體型寫作訓練規程》，上海大學出版社，2004年。 4. 于成鯤主編：《現代應用文》，復旦大學出版社，2003年。 5. 邢福義、汪國勝主編：《現代漢語》，華中師範大學出版社，2003年。 6. 陳瑞端著：《生活錯別字》，中華書局，2000年。 7. 李軍華：《口才學》，華中理工大學出版社，1996年。 8. 陳建民：《說話的藝術》，語文出版社，1994年。 9. 邵守義：《演講全書》，吉林人民出版社，1991年。 10. 路德慶主編：《寫作教程》，華東師範大學出版社，1982年。	

Subject Description Form

Subject Code	CBS1102P
Subject Title	Advanced Communication Skills in Chinese（高階中文傳意）
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Remarks: For students entering with HKDSE Chinese subject result at Level 4 and 5 or equivalent
Objectives	This subject aims to develop students' ability to communicate effectively in both Putonghua and written Chinese, with particular reference to the stylistic variations of expression in different communicative settings.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Develop effective communication skills in both spoken and written Chinese required for workplace such as email-letter, notice, news release, report, presentation and negotiation as well as other settings such as speech delivery and / or special column in newspaper or magazine. in the business and professional setting; b. Master the format, organization, language and style of expression of the following genres of Chinese practical writing: argumentative and persuasive writing; c. Give public speech; d. Produce a piece of prose.
Subject Synopsis/ Indicative Syllabus	1. Enhancement of Basic Competence in Written Chinese and Skill of Summarizing 2. Written Chinese for Practical Purposes 2.1. Uses of words and sentences, choice of diction 2.2. Coherence and thread of thinking in Chinese writing 2.3. Context dependent stylistic variation 2.4. Format, organization, language and style of expression of speeches, argumentative & persuasive writing 3. Enhancement of Basic Skills in Putonghua Pronunciation 4. Public Speech 4.1. Contextual elements: the audiences, the purpose and the topic 4.2. Identification of key points and collection of supporting information 4.3. Articulation and flow of speaking 4.4. Choice of words, manner and gesture 4.5. Using of visual aids 4.6. Handling of question and answer session 5. Creative Writing 5.1. The language, the structure and style of expression in creative writing

Teaching/Learning Methodology	The subject will be conducted in highly interactive seminars. The subject will motivate the students' active participation by assigning group presentation /discussion in class. In a forum-like format, students are guided to: (1) present to the class, their understanding of each genre designed for the syllabus for discussions and improvement; (2) modify passages in a given genre/style into other genres/styles for addressing different audiences and purposes; (3) prepare a script for public speaking; (4) give a public speech in front of the whole class, then receive on spot feedback for discussion and improvement; (5) engage in formal discussion on topics related to current issues and/or business operation that require persuasive and argumentative skills; (6) produce an argumentative article on the same topic; (7) analyze selected prose in terms of contents, structure and styles of expression. E-learning materials for enhancing students' proficiency in both Putonghua and written Chinese are included in Chinese LCR teaching. Students are expected to follow teachers' guidelines and get access to the materials on e-Learning platform for self-study on voluntary basis.
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. Prose Writing	30%	✓	✓		
2. Formal Speech	15%	✓	✓	✓	
3. Feature Article	15%	✓	✓		✓
4. Class Participation	10%	✓	✓	✓	✓
5. Final Examination	30%	✓	✓	✓	✓
Total	100%				

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

Both written assignments and oral presentation will focus on the functions of communication and the adequacy of language used in authentic social settings. The final examination aims to obtain an objective measurement of students' basic competence in the use of Putonghua and written Chinese. It emphasizes on the accuracy of expression in both spoken and written forms. Explanations and exercises are provided in classroom teaching.

Students obtaining a subject pass must pass both components, i.e. the continuous assessment and examination of the subject. Students will get failure of the subject if he/she fails in either one of the two components.

Student Study Effort Expected	Class contact:	
	▪ Seminar	39 Hrs.
	Additional activity:	
	▪ e-Learning in Putonghua and written Chinese	9 Hrs.
	Other student study effort:	
	▪ Outside Class Practice	39 Hrs.
	▪ Self-study	39 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	1. 吳禮權：《演講的技巧》，香港：商務印書館，2013年。 2. 李錦昌：《商業溝通與應用文大全》，香港：商務印書館，2012年。 3. 賴蘭香：《傳媒中文寫作》(全新修訂本)，香港：中華書局，2012年。 4. 于成鯤、陳瑞端、秦扶一、金振邦主編：《當代應用文寫作規範叢書》，上海：復旦大學出版社，2011年。 5. 邵敬敏：《現代漢語通論》，上海：上海教育出版社，2007年。 6. 任伯江：《口語傳意權能：人際關係策略與潛力》，香港：香港中文大學出版社，2006年。 7. 裴顯生、方延明主編：《新聞寫作教程》，北京：高等教育出版社，2005年。 8. 宋春陽、孟德東、張志攀：《實用新聞寫作概論》，上海：復旦大學出版社，2004年。 9. 李白堅、丁迪蒙：《大學體型寫作訓練規程》，上海：上海大學出版社 ，2004年。 10. 鍾文佳：《漢語口才學》，西南師範大學出版社，2004年。 11. 于成鯤主編：《現代應用文》，復旦大學出版社，2003年。 12. 邢福義、汪國勝主編：《現代漢語》，華中師範大學出版社，2003年。 13. 孫光萱：《中國現代散文名家名篇賞讀》，上海：上海教育出版社，2001年。 14. 陳瑞端著：《生活錯別字》，香港：中華書局，2000年。 15. 陳建民：《說話的藝術》，語文出版社， 1994年。	

Subject Description Form

Subject Code	CBS3241P
Subject Title	Professional Communication in Chinese
Credit Value	2
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite / Co-requisite: Chinese LCR subjects (in Semester 2 of Year 3 or Semester 1 of Year 4)
Objectives	This subject aims to develop the language competence for professional communication in Chinese required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals and reports.
Subject Intended Learning Outcomes	Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in Chinese, students will be able to a. plan, organize and produce professionally acceptable project proposals and reports with appropriate text structures and language for different intended readers b. plan, organize 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 and reports in Chinese • Planning and organizing project proposals and reports • 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 • Writing professional reports 2. Oral presentations of projects • 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' Chinese 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 and reports - giving oral presentations to intended stakeholders of the project
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
1. Project proposal and report in Chinese	60%	✓		✓
2. Oral presentation of project proposal and report	40%		✓	✓
Total	100%			

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

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.

Student Study Effort Expected	Class contact:	
	▪ Seminars	26 Hrs.
	Other student study effort:	
	▪ Researching, planning, writing, and preparing the project	44 Hrs.
	Total student study effort	70 Hrs.

Reading List and References	a) 司有和 (1984) ：《科技寫作簡明教程》，安徽教育出版社。 b) 葉聖陶、呂叔湘、 朱德熙、 林燾 (1992)：《文章講評》 語文出版社。 c) 于成鯤主編（2003）：《現代應用文》，復旦大學出版社。 d) 岑紹基、謝錫金、祈永華 (2006) ：《應用文的語言・語境・語用》，香港教育圖書公司。 e) 邵敬敏主編 (2010) ：《現代漢語通論 (第二版)》，上海教育出版社。 f) 于成鯤、陳瑞端、秦扶一、金振邦主編 (2010)：《中國現代應用文寫作規範叢書：科教文與社交文書寫作規範》，復旦大學出版社。 g) 香港特別行政區政府教育局・課程發展處中國語文教育組 (2012) ：《常用字字形表》，政府物流服務署印。

Subject Description Form

Subject Code	CSE30292
Subject Title	Transportation Operations and Management
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: CSE291 or EE2029B
Objectives	1. To provide the students with the knowledge of operations in various transportation systems. 2. To introduce the engineering problems arising from the operations of transportation systems. 3. To discuss the characteristics and performance evaluation of transportation operations and management measures. 4. To understand the inter-modal transportation connections, transfers and competitions.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Discriminate the basic characteristics of various transportation systems. b. Demonstrate understanding of the fundamentals of transportation operations and management. c. Conduct simple design on traffic signal and transit schedules. d. Select appropriate operations and management strategy based on different conditions and constraints. e. Be ready to take further subjects on individual transportation systems at higher levels.
Subject Synopsis/ Indicative Syllabus	1. ***Road transportation*** (3 weeks) Transportation facility planning procedures; Travel demand and traffic data collection; junction control, traffic signal, basic fixed time traffic signal design, signal coordination; traffic management measures. 2. ***Urban transit and railway transportation*** (3 weeks) Transit operations and service scheduling; transit route planning; transit line capacity; capacities of different transit modes; measures for increase of transit speed; rail traffic control; optimizing transit operations. 3. ***Air transportation*** (2weeks) Civil aviation and structure of the airline industry; aircraft characteristics and performance; navigation and traffic control; airport planning and design. 4. ***Transportation terminals***: (4 weeks) Types and characteristics of terminals (sea ports, rail-yards, airports, parking lots); Analysis of terminal operations (queueing theory, Monte Carlo simulation), parking studies
Teaching/Learning Methodology	The key concepts and techniques covered in this subject are discussed in lecture. To strengthen understanding and provide opportunities for students to appreciate what they have learnt, students will have chances to do presentations, discussions, and hands-on exercise both in the lectures and the tutorials. Furthermore, individual assignments consisting of essays and numerical problems let students demonstrate their level of understanding and create evidence of learning.

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.Assignments and in-class exercise	25%	✓	✓	✓	✓	✓
2.Mid-term test	15%	✓	✓	✓	✓	✓
3.Final examination	60%	✓	✓	✓	✓	✓
Total	100%					

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:

The students will be assessed with three components: written assignments and in-class exercise, a midterm test and a final exam. The written assignments will consist of both numerical and descriptive problems, and the in-class exercise includes discussions and presentations. They are aimed at measuring students' attainment of the intended learning outcomes in different aspects. The numerical problems target at ability in conducting transportation system design. The essay problems and the in-class presentations and discussions provide opportunities for students to develop deeper understanding to operations and management of various transportation modes, demonstrate students' ability to think critically in the selection of operations and management strategy and to enhance their effective communication skills. These are appropriate in achieving intended learning outcomes (a), (b), (c), (d), and (e). The midterm test and the final exam are conducted at different times in the semester to consolidate students' knowledge in lectures, tutorials, and other class activities. They are appropriate in assessing intended learning outcomes (a), (b), (c), (d), and (e).

Student Study Effort Expected		
	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials	13 Hrs.
	Other student study effort:	
	▪ Reading and Studying	39 Hrs.
	▪ Completion of assignments and class presentations	39 Hrs.
	Total student study effort	117 Hrs.

Reading List and References

Textbooks

1. C.F. Daganzo, *Fundamentals of transportation and traffic operations*, Pergamon, 1997
2. Vukan R. Vuchic, Urban *Transit: Operations, Planning and Economics*. John Wiley & Sons, 2005
3. Roger P. Roess, Elena S. Prassas, William R. McShane, *Traffic Engineering*, Pretience Hall, 2004

	References 1. Transport Department, *Transportation Planning and Design Manual*, 2008 2. Transportation Research Board, *Highway Capacity Manual 2000*, 2000 3. P.H. Wright, N.J. Ashford, and R.J. Stammer, Jr., *Transportation Engineering: Planning and Design*, John Wiley, 4th Ed., 1997 4. C.J. Khisty and B.K Lall, *Transportation Engineering: An Introduction*, 3rd Edition, Prentice Hall, 2003

Subject Description Form

Subject Code	CSE30312
Subject Title	Transportation and Highway Engineering
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: CSE312
Objectives	1. To promote a basic appreciation of the nature of transportation engineering; 2. To introduce students to those engineering activities essential to the planning and design of highway and transportation systems; 3. To enable students to acquire basic principles of highway planning and engineering; 4. To train students with basic techniques in highway design and pavement material studies; 5. To enable students to make engineering judgment on highway planning and design.
Intended Learning Outcomes	Upon completion of the subject, students will be: a. Able to apply the fundamentals of applied physics and principles of engineering design to carry out geometric design of highway alignments and mix design of pavement materials; b. Able to exercise professional judgement and engineering sense in the design and evaluation of alternative highway alignment schemes in view of the complex site environment; c. Able to analyze and interpret laboratory data for optimal design of highway pavement materials; d. Able to explain the design of highway alignments and pavement materials logically and lucidly; e. Able to understand the limitations of the site constraints and to recognize the assumptions and principles adopted in the highway design so as to develop alternative highway design schemes and optimal mix for pavement materials.

Subject Synopsis/ Indicative Syllabus	1. Introduction to Transportation and Highway Engineering (1 week) The scope of transportation engineering. Transportation in society; economic, social and environmental factors. Transportation modes. Urban transportation problems; aspects of transport planning studies and traffic management. 2. Highway Planning (2 week) Highway hierarchy, classification and design standards; Standard layout of roads; Cross-section elements of highways; Highway junctions: at-grade and grade-separated junctions. Safety considerations. 3. Geometric Design (4 weeks) Design principle and procedure; Basic assumptions and theories for geometric design; Sight distance; Design of vertical and horizontal alignment: Circular curve, transition curve, horizontal curve widening; sag curve and summit curve. 4. Highway Construction (1 weeks) Application of the principles of soil mechanics to subgrade compaction and testing. California Bearing Ratio Test of subgrade. Highway materials and construction control. Soil stabilization. 5. Road Structures and Components (2 weeks) Principal types of road structures. Structural elements of flexible and rigid pavements and their functions. Preparation of subgrade. Joints for rigid pavements and construction details. 6. Highway Materials (3 weeks) Bituminous road materials. Types and uses of pre-mixed bituminous materials. Recycled materials. Design of bituminous materials; Marshall test procedure. Binder characteristics; consistency and composition tests. Mechanical tests on bituminous mixture; indirect tensile fatigue test, indirect tensile stiffness modulus test, rutting test. Non-bituminous materials for road base. 7. Laboratory Basic highway material testing procedures; Marshall test, California Bearing Ratio test.
Teaching/Learning Methodology	Fundamental knowledge will be covered in lectures. Tutorials will provide opportunities for discussion of lecture materials and will also be conducted in the form of example class and problem-solving session to supplement understanding from lectures. Laboratory work will help students appreciate the basic principles and familiarize themselves with basic instruments.
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) Assignments and Lab Reports	30%	✓		✓	✓	✓
(2) Mid-term Test(s)	10%	✓	✓			✓
(3) Final Examination	60%	✓	✓			✓
Total	100%					

<table>
<tr><td></td><td colspan="2">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:

The students will be assessed with three components, i.e., the laboratory session and assignment, mid-term test(s) and a final examination at the end of the semester. The students will be required to attend laboratory sessions and submit group laboratory reports. These laboratory sessions will enable students to acquire basic laboratory techniques and report writing. The works in the laboratory sessions are closely related to practicing highway engineering requirements. Students will have to exert engineering judgments to complete the laboratory sessions. The laboratory sessions to together with the report writing are best to achieve intended learning outcomes a, c, and d. The mid-term test will emphasize on assessing students' basic concept and current practices of highway engineering. It is appropriate to achieve intended learning outcomes a, b and e. The final examination will consolidate students' learning in lectures and tutorials. It is most appropriate to achieve the intended learning outcomes a, b, and e.</td></tr>
<tr><td rowspan="8">Student Study Effort Expected</td><td>Class contact:</td><td>Average Numbers of Hours per Week</td></tr>
<tr><td>▪ Lectures</td><td>2 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>0.31 Hrs.</td></tr>
<tr><td>▪ Laboratory Sessions</td><td>0.69 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading and studying</td><td>4 Hrs.</td></tr>
<tr><td>▪ Completion of Assignments/Lab Reports</td><td>2 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>9 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2"><u>Essential Textbooks</u>

1. "Principles of Highway Engineering and Traffic Analysis", 5th Edition, Mannering, F.L., Washburn, S.S. (John Wiley & Sons), 2013.
2. "Highways Construction & Maintenance 2nd ed., John Watson (Longman), 1994.

<u>Reference Textbooks</u>

1. "Highway Design Characteristics, Transport Planning and Design Manual", Vol. 2, Hong Kong Transport Department, March 1984.
2. "Highway Materials, Soils & Concretes", Atkins, H.N. (Reston).
3. "Highways", 3rd ed., O'Flaherty, C.A. (Edward Arnold), 1986-1988.
4. American Association of State Highway and Transportation Officials (AASHTO). A Policy on Geometric Design of Highways and Streets. 2004. http://www.hyd.gov.hk/eng/public/publications/index.htm</td></tr>
</table>

Subject Description Form

Subject Code	CSE30390
Subject Title	Transportation Systems Analysis
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA1110
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 relate the previously acquired mathematical theories to practical problems. 3. To provide students with a solid bridge between mathematical theories and real life transportation systems. 4. To enable students to analyse the advantages and limitations of the commonly adopted numerical techniques and operations research methods. 5. To prepare students for tackling practical engineering problems, with a combination of strong theoretical background and sound engineering sense.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Make use of operational research techniques for transportation system design and optimisation under various constraints. b. Perform simple statistical analysis on field data, sample estimation and hypothesis testing. c. Design suitable sampling and experimental methods for transportation system analysis and realise error sources.
Subject Synopsis/ Indicative Syllabus	1. ***Operations research*** (5 weeks) Linear programming, simple Simplex algorithms, sensitivity analysis, shortest path and maximum flow problems, integer programming, branch and bound algorithm, applications in transportation. 2. ***Probability & statistics*** (6 weeks) Random variables, probability distributions, sample distributions and means, Central Limit Theorem, Bayesian Theorem, significance and hypothesis testing. 3. ***Data collection and experimental design*** (2 weeks) Use of field data and data gathering techniques, sources of errors, considerations of sample size; experiment design for demand forecasting and transportation operations analysis; analysis techniques.
Teaching/Learning Methodology	Most of the concepts will first be introduced in lectures. Tutorials provide opportunities for students to enhance understanding through practicing on calculation exercises and have chance to discuss with the lecturers to clarify misunderstanding. Lab sessions would introduce students to computer programs that are useful in dealing with real-size problems.

Assessment Methods in Alignment with Intended Learning Outcomes	

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Assignments	15%	✓	✓	✓
2. Lab reports	10%	✓	✓	
3.Quizzes	15%	✓	✓	
4.Final exam	60%	✓	✓	✓
Total	100%			

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:

Students will be assessed by four methods: assignments, lab reports, quizzes, and final exam. Students will demonstrate their knowledge and numerical techniques related to transportation engineering problems in the written assignments. Assignments are appropriate to achieve intended learning outcomes (a) and (b). Through laboratory sessions, students will learn various useful programs and showcase their knowledge acquired through lab reports, and is targeted at intended learning outcome (a) and (b). The quizzes will focus on the numerical techniques and numerical methods required in this subject and will address intended learning outcomes (a) and (b). The final exam scheduled at the end of the semester consolidates the lectures, tutorials, and lab sessions and will address intended learning outcomes (a), (b), and (c).

Student Study Effort Expected	Class contact:	
	▪ Lecture/ Tutorial	39 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Reading and Studying	39 Hrs.
	▪ Completing of assignments, class presentations and lab reports	39 Hrs.
	Total student study effort	123 Hrs.

Reading List and References

Textbooks:

1. F.S. Hillier, Introduction to operations research, McGraw Hill, 2005

2. R.E. Walpole, R.H. Myers, S.L. Myers and K.Y. Ye, Probabilities and Statistics for Engineers and Scientists, Prentice Hall, 2002

Subject Description Form

Subject Code	CSE40407
Subject Title	Design of Transport Infrastructure
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisites: CSE304 / CSE312 / CSE30312 Pre-requisites for TSE Students (41081 and 41481): CSE291, CSE292 and CSE312 / CSE30312 Exclusion: CSE407
Objectives	1. To enable students to acquire basic knowledge of design principles for transport infrastructure development; 2. To enable students to design major transport infrastructures including road drainage, road pavement, road junction, railways and airport runway; 3. To enable students to assess engineering judgment on alternative transport infrastructure designs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Have the basic knowledge of the design principles of transport infrastructure including roads, railways and airport runways as well as the skills to plan and design transport elements such as road, railway and airport layout and structures; b. Be familiar with the common design computer packages as well as manual calculations for road drainage, junction and pavement designs as well as railway station and airport layout designs and be able to exercise professional judgments on design parameters; c. Able to carry out and evaluate proper material tests for road pavements as well as tests on railway civil element requirements; d. Able to formulate and design cost-effective transport infrastructure; e. Able to write formal laboratory test reports and project report as well as analyze and present data in a logical way; f. Able to work in groups and share responsibility in the required group works; g. Able to understand the current transport infrastructure development issues and contribute to discussion on these contemporary issues.

Subject Synopsis/ Indicative Syllabus	1. Introduction (2 weeks) Basic consideration of transport infrastructure developments. Current development programmes. Design concept. 2. Highway Drainage (2 weeks) General considerations. Types of drainage structure. Design and construction of surface drainage and sub-soil drainage. Effects on pavement support. Filter layer design. 3. Pavements (2 weeks) Design principles for flexible and rigid pavements. Loading on pavements. Theoretical and empirical design methods. Pavements evaluation and rehabilitation. 4. Junction Design (4 weeks) Types of at-grade junction. Design of signal controlled junctions, priority junctions and rotary junctions. Co-ordination of traffic signal systems. 5. Railway Design (1 week) Railway development. Railway capacity. Railway alignment. Rail joints and ballast. 6. Airport Design (3 weeks) Airport activity systems. Airport planning procedure. Runway orientation. Runway length and layout design. 7. Project and Laboratory Laboratory work will include: skid-resistance; pavement conditions studies; junction studies; and railway studies. Field data collection exercises will be undertaken and case studies will augment this course.
Teaching/Learning Methodology	Fundamental knowledge will be covered in lectures. Tutorials will provide opportunities for discussion of lecture materials; examples and problem-solving discussion session will supplement the lectures. Laboratory work will help students appreciate the basic principles and familiarize themselves with real-world problems.
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	e	f	g
1. Project Assignment/ Quizzes	20%	✓	✓		✓	✓	✓	✓
2. Laboratory reports	20%		✓	✓		✓	✓	
3. Final Examination	60%	✓	✓		✓			✓
Total	100%							

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:
The project assignment will involve assessment of a large transport infrastructure proposal. Students will be asked to appreciate the critical issues (both planning, design and construction) of the project; considerations and alternative designs and construction methods. Students will have to submit group reports (no more than 5 students in a group) and present their arguments/ findings. The assessment will be based on the report and presentation. This element will achieve the all intended learning outcomes except c.

	There will be 4 laboratory sessions and students will be required to submit 2 individual reports and 2 group reports. This laboratory will enable students to acquire laboratory techniques and skill of laboratory report writing. Students will be asked to comment on the laboratory results. The assessment will be based on the laboratory reports and this element will achieve the intended learning outcomes b, c, e and f. The examination will help students consolidate knowledge learnt in lectures and tutorials and thus achieving intended learning outcomes a, b, d and g.	
Student Study Effort Expected	Class contact:	Average Numbers of Hours per Week
	▪ Lectures	2 Hrs.
	▪ Tutorials	0.46 Hrs.
	▪ Laboratory sessions	0.54 Hrs.
	Other student study effort:	
	▪ Reading and studying	3 Hrs.
	▪ Completion of project assignment/Lab reports	2 Hrs.
	Total student study effort	8 Hrs.
Reading List and References	1. Roess R. P., Prassas E.S., and McShane W.R., Traffic Engineering, 4th Edition, Pearson, 2011. 2. Mallick R.B. and Korchi T.E., Pavement Engineering: principles and practice, CRC Press, 2009. 3. Ashford Norman., Airport Engineering: planning, design and development of 21st century airports, Wiley, 2011, 4th edition. 4. Guidance Note on Road Pavement Drainage Design, Highways Department, RD/RN/035,2010 http://www.hyd.gov.hk/eng/public/publications/road_notes/index.htm. 5. Watson, J., Highway Construction & Maintenance, Longman Scientific & Technical, 1994. 6. Wright, P., Highway Engineering-sixth edition, John Wiley & Sons, 2004. 7. Transport Planning Design Manual, Transport Department, HKSARG. 8. http://www.hyd.gov.hk/eng/public/publications/index.htm 9. http://www.hk2030.gov.hk/	

Subject Description Form

Subject Code	CSE40408
Subject Title	Traffic Surveys and Transport Planning
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisites: CSE304 / CSE312 / CSE30312 Pre-requisites for TSE students (41081 and 41481): CSE291, CSE292 and CSE390 Exclusion: CSE408
Objectives	1. To expose students to the various techniques of traffic survey and transport modelling; 2. To develop an understanding of the nature and extent of urban transportation planning processes; and 3. To enable students to conduct traffic surveys and modelling traffic impacts for urban transportation planning purposes.
Intended Learning Outcomes	Upon completion of the subject, students will be: a. Able to design and conduct traffic surveys for assessment of the impacts due to transport improvement projects and/or other travel demand management measures; b. Able to systemically analyze and interpret data from traffic and traveller surveys for strategic transport planning and travel demand forecasting; c. Able to utilize the four-steps modelling techniques for forecasting the future travel demand and analyzing the effects of transport infrastructure facilities on a transport system; d. Able to marshal logically the facts for illustrating the impacts of the traffic congestion and illustrate the feasible solutions lucidly through demand and capacity analysis, and economic analysis of congestion externality; e. Able to understand the traffic restraints and practical difficulties so as to come up with engineering feasible solutions and management measures for solving the specific transportation problems at a particular study area; f. Able to identify the merits and limitations of current approach in data collection and transport modelling for strategic planning purposes.

Subject Synopsis/ Indicative Syllabus	1. Traffic Surveys and Analysis (3 weeks) Traffic characteristics and census. Hong Kong Annual Traffic Census. Volume studies; speed studies; travel time and delay studies. Capacity analysis; parking studies. 2. Transportation Planning Process (2 weeks) Data collection and preparation. Origin and Destination surveys. Network and zoning. Planning process. Transport-land use planning. 3. Planning for Public Transport (1 week) Public transport operations studies. Levels of public transport planning. Performance indicators. Route design and line frequency. 4. Transportation System Modelling (5 weeks) Four-steps modelling approach; trip generation and attraction analysis, trip classification, multiple regression analysis, category analysis, Bayesian update of trip rate. Trip distribution; the Furness method; the gravity model. Modal split; Aggregated demand model; Disaggregated demand model; Stated Preference Survey. Traffic assignment analysis; User equilibrium, System optimal assignment, network assignment techniques. 5. Travel Demand Management and Road Pricing (2 weeks) Traffic restraint and road pricing. Economic analysis of congestion externality. Barriers to implementation of travel demand management measures, Best practices of urban road pricing schemes. 6. Project and Laboratory Laboratory and tutorial on this course will include: traffic counts; speed studies; parking surveys; network building; transport modelling; trip distribution; traffic assignment. Case studies and field work will support exercises in the application of transportation system models.
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 be exposed to the interdependence between theories and practice in transport planning. Students will therefore be required to undertake survey design and data collection on sites so as 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. Occasionally, professionals from government or industry will be invited to give lectures on current issues of Hong Kong transport planning.
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. Assignments and Lab Reports	20%	✓	✓	✓	✓		
2. Mid-term Test(s)	20%		✓	✓	✓		
3. Final Examination	60%		✓	✓	✓	✓	✓
Total	100%						

Students must attain at least grade D in both coursework (items 1 & 2) 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: The students will be assessed with three components, i.e., the laboratory session and assignment, at least one mid-term test and a final examination at the end of the semester. The students will be required to attend laboratory sessions and submit individual (or group) laboratory reports. These laboratory sessions will enable students to acquire basic laboratory techniques and report writing. The works in the laboratory sessions are closely related to practicing transportation engineering requirements. Students will have to exert engineering judgments to complete the laboratory sessions. The laboratory sessions to together with the report writing are best to achieve intended learning outcomes a, b, c and d. The mid-term test(s) will emphasize on assessing students' basic concept and current practices of traffic surveys and transport modelling. It is appropriate to achieve intended learning outcomes b, c and d. The final examination will consolidate students' learning in lectures and tutorials. It is most appropriate to achieve the intended learning outcomes b, c, d, e and f.	
Student Study Effort Expected	Class contact:	Average Numbers of Hours per Week
	▪ Lectures	2 Hrs.
	▪ Tutorials	0.46 Hrs.
	▪ Laboratory Sessions	0.54 Hrs.
	Other student study effort:	
	▪ Reading and studying	3.69 Hrs.
	▪ Completion of Assignments/Lab Reports	2.31 Hrs.
	Total student study effort	9 Hrs.
Reading List and References	**Essential Textbooks** 1. Ortuzar, J.D and Willumsen, L.G. "Modelling Transport" 3rd Edition, Wiley, 2001. 2. Taylor, M.A.P, Young, W. and Bonsall, P.W., "Understanding Traffic Systems: Data, Presentation and Analysis", Avebury Technical Books: Aldershot, 1996. 3. Norbert Oppenheim, "Urban Travel Demand Modelling", John Wiley & Sons. Inc., 1995. 4. Michael J. Burton, "Introduction to Transportation Planning", 3rd Edition, Hutchinson & Co. (Publishers) Ltd., 1985. **Reference Textbooks** 1. D.A. Hensher and K.J. Button, "Handbook of Transport Modelling", Elsevier Science, 2007. 2. P. Stopher and C. Stecher, "Travel survey methods: quality and future directions", Elsevier, 2006. 3. C.S. Papacosta and P.D. Prevedouros, "Transportation Engineering and Planning", Pearson Prentice Hall, 2005. 4. J.D. Fricker and R.K. Whitford, "Fundamentals of Transportation Engineering: A Multimodal Systems Approach", Pearson Prentice Hall, 2004. 5. E. Cascetta, "Transportation Systems Engineering: Theory and Methods", Springer, 2001. 6. C.A. O'Flaherty, "Transport Planning and Traffic Engineering" 4th Edition, Butterworth-Heinemann, 1996. 7. Yosef Sheffi, "Urban Transportation Networks", Prentice Hall, Inc., 1985. 8. http://www.td.gov.hk/en/publications_and_press_releases/publications/index.html 9. http://www.hk2030.gov.hk/	

Subject Description Form

Subject Code	CSE40462
Subject Title	Environmental Impact Assessment – Theory and Practice
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: CSE462
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; b. analyze major environmental issues for large development projects; c. conduct necessary monitoring and modeling tasks within an EIA cycle; d. function on multi-disciplinary teams; e. understand environmental protection and sustainable development responsibility.
Subject Synopsis/ Indicative Syllabus	**Keyword syllabus**: 1. Development of Environmental Impact Assessment Historical review. Environmental assessment development in the world and Hong Kong. 2. Scope and Objectives of Environmental Impact Assessment Environmental considerations: land use, planning, development and management. EIA aims and objectives. 3. Methodology and Assessment Techniques Methods for air, water, noise and ecology assessment. Other environmental issues (risk, visual, cultural and social-economical impacts). 4. Monitoring and Baseline Studies Baseline studies, Environmental monitoring and audit, Environmental quality and regulatory requirements, Mitigation and control measures. 5. 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

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Continuous assessments	50%	√	√	√	√	√
2. Final examination	50%	√	√			√
Total	100%					

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

Class contact:	Average Numbers of Hours per Week
▪ Lectures	2 Hrs.
▪ Tutorials / Seminars	1 Hr.
Other student study effort:	
▪ Coursework exercise	1.4 Hrs.
▪ Seminar reports	0.2 Hr.
▪ Self Study	4.4 Hrs.
Total student study effort	9 Hrs.

Reading List and References

1. 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.
2. Barbara Caroll, 2002. Environmental Impact Assessment Handbook: A Practical Guide for Planners, Developers and Communities. Thomas Telford, London.
3. Canter, L.W., 1996. Environmental Impact Assessment, 2nd Ed., McGraw-Hill.
4. Christopher Wood. 2003. Environmental Impact Assessment: A Comparative Review. Prentice Hall, New Jersey.
5. Riki Therivel, Peter Morris, 2001. Methods of Environmental Impact Assessment, Spon Press, London.
6. Hong Kong Environmental Protection Department http://www.epd.gov.hk/eia/

Subject Description Form

Subject Code	CSE40475
Subject Title	Sustainable Development Strategy
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Exclusion : CSE475
Objectives	To provide students with an overview and understanding of the current practices in the planning for sustainable development. This will equip students with a sound knowledge on the methods to evaluate sustainability in urban planning and rural conservation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. understand the fundamentals of sustainable development strategy; b. identify diverse problems arising from changing constraints that influence sustainable development, such as economic, environmental, and social considerations; c. apply concept and knowledge to real life application, such as energy planning; d. assess and discuss the ethical and social implications of actions and proposals; e. cope with the challenges and developments in future sustainability;
Subject Synopsis/ Indicative Syllabus	1. Sustainable Development Concepts of sustainable development; Agenda 21 themes; long-term approaches to environmental problem. Indicators of sustainability. 2. Sustainable Development Strategies International efforts to cope with climate change. Comparison of strategies in Mainland China and overseas. 3. The Planning System in Hong Kong The planning hierarchy: stakeholders of sustainable development government, civil society and business; communications for effective participation; principles and framework for strategy decisions. 4. Transportation and Infrastructural Development New towns, port and airport development; railway development, industrial parks and tourist projects. 5. Nature and Countryside Conservation Conservation measures for wetland and marine park: cases of regional and local conflicts; ecotourism. 6. Evaluation of Sustainability New industries; renewable energy, sustainable transport concepts; financial basis for strategies; monitoring and evaluation of strategies.
Teaching/Learning Methodology	Lectures, case studies and demonstrations are used to deliver the various topics in this module. Some of which will be covered in a discussion-based format where this enhances the learning objectives and learning outcomes. The case studies are exclusively based real life situations. This can provide students with an overview and understanding of the current practices in the planning for sustainable development. This will equip students with a sound knowledge on the methods to evaluate sustainability in urban planning and rural conservation.

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. Project	30%	✓	✓	✓	✓	
2. Assignment	20%	✓	✓	✓	✓	
3. Examination	50%	✓	✓	✓	✓	
Total	100%					

Students must attain at least grade D in 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:

The project, assignment and exam will cover all the topics covered in the module which will therefore embrace all the learning outcomes.

The project and assignment require participants to apply what they have learnt in the module and their observations in daily life. Participants required analyzing the problems with critical thinking and discussing with reasons. Feedback will be delivered to each student for the middle project. It will help clarify the concepts, methodology and critical success factors in evaluating sustainable development.

Student Study Effort Expected

Class contact:	Average Numbers of Hours per Week
▪ Lectures	2.15 Hrs.
▪ Case Study and demonstration	0.85 Hrs.
Other student study effort:	
▪ Self Study	6 Hrs.
Total student study effort	9 Hrs.

Reading List and References

1. Kumar, D., *Sustainable Development*, Reference Press, 2009.
2. Susan, B., Sustainable Development, Routledge, 2006.
3. Edwards, B., Green Buildings Pay, Spon Press, 2003.
4. Bailey, R., An Introduction to Sustainable Development, Chartered Institution of Water and Environmental Management, 1997.
5. Hong Kong Planning Standards and Guidelines, Planning Department, Hong Kong Government.
6. Town Planning in Hong Kong, Planning Department, Hong Kong Government.
7. Online resources centre of the Sustainable Development Division, HKSAR Government (http://www.susdev.gov.hk/).

Subject Description Form

Subject Code	CSE40490
Subject Title	Transport Management & Highway Maintenance
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objective of the subject is to provide an overall understanding of the transport management concerning the movement of people and goods, the structure and management of transport organisation, road traffic, highway maintenance and management system of road pavement.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Able to understand the transport system and the operation of various transport organisations; b. Able to identify the functions of various traffic management techniques and their applications; c. Able to understand the formulation and application of pavement management system; d. Able to identity major pavement defects and understand various pavement maintenance techniques.
Subject Synopsis/ Indicative Syllabus	1. ***The Transport System*** (2 weeks) The function and provision of transport; the elements of transport system; characteristics and choice of transport modes. 2. ***The Structure and Management of Transport Organization*****:** (2 weeks) Privatization; Institutional and market environment, competition and regulation; The pattern of ownership; organization structures; management functions, challenges and strategic planning in transportation. 3. ***Road Traffic Management*****:** (2 weeks) Highway classification; parking control, statutory guidelines; junction control, signal coordination and area traffic control system; corridor control; traffic surveillance 4. ***Pavement Management System*****:** (3 weeks) Maintenance Assessment Rating and Costing for Highway (MARCH); pavement maintenance and rehabilitation strategy; pavement performance prediction; economic analysis and network optimization. 5. ***Highway Maintenance*****:** (3 weeks) Basic road maintenance operations; wet skid resistance; design and use of pavement surface treatments; structural maintenance of road pavements; use of deflection measurements; overlay design methods for flexible and concrete pavements.

Teaching/Learning Methodology	The underlying principles and techniques relating to transport management and highway maintenance will be dealt with in lectures. However, it is important that the students be exposed to the interdependence between theories and practice. Students will therefore be required to undertake data collection and visualize road maintenance work on sites so as to understand the associated techniques in practice. Individual assignments will consist of the formulation of traffic management scheme and the establishment of road maintenance proposal. Occasionally, professionals from government or industry will be invited to give lectures on currently conducted transport management schemes and road maintenance projects in Hong Kong.

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. Assignments/site visit reports	10%	✓	✓	✓	✓
2. Two Tests	20%	✓	✓	✓	✓
3.Final Examination	70%	✓	✓	✓	✓
Total	100%				

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:

The students will be assessed with three components, i.e., the assignments/reports, two tests and a final examination at the end of the semester. The students will be required to attend site visits and submit site visit reports. These site visits will enable students to visualize real pavement maintenance projects and to have an insight into the latest development of pavement engineering/maintenance technology in Hong Kong. Writing up site reports will enhance students' ability on reporting and writing technique. The two tests will emphasize on assessing students' basic concept and current practices of transport management & highway maintenance. It is appropriate to achieve intended learning outcomes of (a), (b), (c) and (d). The final examination will consolidate students' learning in lectures and tutorials. It is most appropriate to achieve the intended learning outcomes (a), (b), (c) and (d).

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorials	36 Hrs.
	▪ Site Visits	3 Hrs.
	Other student study effort:	
	▪ Reading and Studying	52 Hrs.
	▪ Completing of Assignments/Reports	26 Hrs.
	Total student study effort	117 Hrs.

Reading List and References	Essential Textbooks 1. Gubbins, E.J., *Managing Transport Operations*, Kogan Page (1988). 2. Hibbs, J., *Bus and Coach Management*, Chapman & Hall (1985). 3. Macpherson, G., *Highway & Transportation Engineering & Planning,* Longman (1993). 4. White, P.R*., Public Transport: Its Planning, Management and Operation,* 2nd Ed., Hutchinson (1986). 5. Taylor, M.A.P, Young, W. and Bonsall, P.W., *"Understanding Traffic Systems: Data, Presentation and Analysis",* Avebury Technical Books: Aldershot (1996). 6. Croney, P. and Croney, D., *"The Design and Performance of Road Pavements",* McGraw-Hill (1998). 7. Shahin, M.Y., *"Pavement Management for Airports, Roads, and Parking Lots",* Springer Science+Business Media, Inc. (2005). Reference Textbooks 1. Benson, D. and Whitehead, G., *Transport and Distribution*, Longman (1985). 2. Gilmour, P. *Total Quality Management*, Longman (1995). 3. Keys, P. and Jackson, M.C., *Managing Transport Systems*, Gower (1985). 4. Research & Development Division, MARCH 2 *Inspection Training Guides for Works Supervisors*, Highways Department (1988). 5. Stubbs, P.C., Transport Economics, Allen & Unwin (1984). 6. Trvelove, P., Decision Making in Transport Planning, Longman (1992). 7. C.S. Papacosta and P.D. Prevedouros, "Transportation Engineering and Planning", Pearson Prentice Hall (2005). 8. Thom, N., "Principles of Pavement Engineering", Thomas Telford (2008). 9. Papagiannakis, A.T. and Masad E.A., "Pavement Design and Materials", John Wiley (2008). Reference Journals 1. Bus and Coach Management 2. Highways & Transportation (IHT Journal) 3. Management Today (BIM Journal) 4. Transportation Research Record 5. Transport (CIT Journal)

Subject Description Form

Subject Code	CSE561
Subject Title	Public Transport: Operations and Service Planning
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 physics consistent with undergraduate level study in science/ engineering.
Objectives	1. To present innovative methods and advance technologies which have significant potential for improving the cost – effectiveness of public transport planning. 2. To compare between traditional operations and service planning, including scheduling procedures, and system analysis approaches, which are now beginning to be applied for improvements of public transport operations. 3. To deal with and to find solutions for persistent and realistic public transport problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to understand the public transport planning inputs and data required for transit line headway determination and timetable development; b. to utilize mathematical models and computer tools for predicting passenger demands and assessing the impacts of alternative public transport improvement measures; c. to apply optimization and analytical techniques for resource allocation and transit network design problems; and d. to exercise professional judgement and engineering sense in design and evaluation of public transit improvement measures.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** 1. Overall Framework, Public Transport Planning Overview on Public transport operations and planning process; public transport planning studies; 2. Public Transport Modes Public transport modes: technology, service characteristics, performance. Comparison and selection of public transport modes. 3. Performance Measures and Data Collection Methods Performance measures: Quality of service, Operators' performance. Data collection for transit planning and performance evaluation: Manual and automated data collection techniques; passenger volume studies, transit speed and delay studies. 4. Costs and Financial Performance of transit services Types of costs. Economics concepts: cost elasticity, return to scale, production function, marginal return. Cost allocation models, fare policy 5. Transit Demand Modeling Elasticities, Econometric Models, Urban Transport Modelling System 6. Transit planning Network planning, frequency and headway determination, timetable development, vehicle scheduling, service reliability. Transit oriented development.

	7. Laboratory This course will be augmented by **two** laboratories: public transport network building and demand assignment; timetabling and vehicle scheduling.
Teaching/Learning Methodology	The underlying principles and techniques relating to public 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 public transport planning. Students will therefore be required to attempt exercises in the tutorials in order to understand the associated techniques in practice. Individual assignments will consist of numerical problems on public transport modelling and system analysis, while computer laboratory sessions will be held to demonstrate the applications of mathematical models and to provide opportunity for students to appreciate the difference between manual calculation and computer modelling. Professionals from government or industry may also be invited to give lectures on current issues of public 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</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 written assignments, lab reports and a test . 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** 1. Ceder, A., *Public Transit Planning and Operation: Theory, Modeling, and Practice,* Butterworth-Heinemann (2007). 2. Richard de Neufville, *Applied Systems Analysis – Engineering Planning and TechnologyManagement*, McGraw-Hill Publishing Company (1990). 3. Lam, W.H.K. and Bell, M.G.H., *Advanced Modeling for Transit Operations and Service Planning*, Pergamon, Elsevier Science Ltd., Oxford (2003). 4. Wilson, N.H.M. and Nuzzolo, A., *Schedule-based Dynamic Transit Modeling: Theory and Applications*, Kluwer Academic Publishers, London (2004). 5. Vuchic V.R., *Urban Transit: Operations, Planning and Economics*, John Wiley & Sons, Inc. (2005). **Reference Books** 1. Bruton, Michael J., *Introduction to Transportation Planning*, 3rd Ed., Hutchinson (1985). 2. De Neufville, Richard and Stafford, Joseph H., *Systems Analysis for Engineers and Managers*, McGraw-Hill Book Company (1971). 3. Ortúzar, J. de D. and Willumsen, L.G., *Modelling Transport*, 3rd Ed., John Wiley & Sons (2001). **Reports** 1. Transportation Research Records, Transportation Research Board 2. Transport Planning and Design Manual, Hong Kong Transport Department 3. TRRL reports, Transport and Road Research Laboratory

Subject Description Form

Subject Code	CSE562
Subject Title	Traffic Engineering and Control
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 physics consistent with undergraduate level study in science/ engineering.
Objectives	To provide knowledge of fundamental traffic flow characteristics and associated analytical methods in the planning, design, and control of transport systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to visualize the applications of theories and practical concepts on topics of the traffic engineering and control; b. to apply the theories and practical measures on solving the encountered traffic problems; c. to convey the ideas and proposed traffic control schemes to others with the support of logical concepts and survey data; and d. to work independently and collaborate with others with minimal supervision.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** 1. Traffic Engineering Fundamentals Elements of traffic engineering; the road user, the vehicle, the road and geometric design; speed-flow-density relationship; traffic steam and capacity; level of service concept. 2. Traffic Studies and Analysis Volume studies; speed studies; travel time and delay studies; capacity analysis; parking studies; data collection technique. 3. Analytical Methods Volume speed flow relationship; headway and gap distributions; traffic simulation; traffic flow theories: car following theory, queuing theory. 4. Junction Design and Control Types of at-grade junction; design of priority junctions, roundabouts, and signal controlled junctions; coordination of traffic signal systems. 5. Traffic safety and control devices Street lighting: function and design; traffic signs: types and sitting; carriageway marking; accident studies and safety measures 6. Traffic management techniques Urban transportation problems; comprehensive traffic management; one way system, access control, ban turns, parking control; bus priority measures, pedestrian measures 7. Laboratory **Two** Laboratories: calibration of traffic stream model, signal controlled junction.

Teaching/Learning Methodology	Lectures will cover the general traffic engineering models, traffic theories, traffic control methods and applications; Assignments, such as traffic signal control, junction design or traffic modeling will be given to students. Students need to conduct the traffic survey, data analysis and model formulation. Presentations and discussions in tutorials provide students a ground for polishing their presentation and communication skills.
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. Continuous Assessment	30%	✓	✓	✓	✓
2. Written Examination	70%	✓	✓		
Total	100%				

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

Continuous assessment will be based on lab reports and written assignments

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	1. Derlough, D.L. and M.J. Huber (1975) *Traffic Flow Theory: A Monograph,* Transport *Research Board*, National Research Council, Washington D.C. 2. Gazis, D.C. (1974) *Traffic Science*, Wiley, New York. 3. Institution of Highways and Transportation and Department of Transport (1987) *Roads and Traffic in Urban Areas,* HMSO, London. 4. May, A.D. (1990) *Traffic Flow Fundamental*s, Prentice-Hall, Englewood Cliff, New Jersey. 5. McShane, W.R. and R.P. Roess (2010) *Traffic Engineering (4th Edition)*, Prentice-Hall, Englewood Cliff, New Jersey. 6. Transport Planning and Design Manual, Hong Kong Transport Department

Subject Description Form

Subject Code	EE2001B
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 and electrical energy systems. 3. To provide students the foundation of electromagnetic field theory and electrical energy systems required for pursuing the electrical engineering subjects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the electromagnetism and its physical meaning behind. Know the meanings of physical quantities of electromagnetism and their basic relationships. b. Be able to analyse electromagnetic phenomena related to electrical engineering systems by selecting the most appropriate laws/theorems/solution techniques. c. To identify, analyze, and solve technical problems using mathematics and engineering techniques. d. Have 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. ***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. 5. ***Electrical energy systems fundamentals*:** Phasor, real and reactive power, power circuit analysis, power transmission and distribution, power system layout and components. **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	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. W.H. Hayt and J.A. Buck, Engineering Electromagnetics, 8th Edition, Boston: McGraw Hill, 2012.
2. Nannapaneni Naraynan Rao, Elements of Engineering Electromagnetics, 6th Edition, Pearson Education International, 2006.
3. Fawwaz T. Ulaby and Umberto Ravaioli, Fundamentals of Applied Electromagnetics, 7th Edition, Pearson Education International, 2015.
4. B. M. Weedy, B. J. Cory, N. Jenkins, J. B. Ekanayake, G. Strbac, Electric Power Systems, 5th Edition, Wiley, 2012.
5. M. E. El-Hawary, Electrical Energy Systems, 2nd Edition, CRC Press, 2008.

Subject Description Form

Subject Code	EE2002B
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.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Acquire a good understanding of fundamental circuit theory. b. Solve simple problems in electric circuits. c. 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	a, b	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	a, b	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.	b, c	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	a, b	Through working assignment and homework, students will develop a firm understanding and *comprehension* of the *knowledge* taught.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/task	% Weighting	Intended Subject Learning Outcomes to be Assessed		
		a	b	c
1. Continuous Assessment (Total 40%)				
▪ Laboratory works and reports	20%		✓	✓
▪ Mid-semester test	20%	✓	✓	
2. Examination	60%	✓	✓	
Total	100%			

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

	<table><tr><td>Specific assessment methods/task</td><td>Remark</td></tr><tr><td>Assignment/ Homework</td><td>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/homework is given. Feedback about their performance will be given promptly to students to help them improvement their learning.</td></tr><tr><td>Laboratory works and reports</td><td>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.</td></tr><tr><td>Mid-semester test</td><td>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.</td></tr><tr><td>Examination</td><td>There will be 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 assignment/homework.</td></tr></table>
Student Study Effort Expected	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lecture</td><td>22 Hrs.</td></tr><tr><td>▪ Tutorial</td><td>8 Hrs.</td></tr><tr><td>▪ Laboratory</td><td>9 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Revision and Assignments</td><td>40 Hrs.</td></tr><tr><td>▪ Report Writing</td><td>18 Hrs.</td></tr><tr><td>Total student study effort</td><td>97 Hrs.</td></tr></table>
Reading List and References	**Textbook:** 1. C.K. Alexander and M.N.O. Sadiku, Fundamentals of Electric Circuits, 6th Edition, New York: McGraw-Hill, 2017. **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, 8th ed., New York: McGraw-Hill, 2012. 3. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 5th ed., 2013.

Subject Description Form

Subject Code	EE2003B
Subject Title	Electronics
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2002B
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.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the operating principles of the fundamental classes of semiconductor based electronic devices and circuits. b. Apply the appropriate techniques to analyze the fundamental classes of semiconductor-based electronic devices and circuits. c. Implement the frequency domain analysis on first-order ac circuits with sinusoidal driving sources. d. 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	See table below
Assessment Methods in Alignment with Intended Learning Outcomes	See table below

Teaching/ Learning Methodology

Lectures, supplemented with interactive questions and answers	a, b, c	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	a, b, c	In tutorials, students *apply* what they have learnt in solving the problems given by the tutor.
Assignments	a, b, c	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.	a, b, d	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 in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed			
		a	b	c	d
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:	
	▪ Lecture	24 Hrs.
	▪ Tutorial	6 Hrs.
	▪ Laboratory	9 Hrs.
	Other student study effort:	
	▪ Self-study	41 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*, 4th ed., Boston: McGraw-Hill, 2010.

References:

4. G. Rizzoni and James Kearns, *Principles and Applications of Electrical Engineering*, 6th ed., New York: McGraw-Hill, 2015.
5. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, *Engineering Circuit Analysis,* 8th ed., New York: McGraw-Hill, 2012.
6. A.H. Robbins and W.C. Miller, *Circuit Analysis: Theory and Practice*, Thomson Learning, 5th ed., 2013.

Subject Description Form

Subject Code	EE2029B
Subject Title	Transportation Engineering Fundamentals
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the fundamental concepts of transportation engineering and transport economics. 2. To enable students to appreciate the operations of real-life transportation systems; and the related engineering, economics and environmental issues. 3. To equip the students with the basic techniques on system analysis and economic evaluation. 4. To prepare students for tackling practical engineering problems, with a combination of strong theoretical background and sound engineering sense.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the key issues in transportation systems. b. Appreciate the problems and suggest original solutions to real-life transport problems. c. Conduct simple engineering design, basic system analysis and economic evaluation. d. Be ready to study transportation-related subjects on higher level.
Subject Synopsis/ Indicative Syllabus	1. ***Transportation systems:*** Introduction to transportation engineering, transportation systems engineering, transport problems and solutions in Hong Kong, sustainability of transportation systems, transportation in social, economic, environmental and political roles. 2. ***The technology of transportation***: Transport modes and operational characteristics, transport technology and development, technology applications in transport and logistics industry. 3. ***Traffic engineering fundamentals***: Elements of traffic engineering, time-space diagram, speed-flow-density relationships, traffic flow theory, cumulative plots, traffic measurement, level of service. 4. ***Public transportation systems***: designs, management, and operations of public transportation systems, generalized cost, value of time, transit network structures, service reliability, adaptive bus control. 5. ***Transport economics***: Principles of transport economics; demand and supply for transport, from economics to transport policy, effects of transport pricing policies. 6. ***Transportation system analysis***: Systems approach planning and engineering; travel choice behaviours and demand modelling; transportation network analysis; decision analysis and economic evaluation of transportation projects.
Teaching/Learning Methodology	The key concepts and techniques covered in this subject are discussed in lectures. Tutorials on specific topics, especially those on theories and numerical exercises, will be given to strengthen students' understanding. Furthermore, individual assignments and group projects consisting of numerical problems let students demonstrate their level of understanding and create evidence of learning.

	Learning/Learning Methodology vs Outcomes

Learning/Learning Methodology	Outcomes			
	a	b	c	d
Lectures	✓	✓	✓	✓
Tutorials	✓	✓	✓	✓

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.Assignments	20%	✓	✓	✓	✓
2. In-class exercises	5%	✓	✓	✓	✓
3. Group project	15%	✓	✓	✓	✓
4. Final Examination	60%	✓		✓	✓
Total	100%				

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

The students will be assessed with four components: written assignments, in-class exercises (quiz), a group project and a final exam. The written assignments and in-class exercises will consist of both numerical and descriptive problems to address different aspects of skills required in achieving intended learning outcomes (a), (b), (c), and (d). The group project will be focused on a specific topic of the subject, in which the students will be invited to solve a realistic problem targeting at intended learning outcomes (a), (c), and (d). The final exam is conducted at the end of the semester to consolidate students' knowledge in lectures, tutorials, and class activities. It is appropriate in assessing intended learning outcomes (a), (c), and (d).

Student Study Effort Expected

Class contact:	
▪ Lectures	27 Hrs.
▪ Tutorials	12 Hrs.
Other student study effort:	
▪ Reading and studying	45 Hrs.
▪ Completion of assignments and group projects	16 Hrs.
Total student study effort	100 Hrs.

Reading List and References

1. C.F. Daganzo, Fundamentals of Transportation and Traffic Operations, Pergamon, 2008.
2. C.F. Daganzo, Public Transportation Systems: Basic Principles of System Design, Operations Planning and Real-Time Control. 2010 (Available online: http://www.ce.berkeley.edu/sites/default/files/assets/users/daganzo/Publications/UCB-ITS-CN-2010-2.pdf)
3. J. Sussman, Introduction to Transportation Systems, Boston: Artech House, 2000
4. P. H. Wright, N. J. Ashford and R. J. Stammer, Jr., Transportation Engineering: Planning and Design, 1998
5. Jon D. Fricker and R.K. Whitford, Fundamentals of Transportation Engineering – A Multimodal Systems Approach. Prentice Hall, 2004
6. E. Quinet and R. Vickerman, Principles of Transport Economics, Edward Elgar Publishing Limited, 2004
7. J.H. Banks, Introduction to Transportation Engineering, McGraw-Hill, 2002

Subject Description Form

Subject Code	EE3002B
Subject Title	Electromechanical Energy Conversion
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2002B
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	33 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Revision, self-study, and assignment	42 Hrs.
	▪ Write-up of laboratory reports	18 Hrs.
	Total student study effort	99 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	EE3003B
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 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 both verbally and in written form. 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	33 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	12 Hrs.
▪ Self-study	48 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	EE3004B
Subject Title	Power Transmission and Distribution
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To introduce students to the fundamental knowledge which is essential for 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 in 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. 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. **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 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 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	25%	✓	✓		
3. Laboratory Performance & Report	15%			✓	✓
Total	100%				

The outcomes on concepts, design and applications are assessed by the usual means of examination and tests. 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	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	13 Hrs.
	▪ Self-study	48 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Textbooks:
1. C.R. Bayliss and B.J. Hardy, Transmission and Distribution Electrical Engineering, Oxford, 4th Edition, 2012
2. W.D. Stevenson, Elements of Power System Analysis, McGraw Hill, 4th Edition, 1982
3. B.M. Weedy, Electric Power Systems, Wiley, 5th Edition, 2012

Reference Books:
1. L. Grigsby, Electric Power Generation, Transmission and Distribution, Electric Power Engineering Handbook, 3rd Edition, CRC Press, 2012
2. A.R. Bergen and V. Vittal, Power System Analysis, Prentice Hall, 2nd Edition, 2000
3. T. Gönen, Modern Power System Analysis, 2nd Edition, CRC Press, 2013

Subject Description Form

Subject Code	EE3010B
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 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 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 or engineering sector. 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 (or equivalent) industrial training. 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 usually at 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 training period, 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 report about the work 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 report, as well as on the entire report. 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 industrial placement** ◆ Full-time placement in a suitable organization for 6 weeks. ◆ 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
Industrial placement	✓	✓	✓	✓

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. Learning Portfolio	80%	✓	✓	✓	✓
2. Placement Questionnaire	20%		✓	✓	✓
Total	100%				

The outcomes on this subject are assessed by means of student learning report as well as questionnaire to industrial supervisors.

Student Study Effort Expected

Class contact:	
N/A	
Other student study effort:	
▪ Industrial Placement	6 weeks
Total student study effort	6 weeks

Reading List and References

Nil

Subject Description Form

Subject Code	EE3011B
Subject Title	Control Systems and Signal Processing
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA2111
Objectives	1. To introduce the principles and techniques for system modelling and analysis so as to enable designing of appropriate controllers; 2. To introduce the principles and techniques used in the analysis and design of feedback control systems, both classical and modern, with the aid of computer aided control system design package; 3. To provide the foundation on signal processing algorithms for the later subjects; and 4. To develop in-depth applications of concepts and design techniques in digital control, filtering and signal processing.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Model a realistic plant with time domain and frequency domain analysis techniques; b. Analyse the basic characteristics and able to design a control system; c. Apply appropriate signal processing techniques and able to design appropriate filters for data analysis.
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; transfer functions. 2. ***Time domain analysis of linear systems***: First-order systems, second-order systems, steady-state error analysis, Routh-Hurwitz stability criterion. 3. ***Frequency domain analysis of linear systems***: Frequency response, stability in frequency domain, Bode diagrams, gain margin and phase margin, polar plots, Nyquist stability criterion, Nichols plot, Compensators, PID controllers. 4. ***Stability and transient analysis***: Stability of closed-loop systems; transient and steady state response and analysis. 5. ***Signal processing techniques and implementation***: DFT, FFT, power spectrum, windowing; computation of convolution and correlation, autocorrelation, cross correlation. **Laboratory Experiments:** Modular position control system Open-loop frequency response 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
Lectures	✓	✓	✓
Tutorials	✓	✓	✓
Experiments	✓	✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes

Methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	60%	✓	✓	✓
2. Class Test	15%	✓	✓	✓
3. Laboratory performance and reports	15%	✓	✓	✓
4. Assignment reports	10%	✓	✓	✓
Total	100%			

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

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. M. Gopal: Control Systems, 3rd Edition, Tata McGraw-Hill, 2008.
2. K. Ogata, Modern Control Engineering, Prentice-Hall, 2010
3. Z. M. Hussain, A. Z. Sadik, P.O'Shea ,Digital signal processing: an introduction with MATLAB and applications, **Springer, 2011**

Subject Description Form

Subject Code	EE4004B
Subject Title	Power Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3004B
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/B/D "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-Seidel, 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	33 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation / report	12 Hrs.
	▪ Mini-project / self-study	49 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	EE4005B
Subject Title	Engineering Project Management
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the concept of modern engineering project management. 2. To integrate theory and practical knowledge of engineering project development & execution. 3. To apply principles of engineering project management to practical examples.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand engineering project management, development & execution stages. b. Analyze engineering project management skills. c. Be aware of new technologies development trends and environmental impacts of engineering projects.
Subject Synopsis/ Indicative Syllabus	1. ***Engineering project definitions and stages*:** Characteristics of engineering projects. Life cycle models. Strategic and tactical issues. Factors affecting the success of project management. 2. ***Engineering project economic analysis*:** Definitions of terms. Present worth, future worth calculations. Comparison of alternatives. Equivalent worth methods. Internal rate of return. Payback period. Inclusion of environmental considerations in analysis. 3. ***Project screening and selection*:** Check list and scoring models. Benefit-cost analysis. Cost effectiveness analysis. 4. ***Organization structure and work breakdown*:** Organization structures. Functional, project and matrix organizations. Work breakdown structure. Management of human resources in projects. 5. ***Project scheduling and control*:** Gantt Chart. Network approach for CPM analysis. PERT and CPM methods. Budget management and resource management. Project control.
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Practical applications are given through case studies and mini-project, in which the students are encouraged to develop critical and analytical thinking to solve problems.

Teaching/Learning Methodology	Outcomes		
	a	b	c
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
1. Examination	60%	✓	✓	✓
2. Class test	20%	✓	✓	✓
3. Mini-project and report	20%		✓	✓
Total	100%			

The usual means of examination and test are adopted to evaluate the concepts and theories. The important components of integrating theories into problems and applying knowledge in case studies are assessed by mini-projects and group-project reports.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Self-study	50 Hrs.
	▪ Mini-project and report	13 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Reference books:

1. A. Shtub, Project Management-Engineering, Technology and Implementation, 2nd Edition, Prentice Hall, 2005
2. G.K. Kapur, Project Management for Information, Technology, Business and Certification, Prentice Hall, 2005
3. Moder, Phillips and Davies, Project Management with CPM, PERT and Precedence Diagramming, Latest Edition, Van Nostrand Reinhold

Subject Description Form

Subject Code	EE4006B
Subject Title	Individual Project
Credit Value	6
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: The student should have completed most of the subjects required in previous years of the programme before taking this subject. The enrollment of this subject is subjected to the approval of the Project Coordinator.
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 a 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 proposed by staff or by an industrial partner. Projects may also be jointly proposed by student and staff. Industrial experience, 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: – an abstract – problem statement and objectives – brief literature research – initial problem identification – preliminary suggestion on methodology – preliminary time schedule – cost estimate and references
	Interim Progress Report At about the midpoint of the project, the students have executed their projects for a few months and they need to submit an Interim Progress Report and carry out a presentation to summarize their progress. This gives the supervisor and an assessor a more formal opportunity than at discussions to indicate his/her assessment of student's progress and to eliminate discrepancies if necessary. **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. These will be given to the Assessment Panel (see Assessment below) for understanding of the student's work and for assessment purpose. 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 a project, each project is assessed by an Assessment Panel of three members, including a Chairman, an independent examiner and the project Supervisor. 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 the student orally during the poster presentation, and – evaluate the project's outcome based on the demonstration (can be a video clip). **Assessment** In assessing the project, the panel will typically consider the following aspects: a. Intellectual achievement; b. In-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, oral presentation and response to questions. The Chairman will ensure that all aspects of the project are thoroughly discussed by the Panel. In arriving at a decision, Panel members should bear in mind their experiences in respect of the achievements in other projects in the Department in the current and previous years. **Method of Assessment: 100% continuous assessment** **(I) Formal Project Proposal** Students are required to submit a formal project proposal when the project commences. **This will contribute to 5% of the final grade.** The contents of the proposal should include: A. Objectives 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. Schedule of your work of the entire project G. References

Assessment Criteria

1. *Literature research.*
2. *Project plan*
3. *Problem definition and methodology.*
4. *Writing quality.*

(II) The Interim Progress Report

Students are required to submit an interim progress report at about the middle of project duration. **This will contribute to 10% of the final grade.**

The contents of the progress report should include:

A. Objectives 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 of the reporting period.
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.
H. References

Assessment Criteria

1. *Abstract and introduction*
2. *Methodology*
3. *Preliminary results*
4. *Project management and overall presentation of the report*

(III) Mid-term progress presentation

Student is required to present the progress to an assessor after the submission of the Interim Progress Report. **The presentation will contribute to 10% of the final grade.**

Assessment Criteria

1. *Technical concept/knowledge/application*
2. *Up-to-date progress and preliminary results*
3. *Response to questions*
4. *Presentation skill and language competence.*

(IV) The Final Report

The final project report should contain all the work carried out by the student in the project. The length of the main body of the final report should be at least 45 pages in standard report format. Students are advised to form a framework for the report first, and 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 40% of the final grade.**

The content of the final report includes:

A. An abstract of the project.
B. Objectives of the project (especially any change from the original aims).
C. The motivation behind the project and a brief outline of the project work.
D. A summary of work done or developed in the project (not work done by others).
E. The system design and the block diagram of the system, plus some brief descriptions on the theory.
F. Results and discussion
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. *Abstract and introduction*
2. *Literature review and background*
3. *Methodology and technical skills*
4. *Results, discussions and conclusion*
5. *Overall presentation and organization of the report*

(V) 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 during the poster presentation. 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 and 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 Poster presentation by providing satisfactory answers to questions.

The presentation and demonstration will contribute to 25% 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.*

(VI) Continuous Assessment

The supervisor of the project will assess the student's overall performance based on the following items. **This will contribute to 10% of the final grade.**

1. Motivation and perseverance

2. Originality and innovation of the project

3. Execution and problem solving skills

4. Communication

5. Self-discipline and time management

Note 1: Each student has to submit/carry out all five components (I to V) before he/she is considered to have completed the FYP.

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

Teaching/Learning Methodology

As the nature of the subject implies, there will not be formal lecture in the subject, other than a few of hours 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 hours of self-learning. The planning of the project will be conducted 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	10%		✓	✓	✓		
3. Mid-term presentation	10%		✓		✓		✓
4. Final report	40%	✓	✓	✓	✓	✓	✓
5. Presentation and demonstration	25%	✓	✓				✓
6. Continuous assessment	10%	✓			✓		✓
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	3 Hrs.
▪ Individual discussions with supervisor	36 Hrs.
Other student study effort:	
▪ Information search, self study, execution of the project, report writing, preparation of presentation	161 Hrs.
Total student study effort	200 Hrs.

Reading List and References

To be advised by supervisor

Subject Description Form

Subject Code	EE4007B
Subject Title	Advanced Power Electronics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3003B
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 converters and its method of loss reduction. c. Be able to apply switched-mode techniques to inverters (DC/AC converters). d. Be able to perform study on power electronics circuit simulation. e. Be aware of impacts of electromagnetic interference (EMI) and reduction of EMI using power electronics techniques. f. Be able to present results of study in the form of computer simulation, design equations and basic models, working 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, snubber circuits, continuous and 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. ***Switched-mode Inverters*:** Single-phase and three-phase voltage-source inverters, AC/AC conversion, resonant inverters. 4. Modelling and **Control of *Power Converters:*** Small-signal modelling, traditional PID control method, modern control techniques, analogue and digital circuit simulation for power electronics, simulation techniques. 5. ***Electromagnetic Interference*:** Generation of EMI, power factor, switched-mode EMI filter, International Standards, reduction of EMI. **Laboratory Experiments (select one out of three labs):** DC-DC Converter II. Quasi-resonant zero-current-switching converter Simulation of buck converters by using Saber

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 techniques, control methods and electromagnetic interference (EMI) aspects. 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 principles 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. Two in-class tests	20%	✓	✓	✓		✓	
3. Laboratory reports	10%	✓	✓	✓	✓	✓	✓
4. Assignments	10%	✓	✓	✓		✓	
Total	100%						

The understanding on theoretical principle and practical considerations, analytical skills and problem solving techniques 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	33 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report/assignment	12 Hrs.
	▪ Self-study	49 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Textbooks:

1. Ned. Mohan, Power Electronics: Converters, Applications & Design, Wiley, 2007
2. K.W.E.Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002
3. G. M. Masters, Renewable and efficient electric power systems, John Wiley & Sons, 2004.

Reference books:

1. N. Mohan, Power Electronics: A First Course, John Wiley & Sons, 2012.
2. A.M. Trzynadlowski, Introduction to Modern Power Electronics, John Wiley & Sons, 2010.

Subject Description Form

Subject Code	EE4008B
Subject Title	Applied Digital Control
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3011B
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.
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*:** PID algorithm, Cascade control, Dead-time compensation, Internal model control. 3. ***Computer control methods*:** Hierarchical control configurations, Distributed approach, 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 two 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
Lectures	✓	✓	✓	
Tutorials	✓	✓	✓	
Experiments and case study			✓	✓

Assessment Methods in Alignment with Intended Learning Outcomes	The outcomes on concepts, analysis and design are assessed by the usual means of examination and tests.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Examination	60%	✓	✓	✓	
2. Class test	20%	✓	✓	✓	
3. Laboratory and case study reports	20%			✓	✓
Total	100%				

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 & Sons, 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, Wiley, 1991
5. R. Isermann, Adaptive Control Systems, New York, Prentice Hall, 1992

Subject Description Form

Subject Code	EE4009B
Subject Title	Electric Traction and Drives
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3003B
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/IET Proceedings – Electric Power Applications

Subject Description Form

Subject Code	EE4011B
Subject Title	Industrial Computer Applications
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	Introduce the applications of computing techniques in solving industrial problems. The topics included are shown in the following: embedded control system; applications of computer vision; Internet of Things (IoT) applications and mobile applications.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design and develop embedded computer control systems b. Understand the use of industrial networks on process data acquisition and control. c. Apply image processing techniques in industrial automation. d. Design Internet of Thing system and basic mobile applications e. Appreciate the importance of computing systems in solving industrial applications. f. Think logically and be able to analyze data as well as present results in writing.
Subject Synopsis/ Indicative Syllabus	1. ***Embedded Computer control*:** Modelling of the computer process control system, practical approaches to digital control implementation, microprocessor based control systems. 2. ***Intelligent instrumentation and systems*:** applications of distributed digital control algorithms, industrial networks and SCADA system. 3. ***Computer vision*:** Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation. 4. ***IoT and Mobile applications*:** Wireless LAN, WiFi technology and advantages, IoT design and implementation. Introduction to server-side and client-side mobile applications. **Mini-project cases:** PC based digital controller for temperature control Power failure monitoring using embedded controller Computer vision applications Wireless communication developments Air disaster investigation

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	e	f
Lectures	✓	✓	✓	✓	✓	
Tutorials	✓	✓	✓		✓	
Experiment	✓	✓	✓	✓		✓

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. In-class Test	20%	✓	✓	✓	✓		
3. Mini-project Report	20%	✓	✓	✓	✓		✓
4. Exercise	10%	✓	✓	✓	✓	✓	
Total	100%						

One end-of-semester written examination; one mid-semester test; a mini-project on an industrial computing based application with a study report covering the investigation of the intriguing computing application for feasibility lookout, failure explanation, rooms for future enhancement and improvements.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Laboratory (mini-project)	6 Hrs.
	Other student study effort:	
	▪ Mini-project report and preparation	16 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Reference books:

1. S.A. Boyer, SCADA: Supervisory Control and Data Acquisition, 2nd Edition, ISA, 1999.
2. C. Pfister, Getting Started with the Internet of Things, Maker Media, Inc, 2011
3. J.A. Rehg and G.J. Sartori, Industrial Electronics, Pearson Prentice Hall, 2006
4. A.V. Deshmukh, Microcontrollers: Theory and Applications, Tata McGraw-Hill, 2006
5. R. Szeliski, Computer Vision: Algorithms and Applications, Springer 2010.

Subject Description Form

Subject Code	EE4014B
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.
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 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 (ANN)*:** 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 of intelligent systems*:** Applications in Control and Utilization – Intelligent process control. Intelligent robot control and Utilization. **Mini-project:** Performance of intelligent systems including GA, Fuzzy systems and ANN comparing to traditional control system such as PID control **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	15%	✓	✓	✓		
3. Mini-project Report and Presentation	15%	✓			✓	✓
4. Exercises	10%	✓	✓	✓		
Total	100%					

The outcomes on concepts, design and applications are assessed by the usual means of examination, test, Mini-projects and written report 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 presentation	6 Hrs.
	Other student study effort:	
	▪ Mini-project preparation/report	16 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	100 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, 2011
3. K. Warwick, A. Ekwue and R. Aggarwal, Artificial Intelligence Techniques in Power Systems, IEE Power Engineering Series 22, UK, IEE Press, 1997
4. Sunnersj Staffan, Intelligent computer systems in engineering design, SpringerLink ebooks, Springer, 2016
5. Handbook of research on advanced hybrid intelligent techniques and applications, InfoSci-Books, Hershey, PA: Information Science Reference 2016
6. Selected reference papers in IEEE Transactions and IEE Proceedings

Subject Description Form

Subject Code	EE4016B
Subject Title	Energy Utilisation and Management in Transportation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2029B and EE3002B
Objectives	1. To enable students to understand energy conversion and utilization process used in transportation systems. 2. To provide students with a solid knowledge on concepts of energy management and techniques in improving energy efficiency of transportation systems. 3. To enable students to analyse the efficiency of energy conversion processes. 4. To prepare students to analyse environmental impacts from transportation systems and understand ways for improvements.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the applications of various common types of energy conversion and utilisation technologies used in different modes of transportation. b. Identify underlying principles of energy management and different engineering measures in improving energy efficiency in transportation systems. c. Apply basic reasoning to analyse impacts of environment from the utilization of energy in transportations systems.
Subject Synopsis/ Indicative Syllabus	1. ***Energy utilisation***: Basics of alternators, converters, auxiliary power unit (APU) for automobiles, trains and aircrafts; analysis of energy utilization in automotives and train units on a fuel-to-wheel basis; rolling stock energy consumption and regeneration; relationship between passenger flow and energy consumption. 2. ***Energy management***: Concept of energy management; comparisons of fuel-to-wheel energy efficiency in different modes of transportation; integrated transport planning for energy efficiency; energy efficiency measures in transportation sector; energy management systems in gasoline, diesel, hybrid and electric cars; energy management in "peak-hour syndrome"; electricity buffering; use of battery energy storage systems (BESS) in mass transportation; charging station, contingency for power failure; backup supplies. 3. ***Environmental aspects***: Environmental impacts of energy utilization of transportations systems; basic principle of emission control of automobiles. 4. ***Hydrogen economy***: Concept of Hydrogen Economy and applications of hydrogen as fuel for transportation systems; types of automobile hydrogen engines and its principle of operation; types of fuel cells and its applications in automobiles. 5. ***Renewable fuels for automobiles***: Bio-diesels, solar cars, solar aircraft.

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 or an energy management problem in the beginning of the study. Students are encouraged to form group to jointly investigate the problem and they have to present the projects.

Teaching/Learning Methodology	Outcomes		
	a	b	c
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
1. Examination	60%	✓	✓	✓
2. Class Test	20%	✓	✓	✓
3. Mini-project & report	20%	✓	✓	✓
Total	100%			

It is an energy utilization 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 energy utilization, as well as technical reporting and teamwork, are evaluated by mini-project and the reports.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Mini-project/report	18 Hrs.
	▪ Self-study	48 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. Dept. of Energy, US Government, Hydrogen energy and fuel cells: transportation power from water (electronic book), Progressive Management 2006
2. National Research Council (US), Energy and transportation: challenges for the chemical sciences in the 21st Century, Washington DC: National Academy Press 2003
3. M. Kojima, Urban air quality management: coordinating transport, environment, and energy policies in developing countries, World Bank Technical Report 2001
4. National Research Council (US) Transportation Research Board, Effect of transportation on energy and air quality, Washington DC: National Academy Press 1997
5. United Nations, Dept. of Development Support and Management Services, Energy Branch, Energy efficiency in transportation: alternatives for the future, New York United Nation 1993
6. Mehrdad Ehsani, Yimin Gao, Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, Second Edition, CRC Press, 2010
7. Frederic P. Miller, Agnes F. Vandome, John McBrewster, Battery Charger, Alphascript Publishing. 2009

Subject Description Form

Subject Code	EE4017B
Subject Title	Risk and Reliability Analysis on Asset Management
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2029B
Objectives	1. To provide the concepts and techniques on risk management and reliability analysis on engineering systems 2. To apply reliability analysis and system assurance analysis on engineering systems including transportation systems 3. To relate maintenance activities to system assurance and reliability management
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Able to perform basic reliability analysis on engineering systems including asset on transportation systems b. Able to demonstrate fundamental understanding on concepts of system assurance c. Able to recognise the relationship between maintenance and reliability
Subject Synopsis/ Indicative Syllabus	1. ***Basics***: Facilities and assets in transportation systems; statistical modelling and numerical optimization methods and their applications to managing systems on transportation facilities and assets; integrated treatment of quantitative and analytical methods 2. ***Reliability analysis***: Fault tree analysis, failure mode effects and criticality analysis (FMECA), reliability growth models, Weibull analysis, reliability block diagram, reliability apportionment and prediction, reliability mathematics. 3. ***System assurance analysis***: Hazard & operability study, event tree analysis, cause-consequence analysis, preliminary hazard analysis, operation & support hazard analysis, cost benefit analysis, qualitative and quantitative risk analyses 4. ***Maintenance***: Reliability-centred maintenance, condition-based monitoring maintenance; scheduling and reliability impact.
Teaching/Learning Methodology	The concept of risk management, reliability analysis and system assurance analysis will be presented through lectures and tutorials with reference to real-life applications on transportation systems. Students will be required to form groups to work through cases covering practices on reliability analysis, system assurance analysis and maintenance issues in transportation systems. 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
Lectures	✓	✓	✓
Case Studies and 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. In-class Test	20%	✓	✓	
3. Cases study & presentation	20%	✓	✓	✓
Total	100%			

The outcomes on the concepts of analysis are assessed by the usual means of examination and test whilst those on analytical skills, 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	33 Hrs.
▪ Presentation	6 Hrs.
Other student study effort:	
▪ Case study and report	15 Hrs.
▪ Self-study	51 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. **P.D.T. O'Connor, D. Newton, R. Bromley Practical reliability engineering, 5th Edition,** John Wiley & Sons, 2012
2. **E.E. Lewis, Introduction to reliability engineering,** J. Wiley, 1996
3. **B.S. Dhillon, Engineering maintainability: how to design for reliability and easy maintenance,** Gulf Publishing, 1999
4. **S.J. Cox and N.R.S. Tait, Reliability, safety and risk management: an integrated approach, 2nd Edition,** Butterworth-Heinemann, 1998

Reference books:

1. **G.B. Guy, Reliability on the move: safety and reliability in transportation,** Elsevier Applied Science, 1989
2. **David Blockley, Engineering safety,** McGraw-Hill, 1992

Subject Description Form

Subject Code	EE4018B
Subject Title	Electrical Systems in Automobiles
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To familiarize students with the basic knowledge of power distribution in automotive systems 2. To enable students to understand the operation of electrical and electronic part and components in vehicles 3. To enable students to learn the reliability and diagnosis of the electrical system of the vehicle. 4. 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. Have the ability to acquire a good understanding of electrical distribution of vehicle. b. Be able to understand and analyze the electrical system, part and components of a vehicle, and be able to develop the skill of design. c. Have a global view on recent development on power electronics for automotive engineering, and be perceptive of applications of electrical systems for other conventional vehicle, electrical vehicle and hybrid electrical vehicle. d. Appreciate the need to develop a good combination of theoretical background and practical engineering sense in order to cope with problems in their pursuit of an engineering career.
Subject Synopsis/ Indicative Syllabus	1. ***Power distributions in vehicles***: Electrical distribution systems in cars, wiring and power bus topology, battery system, wires and connector design, groundings and current protections. 2. ***Electro-mechanical devices***: Ignition systems, cranking systems, motion control for electrical auxiliary system, electric power steering, lighting systems, heating, ventilation and air-conditioning systems, active suspension. 3. ***Electronic systems and control***: Basic electronic control systems, computerized engine control, control network protocols, starter and alternator, entertainment systems, dashboard instrumentation and signaling circuits. 4. ***Test and reliability***: Automotive electronics reliability, electrical transients and protection, diagnosis & services for electrical systems. **Laboratory Experiments:** Each student is required to attend laboratory section which covers the above selected areas. Written report is needed.

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Practical experiences on power system for automobiles are given through Laboratory. 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. Class Test	20%	✓	✓	✓	✓
3. Laboratory performance & reports	20%	✓	✓	✓	✓
Total	100%				

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 system and parts 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	33 Hrs.
	▪ Laboratory/Case study	6 Hrs.
	Other student study effort:	
	▪ Laboratory and case study preparation/report	16 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	100 Hrs.

Reading List and References

Textbooks:

1. A.Emadi, "Handbook of automotive power electronics and motor drives, Taylor & Francis, 2005

Reference books:

1. J.D. Halderman, **Automotive electricity and electronics**, Pearson/Prentice Hall, 2011
2. T. Denton, **Automobile electrical and electronic systems,** Routledge: Taylor & Francis, 2012
3. M. Ehsani, Y. Gao, S. Gay and A.Emadi, Modern electric, hybrid electric, and fuel cell vehicles, CRC Press, 2010.
4. T. Candela, Automotive Wiring and Electrical Systems, S-A Design, 2009.

Subject Description Form

Subject Code	EE4019B
Subject Title	Intelligent Transportation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE2029B
Objectives	1. To introduce the intelligent techniques and their applications in transportation systems 2. To provide a sound understanding of the problems in transportation operations which require intelligence of various characteristics 3. To enable evaluation of appropriate methodologies and be aware of the design and implementation issues of advanced techniques.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Illustrate understanding of underlying principles of intelligent techniques b. Explain the need of intelligent techniques in transportation systems c. Identify the basic design concerns of intelligent transportation systems
Subject Synopsis/ Indicative Syllabus	1. ***Intelligent systems***: Expert systems, fuzzy logic systems, artificial neural networks, evolutionary computations, multi-agent systems. 2. ***Transportation applications***: Advanced surveillance, navigation, communication, and computer technology; monitoring, analysis, evaluation, and prediction of transportation system performance and behaviour; intervention strategies, feasibility studies; human factors, man-machine interfaces, institutional issues. 3. ***Design and implementation***: Selection of methodologies, data collection and processing, control, communication and computation, decision systems, simulation, real-time systems. 4. ***Intelligent vehicle technologies***. The car for the future, intelligent vehicle sensor technologies, micro-controllers and micro-electronic technology, vehicle optical sensor, radio frequency technologies for vehicle information systems, global positioning technology, intelligent vehicle detection and control technologies.
Teaching/Learning Methodology	The basic principles, intelligent techniques and design issues are discussed in lectures. Students are encouraged to keep abreast with the latest technologies by analysing an up-to-date intelligent transportation system through the mini-project.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	✓	✓	✓
Mini-projects		✓	✓
Presentations		✓	✓

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	10%	✓		
3. Mini-project	20%		✓	✓
4. Presentation	10%		✓	✓
Total	100%			

Examination allows assessment on outcomes covering principles, techniques and design, supplemented by the class test. Mini-project and presentation enable students to explore the latest technologies through survey and analysis, and facilitate evaluation of outcomes on techniques and design.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	39 Hrs.
	Other student study effort:	
	▪ Mini project	28 Hrs.
	▪ Self-study	38 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. **W. Barfield and T.A. Dingus, Human Factors in Intelligent Transportation Systems,** Lawrence Erlbaum Associates, 1998
2. **J.M. Sussman, Perspectives on Intelligent Transportation Systems (ITS),** Springer, 2005
3. **E. Bekiaris and Y.J. Nakanishi, Economic Impacts of Intelligent Transportation Systems: Innovations and Case Studies,** Elsevier/JAI, 2004
4. **M.A. Chowdhury and A. Sadek, Fundamentals of Intelligent Transportation Systems Planning,** Artech House, 2003
5. **R. Stough, Intelligent Transport Systems: Cases and Policies,** Edward Elgar, 2001
6. **Artificial Intelligence and Intelligent Transportation Systems,** National Academy Press, 2001
7. L. Vlacic, M. Parent, F. Harashima, Intelligent Vehicle Technologies – Theory and Applicaitons, Butterworth-Heinemann, 2001
8. **IEEE Transactions on Intelligent Transportation Systems,** Institute of Electrical and Electronics Engineers
9. **R.K. Jurgen, Navigation and Intelligent Transportation Systems,** Society of Automotive Engineers, 1998

Subject Description Form

Subject Code	EE4351B
Subject Title	Aircraft Electrical and Actuation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To develop students' knowledge on the components and operating principles of electrical and actuation systems in civil transport aircraft. 2. To provide students an overview of the electrical system of aircraft. 3. To develop students' understanding of the basic concepts, technology and applications in aviation industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to understand: a. basic electrical and electromagnetic principle for aircraft b. aircraft electrical systems including electro-hydraulic system, electrical systems, battery system, emergency electrical system; c. actuation system and machines for aircraft
Subject Synopsis/ Indicative Syllabus	***Electrical Systems*** - Aircraft electrical and distribution system, Aircraft power generation, Ground Power Supply, Power distribution, Power Converter. ***Aircraft Power Electronics and Drives –*** Transformer rectifier unit, inverter, Variable speed constant frequency, brushless motors. ***Electrical Energy Storage*** – Batteries technology, Battery charger, super-capacitors, battery management system. ***Emergency Systems*** - Emergency power sources, Interruptible power supply, Warning and Protection. ***Environmental Electrical Systems*** – Aircraft lighting, air conditioning, windscreen anti-ice systems, Anti-Skid systems. ***Electric Actuation*** – Power electronic actuators, Landing gear and Electrical flap systems, Key helicopter systems. ***More Electric Aircraft*** – Fault tolerant power distribution, energy optimized aircraft, intelligent and effective energy management.
Teaching/Learning Methodology	Lectures and tutorials are used to deliver the knowledge in relation to various aircraft electrical systems and actuation systems (outcomes a to c).

Teaching/Learning Methodology	Intended subject learning outcomes		
	a	b	c
1. Lectures	✓	✓	✓
2. Tutorials	✓	✓	✓

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	25%	✓	✓	✓
2. Test	25%	✓	✓	✓
3. Examination	50%	✓	✓	✓
Total	100%			

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

The mini-projects are designed to assess students' understanding of the aircraft electrical principles and whether they can present the study clearly.

The test is designed to assess students' understanding of the topics that they have learnt relative to learning outcomes (a), (b), (c). The test is usually conduced in the mid-semester to measure students' performance.

Examination: questions are designed to assess learning outcomes (a), (b) and (c). Students are required to answer five questions, each of which covers at least one of the learning outcomes.

Student Study Effort Expected	Class contact:	
	▪ Lecture	30 Hrs.
	▪ Tutorial and presentation	9 Hrs.
	Other student study effort:	
	▪ Mini project or Assignment	27 Hrs.
	▪ Self study	51 Hrs.
	Total student study effort	117 Hrs.

Reading List and References	1. "Military and aerospace electronics", PennWell Publishing Company, Periodic. 2. "Aircraft Electrical Systems", E.H.J. Pallet, Pearson Prentice Hall, 1997 3. "Aircraft Electricity and Electronics", Thomas Eismin, 6th Edition, McGraw-Hill Education, 2013. 4. Aircraft systems: Mechanical, Electrical and Avionics subsystem integration", Ian Moirand and Allan Seabridge, Wiley, 2013. 5. "Principles of electric machines and power electronics", P.C. Sen, Wiley, 2013. 6. Power Electronics: A First Course", N. Mohan, John Wiley & Sons, 2012.

Subject Description Form

Subject Code	EE502B
Subject Title	Modern Protection Methods
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Student should have some prior knowledge in Power Transmission and Distribution
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 understand the design philosophy and 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. 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 power systems. c. Integrate and justify techniques to be used in the planning and operation of power system protection. d. Solve technical problems for power system protection. e. Present technical results in the form of a technical report.
Subject Synopsis/ Indicative Syllabus	1. ***Overview of protection system and its development*:** General considerations. Components of protection. Structure of protective relays. Unit protection and non-unit protection. Trend of protection development. 2. ***Fault and transient in power systems*:** Fault transient behaviour in power systems. Computer simulations of the transient behaviour in power systems. 3. ***Current and voltage transducers*:** Sources of errors. Requirements 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 systems. Features of directional and non-directional protection schemes for distribution systems. 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 which 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. Mini-projects and experiments are designed to supplement the lecturing materials so that 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 and 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 Tests	20%	√	√	√	√	
3. Mini-project and report	10%		√	√		√
4. Laboratory and report	10%		√	√		√
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. Mini-projects, experiments 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	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Mini-projects/Self-study	54 Hrs.
	Total student study effort	105 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, Alstom Grid, 2011
3. S.H. Horowitz and A.G. Phadke, Power System Relaying, Wiley, 2014
4. J.L. Blackburn and J. Domin, Protective Relaying: Principles and Applications, CRC Press, 2014
5. A.T. Johns and S.K. Salman, Digital Protection for Power Systems, IEE Power Series, 1995
6. Advancements in Microprocessor Based Protection and Communication – IEEE Tutorial Course, Publication No. 97TP120-0, 1997
7. Power System Protection, Vol. 1, 2, & 3, The Electricity Training Association, 1995

Subject Description Form

Subject Code	EE505B
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. ***Unit commitment and economic dispatch*:** Priority lists. Methodologies for large system economic dispatch and unit commitment. Programming methods. 3. ***Frequency and voltage control*:** Frequency and voltage control concepts. Control loops and analysis. Automatic generation control (AGC) concepts, methodology and implementation. 4. ***Interconnected systems operation*:** System interconnection merits and problems. Economic interchange and control. Multi-area operation. 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/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	12 Hrs.
	▪ Self-study	54 Hrs.
	Total student study effort	105 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	EE509B
Subject Title	High Voltage Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	HK Electric Institute
Objectives	To provide students with knowledge to understand the techniques of design and analysis 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: 1. Describe the insulation breakdown mechanisms so as to identify the failure phenomena of different insulation systems. 2. Understand the principles and practices of high voltage equipment so as to get on to the pragmatic design and applications of the high voltage equipment in 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; Experimental determination of Townsend's ionization coefficients; 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 and commercial liquids; Purification and breakdown test; Power law for commercial liquids. 4. ***Breakdown of Solid Insulation*:** Breakdown due to treeing, surface flashover, and surface tracking; Breakdown in composite insulation. 5. ***Partial Discharges*:** Classification of partial discharges by origin; Partial discharge measurements; Recent development. 6. ***High Voltage Equipment for Power System Networks*:** Hierarchy of power system networks; Introduction to high voltage equipment and their general specifications. 7. ***Transmission Gas Insulated Switchgears*:** Design and busbar topologies; Layout and internal construction; Environmental, health, and safety precautions in handling SF_6 gas; Type and routine tests; Inspection before installation; Commissioning test and precautions; Typical incidents around the world. 8. ***High Voltage Cables*:** Basic high voltage cable technology; Dielectric properties; Types and constructions; Type, routine, and diagnostic tests; Health index; Water tree formation; Accessory design, operations, and maintenance considerations; Reliability reviews and failure analysis; Faulty joint dissections and lessons learnt. 9. ***Site Visit*:** Site visit to HK Electric; On-site demonstrations of transmission gas insulated switchgears and relevant high voltage test equipment used in the electricity transmission industry.

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 pragmatic design and applications are given through in-house demonstration and site visit to HK Electric. 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
Lectures	√	√
In-house demonstration	√	
Site visit to HK Electric		√

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. Assignments	40%	√	√
Total	100%		

The assessment methods include end of subject examination (60%) and assignments (40%), both covering intended subject learning outcomes 1 and 2. Examination is in form of three-hour, closed book examination. Assignments mainly involve homework and/or classwork.

Student Study Effort Expected

Class contact:	
▪ Lecture/In-house demonstration/Site visit to HK Electric	39 Hrs.
Other student study effort:	
▪ Assignments	16 Hrs.
▪ Self-study	50 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:
NIL (Refer to Lecture Notes).

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	EE512B
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	48 Hrs.
	▪ Report – Case Study	18 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. K. T. Chau, Electric Vehicle Machines and Drives: Design, Analysis and Application, Wiley, 2015.
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, London: Oxford University Press, 2001
3. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, New York: RC Press, 2003

Subject Description Form

Subject Code	EE526B
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. ***Power system stability*****:** Basic concepts and classification. Past incidents of system instability and consequences. Power system stability issues and solutions. 2. ***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). 3. ***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. 4. ***Dynamic stability & power system stabilisers*****:** Eigenvalue and modal analysis. Generator and load modelling. Power system stabiliser. Small-signal stability of multi-machine systems. Selection of input signal and installation location, parameter design and commissioning of PSS. 5. ***Application of HVDC, FACTS and ESS in improving stability*****:** HVDC link operation and its control for stability improvement. Flexible AC transmission devices, power angle control. Energy storage system, e.g. BESS, SOFC, FESS, and its application in stability control. **Mini-projects:** 1. Power system stability analysis using industrial power systems design and analysis software 2. Power system stabiliser design for damping of low frequency power oscillation

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. Mini-project/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	33 Hrs.
▪ Laboratory	6 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	15 Hrs.
▪ Mini-project/self-study	51 Hrs.
Total student study effort	105 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	EE533B
Subject Title	Railway Power Supply Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	MTR Academy
Objectives	1. To enable students to develop a comprehensive understanding of the modern railway power supply systems in metro and mainline systems. 2. To provide an appreciation of the specifications and design of the supply system configuration. 3. To enable students to understand the implications of supply system design on safety and service quality, as well as the practices and difficulties in implementation. 4. To provide students with the basic terminology and the practical processes of testing and commissioning. 5. To enable students to comprehend the connection of the railway supply system to the utility distribution network.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the key components in a railway supply system and their functions and appreciate the relationship of the supply system to other systems in railway. b. Differentiate the requirements on power supply systems in different railway systems, metros, mainlines and light rails. c. Apply the knowledge on power supply system to comprehend the design and installation of power supply system. d. Discuss procedures of testing and commissioning of railway power system and analyse possible faults. e. Organise and present on assigned research topics. f. 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 aspect of railway power supply system*:** Metro system, Light rail system, electric multiple units and locomotives, functions of traction supply system, interface requirement among power and traction supply system, contact line system, permanent way, signalling, SCADA and train. 2. ***Railway power supply system – requirement and specification*:** Types of railway power supply systems, basic structure and design of standard AC distribution and DC traction substation and control system. 3. ***DC overhead line system and equipment*:** Terminology, overhead contact line types and basic characteristic; Basic design – mechanical, electrical and civil; Design for installation, testing and commissioning; failure analysis. 4. ***Traction earthing and DC stray current control system*:** Terminology, operation requirement and specification; DC current return, earthing and bonding; Design for installation, testing and commissioning; Failure analysis. 5. ***AC traction supply system and power quality issues*:** Configuration and operation of 25kV system; Power quality; Voltage dip, harmonics, imbalance, and remedial measures. 6. ***EMC*:** Principles of EMC, Railway-related interference problems and their solutions, booster transformer. **Case Study:** Site visit to MTR system Industrial seminar

Teaching/Learning Methodology	The main lecturers are from MTRC, and their experiences/knowledge are shared with students via lectures and tutorials for conveying the concept and theories. The site visit to MTR system has reinforced the pragmatic design and application in a realistic system. Problem solving skill and team work are trained via minor project and laboratory.

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

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. Test	20%	√	√	√	√	√	
3. Presentation with Essay Submission	20%	√	√	√	√	√	√
Total	100%						

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

The problem solving skill is evaluated via presentation (with essay submission) and laboratory.

Student Study Effort Expected	
Class contact:	
▪ Lecture/Tutorial	33 Hrs.
▪ Industrial/Research Presentation	6 Hrs.
Other student study effort:	
▪ Presentation and Report preparation	24 Hrs.
▪ Self-study	42 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:
1. B.S. Blanchard, Systems Engineering & Analysis, 5th Edition, John Wiley, 2011
2. M.J. Szeliga, Stray Current Corrosion – The Past, Present and Future of Rail Transit Systems, NACE International, 1996

Reference books:
1. R.J. Hill, Electric Railway Traction – Part 3 Traction Power Supplies, Power Engineering Journal, pp. 275-286, December, 1994
2. Selected papers on IEE Proceedings on Electric Power Applications
3. Selected papers on IEE Proceedings on Power Systems

Subject Description Form

Subject Code	EE535B
Subject Title	Maintenance and Reliability Engineering
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	MTR Academy
Objectives	1. To provide students with a comprehensive understanding on various maintenance management processes. 2. To enable students to understand the impact of maintenance management on railway objectives in safety, reliability and cost effectiveness. 3. To enable students to acquire knowledge and techniques in reliability engineering. 4. To equip students to make decisions on sound maintenance and reliability improvement. 5. To enable students to apply the techniques in reliability engineering to railway operation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the possible faults in railway systems and their impacts to the overall system reliability. b. Develop fault trees for a sub-system in railways and apply various reliability models on fault analysis. c. Discuss system data collection for reliability assessment. d. Evaluate maintenance schedules and assess the corresponding risk with appropriate techniques and tools. e. Review the advantages and limitations on condition based monitoring maintenance, alternative sourcing of inventory and maintenance outsourcing management for railway assets. f. Organise and present an assigned research topic. g. Recognise the importance to engage in self-learning on latest methodologies for system maintenance management at this advanced level of study.
Subject Synopsis/ Indicative Syllabus	**Reliability Engineering** 1. ***Reliability fundamentals*:** Reliability Mathematics. Failure distributions. Causes of failures and their treatment. Reliability apportionment and prediction. Reliability data books. Data Recording and Corrective Action System (DRACAS). 2. ***Reliability analysis and modelling methods*:** Fault tree analysis, Failure Mode Effects and Criticality Analysis (FMECA), Reliability block diagram, Reliability Growth Models – IBM and Duane Reliability Growth Modelling, Reliability testing. Monte Carlo Reliability Simulation. Weibull Analysis. **Maintenance Management** 3. ***Maintenance techniques and tools*:** Maintenance as an essential element for asset management. Reliability Centred Maintenance as a means for maintenance decision. Topics on conditioned based maintenance. 4. ***Management for business performance*:** Computerized Maintenance Management System – from planning to implementation. Alternative spare sourcing. Maintenance outsourcing management for railway assets. **Case Study:** Site Visits to MTRCL Depot Industrial/Research Seminars
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	d	e	f	g
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	d	e	f	g
1. Mini-project (group project)	20%		√		√	√	√	√
2. Tests	20%	√		√				
3. Examination	60%	√		√	√	√		
Total	100 %							

This is a specialist subject with bias on maintenance and reliability of railway assets, in particular on rolling stocks. A large number of case studies are discussed in the lectures and the outcomes are to test the understanding of the student on the underlying fundamentals through quizzes, mini-projects and written examinations.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Industrial/Research seminars	3 Hrs.
	Other student study effort:	
	▪ Assignment and Self-studies	66 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. J. Mouray, Reliability Centred Maintenance, 2nd Edition, Industrial Press, 1997
2. C.E. Ebeling, An Introduction to Reliability and Maintainability Engineering, McGraw-Hill, 1997
3. V. A. Profillidis, Railway management and engineering, 3rd Edition, Burlington, Ashgate Pub. Co., 2006.
4. P. D. T. O'Connor, Practical Reliability Engineering, Wiley, 2006
5. Bury St Edmunds, Railway rolling stock, organized by the Railway Division of the Institution of Mechanical Engineers (IMechE) and the Institution of Civil Engineers (ICE) for IMechE, 2001

Subject Description Form

Subject Code	EE536B
Subject Title	Signalling and Train Control Systems
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	MTR Academy
Objectives	1. To provide students with a comprehensive understanding on the basic principles and terminology of railway signalling. 2. To enable students to acquire knowledge on train control systems and their implications to safe and efficient railway operation. 3. To enable students to understand the design processes of signalling layout the control of signals. 4. To provide students with the basic concepts on the principles, means, instrumentation and commissioning of train detection and interlocking systems. 5. To appreciate the structure and components of an automatic train control system.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the functions, operation principles and key components of a signalling system. b. Given track layout and signalling requirements, formulate a simple signalling layout. c. Describe the train detection methodologies and implementation considerations, and compare their advantages and limitations. d. Compare between relay interlocking and processor-based interlocking, their safety principles and commissioning plans. e. Explain the requirements and structure of an automatic train control system.
Subject Synopsis/ Indicative Syllabus	1. ***Basic signalling principles*:** Safe operation of trains, prevention of trains collision and locking of points and routes; type of signalling, signal spacing and signalling layout; headways line capacity, headways for different types of signalling systems, factors affecting headways; control table, conditions for setting of routes, clearing of signals and locking of routes and points; aspect sequence, meaning of signal aspect and the circumstances under which signals display. 2. ***Train detection*:** Track circuit, axle counter and advanced detection system; track circuit bonding; track circuit connections and maintenance of traction return at points and crossings. 3. ***Relay interlocking*:** Interlocking implementation based on relays, safety principles; processor based interlocking, interlocking implementation based on processors/computers, safety principles. 4. ***Principles of testing*:** Competence, functional tests, scenario tests, independent test, test strategy, test plan, commissioning plan, records. 5. ***Automatic train control system*:** Automatic train protection, automatic train operation and automatic train supervision. **Case Study:** Site visits to MTR train control centres Industrial/Research seminars

Teaching/Learning Methodology	Basic principles of signalling functions and operations are usually simple but they are always complicated by the implementation and practices in systems with unique requirements. Lectures are necessary to cover the fundamentals, supplemented by the examples and exercises from real-life applications. Site visits to the MTR Control Centres are also arranged so that the students are able to co-relate what they have learned to actual operations.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
Lectures	√	√	√	√	
Site visits		√		√	√
Industrial seminars					√

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. Test	25%	√	√			
3. Assignments	15%	√	√			
Total	100%					

The examination is to evaluate the students' understanding of the underlying principles in general. Signalling involves signal layout and route setting, which requires substantial practical skills through exercises. Test and assignment provides the means to assess such practical design skills.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	33 Hrs.
	▪ Industrial/Research seminars	6 Hrs.
	Other student study effort:	
	▪ Assignments	10 Hrs.
	▪ Self-study	53 Hrs.
	▪ Site visit	3 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Textbooks:
1. M.E. Leach, Railway Control System, 2nd Edition, A & C Black, 1993
2. Edited by B. Ning, Advanced Train Control Systems, WIT, 2010

Reference books:
1. Proceedings of International Conferences on Computers in Railways, WIT Press
2. Selected papers on IRSE Proceedings
3. IRSE Green Book No. 27, Signalling the Layout
4. IRSE Green Book No. 29, Solid State Interlocking

Subject Description Form

Subject Code	EE537B
Subject Title	Railway Vehicles
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	MTR Academy
Objectives	1. To provide students with a comprehensive understanding on design and applications of railway vehicles. 2. To ensure the students aware of the current state-of-the-art on design, operation and maintenance of railway vehicles in Hong Kong and overseas. 3. To enable students to understand the procurement process of railway vehicles and the necessary management. 4. To acquire knowledge on the components in railway vehicles and their modelling for analysis. 5. To appreciate the testing standards for vehicles; and the inspection and quality control measures.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify various types and configurations of railway vehicles. b. Discuss the design principles and system performance of railway vehicles and be aware of the latest development in the technology. c. Elaborate on the project management process for railway vehicle procurement and devise feasibility study and maintenance planning. d. Apply appropriate modelling for vehicles, body design and train dynamics in vehicle performance analysis. e. Given the acceptance standards, formulate tests and inspection for quality control purposes. f. Appreciate the role of engineers on matters other than technical issues. g. Recognise the importance to engage in self-learning on latest technologies on railway vehicle design at this advanced level of study.
Subject Synopsis/ Indicative Syllabus	1. ***Project management for procurement of railway vehicle*:** Planning and feasibility study, System selection, definition of vehicle, specification, design management, testing and commissioning, maintenance planning. 2. ***Railway vehicle design and development*:** Types and configurations of railway vehicles, design principles, system performance, Interface and environmental considerations, modern development. 3. ***System description and mechanism design*:** Carbody, bogie, coupler, door, brake, pneumatics, air-conditioning, traction and control, pantograph, auxiliary equipment. 4. ***Vehicle modelling and gauging*:** Rail vehicle components, suspension system, modelling of vehicles and analysis, kinetic envelope, load gauge. 5. ***Vehicle structures and dynamics*:** Body shell design, load cases, structural testing and analysis, fundamentals of train dynamics, wheel rail interface, track geometry effect, derailment prediction. 6. ***Vehicle acceptance and testing*:** Acceptance standards, type test, inspection and quality control, static testing, dynamic runs, shakedown operation and reliability monitoring.

	Case Study: Site Visits to MTRCL Depots Industrial/Research Seminars
Teaching/Learning Methodology	The main lecturers are from MTRC, and their experiences/knowledge are shared with students via lectures and tutorials for conveying the concept and theories. The site visit to MTR system has reinforced the pragmatic design and application in a realistic system. Problem solving skill and team work are trained via minor project.

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

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
1. Examination	60%	√	√	√	√	√	√	
2. Test	25%	√		√	√	√	√	
3. Presentation with Essay Submission	15%	√	√	√	√	√	√	√
Total	100%							

The outcomes on concepts, design and applications are assessed by the usual means of examination and test.
The problem solving skill is evaluated via presentation (with essay submission).

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	33 Hrs.
▪ Presentation seminar	3 Hrs.
▪ Site visit	3 Hrs.
Other student study effort:	
▪ Presentation preparation/report	24 Hrs.
▪ Self-study	42 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. V.K. Garg and R.V. Dukkipati, Dynamic of Railway Vehicle Systems, Academic Press, 1984
2. A.H. Wickens, Fundamentals of Rail Vehicle Dynamics: Guidance and Stability, Swets & Zeitlinger Publishers, 2003
3. M.A. Crisfield, Finite Elements and Solution Procedures for Structural Analysis, Pineridge Press, 1984

Reference books:

1. Selected papers from the Proceedings of IMechE Part F – Journal of Rail and Rapid Transit

Subject Description Form

Subject Code	EE550B
Subject Title	Enterprise Risk and Asset Management
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	MTR Academy
Objectives	1. To allow students to appreciate how enterprise risk management and asset management contribute to business sustainability of railway operation and the required organisation. 2. To provide students with basic understanding of Enterprise Risk Management in railway industry. 3. To provide students with comprehensive understanding on asset management for railways and the concept and principles of which are also applicable to other industry sectors. 4. To enable students to acquire knowledge on the key asset management processes and techniques adopted. 5. To enable students to apply international standard and practices on asset management.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the key elements of asset management and ERM framework, international standards and critical success factors for system implementation. b. Appreciate the asset management and enterprise risk management techniques. c. Recognise the importance to engage in self-learning on latest industry best practices on asset management at this advanced level of study.
Subject Synopsis/ Indicative Syllabus	1. ***Enterprise Risk Management*** • Enterprise Risk Management (ERM) framework • Risk management organisation for ERM • Risk aggregation and reporting, risk categorization and measurement, risk identification and assessment, risk control and responses, review and audit • Critical success factors for ERM • Application of ERM in typical railway system 2. ***Asset Management*** **Asset Management Framework** • Introduction to PAS 55: 2008 • Alignment with corporate asset management direction • Asset management organizations • Asset management and business sustainability **Enabling Processes for Asset Management** • Establishment and measurement for levels of service • Demand forecasting and management • Risk management for asset management • Condition assessment and performance monitoring • Reliability Centred Maintenance • Asset criticality • Maintenance management planning • Asset investment and reinvestment decision making • Value engineering, life cycle costing & Internal Rate of Return • Audit and management review for asset management **Asset Management Information Systems and Data Management** • Asset management information system • Data structure and numbering • Data collection and management **Case Study:** Case studies of asset management and ERM techniques and practices Industrial/Research seminars
Teaching/Learning Methodology	The concept of risk and asset management, reliability analysis and system assurance analysis will be presented through lectures and tutorials with reference to real-life applications on railway and related systems. Students will be required to form groups to work through cases covering practices on the real-life cases. Guest lectures are structured on appropriate sessions for relating the theoretical concepts real-life to practices. Students are required to share, present and defense their finding on their case studies.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	√	√	√
Case Studies	√	√	√
Discussion Forum and 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. Class Test	20%	√	√	
3. Case study report	20%	√	√	√
Total	100%			

The outcomes on the concepts of analysis are assessed by the usual means of examination and test whilst those on practical application, 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	33 Hrs.
▪ Guest Lecture	6 Hrs.
Other student study effort:	
▪ Case study preparation/report	18 Hrs.
▪ Self-study	48 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books/journals:

1. PAS 55 : 2008 Asset Management Part 1 & 2
2. ISO 31000: 2009 Risk management – Principles and guidelines
3. BS 31100: 2008 Risk management – Code of practice

Subject Description Form

Subject Code	EE560B
Subject Title	Metros in Hong Kong and China
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Collaboration Institute	MTR Academy
Objectives	To provide students through lectures, site visits and exchanges with Metro personnel; an overview knowledge and an appreciation of Metro operations, business and projects, using systems in Hong Kong and China as illustrations.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. demonstrate an understanding of the fundamentals of metro operations and management b. acquire a comprehensive knowledge of key engineering systems in metros to pave the way for more advanced studies c. appreciate the key issues in the planning and implementation of metro projects.
Subject Synopsis/ Indicative Syllabus	1. Introduction a. Objectives and key attributes of Metros b. Major components of a Metro c. Role of Metros in public transport d. A survey of operating Metros in Hong Kong and China. e. Future development of Metros in Hong Kong and China. 2. Key systems in Metro a. Trains b. Trackwork and civil infrastructure c. Signalling, control and communication systems d. Power supply system e. Station facilities f. System integration and system assurance 3. Metro Operation a. Train operation b. Station operation c. Depot operation d. Asset maintenance e. Key performance indicators f. Safety and risk management 4. Metro business a. Customer services b. Non-fare business c. Fare policy and strategy 5. Metro Project a. Project planning b. Project implementation c. Funding of projects

Teaching/Learning Methodology	a) Lectures – 30 hours b) Site visits c) Tutorial/Discussion with Metro personnel – 9 hours Core subject knowledge will be delivered in the lectures, site visits will enhance the students' understanding on the subject contents, while tutorials and discussion with Metro personnel will give more details on the real world practices.

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

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/assignments	40%	√	√	√
2. Examination	60%		√	√
Total	100%			

Candidates are expected to select a mini-project from the wealth of case studies to demonstrate their understanding of the metro systems. The examination covers both practical and theoretical aspects of the major issues to be considered in the design and planning of metro systems in both Hong Kong and Mainland.

Student Study Effort Expected		
	Class contact:	
	▪ Lectures	30 Hrs.
	▪ Tutorials	9 Hrs.
	Other student study effort:	
	▪ Site Visits	9 Hrs.
	▪ Self-study	57 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

1. Hirsch, R. (Ed), (2007), 'Managing Railway Operations and Maintenance: Best Practices from KCRC', University of Birmingham Press
2. Industry specific codes of practice, procedures, standards and manuals

Subject Description Form

Subject Code	EE5381
Subject Title	System Assurance and Safety in Railways
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: EE538
Collaboration Institute	MTR Academy
Objectives	1. To allow students to appreciate the importance of safety in railway operation and the required organisation for hazard management. 2. To provide students with a comprehensive understanding on the relationship between railway safety and service performance objectives and application of methodologies of system assurance and safety risk. 3. To enable students to acquire knowledge on the key management processes and analysis techniques adopted in various project phases. 4. To enable students to apply international standards on railway system assurance and safety risk. 5. To enable students to acquire hand-on experience from railway operators on system assurance and safety risk practices.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify safety performance indicators and the safety risk principles to produce such indicators. b. Given a railway sub-system, devise the simple safety risk ranking and matrices; and carry out hazard operability study. c. Conduct various system assurance analyses with different techniques to ensure fulfilment of international standards for different purposes. d. Organise safety committees, formulate system assurance programme planning and develop safety cases. e. Analyse the collected safety statistics and plan the hazard registration system. f. Appreciate the safety management skills required in engineering systems g. 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. ***Safety Risk Assessment*:** Railway safety performance, life cycle safety management process, ALARP (As Low AS Reasonably Practicable) principle, societal perception of risk, risk ranking and matrices, closed loop risk management process, tolerability of risk and formulation of risk criteria, value of preventing a fatality, equivalent fatality, risk mitigation principle 2. ***System Assurance Analysis Techniques & Standards*:** Hazard & operability study, use of guidewords in identification of hazards, fault tree analysis, event tree analysis, cause-consequence analysis, preliminary hazard analysis, operation & support hazard analysis, cost benefit analysis, qualitative and quantitative risk analyses, system safety modelling, classification of safety critical items, human error & system safety, safety integrity level & software, MIL STD 882D, IEC 61508, EN50126, BS 5760 3. ***Organisation & Programme Management*:** Safety committees, system assurance programme planning, structure of system safety report/safety Case, in-service safety risk monitoring programme, collection and use of safety statistics, hazard registration system, hazard management organisation. **Case Study:** MTRCL System assurance practices Industrial/Research seminars
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

Teaching/Learning Methodology	Outcomes						
	a	b	c	d	e	f	g
Lectures	√	√	√	√	√		
Tutorials			√	√	√		
Mini-project works/Assignments					√	√	√
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	e	f	g
1. Examination	60%	√	√	√	√	√		
2. Class Test	20%	√	√	√	√	√		
3. Assignments/Mini-project works	20%			√		√	√	√
Total	100%							

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.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Assignment/Mini Project	21 Hrs.
▪ Self-study	45 Hrs.
Total student study effort	105 Hrs.

Reading List and References	**Textbooks:** 1. D.J. Smith, Reliability, Maintainability and Risk, 5th Edition, Butterworth-Heinemann, 1997 2. J.D. Andrews and T.R. Moss, Reliability and Risk Assessment, Longman, 1993 3. F. Redmill, M. Chudleigh and J. Catmur, System Safety: HAZOP and Software HAZOP, Wiley, 1999 **Reference books/journals:** 1. EN50126:1999 "Railway Applications – The specification and Demonstration of Reliability, Availability, Maintainability and Safety" 2. MIL -STD-882D "Standard Practice for System Safety", Department of Defence, USA

Subject Description Form

Subject Code	ELC1011
Subject Title	Practical English for University Studies
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims to develop and enhance students' general proficiency and communication skills in English. A strong focus will be given to enhancing competence and confidence in writing, grammar, vocabulary, pronunciation and fluency.
Intended Learning Outcomes	Upon successful completion of the subject, students will be able to: a. organise and write accurate and coherent short texts b. improve language accuracy and the ability to proofread for common errors in written texts c. use appropriate verbal and non-verbal skills to enhance fluency and accuracy in spoken communication such as short presentations To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present their views logically and coherently.
Subject Synopsis/ Indicative Syllabus	1. Written communication Enhancing the use of accurate and appropriate grammatical structures and vocabulary for various communicative purposes; improving the ability to organise written texts logically; and improving cohesion and coherence in writing. 2. Spoken communication Developing verbal and non-verbal interaction strategies appropriate to the context and level of formality. 3. Reading and listening Understanding the content and structure of information delivered in written and spoken texts; developing effective reading and listening strategies. 4. Language development Improving and extending relevant features of grammar, vocabulary, pronunciation and fluency.
Teaching/Learning Methodology	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 of texts, information search, mini-presentations and discussions. Students will make use of elearning resources and web-based work to improve their grammar and vocabulary, and other language 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

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed	
		a	b
1. In-class paragraph writing	25%	✓	✓
2. Essay writing	40%	✓	✓
3. Documentary presentation	35%	✓	✓
Total	100%		

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

The paragraph writing test, which assess students' grammar, vocabulary and paragraph organization skills, necessitate achievement of LOs (a) and (b).

The essay writing assessment evaluates students' ability write a longer text in accurate and appropriate grammatical structures (ref. Los (a) and (b)).

The documentary presentation assesses students' ability to speak accurately, appropriately and confidently. Students will research a topic, organise information from a variety of sources, and deliver the information as a digital documentary and mini-presentation (ref. LOs (a), (b) and (c)).

In addition to these assessments, students are required to complete further language training through web-based language work. The additional language training offered in online tasks is aligned with all the three LOs and corresponds to their learning in class.

Student Study Effort Expected

Class contact:	
▪ Seminar	39 Hrs.
Other student study effort:	
▪ Self-study/preparation	78 Hrs.
Total student study effort	117 Hrs.

Reading List and References

Course material

1. Learning materials developed by the English Language Centre

Recommended references

1. Boyle, J. & Boyle, L. (1998). *Common Spoken English Errors in Hong Kong*. Hong Kong: Longman.
2. Brannan, B. (2003). *A writer's workshop: Crafting paragraphs, building essays (3rd ed.)*. Boston: McGraw-Hill.
3. Hancock, M. (2003). *English pronunciation in use*. Cambridge: Cambridge University Press.
4. Nettle, M. and Hopkins, D. (2003). *Developing grammar in context: Intermediate*. Cambridge: Cambridge University Press.
5. Redman, S. (2003). *English vocabulary in use: Pre-intermediate and intermediate*. Cambridge: Cambridge University Press.
6. Powell, M. (2011). *Presenting in English. How to get successful presentations.* USA. Heinle & Heinle Publishers.

Subject Description Form

Subject Code	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	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	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; practising summarising 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	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

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		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	39 Hrs.
Other student study effort:	
▪ Self study/preparation	78 Hrs.
Total student study effort	117 Hrs.

Reading List and References

Course material

1. Learning materials developed by the English Language Centre

Recommended references

1. Bailey, S. (2014). *Academic writing: a handbook for international students*. Abingdon: Routledge.
2. Comfort, J. (2001). *Effective presentations.* Oxford: Cornelsen & Oxford University Press.
3. Hung, T. T. N. (2005). *Understanding English grammar: A course book for Chinese learners of English*. Hong Kong: Hong Kong University Press.
4. Swales, J. M., & Feak, C. B. (2004). *Academic writing for graduate students:Essential tasks and skills*. Ann Arbor, MI: University of Michigan Press.
5. Tang, R. (2012). *Academic writing in a second or foreign language: Issues and challenges facing ESL/EFL academic writers in higher education contexts*. London: Continuum International Pub.
6. Zwier, L. J. (2002). *Building academic vocabulary.* Ann Arbor, MI: University of Michigan Press.

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: 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	Upon successful completion of the subject, students will be able to: a. research relevant academic texts for a topic and integrate the sources into a position argument essay appropriately and effectively; b. plan, research for, write and revise a position argument essay; and c. present and justify views effectively in a mini oral defence. 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	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 from academic texts 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 an academic discussion and to present and justify views in an oral defence. 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	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

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Position Argument Essay (draft)	20%	✓	✓	
2. Academic Presentation & discussion	35%	✓		✓
3. Position Argument Essay (final)	45%	✓	✓	
Total	100%			

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

Assessments 1 and 3 assess students' abilities to produce a coherent academic text which requires research, and effective use and referencing of sources (ref. LOs (a) and (b)). Assessment 2 assesses their abilities to plan, present and justify their views in an oral defence (ref. LOs (a) and (c)).

In addition to their assessments, students complete further language training by carrying out academic research and by completing a variety of IndiWork tasks (independent work out of class) focussing on grammar and academic skills such as paraphrasing and discussion strategies.

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

1. Learning materials developed by the English Language Centre

Recommended references

1. Davies, B. (2012). *Reading research: A user friendly guide for health professionals* (5th ed.). Toronto, ON: Elsevier Canada.
2. Faigley, L. (2012). *Backpack writing: Reflecting, arguing, informing, analyzing, evaluating* (3rd ed.). Boston, MA: Pearson.
3. Madden, C. and Rohlck, T. N. (1997). *Discussion and interaction in the academic community*. Ann Arbor, MI: University of Michigan Press.
4. McWhorter, K. T. (2007). *Academic reading* (6th ed.). New York, NY: Pearson/Longman
5. Oshima, A. & Hogue, A. (2006). *Writing academic English* (4th ed.). White Plains, NY: Pearson/Longman.
6. Reinhart, S. M. (2013). *Giving academic presentations* (2nd ed.). Ann Arbor, MI: University of Michigan Press.
7. Rost, M. (2013). *Active listening.* Harlow, England: Pearson.
8. Wood, N. V. (2012). *Perspectives on argument* (7th ed.). Boston, MA: Pearson.

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: ELC1014
Objectives	This subject aims to help students become more effective readers and writers. It focuses on developing students' facility to read a variety of texts in a critical manner, both intensively and extensively; and to write texts that demonstrate knowledge and insight.
Intended Learning Outcomes	Upon successful completion of the subject, students will be able to examine a variety of texts, including literary texts, and: a. reflect on and critically analyze texts of different genres and styles, identifying the writer's aims and stance b. identify and evaluate language used to make claims and support these with valid arguments c. write a text on a chosen topic that includes their opinion and interpretation of some key issues and demonstrates critical thinking and creativity
Subject Synopsis / Indicative Syllabus	Reading strategies Reading extensively to appreciate the use of language, acquire information, promote understanding, and develop empathy. Reading intensively to investigate a particular topic and develop an in-depth understanding of issues and stances. Reading critically to extract implications, identify writers' assumptions and purposes, and analyze issues raised in texts written from different perspectives. Writing strategies Describing and analyzing the structure, meaning and characteristics of a variety of texts. Presenting views and arguments to educated readers with sophisticated language and appropriate visual images and formats.
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 work involving sharing and discussion of reading experiences; and reading, evaluating and drafting texts. The process approach to writing is adopted, and students make use of e-learning resources to engage in 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		
		a	b	c
1. Reflective writing	20%	✓		
2. Analyzing genres of writing	40%	✓	✓	
3. Feature article writing	40%			✓
Total	100%			

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

Assessment 1 requires students to write a reflection after reading a range of literary genres and sharing their ideas in class; and is aligned with ILO (a). Assessment 2 (an in-class assessment) requires students to employ effective critical reading and thinking skills to interpret texts, identify the writer's style and stance, and evaluate the choice of language used; and is aligned with ILOs (a) and (b). Assessment 3 requires students to first conduct research and gain some insight into a particular topic, then produce an article which can inform and impress readers through its substance, structure and language; and is aligned with ILO (c). Through these assessments, students will be able to develop and demonstrate more advanced reading and writing skills.

Student Study Effort Expected

Class contact:	
Seminars	39 Hrs.
Other student study effort:	
Online forums and blogs Readings and sharing session preparation Research and drafting/revising of texts	78 Hrs.
Total student study effort:	117 Hrs.

Reading List and References

Course material

1. Learning materials developed by the English Language Centre

Recommended references

1. Best, J. (2001). *Damned lies and statistics: Untangling numbers from the media, politicians, and activists.* Berkeley, CA: University of California Press.
2. Cooper, S. & Patton, R. (2010). *Writing logically, thinking critically.* New York, NY: Longman.
3. Damer, T. E. (2009). *Attacking faulty reasoning: A practical guide to fallacy-free arguments.* Belmont, CA: Wadsworth Cengage Learning.
4. Kennedy, X. J. & Gioia, D. (2010). *Literature: An introduction to fiction, poetry, drama, and writing* (11th ed.). New York, NY: Longman.
5. 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: 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	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	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	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

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		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

1. ELC-provided subject materials.

Other readings

1. Breaden, B. L. (1996). *Speaking to persuade.* Fort Worth, TX: Harcourt Brace College.
2. Covino, W.A. (1998). *The elements of persuasion.* Boston: Allyn and Bacon.
3. Edwards, R. E. (2008). *Competitive debate: The official guide.* New York: Alpha Books.
4. Leanne, S. (2008). *Say it like Obama: The power of speaking with purpose and vision.* New York: McGraw Hill.
5. Rogers, W. (2007). *Persuasion: messages, receivers, and contexts.* Lanham, MD: Rowman & Littlefield Publishers.
6. Stiff, J. B. (2003). *Persuasive communication* (2nd ed.). New York: Guilford Press.

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: 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	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	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	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	<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</th></tr><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>1. Individual paper</td><td>30%</td><td>✓</td><td>✓</td><td></td></tr><tr><td>2. Written test</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>3. Group project</td><td>30%</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: 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	<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	*Recommended reading* 1. The PolyU library retains either hardcopies or electronic copies of the following titles. The titles can also be found online. 2. 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.

Subject Description Form

Subject Code	ELC3521
Subject Title	Professional Communication in English
Credit Value	2
Level	3
Pre-requisite/ Co-requisite/ Exclusion	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 proposal in English • Planning and organising a project proposal • Explaining the background, rationale, objectives, scope and significance of a project • Referring to the current situation or existing literature to substantiate a project proposal • Describing the methods of study • Describing and discussing anticipated project results and (if applicable) results of a pilot study • Presenting the budget, schedule and (if applicable) method of evaluation • Writing an executive summary 2. Oral presentation of project proposal in English • Selecting content for an audience-focused presentation • Choosing language and style appropriate to the intended audience • Using appropriate transitions and maintaining coherence in a team presentation • Using effective verbal and non-verbal interactive strategies

Teaching/Learning Methodology	The subject is designed to develop the English language skills, both oral and written, that students need to use 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
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
1. Project proposal in English	40%	✓		✓
2. Oral presentation of project proposal in English	60%		✓	✓
Total	100%			

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

The assessments will arise from a course-long engineering-related project. Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. They 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.

Assessment type	Intended readers/audience	Timing
1. Project proposal in English Each team writes a proposal of 2000-2500 words; and each member writes a report of 200-250 words explaining his/her contribution to the project	Mainly engineering experts	Week 8
2. Oral presentation of project proposal in English Each team delivers a speech (30 minutes for a team of four), simulating a presentation of the final proposal	Mainly non-experts	Weeks 12-13

Student Study Effort Expected	Class contact:	
	Seminars	26 Hrs.
	Other student study effort:	
	Researching, planning and writing the project Rehearsing the presentation	52 Hrs.
	Total student study effort:	78 Hrs.
Reading List and References	1. D.F. Beer, (Ed.), *Writing and speaking in the technology professions: A practical guide*, 2nd ed., Hoboken, NJ: Wiley, 2003. 2. R. Johnson-Sheehan, *Writing proposals,* 2nd ed., New York: Pearson/Longman, 2008. 3. S. Kuiper, *Contemporary business report writing*, 3rd ed., Cincinnati, OH: Thomson/South-Western, 2007. 4. M.S. Lawrence, *Writing as a thinking process: Teacher's manual*. Ann Arbor, Mich: University of Michigan Press, 1975. 5. D.C. Reep, *Technical writing: Principles, strategies and readings*, 6th ed., Pearson, Longman, 2006.	

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 research 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 (4 hours*)*** 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. Seminars (12 hours*)*** There will be seminars given by various speakers on various topics to introduce to students the engineering broad discipline, to enthuse them about their major study, to arouse students' interests in engineering and to cultivate their understanding of and sense of belonging to the discipline and the engineering profession, and to cultivate students' global outlook. The formats of the seminars may be, but not limited to, Departmental Seminars, and Renowned Speaker Seminar. ***3. Freshman Project (45 hours*)*** There will be practical workshops, presentation and demonstration sessions for the Freshman Project. The freshman project aims at developing students' creativity, problem-solving skills, research for information, and project management 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. ***4. Entrepreneurship Project (45 hours*)*** 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: hours 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 seminars (such as 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 search for information and do 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, research for information and project management abilities. Assessment tasks will consist of demonstration, presentation, reports, and reflective essay writings. These are designed to evaluate individual student's performance and achievement of the relevant intended learning outcomes 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				
		a	b	c	d	e
Online Tutorial on Academic Integrity	0%					✓
Seminars Quizzes	10%	✓	✓			
Freshman Project Project demonstration, presentation, report and reflective essay writing	45%		✓		✓	
Entrepreneurship Project Business plan	45%			✓	✓	
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 and problem-solving skills abilities*. They can also demonstrate their *ability to research 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 Seminars (such as Departmental Seminars, Renowned Speaker Seminar)	6 Hrs.
	▪ Freshman project: 3 hours per week for 5 weeks	15 Hrs.
	▪ Entrepreneurship project: 3 hours per week for 5 weeks	15 Hrs.
	▪ Other student study effort: 4 hours for Online Tutorial on Academic Integrity; 6 hours for seminars quizzes preparation; 60 hours for Freshman project and Entrepreneurship project: background information search, project work preparation, meeting and discussion, presentation and demonstration, and report writing.	70 Hrs.
	▪ Total student study effort	106 Hrs.
Reading and References List	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. The Hong Kong Institution of Engineers, "Engineering Our City", Youtube clip ref. no. nYMmI6vlVeQ HKIE Corporate Video, Youtube clip ref. no. lNMVl8MuNEY	

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			
		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	39 Hrs.
	Other student study effort:	
	▪ Guided reading, assignments and reports	37 Hrs.
	▪ Self-study and preparation for test and examination	47 Hrs.
	Total student study effort	123 Hrs.

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	1. To introduce the fundamental concepts of computer programming 2. To equip students with sound skills in C/C++ programming language 3. To equip students with techniques for developing structured and object-oriented computer programs 4. To demonstrate the techniques for implementing engineering applications using computer programs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Familiarize themselves with at least one C/C++ programming environment. b. Be proficient in using the basic constructs of C/C++ to develop a computer program. c. Be able to develop a structured and documented computer program. d. Understand the fundamentals of object-oriented programming and be able to apply it in computer program development. e. Be able to apply the computer programming techniques to solve practical engineering problems.
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; Debugging a program. 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.

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, tests and final examination	1,2,3,4,5	By doing 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 enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly. To assure students' understanding of fundamental concepts, a closed-book final examination is arranged.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		1	2	3	4	5
1. In-class exercises	10%	✓	✓	✓	✓	✓
2. Short-quizzes	15%		✓	✓	✓	
3. Programming tests	30%	✓	✓	✓	✓	✓
4. Homework	15%	✓	✓	✓	✓	✓
5. Final examination	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 are conducted to help students familiarized with the programming language and skills. The programming tests are for assessing the ability of students on solving computer problems through programming within a specified period. Through doing homework, students will be able to experience how to solve computer problems and design solutions by using a systematic approach. The final examination is for assessing the students' ability on using the programming language and analysing computer problems.	
Student Study Effort Expected	**Class contact:**	39 Hrs.
	▪ Lectures, Tests and Quizzes	26 Hrs.
	▪ Laboratory/Tutorial	13 Hrs.
	Other student study effort:	71 Hrs.
	▪ Self-studying	57 Hrs.
	▪ Homework	14 Hrs.
	Total student study effort	110 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*, 9th ed. Boston, MA: Prentice Hall, 2014. 3. J. Liberty and R. Cadenhead, Sams Teach Yourself C++ in 24 hours (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 computing 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 Internet of Things as a real life example. Introduction to modern computing systems. 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 Routers). 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	<table><tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr><tr><td>A1</td><td>A2</td><td>A3</td><td>A4</td><td>B1</td></tr><tr><td>1. Continuous Assessment</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. 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> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment methods include an end-of-subject 2-hour closed-book examination (50%) and continuous assessment (50%), including open-booked quizzes, a closed-book mid-term test, laboratory sessions/workshops, and assignments. The examination, mid-term test, 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 B1. The laboratory sessions/workshops give students hands-on experience on setting up internet-applications, building computer networks, and constructing database.
Student Study Effort Expected	<table><tr><td>Class contact:</td><td></td></tr><tr><td>▪ Lectures (18), tutorials (6), and workshops (15)</td><td>39 Hrs.</td></tr><tr><td>Other student study effort:</td><td></td></tr><tr><td>▪ Workshops preparation (6/workshop)</td><td>30 Hrs.</td></tr><tr><td>▪ Self study (3/week)</td><td>39 Hrs.</td></tr><tr><td>Total student study effort</td><td>108 Hrs.</td></tr></table>
Reading List and References	1. B. Williams and S. Sawyer, *Using Information Technology: A Practical Introduction to Computers and Communications*, 11th ed., McGraw-Hill, 2014. 2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 7th ed., Pearson, 2016. 3. D. E. Comer, *Computer Networks and Internets*, 6th ed., Pearson, 2015. 4. B. A. Forouzan, *TCP/IP Protocol Suite*, 4th ed., Tmh, 2010. 5. W. Stalling, *Data and Computer Communications*, 10th ed., Pearson, 2013. 6. S. Morris and C. Coronel, *Database Systems: Design, Implementation, and Management*, 11th Edition, Course Technology, 2014. 7. M. Mannino, *Database Design, Application Development, & Administration*. 6th ed., Chicago Business Press, 2014.

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 examine 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. <u>Introduction</u> General management concepts in organizations; Functions and types of industrial organizations; Organizational structures; Corporate objectives, strategy, and policy 2. <u>Industrial Management</u> Roles of managers: Process of management, leadership, planning, organizing, motivating, and control of social and engineering activities; Quality management: Related tools and techniques 3. <u>Project Management</u> Project scope and objectives; Network analysis; Tools that support engineering operations and task scheduling 4. <u>Management of Change</u> Change leadership; Organizational change; Phases of planned change; Stress management; Factors that affect the execution of change 5. <u>Effects of Environmental Factors</u> 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	See table below

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Coursework • Group learning activities (10%) • Presentation (individual) (30%)	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. John R. Schermerhorn, Jr., 2013, Introduction to Management, 12th Ed., John Wiley
2. Robbins, S P, DeCenzo, D A, and Coulter, M, 2013, Fundamentals of Management Essential Concepts and Applications, 8th Ed., Pearson
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, 2011, The Management of Technology and Innovation: A Strategic Approach, 2nd Ed., South-Western 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 the 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, and the environmental impacts of technology; 4. observe professional conduct, as well as the legal and other applicable constraints, related to various engineering issues; and 5. develop a strong vision to optimize their contribution to sustainable development.
Intended Learning Outcomes	Upon completion of the subject, students will be able to a. identify and evaluate the effects of technology as it applies to the social, cultural, economic, legal, health, safety, and environmental dimensions of society; b. explain the importance of local and international professional training, professional conduct and ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord; **c. <u>evaluate and estimate, in a team setting, the impact of contemporary issues, planned projects, and unforeseen technological advances related to engineers; effectively communicate and present the findings to laymen and peers.</u>**
Subject Synopsis/ Indicative Syllabus	1. <u>Impact of Technology on Society</u> Historical cases and trends of technological innovation explored through their impact on social and cultural developments of civilization and their commonalities. 2. <u>Environmental Protection and Related Issues</u> Roles of the engineer in energy conservation, ecological balance, and sustainable development. 3. <u>Global Outlook for Hong Kong's Economy and Industries</u> Support organizations, policies and their impacts on industrial and economic development in Greater China, the Pacific Rim, and the world.
	4. <u>Regulatory Organizations and Compliance</u> Discussion of engineer's responsibilities within different regulatory frameworks and environments; Examples from various entities such as the Labour Department and the Occupational Health and Safety Council; Legal dimensions to engineering such as liability, contract law, and industrial legislation. 5. <u>Professional Institutions</u> Local and overseas professional institutions; Washington Accord and the qualifications and criteria of professional engineers. 6. <u>Professional Ethics</u> 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 students' in-depth analysis of the relationships. Students are assembled into groups; throughout the course, they will work on engineering cases by completing the following learning activities: 1. Case analysis where students explore the relationships between society and the engineering issues of a project under specific dimensions; 2. Construction and assembly of a case portfolio which includes i. Presentation slides ii. Feedback critiques iii. Weekly summary reports iv. A report on Sustainable Development v. Individual Reflections 3. Final 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. Continuous assessment	60%			
• Group weekly learning activities	(24%)	✓	✓	✓
• Individual final presentation	(18%)	✓	✓	
• Group project report, SD report, individual reflection report	(18%)	✓	✓	✓
2. Examination	40%	✓	✓	
Total	100%			

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

<table>
<tr><td></td><td colspan="2">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.</td></tr>
<tr><td rowspan="7">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures and review</td><td>27 Hrs.</td></tr>
<tr><td>▪ Tutorial and presentation</td><td>12 Hrs.</td></tr>
<tr><td>Other student study efforts:</td><td></td></tr>
<tr><td>▪ Research and preparation</td><td>63 Hrs.</td></tr>
<tr><td>▪ Report writing</td><td>14 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>116 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">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.enb.gov.hk/en/susdev/council/
8. Poverty alleviation: the role of the engineer, http://publications.arup.com/publications/p/poverty_alleviation_the_role_of_the_engineer

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</td></tr>
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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. 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. demonstrate good understanding of definition of a project, the characteristics and project life cycle; b. identify appropriate project variables and practices that are applicable to engineering projects; c. perform project planning, cost/resources estimation, evaluate and monitor of project progress; and d. propose project management solutions, taking into consideration the project objectives and constraints.
Subject Synopsis/ Indicative Syllabus	1. <u>Project Overview, Management Principles, and the Systems Approach</u> Characteristics of projects and project management. Management principles. Project organization. Team development. Systems concepts and principles. Conflict management. 2. <u>Project Methodologies 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>Cost Estimation and Cost Control for Projects</u> Types of estimates. Budgeting project costs. Experience curve. Cost schedules and forecasts. Cost control systems. 4. <u>Evaluation and Control of Projects</u> Earned value measurement system. Managing project risks. Status reporting. Project closeout and termination.
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. Tutorial exercises/ written report	20%		✓	✓	
2. Mid Term Test	20%	✓	✓	✓	
3. Written examination	60%	✓	✓	✓	✓
Total	100%				

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

Continuous assessment (1) & (2): Test, 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) and (c).

Written examination: questions are designed to assess learning outcomes (a), (b), (c), and (d).

Student Study Effort Expected		
	Class contact:	
	▪ Lectures 3 hours/week for 9 weeks	27 Hrs.
	▪ Tutorials / Case studies 3 hours/week for 4 weeks	12 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. Meredith JR and Mantel SJ, 2010, *Project Management: a Managerial Approach*, Wiley, Hoboken NJ 2. Kerzner, H 2009, *Project Management: a Systems Approach to Planning, Scheduling, and Controlling*, John Wiley, New York 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) Describe 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) Interpret basic occupational health and industrial safety requirements for engineering practice; c) Explain common electronic product safety tests; d) Design and implement simple mechatronic systems with programble controller, software, actuation devices, sensing devices and mechanism; and e) Apply scientific computing software for computing in science and engineering including visualization and programming;
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. (TM8059) 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 3.1 Use of basic electronic test instruments, current and voltage measurements, waveform measurement, power supply and signal sources; 3.2 Electronic product safety test method; High Voltage Isolation Test, Insulation Resistance Test, Continuity Test, Leakage Current Measurement, Electrostatic Discharge (ESD) Test. 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	**TM8059**	**TM2009**	**TM1116**	**TM0510**	**TM3014**
▪ Mini-lecture	11 Hrs.	7 Hrs.	2 Hrs.	6 Hrs.	6 Hrs.
▪ In-class Assignment/ Hands-on Practice	40 Hrs.	8 Hrs.	4 Hrs.	21 Hrs.	15 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	IC2113
Subject Title	IC Training I (TSE)
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. 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. 3) To provide the students with knowledge of principles and techniques in some site practices to enable them to appreciate the builder's work associated with pavement and highway construction.
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. recognize the engineering standards, regulations and practices to undertake the design, construction, testing and commissioning electrical distribution and control system in buildings ; d. identify good practices and workmanship in structural concrete & steelwork; describe actual work sequences and methods in area of structural concrete & steelwork; explain the technology impact on equipment, materials and work methods to keep abreast of technology development and construction engineering practices in association with highway construction; and e. identify and relate relevant fundamental engineering theories and principles of site formation and anchorage practice to extend their knowledge and understanding in pavement construction and in highway construction;
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. (TM0372) Electrical Installation, Basic Automation and 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. Introduction of programmable controller systems, sensors, actuators, drives, timers, counters, ladder logic programming and testing. Identification of electronic circuit components, soldering and de-soldering, Dry film process, Etching process.

	(TM1245) Structural Concrete and Steelwork for EE TSE (DG) • Structural Concrete Recognize concrete types and materials; perform concrete mixing, placing, compaction and site quality control tests works; Understand Reinforcement types, sizes, detailing, cutting, bending and fixing steel bars in a timber formwork; Detect cover and size of steel bars in reinforced concrete structures. Design and construction of a simple precast concrete element. • Structural Steelwork Recognize common structural steel sections used in construction industry; steelwork properties, cutting, drilling of steelwork members; understand connection methods of steel members. Use of steelwork and associated practical problems in temporary work; corrosion protection of steelwork. (TM1246) Site Formation and Anchoring Practice for EE TSE (DG) Site Formation Practice • Sand Replacement Method • Vane Shear Test • Speedy Moisture Content Test • Sieve Analysis • Probe Test • Proctor Test • Ground Penetration Radar Survey • CCTV Survey in underground pipe systems • Cable Locator Survey Anchoring Technology Practice • Fixing and anchoring systems commonly used in highway projects, e.g. mechanical and chemical anchor bolts and anchor strength tester
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		Intended Learning Outcomes Assessed				
(TM0367) Lighting and Electrical System Design (TM0372) Electrical Installation, Basic Automation and Electronic Practice	% Weighting	a	b	c	d	e
1. Assignment	40%	✓	✓	✓		
2. Test	30%	✓	✓			
3. Report	30%	✓	✓	✓		
Total	100%					

Assessment Methods	% Weighting	Intended Learning Outcomes Assessed				
(TM1246) Site Formation and Anchoring Practice for EE TSE (DG)		a	b	c	d	e
1. Assignment	30%					✓
2. Test	30%					✓
3. Report	40%					✓
Total	100%					

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.

Assessment Methods	% Weighting	Intended Learning Outcomes Assessed				
(TM1245) Structural Concrete and Steelwork for EE TSE (DG)		a	b	c	d	e
1. Test	30%				✓	
2. Report	70%				✓	
Total	100%					

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	
▪ Workshop / In-Class Practice	120 Hrs.
Other Study Effort	**0 Hrs.**
Total Study Effort	**120 Hrs.**

Reading List and References

1. Training materials, 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.
4. BS1377 (1990), “Methods of Test for Soils for Civil Engineering Purposes. General requirements and sample preparation”, BSI
5. Wong & Allen (2009). “The Hong Kong Conduit Condition Evaluation Codes”. Utility Training Institution (UTI), Hong Kong, China.
6. Hilti Corporation (2009), “Anchor fastening technology manual”, Hilti (www.hilti.com).

Subject Description Form

Subject Code	LGT5013
Subject Title	Transport Logistics in China
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students are expected to understand Putonghua and to read simplified Chinese Characters.
Objectives	To provide within an operational and business environment: an advanced understanding of the market demand and supply, as well as principles and complexities of different mode of transportation in freight industry in China; the advanced skills necessary to implement logistics and supply chain management strategy in various industrial sector within a logistics company environment; proactive thinking to achieve and sustain advantage in a rapidly changing business/freight operational environment in China.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Analyse macro economical and industrial situation of transport logistics in China with updated facts and numbers. b. Describe the modes of logistics operation of road, water, air, and rail in China. c. Gain strategic insight on how to develop logistics related business within China, with deep-dive analysis into rapid developing sectors. d. Examine the policy and regulations in domestics and international trade and logistics and the logistics relationship between China and Hong Kong. e. Apply the Chinese transport and customs law. f. Develop the ability to assess and evaluate the different logistics environments in China and Hong Kong.
Subject Synopsis/ Indicative Syllabus	1. Organisational and Principal Characteristics of Transport Logistics in China: Logistics operation of Air Transport; Logistics operation of Sea/ Inland waterway Transport; Logistics operation of Rail Transport; Logistics operation of Road Transport; and Port Operations. 2. Transport Economics. Demand and supply for freight transportation services, market structure and organization, government intervention, as well as strategic infrastructure investment in different Chinese transport sectors (port, air, rail, road, and sea/inland waterway). 3. Overview of China Trade and its impact on logistics; Chinese Contract Law; Commercial Transport Policy; Human Resource Management in China; Trading practice and related government organisations in China; Hong Kong/China co-operation; Future developments in China Trade. 4. Customs ordinances and trade regulations; Legal framework for transport and logistics in China; Foreign investment law in transport and logistics industries; Chinese judicial system for maritime and logistics cases, Chinese Maritime Law (covering bills of lading, voyage and time charter parties; marine insurance;); and Build and Finance Ships in China.

Teaching/Learning Methodology	Lectures introduce and explain key concepts and key sectors with case analysis. Lectures are followed by class discussions where concepts are linked to real events in the industry through appropriate examples and their analysis. Seminars are highly interactive and include discussions of current / past events, case studies, and student presentations. Students are expected to actively participate in the classes and to share their experience and learn from each other.

Teaching/Learning Methodologies	Intended Subject Learning Outcomes to be assessed					
	a	b	c	d	e	f
Lecture	✓	✓	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓	✓	✓

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.Coursework Assignment / case analysis	50%	✓	✓	✓	✓	✓	✓
2. Examination	50%	✓	✓	✓	✓	✓	✓
Total	100%						

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

- Since the course focuses on transport logistics in China, case analysis and learning from practical, work-based experiences forms an important constituent of student assessment. Further, assignments and case analysis reinforce theoretical concepts learnt during the lectures and enable their applications in real-life operational situations. Final examination that assesses student's familiarity with theoretical concepts and the ability to apply conceptual framework in case analysis.
- Students would be given regular feedback on their performance, by email or as comments on assignments submitted.

To pass this subject, students are required to obtain Grade D or above in BOTH the Continuous Assessment and Exam components.

Student Study Effort Expected	Class contact:	
	▪ Lectures / Tutorials	39 Hrs.
	Other student study effort:	
	▪ Self study	45 Hrs.
	▪ Coursework	42 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	1. Charles Guowen Wang, *CSCMP Global Logistics Perspective – China*, 2005, 2015 2. Binglian Liu, ect, Contempery Logistics in China, 2012, 2013 3. Blauwens,Gust; Peter De Baere, Eddy van de Voorde (2006), Transport economics *Antwerpen* : De Boeck. 4. *China* freight transport report [electronic resource] / Business Monitor International London: Business Monitor International. 5. Anming Zhang et al. (2004), Air cargo in mainland China and Hong Kong / Anming Zhang ... [et al.]. Aldershot, England : Ashgate, c2004. 6. .Hirst, Mike., (2008), The air transport system, Cambridge, England : Woodhead Pub. 7. Ports, cities, and global supply chains, Edited by James Wang et al., Aldershot, England: Ashgate, 2007. 8. 《中国物流学术前沿报告》/ 中国物流与采购联合会, 北京市 : 中国物资出版社, 2014,2015,2016 9. 《中國海關 》 [electronic resource] 北京：中國學術期刊(光盤版)電子雜誌社 10. 《海关报关实务 》[electronic resource], 谢国娥编著. 上海 : 华东理工大学出版社, 2004. 11. 《中国海关监管与征 》[electronic resource] / 朱新瑞主编. 中国 : 中国海洋大学出版社, 2003. 12. 《中国现代物流发展报告》，南开大学/国家发改委, 2014,2015,2016 13. 《中国物流年鉴》，中国物资出版社，2009，2011，2012，2013，2014,2015,2016 14. 《中国供应链管理蓝皮书》，/丁俊发主编，中国：中国物资出版社，2011-2014, 2015, 2016	

Subject Description Form

Subject Code	ME45003
Subject Title	Aviation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students an overview of essential aviation systems, and develop students' understanding of aviation industry and current operational concepts, technology applications and practices in aviation industry.
Subject Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain the relationship among major aviation systems and identify future trends of the industry. b. Demonstrate understanding of air logistics, airlines operation, airport management, flight standards and airworthiness services. c. Explain the key roles and future plans of the Government Flying Service. d. Identify the quality assurance procedures in aircraft maintenance organizations. e. Identify the environmental impact of aviation-related activities. f. Analyze the activities of local aviation organizations in promotion of an aviation culture in Hong Kong.
Subject Synopsis/ Indicative Syllabus	***Aviation Systems*** **-** An overview of the relationship among major aviation systems such as civil aviation authorities, airlines, airports and aviation organizations. ***Civil Aviation Administration*** **-** Air service agreements. Air traffic management. Search and rescue. Provision of ground and flight operations support. Flight standards. Aviation safety and accident investigation. ***Managing Airline Operations*** **-** Flight planning and operations. Training of flight crew, aircraft engineers and technical support staff. Management of engineering operations. Flight simulator training. ***Airport Management*** **-** Organization structure of the Hong Kong Airport Authority. Passenger and air cargo terminal operations. Provisions for general aviation activities. ***Government Flying Service*** **-** Role of Government Flying Service: Search and rescue, air ambulance, police support, firefighting, aerial survey, and general SAR Government support. Helicopter and fixed-wing aircraft maintenance. ***Aircraft Maintenance*** **-** Quality assurance of aircraft maintenance. Aircraft modifications. Engine testing. ***Aviation and the Environment*** **-** Aircraft noise and abatement policy. Air pollution and fuel usage. ***Other Local Aviation Organizations*** **-** Hong Kong Air Cadet Corps. Hong Kong Historical Aircraft Association. Hong Kong Air Traffic Control Association. Hong Kong Aviation Club. Hong Kong Aviation Industry Association.

Teaching/Learning Methodology	Lectures are used to deliver the fundamental knowledge in relation to various aspects of aviation systems (outcomes a to f). Tutorials are used to illustrate the application of fundamental knowledge to practical situations (outcomes a to f). Group mini-projects are used to help students to deepen their knowledge on a specific topic through search of information, analysis of data and report writing (outcomes a and c). Industrial visits and special seminars delivered by invited industrial professionals are used to relate the concepts learnt on class to engineering practices. Students are expected to achieve better understanding of aircraft systems through these activities (outcomes a to f).

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
Lecture	✓	✓	✓	✓	✓	✓
Tutorial	✓	✓	✓	✓	✓	✓
Mini-project	✓		✓			
Industrial field visit and special seminar	✓	✓	✓	✓	✓	✓

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. Assignment	20%	✓	✓	✓	✓	✓	✓
2. Group mini-project	20%	✓		✓			
3. Industrial field visit and visit report, report for seminar	10%	✓	✓	✓		✓	✓
4. Examination	50%	✓	✓	✓	✓	✓	✓
Total	100%						

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

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by continuous assessment including assignments, group mini-project, industrial visits and special seminars. The continuous assessment is aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus. In particular, group mini-project is used to assess the students' capacities of self-learning and problem-solving and effective communication skill in English so as to fulfill the requirements of working in the aviation industry.

Student Study Effort Expected	Class contact:	
	▪ Lecture	33 Hrs.
	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Course work	20 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	104 Hrs.
Reading List and References	1. Richard De Neufville. Airport Systems: Planning, Design, and Management, McGraw-Hill, latest edition. 2. Alexander T. Wells and Seth B. Young, Airport Planning and Management, McGraw-Hill, latest edition. 3. Jon D. Fricker and Robert K. Whitford, Fundamentals of Transportation Engineering: A Multimodel Systems Approach, Prentice-Hall, latest edition. 4. ICAO Journal, International Civil Aviation Organization, latest edition. 5. Aviation Week and Space Technology, McGraw-Hill, latest edition.	

Appendix II

Minor Programme
in Transportation Systems Engineering

1. Objective

The present-day engineering profession has become more and more multi-disciplinary in nature. The possession of adequate knowledge in transportation systems 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 transportation systems engineering for students with whose major is not transportation systems engineering.

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 transportation systems engineering.
(ii) Conduct surveys/experiments with appropriate techniques and tools and interpret and analyse the data in the context of transportation systems engineering.
(iii) Keep abreast of developments in certain areas of transportation systems engineering.

3. Eligibility

Full-time students pursuing a four-year undergraduate degree in Faculty of Engineering or Faculty of Construction and Environment (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 as shown in the following table, with at least 9 credits at level 3 or above.

Subject Code	Subject Title	Number of Credits
EE2001B	Applied Electromagnetics	3
EE2002B	Circuit Analysis	3
EE2003B	Electronics	3
EE2029B	Transportation Engineering Fundamentals*	3
CSE30292	Transportation Operations and Management*	3
CSE30312	Transportation and Highway Engineering#	3
CSE30390	Transportation Systems Analysis#	3
CSE40407	Design of Transport Infrastructure#	3
CSE40408	Traffic Surveys and Transport Planning#	3
CSE40462	Environmental Impact Assessment – Theory and Practice	3
CSE40475	Sustainable Development Strategy	3
CSE40490	Transport Management and Highway Maintenance#	3
EE3002B	Electromechanical Energy Conversion	3
EE3003B	Power Electronics and Drives	3
EE3004B	Power Transmission and Distribution	3
EE3011B	Control Systems and Signal Processing	3
EE4004B	Power Systems	3
EE4005B	Engineering Project Management	3
EE4007B	Advanced Power Electronics	3
EE4008B	Applied Digital Control	3
EE4009B	Electric Traction and Drives	3
EE4011B	Industrial Computer Applications	3
EE4014B	Intelligent Systems Applications in Electrical Engineering	3
EE4016B	Energy Utilisation and Management in Transportation	3
EE4017B	Risk and Reliability Analysis on Asset Management	3
EE4018B	Electrical Systems in Automobiles	3
EE4019B	Intelligent Transportation Systems	3
EE4351B	Aircraft Electrical and Actuation Systems	3
ME45003	Aviation Systems	3

* Compulsory Subjects

At least 1 from these 5 subjects

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.

Aug 2017