2012/2013 Bachelor of Engineering (Honours) in Transportation Systems Engineering (41081)

THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學

Bachelor of Engineering (Honours) in Transportation Systems Engineering

Full-time / Sandwich

Programme Code : 41081

2012/2013

DEFINITIVE PROGRAMME DOCUMENT

Department of
Electrical Engineering
電機工程學系

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BEng (Hons) in Transportation Systems Engineering
2012 – 2013

Bachelor of Engineering (Honours) in Transportation Systems Engineering 2012-13

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Important

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

1 Preamble

Transportation has long since been a multi-disciplinary specialty and it is now indispensable in all populated cities around the world. In Hong Kong, reliable and efficient public transportation is crucial in our daily lives. Operations of electrified railways inevitably require engineers on traction, power supplies and control. On the other hand, road transportation relies heavily on engineering expertise of construction, urban planning, public transportation operation and systems integration. As a result, graduates of the Departments of Electrical Engineering and Civil & Structural Engineering have been in great demand from the highway engineering sector, railway and public transport operators, aircraft engineering services, and consultancy / contractor companies working for the transportation industry at large.

Given the huge number of forthcoming transportation projects in Hong Kong and its neighbouring regions in the next decades, there is an ever growing demand on the transportation engineering professionals. No undergraduate programme is yet available in Hong Kong to provide students with the basic knowledge, and to suitably gear them up to specialise in transportation with both relevant fundamental and advanced subjects and hence to prepare them for a rewarding career as engineers in this well sought-after profession.

The Departments of Electrical Engineering and Civil & Structural Engineering have forged very successful research and development collaborations with the Transportation Industry in Hong Kong and overseas. The precious experience and know-how attained down the years are the knowledge base we are ready to disseminate to our students who are the future of the industry.

This undergraduate programme on Transportation Systems Engineering is thus 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 and Civil & Structural 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. The programme started its first cohort in the year of 2009/10.

2 Aims and Outcomes

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 incorporation of the appropriate engineering knowledge into transportation in order to enhance the efficiency, reliability, safety and sustainability of the system infrastructure and services. The current practices in transportation, the latest technologies in transportation systems; and hence their integration to provide engineering solutions for practical problems constitute the main contents of this programme.

While engineers may change working activities and also employment during their careers, education to prepare students for working life, rather than their first jobs, is important. 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 to 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 engineering activities, as well as the inter-relations between such activities and the society as a whole.

All engineers, and particularly those for whom English is a second language, must learn to express themselves clearly, whether in written reports or verbal presentations. This has led to the inclusion of English and communication subjects, as well as a teaching approach which involves seminars, discussions, in-class feedback, assessed presentations, demonstrations of project work and formal laboratory reports in the programme.

In this undergraduate programme, the students are required to take 102 academic credits and 11 training credits. The first year requires the students to go through subjects on the fundamentals of engineering in general, as well as introduction of accounting and economics. In the second year of study, the bolts-and-nuts knowledge of transportation systems is to be conveyed. When the students come to the final-year, they are ready to take on 4 core subjects of transportation systems and two elective subjects on advanced or specialised topics of transportation. The Individual Project in the final-year must be relevant to transportation systems engineering.

Students have 4 training credits of practical training during year-1 and another 4 in the summer following year-1 at the Industrial Centre to form an appreciation of applications of engineering technologies. They are then required to undertake at least 6 weeks of industrial attachment during the summer at the end of the second year of study, which gives them the opportunity to experience the local or overseas industrial working environment. A full year spent in industrial attachment for the sandwich students allows a deeper appreciation of Transportation Engineering in the industrial context.

For the 2011/12 cohort and onwards, the curriculum is changed to comply with the university’s new requirements on languages. As a result the graduation requirement of the programme is increased from 99 credits to 102 credits. In addition, freshmen seminars are incorporated into the IC training starting from this cohort.

2.2 Objectives and Outcomes

The programme objectives are given as below.

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

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

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

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.
On successful completion of the programme, a student will have shown that he or she can

Category A: Professional/academic knowledge and skills

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 with engineering techniques and tools; and interpret and analyse the data.

A3. Design a system, component or process according to given specifications and requirements in the areas of 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

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

		Programme Objectives		
		1	**2**	**3**
Programme Outcomes	**A1**	√		
	A2	√		
	A3	√		
	A4	√	√	
	A5		√	
	A6		√	√
	B1	√		
	B2	√		
	B3		√	√

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 Descriptions Forms in Appendix I.

PolyU aspires to develop all its students as all-round graduates with professional competence, and has identified a set of highly valued graduate attributes as the learning goals for students. While many of these graduate attributes can be developed through the curricular activities of this programme, some, including global outlook, interest in local and international affairs, communication and interpersonal skills, biliteracy and trilingualism, teamwork and leadership, are primarily addressed through the co-curricular activities offered by faculties, departments, and various teaching and learning support units of the University. Students are encouraged to make full use of such opportunities to develop these attributes.

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

A student normally takes 3 years full-time with an option of an additional year for sandwich. The maximum period of registration is 6 years for the full-time mode of attendance; and 7 years for the sandwich mode.

3.3 Final Award

The award is a bachelor degree with honours in Transportation Systems Engineering and it carries no speciality or stream.

3.4 Implementation Date

September, 2009 (first cohort)
September, 2011 (revised Industrial Training scheme; credit requirement for graduation increased to 102 after the introduction of a compulsory 3-credit subject on Chinese language; abolition of the mandatory requirements of GSLPA for graduation; some minor changes of electives)

3.5 Minimum Entrance Requirements

For Entry with HKALE Qualifications

The General Minimum Entrance Requirements of the University and the following specific subject requirement(s) are to be satisfied:

E in two of the following HKALE subjects: Physics, Engineering Science, Pure Mathematics, Applied Mathematics, Chemistry or Computer Studies	**OR**	E in one of the following HKALE subjects: Physics, Engineering Science, Pure Mathematics, Applied Mathematics, Chemistry or Computer Studies; and E in two of the following HKALE(AS-Level) subjects: Physics, Design & Technology, Mathematics & Statistics, Electronics, Applied Mathematics, Chemistry or Computer Applications (similar subjects at HKALE and HKALE (AS-Level) are mutually exclusive)

AND
C in HKCEE Mathematics or Additional Mathematics (only required for applicants without E in HKALE Applied Mathematics or Pure Mathematics, or HKALE(AS-Level) Applied Mathematics or Mathematics & Statistics); and D in HKCEE Physics or Engineering Science (only required for applicants without E in HKALE Physics or Engineering Science, or HKALE(AS-Level) Physics or Design & Technology)

Alternative Entry Route

A Higher Diploma in Electrical Engineering
OR
An Associate Degree in Engineering
OR
Equivalent qualifications

3.6 Major/Minor Option

In line with the University's Regulations, students in this programme are offered the option of either pursuing the single-discipline degree programme (i.e. BEng (Hons) in Transportation Systems Engineering) or following the major/minor option. Usually, the student may choose to exercise this option at the second semester of the first year of the programme. The Major programme details are given in Appendix II.

For other students opting to study 'Minor' in Transportation Systems Engineering, they must take 18 credits of subjects within the curriculum, of which 9 credits must be of Level 3 or above.

3.7 Summer Training/Industrial Placement

Summer Training at the Industrial Centre and practical work experience in the industry are the vital components to attain the programme outcomes. The training/industrial placement is credit-bearing and compulsory in the programme, constituting the Work-Integrated Education activities as stipulated by the University. The required credits, structure and assessment of the Work-Integrated Education and Industrial Centre training are described in Sections 4.4 and 4.5.

3.8 Student Exchanges

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

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

3.9 External Recognition

Provisional accreditations have been awarded by The Hong Kong Institution of Engineers (HKIE) in 2012. The graduates from this programme are allowed to join the scheme A Training in Electrical Discipline and Logistics & Transportation Discipline.

3.10 Summer Term Teaching

Usually, there will be no summer term teaching on Engineering subjects. Industrial Centre Training and Practical Training will take place during summers of the first two years.

3.11 Daytime and Evening Teaching

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

3.12 Mathematics Benchmark Test (MBT)

The following categories of students admitted to this programme will be requested to take a mandatory Mathematics Benchmark Test prior to the commencement of their studies:

1) JUPAS admittees who do not have a "pass" in any A-level Mathematics subjects; and
2) Non-JUPAS admittees with the exception of those who are given credit-transfer for the subject AMA201, OR who do not have a "pass" in any A-level Mathematics subjects.

Students who have taken and passed AS-Level Mathematics subject(s) only are also required to take the MBT.

Those who fail the MBT will be required to take a mandatory subject Foundation Mathematics (AMA106) in the first semester of the first year.

3.13 Foundation Mathematics (AMA106)

Students who are required to take Foundation Mathematics (AMA106) must pass the subject before taking other mathematics subjects in the curriculum. Foundation Mathematics AMA106 is thus a pre-requisite to AMA201 for students who do not pass the MBT, but it does not constitute part of the curriculum. As the subject is a non-credit bearing, the grade will NOT be counted towards the GPA or WGPA, but it will be recorded in the transcript of studies.

4 Curricula

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 4.1.1-4.1.3. The abbreviations used in these tables are:

AF	Accounting and Finance
AMA	Applied Mathematics
CBS	Chinese & Bilingual Studies
CSE	Civil & Structural Engineering
EE	Electrical Engineering
ELC	English Language Centre
ENG	Engineering Faculty
GEC	General Education Centre
IC	Industrial Centre
LGT	Logistics & Maritime Studies
ME	Mechanical Engineering

In general, a normal student must complete 43, 32 and 27 credits in Levels 2, 3 and 4 (or 5), respectively as shown in the typical progress patterns in Tables 4.2.1 to 4.2.4. In other words, a student must complete a total of 102 credits, in addition to the credits earned in IC training and Summer Placement and the requirements on languages and co-curricular activities, before graduation.

For those students who opt for the "Major in Transportation Systems Engineering", students are required to complete 84 credits in prescribed subjects, and 18 credits in a Minor programme, before they are qualified to graduate.

Subjects are referenced by a Departmental prefix (e.g. EE corresponds to Electrical Engineering) followed by a reference number. In the reference numbers, the first digit (i.e. 2, 3 or 4) indicates the level of the subject.

'*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. Tables in Section 4.1 show the times (semesters) in which these subjects are *recommended* to be taken if the programmes are to be completed in the minimum time.

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

4.1 Curricula for Various Levels

THE HONG KONG POLYTECHNIC UNIVERSITY BENG (HONS) IN TRANSPORTATION SYSTEMS ENGINEERING Level 1 & 2		Curriculum					Assessment Method	
		Teaching Dept.	Contact Hours		Credits	GPA Weight (W_i)		
Subject Code	Subject Title		Lt/ Tu	Lab			Continuous	Examination
AMA106	Foundation Mathematics	AMA	42	-	0	0.0	40%	60%
AMA201	Mathematics I	AMA	42	-	3	0.2	40%	60%
AMA202	Mathematics II	AMA	42	-	3	0.2	40%	60%
EE207	Engineering Electromagnetics	EE	28	6	2	0.2	40%	60%
CSE291	Transportation Engineering Fundamentals	CSE	42	-	3	0.2	40%	60%
CSE292	Transportation Operations and Management	CSE	42	-	3	0.2	40%	60%
ENG232	Engineering Science	ENG	54	4	3	0.2	40%	60%
ENG236	Computer Programming	ENG	53	-	3	0.2	100%	-
ENG237	Basic Electricity and Electronics I	ENG	20	9	3	0.2	40%	60%
ENG238	Basic Electricity and Electronics II	ENG	55	11	3	0.2	40%	60%
AF2601	Introduction to Economics	AF	42	-	3	0.2	50%	50%
AF2108	Financial Accounting	AF	42	-	3	0.2	50%	50%
ELC2501	University English I	ELC	28	-	2	0.2	100%	-
ELC2502	University English II	ELC	28	-	2	0.2	100%	-
	Def Subjects							
CBS2080	Fundamentals of Chinese Communication	CBS	42	-	3	0.2	60%	40%
*GEC2801 or equivalent	Chinese Studies	GEC	28	-	2	0.2	-	-
**GEC2xxx	Broadening General Education Subject	GEC/other	28	-	2	0.2	-	-
	IC Training		Duration					
IC2105	Engineering Communication and Fundamentals	IC	120 hours through out the year		4 Training credits	-	100% Assessed and graded	-
IC2113	IC Training for Transportation Systems Engineering	IC	120 hours in Year-1 summer		4 Training credits	-	100% Assessed and graded	-

Table 4.1.1

* All students can take one of the China Studies subjects in lieu of GEC2801 to satisfy their *China Studies* category GE requirement. The China Studies subjects and their syllabi are available at: www.polyu.edu.hk/~gec/subjects/

** Subject code depends on the actual subject to be taken.

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THE HONG KONG POLYTECHNIC UNIVERSITY BENG (HONS) IN TRANSPORTATION SYSTEMS ENGINEERING **Level 3**		**Curriculum**					**Assessment Method**	
		Teaching Dept.	**Contact Hours**		**Credits**	**GPA Weight (W_i)**		
Subject Code	**Subject Title**		**Lt/ Tu**	**Lab**			**Continuous**	**Examination**
EE3021	Electromechanical Energy Conversion	EE	36	12	3	0.3	40%	60%
EE3031	Power Electronics and Drives	EE	36	12	3	0.3	40%	60%
EE3041	Power Transmission and Distribution	EE	36	12	3	0.3	40%	60%
EE309	Control Systems and Signal Processing	EE	39	12	3	0.3	40%	60%
EE310	Safety in Systems Engineering	EE	42	-	3	0.3	40%	60%
CSE312	Transportation and Highway Engineering	CSE	34	8	3	0.3	30%	70%
CSE331	Air and Noise Pollution Studies	CSE	36	6	3	0.3	30%	70%
CSE390	Transportation Systems Analysis	CSE	36	6	3	0.3	40%	60%
ELC3508	English for Effective Workplace Communication	ELC	28	-	2	0.3	100%	-
ENG307	Society and the Engineer	ENG	42	-	3	0.3	60%	40%
	Choose one of the following core subjects							
LGT3019	Economics of International Transport Logistics	LGT	42	-	3	0.3	50%	50%
AF3313	Business Finance	AF	42	-	3	0.3	40%	60%
EE3502	Summer Practical Training	Industry	A minimum of 6 weeks (Full-time BEng (Hons) Students). Optional for Sandwich Students		3 Training credits	-	100% assessed on Pass/Fail basis	-

Table 4.1.2

Note: The Department reserves the right of NOT offering all electives in each year.

THE HONG KONG POLYTECHNIC UNIVERSITY BENG (HONS) IN TRANSPORTATION SYSTEMS ENGINEERING Levels 4 and 5		Curriculum					Assessment Method	
		Teaching Dept.	Contact Hours		Credits	GPA Weight (W_i)		
Subject Code	Subject Title		Lt/ Tu	Lab			Continuous	Examination
EE4121	Individual Project	EE	-	-	9	0.5	100%	-
CSE407	Design of transport Infrastructure	CSE	34	8	3	0.5	40%	60%
CSE408	Traffic Surveys and Transport Planning	CSE	35	7	3	0.5	30%	70%
CSE490	Transport Management and Highway Maintenance	CSE	36	6[+]	3	0.5	30%	70%
	Choose one of the following core subjects							
EE437	Intelligent Transportation Systems	EE	42	-	3	0.5	40%	60%
EE4031	Power Systems	EE	38	8	3	0.5	40%	60%
	Electives							
EE4041	Engineering Project Management	EE	42	-	3	0.5	40%	60%
EE405	Energy Utilisation and Management in Transportation	EE	42	-	3	0.5	40%	60%
EE406	Risk and Reliability Analysis on Asset Management	EE	42	-	3	0.5	40%	60%
EE4211	Advanced Power Electronics	EE	38	8	3	0.5	40%	60%
EE4251	Electrical Traction and Drives	EE	45*	-	3	0.5	40%	60%
EE4261	Fibre Optics	EE	36	12	3	0.5	40%	60%
EE4281	Industrial Computer Applications	EE	36	12	3	0.5	40%	60%
EE4341	Intelligent Systems Applications in Electrical Engineering	EE	36	12[#]	3	0.5	40%	60%
EE435	Electrical Systems in Automobiles	EE	36	12	3	0.5	40%	60%
CSE508	Environmental Impact Assessment	CSE	42	-	3	0.5	50%	50%
CSE535	Land Transport and Environment	CSE	42	-	3	0.5	30%	70%
CSE561	Public Transport: Operations and Service Planning	CSE	36	6	3	0.5	40%	60%
CSE562	Traffic Engineering and Control	CSE	36	6	3	0.5	30%	70%
CSE575	Sustainable Delopment Strategy	CSE	42	-	3	0.5	50%	50%
ME4503	Aviation Systems	ME	42	-	3	0.5	100%	-

Table 4.1.3

Note: The Department reserves the right of NOT offering all electives in each year.

[+] site visits
* Lecture: 39hrs, Seminars: 6hrs
[#] Mini-project

4.2 Normal Progression Pattern

A student in the First Year is advised to take the following curriculum as indicated in Table 4.2.1 below and obtain a total of 36 credits on completion of first year.

	Semester One
AMA106*	Foundation Mathematics
AMA201*	Mathematics I
ELC2501	University English I (2 credits)
ENG232	Engineering Science
ENG236	Computer Programming (2 credits in semester 1)
ENG237	Basic Electricity and Electronics I
CSE291	Transportation Engineering Fundamentals
	16 credits
	Semester Two
AMA202	Mathematics II
ELC2502	University English II (2 credits)
ENG236	Computer Programming (1 credit in semester 2)
ENG238	Basic Electricity and Electronics II
CSE292	Transportation Operations and Management
GEC2801 or equivalent	China Studies (2 credits)
AF2601	Introduction to Economics
CBS2080	Fundamentals of Chinese Communication
	20 credits
IC2105	Engineering Communication and Fundamentals (Taken during year 1, 4 training credits)
	Semester Three (Summer Period at the end of Year 1)
IC2113	IC Training for Transportation Systems Engineering (4 training credits)

Table 4.2.1

***** refers to Section 6.11 (page 25, Graduation Requirement 'g') on the condition of taking AMA106 and AMA201.

A student in the Second Year is advised to take the following curriculum as indicated in Table 4.2.2 below and obtain 36 credits on completion of year 2.

	Semester One
ELC3508	English for Effective Workplace Communication (2 credits)
EE207	Engineering Electromagnetics (2 credits)
EE3041	Power Transmission and Distribution
EE309	Control Systems and Signal Processing
CSE312	Transportation and Highway Engineering
CSE331	Air and Noise Pollution Studies
AF2108	Financial Accounting
	19 credits
	Semester Two
EE3021	Electromechanical Energy Conversion
EE3031	Power Electronics and Drives
EE310	Safety in Systems Engineering
CSE390	Transportation Systems Analysis
GEC2XXX	Broadening General Education Subject (2 credits)
	Choose one of the following core subjects
AF3313	Business Finance
LGT3019	Economics of International Transport Logistics
	17 credits
	Semester Three (Summer Period at the end of Year 2)
EE3502	Summer Practical Training (6 weeks in summer) (3 training credits)

Table 4.2.2

A student may opt for sandwich training after the second year of study and he or she is required to take the following training subject in Table 4.2.3 during the sandwich year.

EE4001	External Industrial Training (Students are required to take a minimum of 44 weeks of training in industry) (22 training credits)

Table 4.2.3

A student is advised to take the following curriculum as indicated in Table 4.2.4 and obtain 30 credits in the final year. He/she must accumulate a total of 102 academic credits to qualify for graduation.

	Semester One
CSE490	Transport Management and Highway Maintenance
ENG307	Society and the Engineer
	Choose one of the following core subjects
EE437	Intelligent Transportation Systems
EE4031	Power Systems
EE4121	Individual Project (Continue in semester 2. Total 9 credits for semesters 1 & 2) Note: The Individual Project must be related to Transportation
	Electives (2 electives are to be taken in Year 3) • At least 1 EE subject elective should be taken under the elective list. .
	15 credits
	Semester Two
EE4121	Individual Project (Continue from Semester 1. Total 9 credits for both semesters 1 & 2)
CSE407	Design of Transport Infrastructure
CSE408	Traffic Surveys and Transport Planning
	Electives (2 electives are to be taken in Year 3) • At least 1 EE subject elective should be taken under the elective list.
	15 credits

Table 4.2.4

Elective List

EE4041	Engineering Project Management (mutually exclusive with LGT3019 Economics of International Transport Logistics)
EE405	Energy Utilisation and Management in Transportation
EE406	Risk and Reliability Analysis on Asset Management
EE4211	Advanced Power Electronics
EE4251	Electrical Traction and Drives
EE4261	Fibre Optics
EE4281	Industrial Computer Applications
EE4341	Intelligent Systems Applications in Electrical Engineering
EE435	Electrical Systems in Automobiles
CSE508	Environmental Impact Assessment
CSE535	Land Transport and Environment
CSE561	Public Transport: Operations and Service Planning
CSE562	Traffic Engineering and Control
CSE575	Sustainable Development Strategy
ME4503	Aviation Systems

Note: The Department reserves the rights of NOT offering all the electives at any one year

4.3 Subject Support to Programme Outcomes

Table 4.3 illustrates how the subjects support the Programme Outcomes through teaching, student practising and/or measurements.

		PROGRAMME OUTCOMES								
		A1	A2	A3	A4	A5	A6	B1	B2	B3
SUBJECTS	AF2108				√	√	√	√	√	
	AF2601				√	√	√	√	√	√
	AF3313				√	√	√	√	√	
	AMA201	√			√				√	
	AMA202	√			√				√	
	CBS2080					√		√		
	CSE291	√		√				√	√	
	CSE292	√		√				√	√	
	CSE312	√	√	√	√			√	√	
	CSE331	√			√	√	√		√	
	CSE390	√	√	√	√	√		√	√	
	CSE407	√	√	√	√	√	√	√	√	
	CSE408	√	√	√	√			√	√	√
	CSE490	√		√	√			√	√	
	CSE508	√			√	√	√	√	√	
	CSE535	√		√	√	√	√	√	√	
	CSE561	√	√	√	√		√	√	√	√
	CSE562	√	√	√	√		√	√	√	
	CSE575	√			√	√	√	√	√	√
	EE207	√		√		√		√		√
	EE3021	√	√					√		
	EE3031	√	√					√		√
	EE3041	√	√	√	√	√		√	√	
	EE309	√	√						√	
	EE310	√			√	√	√		√	
	EE3502	√			√	√	√		√	
	EE4001	√			√	√	√		√	
	EE4031	√	√					√	√	
	EE4041	√	√	√				√		
	EE405	√	√		√	√			√	
	EE406	√	√		√	√	√		√	
	EE4121		√	√	√	√	√	√	√	√
	EE4211	√		√	√	√		√		√
	EE4251	√		√	√	√	√	√	√	
	EE4261	√	√	√	√				√	
	EE4281	√		√		√		√		
	EE4341	√	√					√	√	√
	EE435	√		√	√	√		√	√	
	EE437	√		√	√				√	
	ELC2501					√		√		
	ELC2502					√		√		
	ELC3508					√		√		
	ENG232	√			√				√	
	ENG236	√		√					√	
	ENG237	√	√		√				√	
	ENG238	√	√		√				√	
	ENG307				√	√	√	√		√
	GE2801					√	√	√		
	GE2XXX					√	√	√		
	IC2105, IC2113	√	√		√		√			
	LGT3019	√			√	√	√		√	
	ME4503	√		√	√	√		√	√	

4.4 Work-Integrated Education and Summer Practical Training

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

Summer Practical Training (EE3502) normally takes place during the summer at the end of Year Two. Students are required to undertake a minimum of 6 weeks (3 training credits) of summer training, of which at least 2 weeks (1 credit) are of valid WIE activities as recognised by the University.

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

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

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

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

(I) Orientation

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

- Information on search techniques to find national/international work-base employment, attachments etc.

- Life skills to be successful in the workplace
- Develop a positive attitude to work-based learning
- Planning and scheduling for successful completion of assessment instruments
- Consolidation of Training Proposal and/or Learning Contract
- Consideration of taking this chance for the preparation of Final Year Project

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

(II) Progress Monitoring

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

(III) Learning Evaluation

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

Learning Portfolio

In writing the portfolio, the following should be observed:

- *Preliminary Information:* A contents list, abstract and employment details should precede the main learning portfolio. The abstract should be a summary of the portfolio and comprise about 300 words on one page. The employment details should set out names of employing organisations, method of obtaining employment, specific periods of employment, and nature of appointments (eg. trainee engineer etc.). Also required are details of job locations, name, phone number and designation of immediate superior (for possible contact by the course coordinator), projects in which the student was directly involved, and their degree of responsibility.
- *Content:* The major portion of the portfolio should be set out as a technical report, divided into suitable sections, and with an introduction to each major or different aspect of work. Students need to report on all projects listed in the employment details. Noteworthy technical details of projects in which the student was directly involved, or of projects which the student observed, should also be included. These may include investigation, feasibility, design, management, commissioning or operational aspects etc. Students should openly discuss aspects of the work they have performed or observed and indicate their involvement in their work throughout the text. To be able to produce an accurate and comprehensive portfolio it is recommended that students keep a diary, along with photographs and any other information regarding their work. This diary will not be assessed; it will however be helpful in writing the final portfolio. All project data and information must be cleared by the employers for confidentiality prior to its incorporation in the portfolio. It is generally advisable to avoid all sensitive information related to the employment by limiting the contents to the general or public aspects of each specific project. References should be made in the text to books, technical papers, standards etc., used during the training period and should be listed. Finally, a conclusion should include

comprehensive comments on the type and value of experience gained, and how this relates to the student's future professional career.

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

1. Fulfilment of at least 6 weeks of summer practical training for full time students or 44 weeks for students taking the sandwich mode option, with at least 2 weeks of valid WIE activities as recognised by the University.
2. Punctual submission of training proposals and/or learning contracts, training journal and learning portfolio.

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

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

4.5 IC Training

Besides the WIE training components, students are required to undertake training at the IC, which is equivalent to 8 training credits. The training is scheduled partly during term time of Year One and partly in the summer at the end of Year One. The students will not pay any training fee, nor receive any stipend. IC training is however not parts of WIE activities.

4.6 Language Requirements and Programmes

With effect from the 2011/12 cohort of intakes, students on UGC-funded full-time undergraduate degree programmes (including the 2-year articulation degree programmes) will be required to complete two compulsory 3-credit language subjects (one in English and one in Chinese).

To comply with the above and other language requirements prescribed by the university, all students in the BEng (Hons) in Electrical Engineering programme are required to study three compulsory English subjects (totalling 6 credits). Starting from the 2011/12 intake cohort, all students are also required to study a compulsory 3-credit subject Fundamentals of Chinese Communication.

Chinese/English Language Enhancement Programmes (LEPs) will be prescribed to individual students by the Department of Chinese and Bilingual Studies (CBS) and/or English Language Centre (ELC) of the University upon their admission. The students are expected and encouraged to complete the LEPs but non-completion will not affect the students' eligibility for graduation.

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

4.7 Co-curricular Activities

In order to enhance the all-roundedness attribute of the students, all students are required to participate in a minimum of 6 hours of non-credit bearing co-curricular activity during their study period, which is a mandatory requirement of general education for graduation.

The co-curricular activities are non-credit bearing, and they aim at rendering additional values and helping students to broaden their horizons and inspiring them to actualize all-round development outside the classroom.

Activities like Complementary Studies Programme, Leadership and Competence for Success Programme, Physical Education Programmes, Personal Development Programmes, hall education programmes, pre-placement training or career training organised by the Student Affairs Office (SAO), seminars and lunch talks by prominent speakers, study tour, exchange activity offered or organised by Faculties, academic Departments or supporting units, cultural appreciation programme, and any other activities in a variety of forms that the Department consider essential as part of the overall requirement of general education will be counted as co-curricular activities. Students will be considered as having fulfilled the requirement if they have participated in these co-curricular activities.

However, summer attachments, internships, mentorship programmes, community service and Work-integrated Education activities forming part of the formal programme curricular will not be counted as co-curricular activities.

Students' participation in such activities will be recorded in the Co-curricular Achievement Transcript (CAT) administered by the SAO. Further information is available at the website: http://www.polyu.edu.hk/sao/cca/

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 fully supported by the General Office of the Department of Electrical Engineering. All enquiries regarding registration and general administration from students on the programme are referred to the General Office as the first contact point.

The Undergraduate Programme Committee, in which the Chairman is nominated by 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; whilst the Departmental Learning & 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 assistance on various fronts.

As this programme is jointly held by the Departments of Electrical Engineering and Civil & Structural Engineering, a Liaison Programme Committee is set up to ensure regular communications, close cooperation and consistent management between the two departments.

5.2 Class Tutors and Personal Tutors

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

As the 'Year' system does no longer exist with the credit-based system and the boundaries between years become vague, the Class Tutors are responsible for the general welfare of the students progressing through the 3 years of study according to the normal study pattern. A Class Tutor may thus look after students at different years of study. Students may seek helps from Class Tutors on general enquiry, subject selection and academic counselling at the respective years.

A Personal Tutor, usually an academic staff member, is assigned to each newly admitted student and the Personal Tutor will be with the student till his/her graduation. Personal Tutors provide continuous and individual counselling and help guide the students through various difficulties, if any, which might affect their studies. The scope of counselling may sometimes go beyond academic matters.

6. Admission, Registration and Assessment

The admission, registration and assessment arrangements described below are in accordance with the University policies and regulations for credit-based programmes which lead to an award of the University, except where the Senate decides otherwise.

6.1 Admission/Registration

Students are normally admitted into the programme via the joint admission scheme (JUPAS) on a yearly basis. Non-JUPAS applicants are also considered on their academic merits, as well as non-academic achievements.

6.2 Credit Transfer/Subject Exemption

Students may be allowed to have credit transferred or be exempted on subjects from recognised previous study. Credits transferred and subjects exempted normally do not carry grades. Decisions regarding granting or rejecting a subject credit transfer or exemption are entirely with the subject-offering departments. Students who have completed an approved student exchange programme may be granted a block transfer of the equivalent number of credits that have been successfully completed.

In cases that credit transfer is accompanied with grade, the actual grade as approved will be used in calculating the GPA/WGPA. The Department will not approve more than 27 credits normally

but special consideration will be given in certain cases, such as advanced-standing students, subject to the University's guideline on maximum number of credits to be transferred (i.e. If the credits attained from previous study are from the PolyU, the total credit transferred should not exceed 67% of the required credits for the award. If the credits earned are from other institutions, the total credit transferred should not exceed 50%).

Subject exemption may be granted when it has clearly been identified that a student has *a priori* knowledge of a subject (in terms of content, academic level and achievement). In cases where exemption is given, no credits for that subject will be given and the student is required to take another subject assigned in lieu of the exempted subject.

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 transfer of credits; students should submit all applications for credit transfer at the point of admission, i.e. Year 1.

6.3 Subject Registration/Add-drop

Subject registration is carried out prior to the commencement of each semester. The timetables are then drawn up based on student's choices. In cases of timetable clashes, students will be allowed to re-select a different subject. Students may add and drop subjects during the add/drop period scheduled for each semester.

Students are not allowed to drop subjects after the add/drop period. 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 department and will require the approval of both the subject lecturer and the Programme Leader or an academic staff nominated by the Department. Application for subject withdrawal must be submitted at least one month before the commencement of the examination period for approval. If approved, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the examination result notification and the transcript of studies but will not be counted towards the calculation of GPA. A handling fee will be incurred by the University.

6.4 Zero Subject Enrolment/Deferment of Study

A student is not allowed to have zero subject registration in any semester without prior approval from the Department. Student failing to get prior approval for zero subject registration may be regarded as having withdrawn from the programme. All semesters in which the student is allowed to take zero subject enrolment will be counted towards the maximum period of registration. Students will be responsible for ensuring that they complete their studies within the maximum period of registration. A fee for retention of study place will be charged upon approval of zero subject enrolment.

Application for deferment of study is only considered under very extraordinary circumstances. Deferment periods will not be counted towards the maximum period of registration. No retention fee will be incurred.

6.5 General Assessment Regulations

The University's General Assessment Regulations (GAR) applies to this Programme. The specific assessment regulations are set out here, having been developed within the framework of the GAR.

Students progress by credit accumulation, i.e. credits earned by passing individual subjects can be accumulated and counted towards the final award.

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.

A 'subject' is defined as a discrete section of the programme which is assigned a separate assessment.

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

6.6 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 are 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 are made explicit to students before the start of the assessment to facilitate student learning, and feedback provided links to the criteria and standards. Timely feedback will 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 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 (ACC) and reported to the Senate.

6.7 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 this 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 this 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 are determined by the subject-offering Departments.

At the beginning of each semester, the subject lecturer will inform students of the details of the assessments methods and criteria to be used within the assessment framework as specified in this document.

6.8 Progression/Academic Probation/Deregistration

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

(i) eligible for progression towards an award; or
(ii) eligible for an award; or
(iii) required to be deregistered from the programme.

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

A student is referred to the Board of Examiners of the Programme with the probable consequence of being de-registered from the programme if he/she falls within one of the following categories:

(a) the student's GPA is lower than 2.0 for 3 consecutive semesters.
(b) the student's GPA is lower than 2.0 for 2 consecutive semesters and his Semester GPA in the second semester is also lower than 2.0.
(c) the student has exceeded the maximum period of registration for the programme.

A student may be de-registered from the programme if his/her academic performance is so poor to the extent that the Board of Examiners considers that his/her prospect of attaining a GPA of 2.0 or above at the end of the programme is slim or the student is incapable of completing the programme at all.

6.9 Retaking Subjects

Normally, students are required to retake those subjects that they have failed (grade F). In addition to retaking a subject due to failure, students may retake any subject for the purpose of improving their grades without having to seek approval. 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 subject 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 in the previous attempt) will be included in the calculation of the Grade Point Average (GPA). If students have passed a subject but failed after retake, credits accumulated for passing the subject in a previous attempt will remain valid for satisfying the credit requirement for award. The grades obtained in previous attempts will only be reflected in transcript of studies.

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

6.10 Appeal Against Examination Results

A student may appeal against the decision of the Board of Examiners within 7 working days after the public announcement of the overall examination results. The appeal should be made to the Head of Department in writing. The Departmental Examination Officer will inform the student of the appeal results within 7 working days upon the receipt of all required information. Students may refer to the Student Handbook for more details on appeal procedures.

6.11 Grades, GPA and Award Classifications

Assessment grades are awarded on a criterion-referenced basis. A student's overall performance in a subject is 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.

Table 6.11.1 Descriptions of Grades

'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.

Each grade is assigned a numerical value as indicated in Table 6.11.2. At the end of each semester, the GPA will be computed to indicate the student's performance up to and including the last semester. Exempted, incomplete and ungraded subjects for which credit transfer has been approved without assigning a grade, and subjects from which a student has been allowed to withdraw (i.e. those with grade 'W') will be excluded from the GPA calculation. Subject which has been given a 'S' subject code i.e. absent from examination, will be included in the GPA calculation and will be counted as 'zero' grade point. IC training credits are included in the GPA calculation.

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

where i = number of all subjects taken by the student up to and including the latest semester. For subjects being re-taken, only the grade obtained in the final attempt will be included in the GPA calculation.

Letter Grade	Grade Point	Description
A+	4.5*	Exceptionally Outstanding
A	4	Outstanding
B+	3.5	Very Good
B	3	Good
C+	2.5	Wholly Satisfactory
C	2	Satisfactory
D+	1.5	Barely Satisfactory
D	1	Barely Adequate
F	0	Inadequate
I#	N/A	Assessment to be completed
P	N/A	Pass on an ungraded subject
U	N/A	Fail on an ungraded subject
MΔ	N/A	Pass with Merit
L	N/A	Subject to be continued in the following semester
S	0	Absent from assessment
W	N/A	Withdrawn from subject
Z	N/A	Exempted
T	N/A	Transfer of credit

Table 6.11.2 Grade Point Average System

* The overall and weighted GPA will be capped at 4.0.

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.

Δ For GE subjects taken after the 2010/11 intake cohort, the 9 alpha grades system as for all other subjects will be used.

Subjects with the assigned codes I, P, L, U, M, W, Z, 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.

In order to graduate, a student must achieve a minimum GPA of 2.0, in addition to satisfying the programme-specific graduation requirements, such as IC training, WIE and exit language test. The awards will be classified based upon the weighted GPA (WGPA).

$$Weighted\ \ GPA = \frac{\sum_i Subject\ \ Grade\ \ Point \times Subject\ \ Credit\ \ Value \times W_i}{\sum_i Subject\ \ Credit\ \ Value \times W_i}$$

where W_i = weighting of between 0 and 1, to be assigned according to the level of the subject and the weighted GPA is capped at 4.0.

In determining the classification of awards, the credits earned at Levels 2, 3 and 4 are weighted 0.2, 0.3 and 0.5 respectively. Level 5 credits are also weighted 0.5. Not all subjects taken are included in the computation of the weighted GPA (WGPA). Training subjects are excluded. A student is eligible for award if he/she satisfies all the conditions listed below:

(a) Accumulation of the requisite number of credits for the particular award.
(b) Satisfying all the requirements as defined in the definitive programme document and as specified by the University.
(c) Satisfying the WIE and IC Training requirements.
(d) Satisfying the residential requirement for at least one-third of the credits required for the award to be completed under the current enrolment at the PolyU, unless professional bodies stipulate the otherwise.
(e) Having a Grade Point Average (GPA) of 2.0 or above at the end of the programme.
(f) Having participated in a minimum of 6 hours' co-curricular activities.
(g) A pass in Foundation Mathematics (AMA106). *It is only applicable to admittees who do not have a "pass" in the A-level Mathematics subject(s) and who have not been given credit transfer for the subject AMA201. These students are required to take a mandatory Mathematics Benchmark Test (MBT) prior to the commencement of their studies. Those who pass the MBT are exempted from this graduation requirement and they follow the normal study pattern. Those who fail or do not attend the MBT are required to take a non-credit bearing subject AMA106 "Foundation Mathematics", which is a pre-requisite for AMA201. A pass in AMA106 "Foundation Mathematics" is thus a graduation requirement for such students.*
(h) Having satisfied any additional graduation requirement as stipulated.

Table 6.11.3 shows the guidelines for the classifications. These are meant to be guidelines for reference only. The Board of Examiners shall exercise its judgement in coming to its conclusions as to the award for each student, and where appropriate, may use other relevant information.

Honours degrees	GPA or Weighted GPA[@]	Guidelines
1st	3.7^{+} - 4	The student's performance/attainment is outstanding, and identifies him as exceptionally able in the field covered by the programme in question.
2:i	3.2^{+} - 3.7^{-}	The student has reached a standard of performance/ attainment which is more than satisfactory but less than outstanding.
2:ii	2.3^{+} - 3.2^{-}	The student has reached a standard of performance/ attainment judged to be satisfactory, and clearly higher than the 'essential minimum' required for graduation.
3rd	2.0 - 2.3^{-}	The student has attained the 'essential minimum' required for graduation at a standard ranging from just adequate to just satisfactory.

Table 6.11.3 Degree Classification Guidelines

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.

Any subjects passed after the graduation requirement has been met or subjects taken on top of the prescribed credit requirements for award shall not be taken into account in the grade point calculation for award classification. If a student passes more elective subjects (or optional subjects) than the requirement for graduation in or before the semester within which he/she becomes eligible for award, the elective subjects with higher contribution (with the exception of the additional subjects taken out of interest and not for satisfying the award requirements) shall be counted in the grade point average calculation for award classification (i.e. the passed subjects with lower contribution will be excluded from the grade point calculation), irrespective of when the excessive elective subjects are enrolled.

6.12 Different types of GPA's

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.

The relationship between the different types of GPA's, and the methods for calculating each, is further explained in Table 6.12.1.

Table 6.12.1 Different types of GPA, and their calculation methods

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 subjects, both academic and 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) Weighting can be between 0 and 1, to be assigned according to the level of the subject. (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 subjects, for both academic and training subjects, are to be counted towards the Major/Minor GPA. (3) For retake subjects, only the last attempt will be taken in the Major/Minor GPA calculation. *Major GPA* (4) Level weighting will only be included in the calculation for weighted assessment scheme. (5) The Major GPA will be the same as the Award GPA unless students take more than the required subjects. *Minor GPA* (6) Level weighting will not 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 programmes without level weighting: Award GPA = GPA (2) For programmes with level weightings: Award GPA = Weighted GPA (3) For Major/Minor programmes: Award GPA = Major GPA

6.13 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.

6.14 Aegrotat Award

If a student is unable to complete the requirement of the programme for the award due to very serious illness, or other very special circumstances which are beyond his/her control, and considered by the Board of Examiners as legitimate, the Faculty 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/her from any subsequent assessment for the same award.

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

6.15 Compulsory Graduation

A student must graduate as soon as the criteria for graduation in the programme are satisfied. That is, a student will be allowed to register for more credits than needed only if adequate credits for graduation have not yet been accrued. This requirement has been stipulated in order to ensure the most efficient use of the PolyU resources.

Appendix I

Subject Description Forms

Content

Subjects

Subject Description Form

Subject Code	AF2108
Subject Title	Financial Accounting
Credit Value	3
Level	2
Pre-requisite / **Co-requisite/ Exclusion**	None
Role and Purposes	This subject contributes to the achievement of BBA Outcomes by enabling students to analyse financial reports (Outcome 9), apply accounting conceptual framework in the business problems analysis (Outcome 7) and process a foundation of financial accounting skills and knowledge, on which to base the process of continuous professional development (Outcome 13). It also contributes to the development of information technology skill (Outcome 6) and ethical reasoning (Outcome 5).
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain the role and importance of accounting information in assisting decision-making in a business context. b. Apply the financial accounting conceptual framework in the recording, processing, summarizing and reporting phases of the accounting cycle. c. Evaluate the assumptions, principles and conventions underlying financial accounting processes. d. Identify and resolve accounting related ethical issues as they arise. e. Apply appropriate analytical tools for the interpretation of financial statements.
Subject Synopsis/ Indicative Syllabus	**The Business and Accounting Environment** Different types of businesses, their common objectives and basic features. The need for accounting as a basis for decision making. Ethical considerations in financial reporting. **The Financial Accounting Framework** Accounting equation and double entry bookkeeping system. Differences between cash and accrual bases of accounting. Preparation of journals, ledger accounts, trial balance and basic financial statements. Prepayments and accruals. Valuation of accounts receivables, inventory and fixed assets. Quality of earnings and earnings management. Internal control of cash through bank reconciliation statement. **Accounting Principles and Concepts** Fundamental accounting concepts and other accounting principles that underlie the preparation of financial statements. **Company Accounting** Features of the corporate form of business ownership. Rights and obligations of interested parties. Issues relating to company accounts. Preparation of financial statements of a company. **Analysis and Interpretation of Financial Statement** Need for analysis and interpretation of financial statements. Interpretation techniques including ratio analysis and statement of cash flow. Calculation and interpretation of basic financial ratios. Limitations of ratio analysis.

Teaching/Learning Methodology	A two hour lecture will be conducted each week to initiate students into the ideas, concepts and techniques of the topics in the syllabus, which is then reinforced by a one hour tutorial designed to consolidate and develop students' knowledge through discussion and practical problem solving. Students will be assigned and assessed with a group project which simulates the maintenance of a set of accounting records for a company

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
Continuous Assessment	**50%**						
1. Project Assignment	10%		√				
2. Tests (close book)	40%		√		√		
Final Examination (closed book)	**50%**	√	√	√	√	√	
Total	100 %						

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

Student Study Effort Expected	
Class contact:	
▪ Lectures	28 Hrs.
▪ Tutorials	14 Hrs.
Other student study effort:	
▪ Weekly preparation and review (3 hour X 12 weeks)	36 Hrs.
▪ Assignments (3 hours X 12 topics) and project (10 hours)	46 Hrs.
Total student study effort	124 Hrs.

Reading List and References

Recommended Textbook
Weygandt, J.J., D.E. Kieso and P.D. Kimmel, *Financial Accounting*, IFRS Edition, Wiley (latest version).

Recommended References
Williams, Haka, Bettner, Carcello, Lam and Lau, *Financial Accounting: Including International Financial Reporting Standards (IFRS)*, McGraw-Hill (latest version).

Ferrell, Fraedrich and Ferrell, *Ethical Decision Making for Business*, international edition, South Western (latest version).

Alexander and Nobes, *Financial Accounting: An International Introduction*, New York : Financial Times Prentice Hall (latest version).

Subject Description Form

Subject Code	AF2601
Subject Title	Introduction to Economics
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Role and Purposes	This subject contributes to the achievement of the BBA Outcomes by enabling students to analyze business situations and problems (Outcome 7) by applying conceptual frameworks drawn from Economics, and identify and analyze the means (Outcome 10) by which value is created in goods and services and delivered to users. It also identifies and analyzes (Outcome 12) those aspects of the domestic and global business environment that set the 'parameter of choice' within which business organizations set objectives and take actions.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. Appraise the issues involved in the allocation of scarce resources for individual economic agents and the economy as a whole. b. Conduct economic analysis of the behaviour of firms and markets. c. Evaluate the issues relating to the macroeconomy and analyze the effectiveness of government economic policy. d. Apply relevant economic knowledge to enhance their understanding of other business subjects.
Subject Synopsis/ Indicative Syllabus	**The Scope of Economic Analysis** Concept of scarcity and opportunity cost. Nature of economic science. Relation with other subject disciplines. Cost and benefit analysis. **Demand, Supply and the Price Mechanism** The law of demand. Elasticity of demand. The law of supply. Production and cost. Price control. **Market Structure** Perfect competition. Monopoly. Oligopoly and game theory. Cases of market failure. **National Income Accounting and Determination** Major macroeconomic issues. Concepts and approaches to national income accounting. Aggregate expenditure and national income determination. **Fiscal Policy and Monetary Policy** Roles of government spending and taxation. Demand for money. Banking system and the money creation process. Determination of interest rate. Central banking and monetary policy. Inflation and unemployment. **The International Economy** International exchange and gains from trade. The foreign exchange market and alternative exchange rate systems.

Teaching/Learning Methodology	Lectures focus on the introduction and explanation of key economic concepts, with specific reference to current economic issues wherever appropriate. Tutorials provide students with the opportunity to deepen their understanding of the concepts taught in lectures and to apply the theories to the analysis of real-life economic issues. The activities in tutorials include student presentations and discussions of problem sets and case studies.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d		
Continuous Assessment	**50%**						
1. Presentation	15%	√	√	√	√		
2. Written report	10%	√	√	√	√		
3. Attendance and participation in class	5%	√	√	√	√		
4. Mid-term test	20%	√	√				
Final Examination	**50%**	√	√	√			
Total	100 %						

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

Student Study Effort Expected		
	Class contact:	
	▪ Lecture	28 Hrs.
	▪ Tutorials	14 Hrs.
	Other student study effort:	
	▪ Self study and homework preparation	42 Hrs.
	Total student study effort	84 Hrs.

Reading List and References

Recommended Textbook
Frank, Robert H. and Ben S. Bernanke, Principles of Economics, 4th edition, McGraw Hill, 2009.

References
Parkin, Michael, Economics, 9th edition, Pearson Addison Wesley, 2010.
Mankiw, N. Gregory, Principles of Economics, 5th edition, Thomson South-Western, 2009.

Subject Description Form

Subject Code	AF3313
Subject Title	Business Finance
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: Financial Accounting (AF2108) or equivalent
Role and Purposes	This subject contributes to the achievement of the BBA Outcomes by enabling students to develop strong analytical skills and critical thinking (Outcome 4), and apply financial methods to analyze business problems (Outcome 7) and apply basic financial theories, analyze financial reports and understand the operations of financial markets (Outcome 9) and present and communicate in English effectively (Outcome 1 and Outcome 2).
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. Identify the major responsibilities of financial managers; b. Apply different investment appraisal techniques and evaluate the limitations; c. Apply the portfolio theory to construct a diversified portfolio; d. Determine the corporate cost of capital and e. Analyze the key characteristics of working capital and its individual elements.
Subject Synopsis/ Indicative Syllabus	**Introduction** Corporate Goal. The Agency Problem and Control of the Corporation **Valuation of Securities** Time value of money. Valuation of Stocks and bonds. **Investment Appraisal Techniques and the limitations** Payback period. Average Accounting Return. Internal rate of return. Net present value. Profitability Index. Incremental cash flows and Capital Budgeting. Investments of unequal lives. **Risk Analysis, Real Options and Capital Budgeting** Decision trees, Real Options. Sensitivity Analysis. Scenario Analysis. .Breakeven Analysis **Portfolio Theory** Risk statistics. Opportunity Set and Efficient set. Capital Market Line. Capital Asset Pricing Model. The Security Market Line. **Cost of Capital** Beta. Cost of Equity. Cost of Debt. Weighted Average Cost of Capital. **Net Working Capital Management** Short-term Finance and Planning. Cash Management. Credit Management

Teaching/Learning Methodology	The mass lectures cover the basic concepts and theories. Tutorial sessions allow students to discuss the lectures and present the applications of financial methods in smaller groups.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
Continuous Assessment	**40%**						
1. Participation (Tutorial sessions)	5%		√	√	√	√	
2. Midterm Test	20%	√	√				
3. Individual Written Assignment	15%	√		√	√	√	
Final Examination	**60%**	√	√	√	√	√	
Total	100 %						

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

Student Study Effort Expected	Class contact:	
	▪ Lectures	28 Hrs.
	▪ Tutorials	14 Hrs.
	Other student study effort:	
	▪ Assigned tutorial questions	14 Hrs.
	▪ Individual written assignment	8 Hrs.
	Total student study effort	64 Hrs.
Reading List and References	Ross, S.A., R.W. Westerfield, J. Jaffe and B. Jordan, *Modern Financial Management*, 8th Edition, Irwin/McGraw-Hill, 2008.	

Subject Description Form

Subject Code	AMA106
Subject Title	Foundation Mathematics
Credit Value	0
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This is a subject to provide students with a solid foundation in Mathematics. The emphasis will be on the application of mathematical methods to solving basic mathematical problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. solve problems using the concept of functions and inverse functions; 2. apply the basic operations of matrices and calculate the determinant; 3. apply mathematical reasoning to analyse essential features of different mathematical problems such as differentiation and integration; 4. apply appropriate mathematical techniques to model and solve problems in science and engineering; 5. extend their knowledge of mathematical techniques and adapt known solutions in different situations.
Subject Synopsis/ Indicative Syllabus	*Basic concepts* Functions and inverse functions; Elementary functions, Trigonometric functions. *Differential Calculus*: Limits and continuity (intuitive approach); Derivatives; Techniques of differentiation; Mean Value Theorem; Higher derivatives; Maxima and minima; Curve sketching. *Integral Calculus*: Indefinite integrals; Techniques of integration; Definite integrals. Fundamental Theorem of Calculus; Taylor's Theorem; Applications in geometry, physics and engineering. *Matrix Algebra*: Introduction to matrices and determinants.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures, tutorials and presentation. The lectures aim to provide students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials and presentations will be held to develop students' ability of logical thinking and effective communication.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		1	2	3	4	5
a. Assignment and Mid-term Test	40%	✓	✓	✓	✓	✓
b. Examination	60%	✓	✓	✓	✓	✓
Total	100 %					

Continuous Assessment comprises of assignments and a mid-term test. A written examination is held at the end of the semester.

Questions used in assignments, tests and examinations are set to test students' ability with regard to any one of the intended learning outcomes.

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

Student Study Effort Required

Class contact:	
▪ Lecture	28 Hrs.
▪ Tutorial and Student Presentation	14 Hrs.
Other student study effort:	
▪ Assignment	20 Hrs.
▪ Self-study	58 Hrs.
Total student study effort	120 Hrs.

Reading List and References

Textbook:

Chung, K.C.	A Short Course in Calculus and Matrices 2nd edition	McGraw-Hill 2010

References:

K.F. Hung, Wilson C.K. Kwan and Glory T.Y. Pong	Foundation Mathematics & Statistics	McGraw Hill 2011

Subject Description Form

Subject Code	AMA201
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To introduce students the fundamentals of basic engineering mathematics. Emphasis will be on the basic theory as well as application of mathematical methods to solving engineering problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. apply mathematical reasoning to analyse essential features of different engineering problems; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations; 3. apply appropriate mathematical concepts and techniques and adapt known solutions to different situations; 4. develop and extrapolate the mathematical concepts in synthesizing and solving new problems; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	*Algebra of complex number*: Complex numbers; Geometric representation; n-th roots of complex numbers. *Linear algebra:* Matrices and determinants; Vector space; Elementary algebra of matrices; Eigenvalues and eigenvectors; Normalization and orthogonality. *Ordinary differential equations*: First and second order linear ordinary differential equations; Laplace transforms; Convolution theorem; 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

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

Continuous Assessment comprises of assignments, in class quizzes, online quizzes and a mid-term test. A 3-hour examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess the student's 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.

Student Study Effort Required		
	Class contact:	
	▪ Lecture	28 Hrs.
	▪ Tutorial	14 Hrs.
	▪ Mid-term test and Examination	5 Hrs.
	Other student study effort:	
	▪ Assignments and self-study	73 Hrs.
	Total student study effort	120 Hrs.

Reading List and References

Textbook:

Chan, C.K., Chan, C.W. & Hung, K.F.	Basic Engineering Mathematics Updated 3rd edition	McGraw Hill 2011

References:

Anton, H.	Elementary Linear Algebra 10th edition	John Wiley 2010
Kreyszig, E.	Advanced Engineering Mathematics 10th edition	Wiley 2011
James, G.	Modern Engineering Mathematics 4th edition	Prentice Hall 2007
Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 12th edition	Addison Wesley 2009

Subject Description Form

Subject Code	AMA202
Subject Title	Mathematics II
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: Mathematics I (AMA201)
Objectives	This subject aims to introduce students to the differential and integral calculus of functions of several variables, vector field theory and partial differential equations of mathematical physics. Emphasis will be on the basic theory as well as application of mathematical methods to solving engineering problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. apply mathematical reasoning to analyse essential features of different engineering problems; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations; 3. apply appropriate mathematical concepts and techniques and adapt known solutions to different situations; 4. develop and extrapolate the mathematical concepts in synthesizing and solving new problems; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	*Calculus and functions of several variables:* Infinite series; Power series; Taylor series; Fourier series; Partial differentiation; Maxima and minima; Lagrange multiplier. *Partial differential equations:* Formulation of partial differential equations; Method of separation of variables; Initial and boundary value problems. *Vector Calculus:* Vectors; Scalar and vector products; Gradient, divergence and curl operators; Multiple integrals; Line, surface and volume integrals; Green's theorem, divergence theorem and Stokes' theorem.
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide 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	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		1	2	3	4	5
a. Continuous Assessment	40%	✓	✓	✓	✓	✓
b. Examination	60%	✓	✓	✓	✓	✓
Total	100%					

Continuous Assessment comprises of assignments, in class quizzes, online quizzes and a mid-term test. A 3-hour examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess the student's 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.

Student Study Effort Required

Class contact:	
▪ Lecture	28 Hrs.
▪ Tutorial	14 Hrs.
▪ Mid-term test and Examination	5 Hrs.
Other student study effort:	
▪ Assignments and self-study	73 Hrs.
Total student study effort	120 Hrs.

Reading List and References

Textbook:

Chan, C.K., Chan, C.W. & Hung, K.F.	Basic Engineering Mathematics Updated 3rd edition	McGraw Hill 2011

References:

Van Valkenberg, M.E.	Network Analysis 3rd edition	Prentice Hall 1974
Kreyszig, E.	Advanced Engineering Mathematics 10th edition	Wiley 2011
James, G.	Advanced Modern Engineering Mathematics 3rd edition	Prentice Hall 2005
Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 12th edition	Addison Wesley 2009

Subject Description Form

Subject Code	CBS2080
Subject Title	Fundamentals of Chinese Communication
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Students whose HKALE result of Chinese Language and Culture is at grade D or below are advised to complete / concurrently take non-credit bearing Chinese Language Enhancement subject(s) as recommended.
Objectives	This subject aims to enhance and polish the communication skills of the students in both written Chinese and Putonghua for basic usage in the work-place.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) develop effective communication skills in both written Chinese and Putonghua required for basic usage in the work-place; (b) master the format, organization, language and style of expression of various genres of Chinese practical writing such as official correspondences, publicity materials, reports and proposals; (c) give formal presentation in Putonghua; (d) engage with formal discussion in Putonghua. Students will be required to read and write intensively for enhancing their proficiency level in written Chinese. They would be required to organize their own ideas, concepts in sensible and logical manner and present them in both written and spoken format for effective transmission of message in given contexts with specific purposes. Such learning activities would engage them in reasoning and analytical processes. The mastering of effective communication skills in both written Chinese and Putonghua will also facilitate their life-long learning in various disciplines.
Subject Synopsis/ Indicative Syllabus	1. Written Chinese for practical purposes • uses of words and sentences; • coherence in Chinese writing • format, organization, language and style of expression of official correspondences, publicity materials, reports and proposals; • context dependent stylistic variation 2. Formal Presentation in Putonghua • the articulation in Putonghua • the flow of speaking • choice of words, manner and gesture 3. Formal Discussion in Putonghua • identification of main idea and key messages • evaluation of relevancy of information in a message • skills of seeking clarity/agree/disagreeing/answering to a question • skills of summarizing

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; then (4) prepare a written report/proposal on the same topic; and (5) engage in formal discussion in Putonghua on topics related to current issues and/or business operation; then (6) produce a written document on the same topic using a chosen genre.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
1. Written Assignment	30%	√	√				
2. Oral Presentation	30%			√	√		
3. Final Examination	40%	√	√	√	√		
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 examination emphasizes the correctness of expression and students' general competence in Chinese Language.

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	42 Hrs.
	Other student study effort:	
	▪ Outside class practice	3 x 12 = 42 Hrs.
	▪ Self-study	3 x 12 = 42 Hrs.
	Total student study effort	126 Hrs.
Reading List and	路德慶主編(1982) 《寫作教程》, 華東師範大學出版社。	

References	邵守義（1991）《演講全書》，吉林人民出版社。 陳建民（1994）《說話的藝術》，語文出版社。 李軍華（1996）《口才學》，華中理工大學出版社。 陳瑞端著（2000）《生活錯別字》，中華書局。 邢福義、汪國勝主編（2003）《現代漢語》，華中師範大學出版社。 于成鯤主編（2003）《現代應用文》，復旦大學出版社。 鍾文佳（2004）《漢語口才學》，西南師範大學出版社。 李白堅、丁迪蒙（2004）《大學體型寫作訓練規程》，上海大學出版社。 于成鯤、陳瑞端、秦扶一、金振邦主編（2011）《當代應用文寫作規範叢書》，復旦大學出版社。

Subject Description Form

Subject Code	CSE291
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, economical 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 system engineering, transport problems and solutions in Hong Kong, sustainability of transportation systems, transportation in social, economics, 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, speed-flow-density relationships, level of service concept. 4. ***Transport economics***: Principles of transport economics; demand and cost for transport, from economics to transport policy, effects of transport pricing policies. 5. ***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 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 (Please tick as appropriate)							
		a	b	c	d				
1.Assignment and in-class exercise	25	√	√	√	√				
2. Midterm 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 essay writings to address different aspects of skills required in achieving intended learning outcomes (a), (b), (c), and (d). In-class exercises include presentations and group discussions to provide opportunities for students to demonstrate their appreciation to real life transportation issues, evaluate their ability to develop original solutions in individual and group efforts (intended learning outcome (b)) and enhance their effective communication skills. The midterm test and the final exam are conducted at different times in the semester to consolidate students' knowledge in lectures, tutorials, and class activities. They are appropriate in assessing intended learning outcomes (a), (c), and (d).

Student Study Effort Expected	Class contact:	
	▪ Lecture	35 Hrs.
	▪ Tutorial	7 Hrs.
	Other student study effort:	
	▪ Reading and Studying	42Hrs.
	▪ Completion of Assignments and class presentations	16Hrs.
	Total student study effort	100Hrs.

Reading List and References	**Textbooks:** M.G.H. Bell and Y. Iida, Transportation Network Analysis, J. Wiley, 1997 J. Sussman, Introduction to Transportation Systems, Boston : Artech House, 2000 P. H. Wright, N. J. Ashford and R. J. Stammer, Jr., Transportation Engineering: Planning and Design, 1998 Jon D. Fricker and R.K. Whitford, Fundamentals of Transportation Engineering – A Mulitmodal Systems Approach. Prentice Hall, 2004 E. Quinet and R. Vickerman, Principles of Transport Economics, Edward Elgar Publishing Limited, 2004 **Reference books:** J.H. Banks, Introduction to Transportation Engineering, McGraw-Hill, 1998

Subject Description Form

Subject Code	CSE292
Subject Title	**Transportation Operations and Management**
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	CSE291 Transportation Engineering Fundamentals
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. ***Introduction***: Management of vehicle flows and fleets; traffic stream properties and their measurement, and queuing theories; Flow control and fleet scheduling. 2. ***Asset and facility design***: Design of transportation assets and facilities based on operational capacity, site constraints, and safety considerations. 3. ***Road transportation***: Traffic flow and demand; traffic lights, vehicle detection, traffic control and coordination; traffic management measures. 4. ***Urban transit and railway transportation***: Transit operations and service scheduling, elements of transit line capacity, capacity computations, system approach to transit line capacity, capacities of different transit modes, measures for increase of transit speed, vehicle design and performance characteristics. Train services, system capacity; rolling stocks and electrification; signalling and communication. 5. ***Air transportation*:** Nature of civil aviation and structure of the airline industry; aircraft characteristics and performance; navigation and traffic control; airport planning and design. 6. ***Transportation terminals***: Characteristics of terminals (sea ports, rail-yards, airports, parking lots); methodologies study terminal operations and management of congestion. (chronographs, input-output diagrams, pricing, simulation).
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	See table below
Student Study	Class contact:

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		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).

Effort Expected	▪ Lectures	35 Hrs.
	▪ Tutorials	7 Hrs.
	Other student study effort:	
	▪ Reading and Studying	42Hrs.
	▪ Completion of assignments and class presentations	16Hrs.
	Total student study effort	100Hrs.
Reading List and References	P.H. Wright, N.J. Ashford, and R.J. Stammer, Jr., Transportation Engineering: Planning and Design, John Wiley, 4th Ed., 1997 C.J. Khisty and B.K Lall, Transportation Engineering: An Introduction, 3rd Edition, Prentice Hall, 2003 Roger P. Roess, Elena S. Prassas, William R. McShane , Traffic Engineering, Pretience Hall, 2004 Vukan R. Vuchic , Urban Transit : Operations, Planning and Economics. John Wiley & Sons, 2005	

Subject Description Form

Subject Code	CSE312
Subject Title	Transportation and Highway Engineering
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
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;
	f. Able to appreciate the shortcomings of current highway design practice and the need for further research on design methods for highway alignments and 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 weeks) Hierarchy of highways; urban roads, rural roads. Cross-section elements of highways. Standard layout of roads. Classification and design standards. Layout of highway junctions – at-grade and grade-separated junctions. Safety considerations. Directional Signing. 3. Geometric Design (4 weeks) Design principle and procedure. Basic assumptions and theories for geometric design. Minimum stopping sight distance. Minimum overtaking sight distance. Horizontal curve widening. Design of vertical and horizontal alignment; circular curve, transition curve, sag curve and summit curve. 4. Highway Construction (2 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. Binder tests. This course will be augmented by appropriate films and/or site visits in Hong Kong.
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 (Please tick as appropriate)					
		a	b	c	d	e	f
(1) Assignments and Lab Reports	20	√		√	√		√
(2) Mid-term Test(s)	10	√	√			√	
(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 laboratory session and assignment, a mid-term test 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), d) and f). 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), e) and f).

Student Study Effort Required	Class contact:	
	▪ Lectures/Tutorials	34 Hrs.
	▪ Laboratory Sessions	8 Hrs.
	Other student study effort:	
	▪ Reading and studying	60 Hrs.
	▪ Completion of Assignments/Lab Reports	26 Hrs.
	Total student study effort	128 Hrs.

Reading List and References

Essential Textbooks

"Highways", 3rd ed., O'Flaherty, C.A. (Edward Arnold), 1986-1988.

"Highways Contruction & Maintenance 2nd ed., John Watson (Longman), 1994.

Reference Textbooks

"Highway Design Characteristics, Transport Planning and Design Manual", Vol. 2, Hong Kong Transport Department, March 1984.

"Highway Materials, Soils & Concretes", Atkins, H.N. (Reston).

"Principles of Highway Engineering and Traffic Analysis", Mannering, F.L., Kilareski, W.P. (John Wiley & Sons), 1990.

American Association of State Highway and Transportation Officials (AASHTO). AASHTO Guide for Design of New and Rehabilitated Pavement Structures, 2002.

Subject Description Form

Subject Code	CSE331
Subject Title	Air and Noise Pollution Studies
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	To provide basic knowledge about the causes, impact and control of air and noise pollution.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Have the basic knowledge of contemporary air and noise pollution, including chemistry and/or physics involved, commonly used methods for monitoring, prediction, and assessment; b. Have general understanding of commonly used control technologies for reducing air and noise pollution; c. Able to work as an entry-level staff in the air and noise pollution profession; d. Obtain sufficient knowledge and skills which will facilitate the students to further study the subject independently. e. Have the basic ability to analyze data and issue in a logical way; f. Develop senses to link local environmental issues to sustainable development of global society and able to contribute to discussion of environmental/social issues logically.
Subject Synopsis/ Indicative Syllabus	Air Pollution Studies 1. Chemical and physical characteristics of the atmosphere Sources and sink of main air pollutants in the atmosphere; meteorological parameters affecting the concentrations of air pollutants. 2. Measurement and analysis of ambient air pollutants Methods and techniques for the measurement and analysis of ambient gaseous pollutants, particulate pollutants, and odor pollutants in the environment. 3. Source sampling and pollution analysis Source sampling criteria, method of measurement and analysis for gaseous pollutants, particulate pollutants, and odor pollutants from the sources. 4. Air pollution dispersion modelling Application of Gaussian Dispersion Models, transport of air pollutants and atmospheric stability, wind profile, factors affecting pollution dispersion in the atmosphere. 5. Indoor air quality assessment Indoor sources of air pollutant; outdoor contributions, sick building syndrome, indoor air quality standards, ASHRAE design for indoor environment; methods for evaluation of indoor air quality. 6. Stationary and mobile sources of air pollutants and their control Control devices of gas- and particle-phase pollutants from stationary sources; control methods of gas- and particle-phase pollutants from mobile sources. 7. Laboratory works (a) Air Pollution Modelling (b) Indoor Air Pollutant Analysis Noise Pollution Studies 1. Environmental Noise Prediction Geometric spreading of sound from simple sources. Outdoor sound propagation. Effects of meteorological conditions - sound refraction and sound ray equations, air absorption. Sound radiation near boundary, ground absorption, ground/facade reflection. Sound diffraction around obstacles. 2. Noise Assessment Need for noise impact assessment. Basic principles - baseline study, noise prediction, monitoring and evaluation. Background noise survey - instrumentation, approach and data analysis. Assessment criteria - local and international codes. 3. Road Traffic Noise Vehicle noise - sources, emission limits. Traffic noise - characteristics, propagation. Computer prediction methods. Noise criteria. Methods of noise control - land use, road design, traffic measures, barrier, enclosure and others. 4. Railbound Traffic Noise Train noise and railway noise, Wayside noise and vibration, squealing noise. Noise sources and control technology. Noise

<table>
<tr><td></td><td>prediction methodology.

5. <u>Construction Noise</u>
Major noise sources. Noise prediction - stationary and moving sources. Regulatory standard, work permits. Engineering and management control.

6. <u>Laboratory Works</u>
(a) Noise Barrier
(b) Industrial Noise Measurement</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>In lectures students will be presented with an overview of the nature of air and noise pollution. They will also be taught the knowledge required to predict and assess air and noise pollution impact and to make recommendations for solution. The lecture will be keynote in nature, and students will be encouraged to read pre-assigned references. Laboratory sessions will involve familiarization with the relevant basic measuring instruments. Tutorials will be used to discuss readings, assignments and laboratory reports.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<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 (Please tick as appropriate)</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. Homework, quizzes, in-class problems and lab report</td><td>30</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Final examination</td><td>70</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>
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:

Homework – To help students further understand what they learnt in the lectures.

Quiz –To test if students have grasped the underlying ideas.

In-class problem - During class periods, students will sometimes be asked to work a problem in a group or individually. These problems are designed to help students learn to utilize the concepts discussed in the reading material and covered in the quiz.

Lab experiment – It will provide students first-hand experience in understanding the sources, analysis and control of air pollutants and noise. Students are required to carry out experiments under the supervision of lecturers and lab technicians.

Final examination - The exam tests student's ability to utilize the concepts covered in this course.</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>28 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>8 Hrs.</td></tr>
<tr><td>▪ Laboratory</td><td>6 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Assignments</td><td>24 Hrs.</td></tr>
<tr><td>▪ Self Study</td><td>60 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>126 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>Thad Godish, Air quality, 4th edition, Lewis Publishers, 2004.

Noel De Nevers, Air pollution control engineering, McGraw Hill, 2000.

Urban sound environment by Jian Kang, Taylor & Francis, 2007.

Industrial noise and hearing conservation / edited by Julian B. Olishifski, Earl R. Harford, National Safety Council, c1975.</td></tr>
</table>

Subject Description Form

Subject Code	CSE390
Subject Title	Transportation Systems Analysis
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	AMA201 Mathematics I
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. Apply numerical techniques on transportation system analysis and realise error sources. b. Perform simple data analysis on field data. c. Make use of operational research techniques for transportation system design and optimisation under various constraints.
Subject Synopsis/ Indicative Syllabus	1. ***Probability & statistics***: Random variables, probability distributions, sample distributions and means, Central Limit Theorem, Bayesian Theorem, significance and hypothesis testing. 2. ***Operations research***: Linear programming, simple Simplex algorithms, sensitivity analysis, shortest path and maximum flow problems, integer programming, combinatorial optimisation problems, branch and bound algorithm, applications in transportation. 3. ***Modelling in transportation***: 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 (Please tick as appropriate)							
		a	b	c					
1. Assignments	10	√		√					
2. Lab reports	10		√						
3.Mid-term test	20	√	√						
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: written assignments, lab reports, midterm test, 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 (c). Through laboratory sessions, students will learn various useful programs and showcase their knowledge acquired through lab reports, and is targeted at intended learning outcome (b). The midterm test 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	30 Hrs.
▪ Tutorial	6 Hrs.
▪ Laboratory	6Hrs.
Other student study effort:	
▪ Reading and Studying	42Hrs.
▪ Completing of assignments, class presentations and lab reports	16Hrs.
Total student study effort	100Hrs.

Reading List and References

Textbooks:

J.H. Mathews, Numerical methods for mathematics, science, and engineering, Prentice Hall, 1992

E.R. Champion, Numerical methods for engineering applications, Marcel Dekker, 1993

	F.S. Hillier, Introduction to operations research, McGraw Hill, 2005 R.E. Walpole, R.H. Myers, S.L. Myers and K.Y. Ye, Probabilities and Statistics for Engineers and Scientists, Prentice Hall, 2002 M.G.H. Bell and Y. Iida, Transportation Network Analysis, J. Wiley, 1997 M.A.P. Taylor, W. Young and P.W. Bonsall, Understanding Traffic Systems: Data, Presentation and Analysis, Avebury Technical Books: Aldershot, 1996 De Neufville, R., Applied Systems Analysis – Engineering Planning and Technology Management, McGraw-Hill Publishing Company (1990) **Reference books:** F.S. Budnick, Applied Mathematics for Business, Economics, and the Social Sciences, McGraw-Hill, 1993. S. Barnett, Some Modern Applications of Mathematics, Ellis Horwood, 1995

Subject Description Form

Subject Code	CSE407
Subject Title	Design of Transport Infrastructure
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	CSE304 Transportation and Highway Engineering or CSE312 Transportation and Highway Engineering or For TSE Students (41081): CSE291 Transportation Engineering Fundamentals, and CSE292 Transportation Operations and Management, and CSE312 Transportation and Highway Engineering
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. (1) 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

<table>
<tr><td></td><td>familiarize themselves with real-world problems.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="7">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td></tr>
<tr><td>1. Project Assignment</td><td>20</td><td>√</td><td>√</td><td></td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Laboratory Reports</td><td>20</td><td></td><td>√</td><td>√</td><td></td><td>√</td><td>√</td><td></td></tr>
<tr><td>3.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>
Students must attain at least grade D in both coursework and final examination 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 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.
</td></tr>
<tr><td rowspan="3">Student Study Effort Required</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures/Tutorials</td><td>34 Hrs.</td></tr>
<tr><td>▪ Laboratory sessions</td><td>8 Hrs.</td></tr>
<tr><td></td><td>Other student study effort:</td><td></td></tr>
<tr><td></td><td>▪ Reading and studying</td><td>60 Hrs.</td></tr>
<tr><td></td><td>▪ Completion of project assignment/Lab reports</td><td>26 Hrs.</td></tr>
<tr><td></td><td>Total student study effort</td><td>128 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">
Textbooks:

R.J. Salter, Highway Traffic Analysis and Design, 1980

F.L. Mannering and W.P. Kilareski, Principle of Highway Engineering & Traffic Analysis, Wiley & Sons Inc. 1990

J.F. Brown, A Simplified Fundamental Procedure for the Design of Bituminous Pavements, 2nd Edition, 1976

Y.H. Huang, Pavement Analysis and Design, Prentice Hall, 1993

J. Watson, Highway Construction and Maintenance, 1991

J. Black, Urban Mass Transportation Planning, McGraw-Hill Inc., 1995

L.A. Hoel, N.J. Garber, A.W. Sadek, Transportation Infrastructure Engineering – A Multi-modal Integration, Thomson, 2008

J.H.H. Gorver, Handbook of Aircraft Performance, BSP Professional Books, 1989

R. Horonjeff and F.X. McKelvey, Planning & Design of Airports, 3rd Edition, 1983

Reference books:

Transaction, Hong Kong Institution of Engineers

Asia Engineer, The Journal of Hong Kong Institution of Engineers

Transport and Road Research Laboratory (TRRL) Reports

Airport Railway News, Mass Transit Railway Corporation

Publications of New Airport Projects Co-ordination Office, Hong Kong Government
</td></tr>
</table>

Subject Description Form

Subject Code	CSE408
Subject Title	Traffic Surveys and Transport Planning
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	CSE304 Transportation and Highway Engineering or CSE312 Transportation and Highway Engineering and For TSE Students (41081): CSE291 Transportation Engineering Fundamentals, and CSE312 Transportation and Highway Engineering, and CSE390 Transportation Systems Analysis
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 (4 weeks) Traffic characteristics and 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 scheduling. 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.

<table>
<tr><td>Teaching/Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<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 (Please tick as appropriate)</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. Assignments and Lab Reports</td><td>20</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>2. Mid-term Test(s)</td><td>10</td><td></td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>3. Final Examination</td><td>70</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>
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, a mid-term test 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), b), 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 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).</td></tr>
<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures/Tutorials</td><td>35 Hrs.</td></tr>
<tr><td>▪ Laboratory Sessions</td><td>7 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading and studying</td><td>60 Hrs.</td></tr>
<tr><td>▪ Completion of Assignments/Lab Reports</td><td>26 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>128 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td><u>Essential Textbooks</u>

Ortuzar, J.D and Willumsen, L.G. "Modelling Transport" 3rd Edition, Wiley, 2001.

Taylor, M.A.P, Young, W. and Bonsall, P.W., "Understanding Traffic Systems: Data, Presentation and Analysis", Avebury Technical Books: Aldershot, 1996.

Norbert Oppenheim, "Urban Travel Demand Modelling", John Wiley & Sons. Inc., 1995.

Michael J. Burton, "Introduction to Transportation Planning", 3rd Edition, Hutchinson & Co. (Publishers) Ltd., 1985.

<u>Reference Textbooks</u>

D.A. Hensher and K.J. Button, "Handbook of Transport Modelling", Elsevier Science, 2007.

P. Stopher and C. Stecher, "Travel survey methods: quality and future directions", Elsevier, 2006.

C.S. Papacosta and P.D. Prevedouros, "Transportation Engineering and Planning", Pearson Prentice Hall, 2005.

J.D. Fricker and R.K. Whitford, "Fundamentals of Transportation Engineering: A Multimodal Systems Approach", Pearson Prentice Hall, 2004.</td></tr>
</table>

	E. Cascetta, “Transportation Systems Engineering: Theory and Methods”, Springer, 2001. C.A. O’Flaherty, “Transport Planning and Traffic Engineering” 4th Edition, Butterworth-Heinemann, 1996. Yosef Sheffi, “Urban Transportation Networks”, Prentice Hall, Inc., 1985. John W. Dickey, "Metropolitan Transportation Planning", Scripta Book Company, 1975. B.G. Hutchinson, "Principles of Urban Transport Systems Planning", McGraw-Hill, 1974.

Subject Description Form

Subject Code	CSE490
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 management and maintenance.
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 classify major pavement defects and the application of various pavement maintenance techniques.
Subject Synopsis/ Indicative Syllabus	1. ***The Transport System*** **:** The function of transport; the elements of transport system; the system concept as applied to transport and distribution. 2. ***The Structure and Management of Transport Organisation*****:** The pattern of ownership and scale of operation; organisation structures; management function and practices; policy formulation and planning of strategies. 3. ***Road Traffic Management*****:** Highway classification; parking control; principles of junction control and area traffic control; corridor control; traffic surveillance and regulations. 4. ***Pavement Management System*****:** Maintenance Assessment Rating and Costing for Highway (MARCH); pavement maintenance and rehabilitation strategy; pavement performance prediction; economic analysis and network optimization. 5. 5. ***Highway Maintenance*****:** 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 (Please tick as appropriate)							
		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	6 Hrs.
Other student study effort:	
▪ Reading and studying	60Hrs.
▪ Completing of Assignments/Reports	26Hrs.
Total student study effort	128Hrs.

Reading List and References

Essential Textbooks
Gubbins, E.J., *Managing Transport Operations*, Kogan Page (1988).
Hibbs, J., *Bus and Coach Management*, Chapman & Hall (1985).
Macpherson, G., *Highway & Transportation Engineering & Planning*, Longman (1993).
White, P.R., *Public Transport: Its Planning, Management and Operation*, 2nd Ed., Hutchinson (1986).
Taylor, M.A.P, Young, W. and Bonsall, P.W., "Understanding Traffic Systems: Data, Presentation and Analysis", Avebury Technical Books: Aldershot, 1996.

	Reference Textbooks Benson, D. and Whitehead, G., *Transport and Distribution*, Longman (1985). Gilmour, P. *Total Quality Management*, Longman (1995). Keys, P. and Jackson, M.C., *Managing Transport Systems*, Gower (1985). Research & Development Division, MARCH 2 *Inspection Training Guides for Works Supervisors*, Highways Department (1988). Stubbs, P.C., *Transport Economics*, Allen & Unwin, 1984. Trvelove, P., *Decision Making in Transport Planning*, Longman (1992). C.S. Papacosta and P.D. Prevedouros, "Transportation Engineering and Planning", Pearson Prentice Hall, 2005. Reference Journals Bus and Coach Management Highways & Transportation (IHT Journal) Management Today (BIM Journal) Transportation research record Transport (CIT Journal)

Subject Description Form

Subject Code	CSE508
Subject Title	Environmental Impact Assessment
Credit Value	3
Level	5
Pre-requisite / Co-requisite/ Exclusion	Recommended background knowledge: Engineering or applied science undergraduate background.
Objectives	To provide students with an overview and understanding of the principles and current practices of environmental impact assessment (EIA). In particular, emphasis will be placed on environmental impact assessment studies relevant to Hong Kong.
Intended Learning Outcomes	Upon completion of the subject, students will be able : a. to conduct EIA studies in a team; b. to perform environmental monitoring work within the EIA cycle; c. to critically comment EIA reports and other related documents; d. to be able to analyse complex environmental issues and to seek the best possible practical solutions for large infrastructural development project; and e. to understand the relationship among project EIA, Strategic Environmental Assessment (SEA) and sustainable development.
Subject Synopsis/ Indicative Syllabus	**Keyword syllabus**: i) Development of Environmental Impact Assessment Historical review. Environmental assessment development in the world and Hong Kong. ii) Scope and Objectives of Environmental Impact Assessment Environmental considerations: land use, planning, development and management. EIA aims and objectives. Environmental assessment and sustainable development. iii) Methodology and Assessment Techniques Methods for assessing direct impacts and indirect impacts. Modeling and miscellaneous assessment techniques. Methods for air, water, noise and ecology assessment. Other environmental issues (risk, visual, cultural and social-economical impacts). iv) Monitoring and Baseline Studies Environmental effects. Baseline studies requirements. Special field studies. Environmental monitoring and audit. Air, water, ecological, socioeconomic, visual, risk impact assessments. Environmental quality and regulatory requirements. Mitigation and control measures. v) Environmental Impact Statement Role of Environmental Impact Statement, Statement Scope & Content, Report writing techniques. vi) Case Studies Selected case studies on the EIA of infrastructure and other development projects.
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 and term project (individual cases study) on EIA in Hong Kong.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below. Written examination is evaluated by final examination. Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.
Reading List and References	The following texts provide the majority of the basic materials to be covered in lectures. Students will need to study other publications including case studies. Barbara Caroll, 2002. *Environmental Impact Assessment Handbook: A Practical Guide for Planners, Developers and Communities*. Thomas Telford, London. Canter, L.W., *Environmental Impact Assessment*, 2nd Ed., McGraw-Hill, (1996). Christopher Wood. 2003. *Environmental Impact Assessment: A Comparative Review*. Prentice Hall, New Jersey. Riki Therivel, Peter Morris, 2001. *Methods of Environmental Impact Assessment*, Spon Press, London. Hong Kong Environmental Protection Department http://www.epd.gov.hk/eia/

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a.	b.	c.	d.	e.	
1. Continuous Assessment	50%	√	√	√	√	√	
2. Written Examination	50%	√	√	√	√	√	
Total	100 %						

Subject Description Form

Subject Code	CSE535
Subject Title	Land Transport and Environment
Credit Value	3
Level	5
Pre-requisite / Co-requisite/ Exclusion	Recommended background knowledge: Advanced Level or equivalent in Mathematics or Physics
Objectives	Land transportation system includes rail and road infrastructures. The economy and the social activities of Hong Kong, as an urban city, rely heavily on an efficient land transportation system. The system, however, has many environmental impacts. This subject focuses on the inter-relationship of the planning, construction and operation of an efficient transportation system with their associated environmental impacts. Techniques to minimize these impacts are discussed and illustrated with examples.
Intended Learning Outcomes	Upon completion of the subject, students will be able : a. to identify and assess critically real-life problems and challenges, both technological and non-technological, in land transportation system design and development; b. to devise possible strategies independently and measures to address the problems and issues encountered; c. to communicate effectively problems, issues, options of measures to stakeholders; and d. to work efficiently as a team member in group work.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** i) Introduction of land transport infrastructure development Elements of land transport system; trend of development; planning procedure; future developments. ii) Design considerations of land transport development Capacity and safety; cost benefit analysis; existing land use pattern constraint; information technology and management; environment and ecology. iii) Transport pollution Land, air, noise, and water pollution; vibration and visual intrusion. iv) The EIA process Environmental Impact Assessment (EIA) Ordinance; terms of reference of EIA Studies; EIA methods and guidelines. v) Pollution control measures Land use planning; legislation and education; alternative fuels; after-treatment technologies.

Teaching/Learning Methodology	Lectures will cover the basic design and analytical concepts of land transportation systems as well as its inter-relationships with the environment; Assignments will cover real-life issues involving land transportation system design, construction and operation; students will be required to collect, collate, analysis relevant information in these assignments as well as write report on their works and findings; and Presentations by students and discussions in tutorials will enable students to communicate effectively and exercise their critical thinking of issues involved.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a.	b.	c.	d.		
1. 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 two groups assignments and presentations made by individual students.

Written examination is evaluated by final examination.

Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Reading List and References	**Essential textbooks** *Methods of environmental impact assessment* / edited by Peter Morris and Riki Therivel, London ; New York : Routledge, 2009. 3rd edition. *Building blocks for sustainable transport: obstacles, trends, solutions*, Bingley: Emerald Group Pub., Ltd., 2008. *Urban transport and the environment: an international perspective* / World Conference on Transport Research Society and Institute for Transport Policy Studies. Amsterdam: Elsevier, 2004. *Environmental Impact Assessment Ordinance* 1997. *Environment Hong Kong (Annual report)*. Hong Kong, Government Printer. *Environmental Impact Assessment Ordinance: Technical Memorandum*. Environmental Protection Department , 1997. *Highway Pollution* / edited by Hamilton R.S. and Harison R.M., Elsevier Science Publisher, Amsterdam, 1991.

	Transport Planning Design Manual Vol.6.7, Transport Department. **Reference readings** Hung, W.T., *Environmental Neglect In Transport Policy*, Modern Transport in Hong Kong for the 21st Century Conference and Public Forum held in 30 April and 1 May 1999. Hung, W.T (1994) *The Environment In The Other Hong Kong Report*, ed. D.H. McMillen, and S.W. Man, pp 253-264. Hong Kong: The Chinese University Press. Hung, W.T. (1997) *Transport And Infrastructure Development In The Other Hong Kong Report*, ed. Y.S. Cheng, pp 377 - 392, Hong Kong, The Chinese University Press. Tong, H.Y., Hung, W.T. and Cheung, C.S., *Development Of A Driving Cycle Of Hong Kong:, Atmospheric Science 33* (1999) Elsevier Science, pp 2323-2325. Tsang, K.S., Hung, W.T. and Cheung, C.S. (2011), "Emissions and fuel consumption of a Euro 4 car operating along different routes in Hong Kong", Transportation Research Part D: Transport and Environment, Volume 16, Issue 5, July 2011, Pages 415-422. Mak, K.L. Lee, S.H., Ho, K.Y. and Hung, W.T (2011), "Developing instantaneous tyre/road noise profiles: A note", Transportation Research Part D 16 (2011) 257–259

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 civil 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** i) Overall Framework Public transport operations and plannings process; tradeoffs between services; standard versus mini-vehicle; public transport planning studies; transit modes and technologies. ii) Data Collection Methods Manual and automated data collection techniques; automatic vehicle monitoring; sampling considerations; operations surveys: passenger load counts, boarding and alighting checks, transit speed and delay studies. iii) Frequency and Headway Determination Analyzing passenger load and running time data; four methods for frequency and headway determination; examples of the four methods; cost-effectiveness criteria. iv) Timetable Development Current practice; alternative timetables; timetables with evenly spaced headways; timetables with even loads; automated timetables with examples; experiences with computer programs. v) Vehicle Scheduling An experience with an optimization scheduling method; graphical and optimal method for an interactive system; fixed and variable schedules; minimum fleet size; deadheading considerations. vi) Service Reliability Variability of concern to passengers and operator; the bunching phenomenon; improving reliability; passenger waiting time; vehicle running time; AVL (automatic vehicle location) systems-features and benefits. vii) Systems Analysis Recent developments; production functions and marginal analysis; sensitivity analysis; resource allocation and transportation problems. viii) Transit Network and Modelling Process Current practices; establishing objective functions; transit network building; demand assignment and initial frequency determination; optimal criteria and best solutions with flexibility for decision makers. ix) Design & Evaluation of Public Transport Priority Measures Important elements in providing preference to public transport; priority schemes; design and evaluation; applications of information technologies in public transport. x) Field/Laboratory Work This course will be augmented by laboratories: public transport network building and demand assignment; boarding and alighting counts, on-board surveys, and on-site case studies.
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 will also be invited to give lectures on current issues of public transport planning in Hong Kong.

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

Continuous assessment will be based on coursework and case study discussions.

Written examination is evaluated by final examination.

Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Reading List and References

Textbooks

Ceder, A., *Public Transit Planning and Operation: Theory, Modeling, and Practice,* Butterworth-Heinemann (2007).

Richard de Neufville, *Applied Systems Analysis – Engineering Planning and TechnologyManagement*, , McGraw-Hill Publishing Company (1990).Lam, W.H.K. and Bell, M.G.H., *Advanced Modeling for Transit Operations and Service Planning*, Pergamon, Elsevier Science Ltd., Oxford (2003).

Wilson, N.H.M. and Nuzzolo, A., *Schedule-based Dynamic Transit Modeling: Theory and Applications*, Kluwer Academic Publishers, London (2004).

Vuchic V.R., *Urban Transit: Operations, Planning and Economics*, John Wiley & Sons, Inc. (2005).

Reference Books

Bruton, Michael J., *Introduction to Transportation Planning*, 3rd Ed., Hutchinson (1985).

De Neufville, Richard and Stafford, Joseph H., *Systems Analysis for Engineers and Managers*, McGraw-Hill Book Company (1971).

Ortúzar, J. de D. and Willumsen, L.G., *Modelling Transport*, 3rd Ed., John Wiley & Sons (2001).

Conference Proceedings and Symposia

Proceedings of the HKSTS Conferences - Hong Kong Society for Transportation Studies *(www.hksts.org)*

Proceedings of the International Symposium on the Theory of Traffic Flow and Transportation (ISTTT) – www.isttt.org

Proceedings of the Conference on Advanced Systems for Public Transport (CASPT) – www.caspt.org

Journals

Accident Analysis and Prevention

Bus and Coach Management

Journal of Advanced Transportation

Journal of the Transportation Research Board

Journal of Transportation Engineering, the American Society of Civil Engineers

The journal – Public Transport: Planning and Operations

Traffic Engineering and Control

Transport Policy

Transportation Research

Transportation Science

Transportmetrica

Reports

Technical reports by the Traffic and Transport Survey Division, Hong Kong Government

Transportation Research Records, Transportation Research Board

Transport Planning and Design Manual, Hong Kong Transport Department

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 civil 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** i) 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. ii) Traffic Studies and Analysis Volume studies; speed studies; travel time and delay studies; capacity analysis; parking studies; data collection technique. iii) Traffic Management Techniques Urban transportation problems; comprehensive traffic management; one way system, access control, ban turns, parking control; bus priority measures; pedestrian measures. iv) Junction Design and Control Types of at-grade junction; design of signal controlled junctions, priority junctions and rotary junctions; co-ordination of traffic signal systems. v) Analytical Methods Traffic flow; volume speed flow relationship; headway and Gap Distributions; fitting distribution to mathematical functions; traffic Simulation; microscopic and macroscopic models; traffic Flow Theory; car following theory, queuing theory; practical applications of traffic flow theories. vi) Field/Laboratory Work Two Laboratories: volume count; traffic signal analysis; one assignment touching on current traffic control issue.
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	<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 (Please tick as appropriate)</td></tr><tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td><td></td><td></td></tr><tr><td>1. Continuous Assessment</td><td>30%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr><tr><td>2. Written Examination</td><td>70%</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> Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Continuous assessment will be based on courseworks and case study discussions Written examination is evaluated by final examination. Students must attain at least Grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.
Reading List and References	Allsop, R.E. (1992) *Evolving Application of Mathematical Opimisation in Design and Operation of Individual Signal-controlled Road Junctions*, in J.D. Griffiths (Ed.) Mathematics in Transport and Planning and Control, 1-24 Clarendon Press, Oxford. Derlough, D.L. and M.J. Huber (1975) *Traffic Flow Theory: A Monograph, Transport Research Board*, National Research Council, Washington D.C. Gazis, D.C. (1974) *Traffic Science*, Wiley, New York. Institution of Highways and Transportation and Department of Transport (1987) *Roads and Traffic in Urban Areas,* HMSO, London. May, A.D. (1990) *Traffic Flow Fundamental*s, Prentice-Hall, Englewood Cliff, New Jersey. McShane, W.R. and R.P. Roess (1990) *Traffic Engineering*, Prentice-Hall,

Englewood Cliff, New Jersey.

Transport Department (1984) *Highway Design Characteristics, Vol. 2*, Transport Planning and Design Manual, Hong Kong.

Transport Department (1986) *Road Traffic Signals, Vol. 4*, Transport Planning and Design Manual, Hong Kong.

Subject Description Form

Subject Code	CSE575
Subject Title	Sustainable Development Strategy
Credit Value	3
Level	500
Pre-requisite / Co-requisite/ Exclusion	Nil
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 to appreciate the method to evaluate sustainability in urban planning and rural conservation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: Category A Professional/academic knowledge and skills a. To understand the fundamentals of sustainable development strategy; b. To identify diverse problems arising from changing constraints that influence sustainable development, such as economic, environmental, and social considerations; c. To apply concept and knowledge to real life application, such as energy planning. d. To assess and discuss the ethical and social implications of actions and proposals; e. To cope with the challenges and developments in future sustainability. Category B Attributes for all-roundedness a. Communicate logically and lucidly through seminars and presentations; b. Work effectively with others in team work, and take responsibility for an agreed area of a shared activity; c. Work independently; d. Recognize the need for, and developed an ability to engage in life-long learning; e. Develop critical thinking, creative thinking, and systematic thinking in perceiving, understanding and solving practical problems.
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 to appreciate the method to evaluate sustainability in urban planning and rural conservation.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below **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.**

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
1. Project	30	√	√	√	√	√	
2. Assignment	20	√	√	√	√		
3. Exam	50	√	√	√	√		
Total	100 %						

	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 Required	Class contact:	
	▪ Lectures	30 Hrs.
	▪ Case Study and demonstration	12 Hrs.
	Other student study effort:	
	▪ Self Study	84 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	Kumar, D., Sustainable development, New Delhi: Reference Press, 2009. Susan, B., Sustainable development, Milton Park, Abingdon, Oxon; New York, NY : Routledge, 2006. Edwards, B., Green buildings pay, London; New York: Spon Press, 2003. Bailey, R., An introduction to sustainable development, London: Chartered Institution of Water and Environmental Management, 1997. Hong Kong Planning Standards and Guidelines, Planning Department, Hong Kong Government. Town Planning in Hong Kong , Planning Department, Hong Kong Government Territorial Development Strategy: Consultative Digest, Planning Department, Hong Kong Government. Online resources centre of the Sustainable Development Division, HKSAR Government (http://www.susdev.gov.hk/).	

Subject Description Form

Subject Code	EE207
Subject Title	Engineering Electromagnetics
Credit Value	2
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce to students the physical laws that govern the electromagnetic phenomena commonly encountered in electrical engineering systems. 2. To familiarise students with the techniques for solving problems in electromagnetics. 3. To provide students the foundation of electromagnetic field theory required for pursuing the EE programme.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Be able to apply mathematical techniques to formulate the fundamental field equations and to analyse electromagnetic phenomena related to electrical engineering systems. b. Select the most appropriate laws/theorems/solution techniques for electromagnetic field analysis. c. Be able to apply electromagnetic theory to the design of practical electromagnetic devices and components. d. Have had hands-on experience in electromagnetic measurements and be able to compare/appreciate different kinds of field plotting mechanisms. e. Appreciate the engineering applications of electromagnetic theory. f. Appreciate the importance of electromagnetics from a historical perspective. g. Interpret the physical meaning and phenomena behind mathematical equations and computed results.
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, energy storage.. 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. ***Maxwell's Equations and EM Waves*:** Maxwell's equations in integral form as a restatement of fundamentals. The continuity equation. The displacement current. Non-mathematical description of a plan-polarised wave. 4. ***Material Media*:** Dielectric material: dipole, polarisation, permittivity and capacitors. Ferromagnetism: magnetisation curve, permeability, hysteresis and saturation. Magnetic circuits: magneto-motive force, reluctance and permeance, permanent magnets. Conduction field. 5. ***Solution of Static Field Problems*:** Hand-mapping, method of images, numerical and computer-based methods. Estimation of conductance, inductance, capacitance and field quantities from field plots. **Laboratory Experiments:** Field plotting using the Electrolytic tank. Field plotting using the resistive paper.
Teaching/Learning Methodology	The main teaching methods used to convey the basic concepts and fundamental theories are lectures and tutorials. The laboratory sessions are used to help the students to have an in-depth understanding of the fundamentals of electromagnetic and apply the fundamental theory and knowledge learned to practice.

Teaching/Learning Methodology	Outcomes						
	a	b	c	d	e	f	g
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	g			
1. Examination	60%	√	√	√			√	√			
2. Test	25%	√	√	√			√	√			
3. Laboratory	10%			√	√	√					
4. Home work or in-class exercises	5%	√	√	√			√	√			
Total	100%										

The outcomes on mathematical techniques, basic concepts and theories are assessed by the usual means of examination and test whilst those on hands-on experience in electromagnetic measurements, engineering applications are evaluated by the experiments and reports.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	28 Hrs.
	▪ Laboratory	6 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	10 Hrs.
	▪ Self-study	24 Hrs.
	Total student study effort	68 Hrs.

Reading List and References

Reference books:

1. W.H. Hayt, and J.A. Buck, Engineering Electromagnetics, 7th Edition, Boston: McGraw Hill, 2006

Subject Description Form

Subject Code	EE3021
Subject Title	Electromechanical Energy Conversion
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To provide students a general knowledge on common types of electric machines. 2. To provide students the basic techniques of steady-state electric machine analysis.
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. ***Transformers:*** Operating principles. Equivalent circuits. Voltage regulation and efficiency. Parallel operation. Three-phase transformers and phase grouping. 4. ***Windings*:** Phase and commutator windings. Winding factors. E.m.f. equation. Harmonics. Production of rotating field. 5. ***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. 6. ***Synchronous machines*:** Construction. Synchronous impedance. Voltage regulation. Synchronising. Performance on infinite busbars. Power/load angle relationship. Stability. Synchronous motor. 7. ***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. Tests	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	36 Hrs.
	▪ Laboratory	12 Hrs.
	Other student study effort:	
	▪ Revision, self-study, and assignment	48 Hrs.
	▪ Write-up of laboratory reports	9 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. C.G. McPherson and R.D. Laramore, An Introduction to Electrical Machines and Transformers, 2nd Edition, NY: John Wiley and Sons, 1990
2. S.A. Nasar, Schaum's Outline of Electric Machines and Electromechanics. NY: Macmillan Publishing Company, 1998

Subject Description Form

Subject Code	EE3031
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.
Intended Learning Outcomes	Upon completion of the subject, students will: a. Be able to explain both verbally and in written form major semiconductor devices that can be used as switches, and their electrical characteristics which include basic idealised models as well as extension to some important non-ideal characteristics. b. Be able to explain the processes of efficient energy conversion through the use of power semiconductor switches. c. Be able to apply the concepts of switching power conversion to analyse a variety of circuits including: i. DC to DC conversion ii. AC to DC conversion iii. DC to AC conversion d. Be able to present the results of study and experiments in the form of a technical report.
Subject Synopsis/ Indicative Syllabus	1. ***Power electronics fundamentals*:** power conversion, energy balance principle, review of fundamentals. 2. ***Power semiconductor devices*:** Diodes**,** Power Transistor, MOSFET, SCR, GTO, IGBT, switching characteristics. 3. ***DC-DC converters*:** Buck, Boost and Buck-Boost DC-DC Converter, Duty Cycle Controller, Switched Mode Power Supply. 4. ***AC-DC rectifiers*:** Uncontrolled and controlled single-phase and three-phase rectifiers, terminal characteristics, supply and load interactions. 5. ***DC/AC inverters*:** Basic Single-phase bridge inverters, voltage and frequency control, harmonic reduction. 6. ***Electric drive systems*:** Introduction to electric drives system, applications for conservation of energy, dc electric drives. **Laboratory Experiment:** DC/DC Buck Converter, Introduction to SCR circuits, PSPICE simulation of SCR Bridge.

Teaching/Learning Methodology	Lectures and tutorials are effective teaching methods: 1. To provide an overview or outline of the subject. 2. To introduce new concepts and knowledge to the students. 3. To explain difficult ideas and concepts of the subject. 4. To motivate and stimulate students interest. 5. To provide students feedback in relation to their learning. 6. To encourage students responsibility for their learning by extra reference books reading and computer-based circuit simulations. Laboratory works is an essential ingredient of this subject: 1. To supplement the lecturing materials. 2. To add real experience for the students. 3. To provide deep understanding of the subject. 4. To enable students to organise principle and challenge ideas.

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

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. Ned. Mohan, Tore M. Undeland, William P. Robbins, Power Electronics: Converters, Applications & Design, 3rd Edition, Wiley, 2003
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
5. P.C. Sen, Principles of Electric Machines and Power Electronics, 2nd Edition, Wiley, 1996
6. W. Shepherd, Power Electronics and Motor Control, 2nd Edition, Cambridge University Press, 1996

Subject Description Form

Subject Code	EE3041
Subject Title	Power Transmission and Distribution
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce students to the fundamental knowledge which is essential for all electrical power engineers. It leads to a deeper insight into the design, planning, operation, equipment characteristics and environmental impacts of modern electrical power systems.
Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired the fundamental knowledge and analytical techniques on electrical power systems. b. Be able to identify, analyze, and solve technical problems to power system design, planning, and operation, making use of mathematics and engineering techniques. c. Be able to work in teams when conducting laboratory investigations. d. Be able to write a technical report and present the findings.
Subject Synopsis/ Indicative Syllabus	1. ***Generation, energy and environment*:** Renewable and non-renewable resources and generation. Pump storage and wind turbine. Sources of pollution and environmental impacts. 2. ***Power system components*:** Busbar**.** Turbine and generator system. Concept of generation control and operating chart. Power Transformers. Line and Cable: RLCG and ABCD parameters and applications. 3. ***Reactive power and voltage control*:** Voltage drop and power loss calculation. Voltage control using tap-changing and booster transformer, regulator, series and shunt compensation. Reactive power flow. Power factor improvement and bulk tariff. 4. ***Surges*:** Travelling wave, surge impedance and standing voltage. Lightning and switching surges. Surge mitigation, reflection and refraction. Use of lattice diagram. Protection against overvoltage. 5. ***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. 6. ***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 the students are expected to solve the power system design, planning, and operation problems with practical constraints and to attain pragmatic solutions with critical and analytical thinking. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

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

Assessment Methods in Alignment with Intended Learning Outcomes	

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

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

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Textbooks:

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

Reference Books:

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

Subject Description Form

Subject Code	EE309
Subject Title	Control Systems and Signal Processing
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA201
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 introduce the constraints in practical signal measurement, system modelling and controller design process; 4. To provide the foundation on signal processing algorithms for the later subjects; and 5. To develop in-depth applications of concepts and design techniques in digital control, filtering and signal processing.
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; d. Demonstrate basic problem-solving on using systematic approach; e. Present the findings through reports and demonstrations; and f. Work efficiently in a team to accomplish the assessment tasks by solving real-life engineering analysis and design problems.
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; wavelet transforms; computation of convolution and correlation, autocorrelation, cross correlation, estimation of signal in noise. **Laboratory Experiments:** Transient response analysis of continuous systems Three-term controller Digital controllers Digital signal analysis and filter design

Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on system controller simulation and practical designs are given through laboratory experiments where students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking. On-the-spot assessments are conducted in the laboratory to provide additional incentives for student learning. Experiments are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information; it also provides a platform for problem based learning.

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed									
		a	b	c	d	e	f				
1. Examination	60%	√	√	√	√						
2. Class Test	15%	√	√	√	√						
3. Laboratory performance and reports	15%	√	√	√	√	√	√				
4. Assignment reports	10%	√	√	√	√	√	√				
Total	100%										

The assessment methods include an examination, a class test, and written assignment in the form of laboratory performance and reports and assignment reports. The examination and class test assess the technical competence of students in control systems and signal processing. The written reports assess the students' ability to apply the theories learned in class to laboratory practice and practical project, to interpret the results and observations obtained through laboratory practices, and to communicate in written form.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
▪ Laboratory	12 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	12 Hrs.
▪ Self-study	42 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. K. Ogata, Modern Control Engineering, 4th Edition, Prentice-Hall, 2002
2. R. C. Dorf and R. H. Bishop, Modern Control Systems, 10th Edition, Prentice-Hall, 2004
3. N. S. Nise, Control Systems Engineering, 4th Edition, Wiley, 2003
4. G.F. Franklin, J.D. Powell and M.L. Workman, Digital Control of Dynamic Systems, 3rd Edition, Addison-Wesley, 1997
5. B.C. Kuo, Digital Control Systems, 2nd Edition, Oxford University Press, 1995
6. K. Ogata, Discrete-time Control Systems, 2nd Edition, Prentice Hall, 1995
7. R. Kuc, Introduction to Digital Signal Processing, McGraw Hill, 1988

Reference books:

1. B. C. Kuo, Automatic Control Systems, 7th Edition, Prentice-Hall, 1995
2. J. Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1989
3. E. Ifeachor and B. Jervis, Digital Signal Processing: A Practical Approach, Addison-Wesley, 1993

Subject Description Form

Subject Code	EE310
Subject Title	Safety in Systems Engineering
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce to students the importance of safety analysis from the system perspective; 2. To familiarise students with the techniques of safety analysis and system assurance; 3. To introduce to students the standards and professional organisations and authorities in safety audit and assurance practice; and 4. To provide students with the difficulties and applications of safety management in transportation systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Be able to conduct simple safety analysis for an engineering system on the system level; b. Select the most appropriate techniques for safety analysis and management; c. Understand and follow the safety audit and standard requirements set by corresponding professional organisations and authorities; d. Be able to interpret system assurance reports and to appreciate the values of safety management in system reliability; e. Be able to work in a team environment effectively and efficiently to solve case studies involving real life examples relating to safety issues; and f. Develop communication skills by reports and presentations to demonstrate the findings out of the study
Subject Synopsis/ Indicative Syllabus	1. ***Safety analysis techniques*:** Fault tree analysis, event tree analysis. Hazard identifications. Hazard and operability studies. 2. ***System reliability and survivability analysis*:** Life data analysis, accelerated life testing. Failure distributions, time to failure, maintainability, availability. Reliability block diagrams. 3. ***Hazards and risk analysis*:** Cost benefit analysis. Qualitative and quantitative risk analysis. System safety modelling, classification of safety critical items. Failure mode and effect analysis. 4. ***Safety audit and monitoring*:** Safety committee. System assurance programmes, system safety report and safety case. Hazard management organisation. 5. ***Human-machine interfaces*:** Usability engineering cycle. Ergonomics, engineering psychology, interface protocols. Human factors and system safety. 6. ***Safety Standards:*** Safety integrity level and software. International standards and their applications. 7. ***Safety of new technologies:*** Risk analysis and management, safety and system assurance programmes.

Teaching/Learning Methodology

Lectures and tutorials are the primary means of conveying the basic concepts and theories. Guest lectures/industrial seminars on selected topics will be given through out the semester to help students' knowledge in real-life safety issues and to attain comprehensive understanding with critical and analytical thinking. Interactive sessions are introduced to encourage better preparation and hence understanding of the subject. Student group and individual presentations will be conducted to provide additional incentives for student learning and to widen the horizon of student's understanding of safety issues in realistic engineering practice. Assignment reports are designed to supplement the lecturing materials with more practical understanding 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	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	10%	√	√	√	√						
3. Presentations	15%	√	√	√	√	√	√				
4. Final report	15%	√	√	√	√	√	√				
Total	100%										

The assessment methods include an examination, a class test, presentations and written assignment in the form of a final studies report. The examination and class test assess the technical competence of students in safety in systems engineering. Presentations assess students' ability in oral communications and presentation skills. 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	36 Hrs.
▪ Industrial seminars	6 Hrs.
Other student study effort:	
▪ Presentation preparation/report	18 Hrs.
▪ Self-study	45 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. J.D. Andrews and T.R. Moss, Reliability and Risk Assessment, Longman, 1993
2. B.S. Dhillon, Reliability, Quality and Safety for Engineers, CRC Press, 2005
3. E. Zio, An Introduction to the Basics of Reliability and Risk Analysis, World Scientific Publishing, 2007

Subject Description Form

Subject Code	EE3502
Subject Title	Summer Practical Training
Credit Value	3 training credits (not counted towards GPA)
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To give the students an exposure to the industrial/engineering working environments before they complete their formal education. 2. To explore and extend their understanding of engineering study in a broader perspective. 3. To enrich students' all-round and/or global learning experience.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Develop and deliver a learning portfolio for presenting learning experiences and outcomes. b. Demonstrate the awareness of the practical contexts in engineering. c. Appreciate the work of others in an industrial/engineering working. d. Develop a resourceful and speculative approach in making contacts and sourcing information. e. Demonstrate good working practices to show a developing maturity and sense of responsibility.
Subject Synopsis/ Indicative Syllabus	**INDICATIVE CONTENT** In order to ensure that students have useful experience, the summer practical training must be suitably chosen and properly organized. Students are expected to carry out a minimum of 6 weeks (3 credits) industrial training with at least 2 weeks (1 credit) of valid WIE activities as recognized by the University. Students are required to indicate the expected training experiences prior to the commencement of their placement, as well as to submit a learning portfolio to report on the learning outcomes and achievements. Accordingly, the following learning support activities will be coordinated. **(I) Orientation** Students should start their preparatory work by the commencement of the second semester of their second 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 should maintain a weekly training journal to identify their progress of their training. The weekly journal may include: ◆ **Location**: Summarise 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 fulfil the work responsibilities. Describe how the knowledge and skill set evolved during the work experiences. Explain how these are relevant to the academic studies and future goals. ◆ **Outcome**: Describe the placement experiences and major achievements with concrete examples. **(III) Learning Evaluation** After returning from the practical training, students are required to submit a learning portfolio about the work term experience. It provides an opportunity for the student to reflect upon the learning gained at the work site. The framework of the portfolio includes: ◆ **Collection**: students collect relevant artifacts produced for the employer during the work term and/or from company interviews etc. ◆ Selection: students examine what has been collected to decide what should be included into the learning portfolio. ◆ **Reflection**: students articulate their thinking about each piece in the portfolio, as well as on the entire portfolio. Through this process of reflection, students draw connections between work experience and university-based learning, construct new knowledge, and become increasingly aware of themselves as learners. ◆ **Direction**: after reflection on their workplace experience, students set goals and directions for future learning, such as formulate the objectives of their Final Year Project. **Examples of valid WIE activity** ◆ Full-time placement in a suitable organization as part of a sandwich programme. ◆ Summer placement in a suitable organization participating in the Preferred Graduate Development Programme. ◆ Any other placement in any suitable external organization for a specified period of time. ◆ Relevant placement as student helpers in PolyU administrative departments and the Industrial Centre. ◆ Assisting in PolyU activities that have an external collaboration or service component such as, Innovation and Technology Fund projects, RAPRODS projects, IGARD projects, high-level consultancy projects, collaborative research projects that were undertaken with external organizations, jobs undertaken by the Industrial Centre as a service for an external organization. ◆ Placement within the IAESTE (International Association for the Exchange of Students for Technical Experience) Programme in which the student is attached to a workplace abroad during the training. The student works on his final-year degree project which involves an industrial partner or external client. The student need not be placed in the company but make frequent visits to ensure that the project will meet the specifications required by the company/client.
Teaching/Learning Methodology	Through on-the-job work placements, students learn to connect classroom theory with practical workplace applications, prepare themselves for the realities of workplaces and develop their generic skills in a real working setting. In addition to the orientation, students consult with teaching staff on a one-to-one basis. Teaching/Learning Methodology: Industrial placement — Outcomes: a √, b √, c √, d √, e √
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. Learning Portfolio — 80% — √ √ √ √ √ 2. Placement Questionnaire — 20% — √ √ √ √ Total — 100% The outcomes on this subject are assessed by means of student learning portfolios as well as questionnaire to industrial supervisors.
Student Study Effort Expected	Class contact: — Other student study effort: — ▪ Industrial Placement — 6 weeks Total student study effort — 6 weeks
Reading List and References	Nil

Subject Description Form

Subject Code	EE4001
Subject Title	External Industrial Training
Credit Value	22 training credits
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To give the students an exposure to the industrial/engineering working environments before they complete their formal education. 2. To explore and extend their understanding of engineering study in a broader perspective. 3. To enrich students' all-round and/or global learning experience.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Develop and deliver a learning portfolio for presenting learning experiences and outcomes. b. Demonstrate the awareness of the practical contexts in engineering. c. Appreciate the work of others in an industrial/engineering working. d. Develop a resourceful and speculative approach in making contacts and sourcing information. e. 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 44 weeks (22 credits) industrial training with at least 2 weeks (1 credit) of valid WIE activities as recognized by the University. Students are required to indicate the expected training experiences prior to the commencement of their placement, as well as to submit a learning portfolio to report on the learning outcomes and achievements. Accordingly, the following learning support activities will be coordinated. **(I) Orientation** Students should start their preparatory work by the commencement of the second semester of their second 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 placement. A training tutor will then be allocated. Preferably, students should be trained under Scheme 'A' or 'C' under the training programmes of the local industrial organisations. For Scheme 'A', the training programme is approved by the Hong Kong Institution of Engineers, while for Scheme 'C', the programme is planned by the organisations with the advice of the EE industrial liaison group. Training will take place under the joint supervision of an industrial supervisor who will be a professional engineer appointed by the firm to which the trainee is attached, and a PolyU training tutor appointed by the Department. The latter shall be a Corporate Member of an appropriate Engineering Institution. **(II) Progress Monitoring** During the practical training, students should maintain a monthly training journal to identify their progress of their training. If applicable, site visits will be arranged by the training tutor during the industrial training. The monthly journal may include: ◆ **Location:** Summarise 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 fulfil the work responsibilities. Describe how the knowledge and skill set evolved during the work experiences. Explain how these are relevant to the academic studies and future goals. ◆ **Outcome:** Describe the placement experiences and major achievements with concrete examples. **(III) Learning Evaluation** After returning from the practical training, students are required to submit a learning portfolio about the work term experience. It provides an opportunity for the student to reflect upon the learning gained at the work site. The framework of the portfolio includes: ◆ **Collection:** students collect relevant artifacts produced for the employer during the work term and/or from company interviews etc. ◆ **Selection:** students examine what has been collected to decide what should be included into the learning portfolio. ◆ **Reflection:** students articulate their thinking about each piece in the portfolio, as well as on the entire portfolio. Through this process of reflection, students draw connections between work experience and university-based learning, construct new knowledge, and become increasingly aware of themselves as learners. ◆ **Direction:** after reflection on their workplace experience, students set goals and directions for future learning, such as formulate the objectives of their Final Year Project. **Examples of valid WIE activity** ◆ Full-time placement in a suitable organization as part of a sandwich programme. ◆ Summer placement in a suitable organization participating in the Preferred Graduate Development Programme. ◆ Any other placement in any suitable external organization for a specified period of time. ◆ Relevant placement as student helpers in PolyU administrative departments and the Industrial Centre. ◆ Assisting in PolyU activities that have an external collaboration or service component such as, Innovation and Technology Fund projects, RAPRODS projects, IGARD projects, high-level consultancy projects, collaborative research projects that were undertaken with external organizations, jobs undertaken by the Industrial Centre as a service for an external organization. ◆ Placement within the IAESTE (International Association for the Exchange of Students for Technical Experience) Programme in which the student is attached to a workplace abroad during the training. The student works on his final-year degree project which involves an industrial partner or external client. The student need not be placed in the company but make frequent visits to ensure that the project will meet the specifications required by the company/client.

Teaching/Learning Methodology	Through on-the-job work placements, students learn to connect classroom theory with practical workplace applications, prepare themselves for the realities of workplaces and develop their generic skills in a realistic working setting. Other than the orientation meeting, students will consult with teaching staff on a one-to-one basis.

Teaching/Learning Methodology	Outcomes				
	a	b	c	d	e
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	e					
1. Learning Portfolio	80%	√	√	√	√	√					
2. Placement Questionnaire	20%		√	√	√	√					
Total	100%										

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

Student Study Effort Expected

Class contact:	
Other student study effort:	
▪ Industrial Placement	42 weeks
Total student study effort	42 weeks

Reading List and References

Nil

Subject Description Form

Subject Code	EE4031
Subject Title	Power Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3041
Objectives	1. To provide students with a sound knowledge of modern power systems, which is essential for all electrical power engineers to understand power system operation and control. It also provides a continuation of study of power systems in level 3 subject EE3041 "Power transmission and Distribution" and lead to more advanced topics of power systems study in final year electives.
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 communication skills with others in a team environment. e. Have acquired skills in presentation and interpretation of experimental results and communicate in written form
Subject Synopsis/ Indicative Syllabus	1. ***Power system load flow*:** Load flow concepts and formulation. Solution methods, including Gauss-Seidal, Newton-Raphson and Fast Decoupled Methods. Applications of load flow study to system operation. 2. ***Economic operation*:** Generation costs. Equal incremental cost. B coefficients. Penalty factor. Multi-area coordination. Unit commitment. AGC and coordination. 3. ***Power system control*:** Generator control systems. Speed governor systems. Load sharing. Load frequency control. Interconnected area system control. Voltage control loop. Automatic voltage regulator. AVR models and response. 4. ***Power system stability*:** Steady state and transient stability. Equal area criterion. Time domain solution of swing curves. Multi-machine stability. Stability improvement. Excitation and governor control effects. Dynamic equivalents. 5. ***Power system operation*:** Power System control configurations. Security concepts. Scheduling and coordination. Supervisory control and data acquisition. Computer control, communication and monitoring systems. Man-machine interface. Load forecasting. Energy management systems. Power quality. Power system regulation, deregulation and current issues. **Laboratory Experiment:** Power system load flow and security operation simulation of sample power system. Transient stability assessment of power system.

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 and mini-projects, in which the students are expected 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 so that the students are encouraged to take extra readings and practice specialty software tools for power system planning, operation and control.

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. Laboratory performance & report	15%	√	√	√	√	√					
3. Mini-project & report	15%	√			√	√					
4. Class test	10%	√	√	√							
Total	100%										

This comprises an examination, class tests, written assignment in the form of laboratory report and mini-project report. The examination and tests 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 experiments, to interpret the experimental results obtained and to communicate in written form.

Student Study Effort Expected		
	Class contact:	
	▪ Lecture/Tutorial	38 Hrs.
	▪ Laboratory	8 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	47 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	EE4041
Subject Title	Engineering Project Management
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Exclusion: LGT3019
Objectives	1. To introduce the concept of modern engineering project management to students. 2. To integrate theory and practical knowledge of engineering project development & execution to students. 3. To apply the principle of engineering project management to practical examples.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand engineering project management, development & execution stages. b. Analyse 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. ***Organisation structure and work breakdown*:** Organisation structures. Functional, project and matrix organisations. 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. Examples. Budget management and resource management. Project control. Computer support for project management. Case studies. Project termination.
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		
Specific assessment	%	Intended subject learning outcomes to be assessed

methods/tasks	weighting	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	42 Hrs.
Other student study effort:	
▪ Self-study	50 Hrs.
▪ Mini-project and report	13 Hrs.
Total student study effort	105 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	EE405
Subject Title	Energy Utilisation and Management in Transportation
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: CSE291 & EE3021
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.
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	42 Hrs.
Other student study effort:	
▪ Mini-project/report	15 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	EE406
Subject Title	Risk and Reliability Analysis on Asset Management
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: CSE291
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
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	36 Hrs.
	▪ Presentation	6 Hrs.
	Other student study effort:	
	▪ Case study and report	12 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, John Wiley & Sons, 1995
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, Butterworth-Heinemann, 1991

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	EE4121
Subject Title	Individual Project
Credit Value	9
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3111 (for Prog. 41070), EE3141 (for Prog. 41080), nil for Prog. 41081 and subject to the approval of the Project Coordinator
Objectives	1. The project accounts for more than 30% of the total assessment in Level 4 and it provides an opportunity for students to apply specialised professional engineering knowledge independently in the creative design, implementation, monitoring and evaluation of an engineering project. 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. The project is included in the Programme to cover some major professional and all-rounded learning outcomes and the assessment should provide evidences on how well students have achieved those outcomes.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. To apply specialized knowledge independently. b. To identify key engineering problems, to solve them and to communicate what is achieved orally and in a written report. c. To develop a project which is creative, rich in intellectual content and sufficiently challenging. d. To monitor the progress of project from concept to final implementation and testing, through problem definition and the selection of alternative solutions. e. To synthesize and apply their knowledge and analytical skills gained in various engineering domains. f. To build self confidence, demonstrate independence, and develop professionalism by successfully completing the project in a competent manner.
Subject Synopsis/ Indicative Syllabus	**Choice of Project** Projects are expected to be proposed by the students. They may also be proposed by academic members of staff, or jointly by student and staff. Industrial experience and staff research and consultancy activities are fertile ground for ideas. Project proposals must include an objective, describe the method of approach, describe any innovative features, and provide an estimate of cost. The suitability of a proposal may be judged by factors such as its intellectual level, relevance to the aims of the Programme, practicality in terms of time, funding and availability of resources. **Project Proposal** At the beginning of the project, students are required to submit a clear project proposal. The proposal should not be too long but should cover such matters as: – problem statement – brief literature research – initial problem identification – preliminary suggestion on methodology – division outline of hardware and software – preliminary time schedule – cost estimate **Interim Report** At the middle of the project period, each student has to submit an Interim Report to summarise their progress to date. This gives the supervisor a more formal opportunity than at discussions to indicate his assessment of student progress and to eliminate discrepancies if necessary. Problem cases are brought to the notice of the subject coordinator by supervisors. **Final Project Report** A good project schedule includes adequate time for preparing a report of the appropriate standard. The final report should be submitted, before the examination period, and will be given to the Assessment Panel (see Assessment below) for understanding of the student's work and for assessment purposed. To ensure that the project reports are prepared properly and of appropriate standard, students must first submit a draft of the report to the supervisor for comments before final submission. At the end of the project period, each project is assessed by an Assessment Panel of three members, including a Chairman, an independent examiner and the project Supervisor. The Chairman and the independent examiner should have sufficient knowledge of the subject area, so as to form an independent opinion of the technical merit of the project and to independently assess achievements. The Project Supervisor will provide information on student's progress, originality, initiative and ability to work independently. The Supervisor will also be in a position to contribute views on the student's technical achievement. All members of the Assessment Panel will read the project report before the assessment meeting. The Assessment Panel will reach their decision after: – listening to the student's presentation (can be a video clip), – examining him orally on his work, and – seeing a demonstration of the project's outcome (can be a video clip). In assessing the project, the panel will consider, normally with equal weight, the following aspects: a. Intellectual achievement; b. Depth of understanding of the topic and the relevant allied topics; c. Quantity and quality of work done, including design and construction of equipment, experimentation, mathematical models, program writing, verification; d. Presentation including the written report, seminar presentation and response to questions. The Chairman will ensure that all aspects of the study are thoroughly discussed by the Panel before arriving at a consensus on an overall grade to be awarded to the project. In arriving at their decision, the Panel will bear in mind their experiences in respect of the achievements in other projects in the Department in the current and previous years. If no consensus arises as to the overall grade to be awarded to the project, each panel member (i.e. the Chairman, the project supervisor and the independent examiner) will independently award grades to the project on an assessment form with written

justification for their grades. A grade from the Assessment Panel will then be derived by averaging (with the same weight) the conversion marks for the grades given by the three academics constituting the Assessment Panel.

Overall assessment: 1.00 × Continuous Assessment

(I) Formal Project Proposal

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

The contents of the proposal should include:

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

If a student decides to carry the project which he/she developed in subject EE3111 (for Prog. 41070) or EE3141 (for Prog. 41080), he/she should give details on updated materials in every section in this formal project proposal, as compared with his previously submitted work in EE3111 or EE3141.

Assessment Criteria

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

(II) The Interim Report

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

The contents of the progress report should include:

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

Assessment Criteria

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

(III) The Final Report

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

The content of the final report includes:

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

Assessment Criteria

1. *Problem identification*
2. *Conceptual Clarity and Accuracy*
3. *Technical application*
4. *Literature research*
5. *Writing quality*

(IV) The Presentation and Demonstration

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

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

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

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

Assessment Criteria

1. *Problem identification*

	2. *Conceptual accuracy and clarity* 3. *Technical Application* 4. *Success of the demonstration.* 5. *Language competence in presentation* **Note 1:** Each student has to submit/carry out all the above four components before he/she is considered to complete the FYP. **Note 2:** The final grade for the FYP will be calculated by taking the weighted average of the grades from the above four components.

Teaching/Learning Methodology

As the nature of the subject implies, there will not be many formal lectures in the subject, other than a few of 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 carried under the direction of the supervisor. Through the execution of the project plan with guidance from the supervisor, the student should be able to achieve the learning outcomes.

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

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

Student Study Effort Expected

Class contact:	
▪ Briefings	5 Hrs.
▪ Individual Discussions with supervisor	~15 Hrs.
Other student study effort:	
▪ information search, self study, execution of the project, report writing, preparation of presentation	~240 Hrs.
Total student study effort	260 Hrs.

Reading List and References

Nil

Subject Description Form

Subject Code	EE4211
Subject Title	Advanced Power Electronics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3031
Objectives	1. To provide the students with the knowledge of advanced power electronic conversion. 2. To ensure the students having an in-depth understanding of the design and control of various power electronics converters. 3. To give the knowledge of AC switched-mode conversion. 4. To provide a concept of impact of power electronics on power quality.
Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired a good understanding of basic switched-mode DC/DC topologies, operation, performance and modelling. b. Have acquired a basic understanding of resonant converter and its method of loss reduction. c. Be able to apply the switched mode techniques to inverters. d. Be able to perform study on power electronics circuit simulation. e. Be aware of the impact of electromagnetic interference (EMI) and the reduction of EMI using power electronics techniques. f. Be able to present results of study in the form of simulation, design equation and basic model and work independently and in teams when conducting laboratory investigations and power electronics circuit design.
Subject Synopsis/ Indicative Syllabus	1. ***Pulse-Width-Modulated DC/DC converters*:** Basic topologies and higher order converters, transformer-isolated topologies, snubbers, discontinuous conduction modes of operation, ripple analysis. 2. ***Resonant-Mode DC/DC converters*:** Classification, zero-current switching and zero-voltage switching techniques, quasi-resonant converters, resonant transition converters. 3. **Control and *CAD for power electronics:*** Small-signal model and control, analog and digital circuit simulation for power electronics, simulation techniques. 4. ***Switched-Mode inverters*:** Single-phase and three-phase voltage-source inverters, AC-AC conversion, Resonant inverters. 5. ***Electromagnetic interference*:** Generation of EMI, power factor, switched-mode EMI filter, International Standards., Reduction of EMI. **Laboratory Experiments:** Switched-mode power converters with parasitic components and snubbers. Resonant converters Mixed-mode circuit simulation EMC/EMI setup and measurement

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

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

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	38 Hrs.
▪ Laboratory	8 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	12 Hrs.
▪ Self-study	47 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbooks:

1. Ned. Mohan, Tore M. Undeland, William P. Robins, Power Electronics: Converters, Applications & Design, 3rd Edition, Wiley, 2003
2. K.W.E.Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

Reference books:

1. K. Billings, Switched Mode Power Supply Handbook, 2nd Edition, McGraw-Hill, 1999
2. J.G. Kassakian, M.F. Schlecht and G.C. Verghese, Principles of Power Electronics, Addison-Wesley Publishing Co., 1991

Subject Description Form

Subject Code	EE4251
Subject Title	Electric Traction and Drives
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3031 & EE4021
Objectives	1. To enable students to develop a sound understanding of operation of modern electrified railway systems. 2. To provide an appreciation of the design and application of electric drives and operation principles of railway signalling. 3. To enable students to understand the implications of design of traction and signalling systems on railway operations and traffic control. 4. To introduce to students the vital problems of electromagnetic interference and hardware design of enhanced electromagnetic compatibility. 5. To enhance students' awareness on the use of computer simulation in railway planning and operation, as well as the future technologies in railway systems.
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: Lectures: √ a, √ b Tutorials: √ a, √ c Experiments: √ c Mini-Projects: √ a, √ b, √ c
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% — c 2. Tests — 20% — a, b 3. Examination — 60% — a, b 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 — 39 Hrs. ▪ Seminar — 6 Hrs. Other student study effort: ▪ Assignment and self-studies — 60 Hrs. Total student study effort — 105 Hrs.
Reading List and References	**Textbooks:** 1. M.H. Rashid, Power Electronics: Circuits, Devices and Applications, 3rd Edition, Prentice Hall 2004 2. Managing railway operations & maintenance : best practices from KCRC / edited by Robin Hirsch ; technical co-editors, Felix Schmid, Michael Hamlyn. A & N Harris ; Birmingham : University of Birmingham Press, 2007 **Reference books/journals:** 1. J. Pachl, Railway Operation and Control. VTD Rail Publishing, Mountlake Terrace (USA) 2004. 2. Bonnett, Clifford F. Practical railway engineering, London : Imperial College Press, 2005. 3. O.S. Lock, Railway Signalling, 3rd Edition, A & C Black, 1993 4. Selected papers from IEE Proceedings – Electric Power Applications

Subject Description Form

Subject Code	EE4261
Subject Title	Fibre Optics
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: EE3131 or EIE331
Objectives	1. To introduce to students the physical laws that govern the behaviour of fibre-optics components. 2. To give students an understanding of the principles of fibre-optic sensing and optical fibre communications. 3. To equip students with the knowledge to design simple fibre-optics sensor systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the basics of generation, modulation and detection of light signals, and light transmission in optical fibres. b. Understand the functions and test the performance of various fibre-optic components and sub-systems. c. Design simple optical fibre sensors and communication systems considering the performance of the fibres (e.g., dispersion, loss) and component constraints.
Subject Synopsis/ Indicative Syllabus	1. ***Overview*:** Introduction to the significance of fibre optics for electrical engineering. Summary of applications in high-field environments. 2. ***Optical fibres*:** Propagation theory. Wave-guiding. Fibre types. Optical loss. Fibre dispersion. Mechanical properties. Special fibres. Fibre-optic cables and cable design examples. 3. ***Fibre optic connections*:** Coupling losses. Splices. Connectors. Coupling devices and techniques. Distribution systems. Devices for wavelength-division-multiplexing. 4. ***Fibre optic test methods*:** Power measurements. Fibre loss and dispersion measurements. Optical time-domain reflectometry. Reliability. 5. ***Optical sources for fibres*:** Wavelength considerations. Emitter materials. Light-emitting-diodes. Laser diodes. Emitter lifetime. 6. ***Optical detectors for fibres*:** Photo-detectors: noise, response time, materials. PIN and avalanche photodiodes. Receivers. 7. ***Optical modulation*:** Modulation of LED and laser diodes. Drive circuits. Formats for digital modulation. Direct and coherent transmission systems. Noise and error mechanisms. Receiver sensitivity and circuit design. 8. ***Optical fibre sensors*:** Extrinsic, evanescent, intrinsic sensors. Optical components for fibre sensor systems. Power transmission, actuation and safety aspects of design. Applications. 9. ***Fibre optic systems design*:** Fibre optic communication system design considerations. Attenuation and dispersion budgets. Digital system design. 10. ***Applications of fibre optics in electrical engineering*:** Optical groundwire. Enhancing power system telecommunications and control with overhead and underground fibre optic cables. Fibre optic sensors for measuring voltage, current, temperature. Location of cable faults by using optical fibre sensing. **Laboratory Experiments/Demonstrations:** Insertion loss measurement of optical fibres using optical power meters and optical spectrum analyzers Optical spectrum analyzer for spectral measurements of light sources Fibre Bragg grating sensors
Teaching/Learning Methodology	Lectures, quizzes, tests, laboratory experiments, mini-projects, and examination. Teaching/Learning Methodology — Outcomes: a, b, c Lectures: √ √ √ Tutorials: √ √ Experiments/Demonstration: √ √
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks — % weighting — Intended subject learning outcomes to be assessed (a, b, c) 1. Quizzes — 2% — √ √ √ 2. Tests — 28% — √ √ √ 3. Laboratory experiment report — 5% — √ √ 4. Mini-projects — 5% — √ √ 5. Examination — 60% — √ √ √ Total — 100% This subject introduces the physical laws that govern the behaviour of optical fibres, semiconductor light sources and detectors, and how to employ them to design simple fibre-optics sensor systems. The outcomes are assessed by quizzes, tests, mini-projects, laboratory experiments and examination.
Student Study Effort Expected	Class contact: ▪ Lecture/Tutorial — 36 Hrs. ▪ Laboratory — 12 Hrs. Other student study effort: ▪ Mini-projects — 20 Hrs. ▪ Self-study — 37 hrs. Total student study effort — 105 Hrs.
Reading List and References	**Reference books:** 1. J.M. Senior, Optical Fiber Communications-Principles and Practice, 3rd Edition, Prentice Hall, 2008 2. J.C. Palais, Fiber Optic Communications, 5th Edition, Prentice Hall, 2005 3. G. Keiser, Optical Fiber Communications, 3rd Edition, McGraw-Hill, 1999 4. G.P. Agrawal, Fiber-optic Communication Systems, Wiley, 1993 5. J. Hecht, Understanding Fiber Optics, 5th edn., Prentice Hall, 2006

Subject Description Form

Subject Code	EE4281
Subject Title	Industrial Computer Applications
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the applications of computing techniques in solving industrial problems and the following topics are included: Computer process control; Industrial instrumentation and systems; Image processing; Multimedia concepts.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Design and develop digital controllers. b. Write ladder logic for simple PLC applications. c. Understand the use of industrial networks. d. Apply image processing techniques in industrial automation.
Subject Synopsis/ Indicative Syllabus	1. ***Computer process control*:** Modelling of the computer process control system, practical approaches to digital control implementation, PLC and microcomputer-based control systems. 2. ***Intelligent instrumentation and systems*:** Embedded microcontrollers, industrial process controllers, applications of distributed digital control algorithms, industrial networks and SCADA system. 3. ***Image processing*:** Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation. 4. ***Multimedia concepts and applications*:** Multimedia fundamentals, image compression, video compression, hardware peripherals and software tools. **Laboratory Experiment:** PC based digital controller for temperature control Power failure monitoring using embedded controller Sequential control using PLC Automatic meter reading using computer vision
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.

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

Assessment		
Specific assessment	%	Intended sub ect l arning outcomes to

Methods in Alignment with Intended Learning Outcomes	methods/tasks	weighting	be assessed								
			a	b	c	d					
	1. Examination	60%	√	√	√	√					
	2. In-class Test (x2)	20%	√	√	√	√					
	3. Mini-project Report	10%	√	√							
	4. Mini-project Demo/Presentation	10%	√	√							
	Total	100%									

One end-of-semester written examination; one mid-semester-test; one end-of-semester test; a mini-project on a small micro-processor based application; and a report/demonstration/presentation to accompany the mini-project.

Student Study Effort Expected	Class contact:	
	▪ Lecture/Tutorial	36 Hrs.
	▪ Laboratory (mini-project)	12 Hrs.
	Other student study effort:	
	▪ Mini-project report and preparation	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

Reference books:

1. J.A. Rehg and G.J. Sartori, Industrial Electronics, Pearson Prentice Hall, 2006
2. A.V. Deshmukh, Microcontrollers: Theory and Applications, Tata McGraw-Hill, 2006
3. R.C. Gonzalez and R.E. Woods, Digital Image Processing, 3rd Edition, Prentice Hall, 2008
4. T. Vaughan, Multimedia: Making It Work, 7th Edition, McGraw-Hill, 2008

Subject Description Form

Subject Code	EE4341
Subject Title	Intelligent Systems Applications in Electrical Engineering
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce students to the fundamentals of intelligent systems and their applications in Electrical Engineering including electrical power systems, control and utilization.
Intended Learning Outcomes	Upon completion of the subject, students will: a. Have acquired a good understanding of the fundamental concepts and characteristics and methodologies of intelligent systems. b. Be able to Appreciate the power and usefulness of intelligent techniques. c. Be able to Know the design of artificial intelligence systems, evolutionary computation algorithms, uncertainty representation and reasoning mechanisms. d. Be able to integrate the intelligent system approaches in real-life electrical power engineering problems and control problems. e. Have acquired communication skills with others in a team environment. f. Have acquired skills in presentation and interpretation of mini-project results and communicate in written form
Subject Synopsis/ Indicative Syllabus	1. ***Knowledge-based intelligent systems*:** Concepts and theory. Knowledge representation techniques. Structure of a rule-based expert system. Forward and backward chaining inference techniques. 2. ***Fuzzy systems*:** Concepts of Fuzzy reasoning. Membership Functions and Fuzzy sets. Fuzzy rules. Defuzzification methods. Fuzzy inference. Building a fuzzy expert system. 3. ***Artificial neural networks*:** Concepts of ANN. Neuron and perception. Multilayer neural networks. Forward and Backward Propagation. Neural Network Training. Hopfield network. 4. ***Evolutionary computation*:** Concepts of Evolutionary computing. Genetic algorithms. Chromosomes, fitness function, cross-over and mutation. Evolutionary Programming. 5. ***Hybrid algorithms*:** Simulated Annealing. Combined Genetic Algorithm and Simulated Annealing. Fuzzy Neural Systems. Fuzzy Genetic Algorithm. 6. ***Applications in power system problems in planning, operation and control*:** Applications in Control and Utilization – Intelligent process control. Intelligent robot control and Utilization. **Mini-project:** Performance of Genetic Algorithm **Case study:** To study the performance of genetic algorithm on solving different functions such as De Jong problems and Colville problems. To investigate the effects of parameter setting on the performance of genetic algorithm. To investigate the effect of solution acceleration technique on the performance of genetic algorithm.
	To apply genetic algorithm to different Electrical Engineering problems.
Teaching/Learning Methodology	Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on system analysis, design and practical applications are given through mini-projects, in which the students are expected to solve the electrical engineering problems using intelligent techniques with critical and analytical thinking. Mini-projects are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Teaching/Learning Methodology	Outcomes					
	a	b	c	d	e	f
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	f				
1. Examination	60%	√	√	√							
2. Class Test	20%	√	√	√							
3. Mini-project Report and Presentation	20%	√			√	√	√				
Total	100%										

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

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	36 Hrs.
▪ Mini-project	12 Hrs.
Other student study effort:	
▪ Laboratory preparation/report	12 Hrs.
▪ Self-study	45 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books:

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

Subject Description Form

Subject Code	EE435
Subject Title	Electrical Systems in Automobiles
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To familiarise 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.
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 analyse the electrical system, part and components of a vehicle. c. Understand the correlation of the electrical components of a vehicle and be able to develop the skill of design. d. Have a global view on recent development on power electronics for automotive engineering. e. Be perceptive of applications of electrical systems for other conventional vehicle, electrical vehicle and hybrid electrical vehicle. f. Be able to present the understanding of the basic requirements of electrical engineering to automotive environment. g. 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 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 signalling 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	e	f	g
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	g			
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	36 Hrs.
	▪ Laboratory/Case study	12 Hrs.
	Other student study effort:	
	▪ Laboratory preparation/report	12 Hrs.
	▪ Self-study	45 Hrs.
	Total student study effort	105 Hrs.

Reading List and References

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; Upper Saddle River, N.J.: Pearson/Prentice Hall, 2005
2. T. Denton, Automobile electrical and electronic systems, Oxford: Elsevier Butterworth-Heinemann, 2004
3. M. Ehsani, Y. Gao, S. Gay and A.Emadi, Modern electric, hybrid electric, and fuel cell vehicles, CRC Press, 2005
4. T. Candela, Automotive Wiring and Electrical Systems, A-A Design, 2009.

Subject Description Form

Subject Code	EE437
Subject Title	Intelligent Transportation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: CSE291
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.
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	42 Hrs.
	Other student study effort:	
	▪ Mini project	25 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 title: University English I
Subject code: ELC2501
Credit value: 2
Pre-requisites: Nil
Contact hours: 28

Objectives

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

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

Learning outcomes

By the end of the subject, students should be able to communicate effectively in an academic context through
1. writing well-organised academic texts, such as expository essays,
2. delivering effective oral presentations, and
3. using appropriate referencing skills in academic writing and speaking.

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

Content

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

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

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

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

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

Teaching and learning approach

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

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

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

Assessment

Continuous assessment: 100%

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

Indicative references

Billingham, J. (2003). *Giving presentations*. Oxford: Oxford University Press.

Carter, R., Hughes, R. & McCarthy, M. (2000). *Exploring grammar in context: Upper-intermediate and advanced*. Cambridge: Cambridge University Press.

Collins COBUILD English dictionary for advanced learners. (2001). Glasgow: Collins.

Gelfand, H., Walker, C. & the American Psychological Association. (2002). *Mastering APA style: Student's workbook and training guide*. Washington, DC: American Psychological Association.

Jay, A. & Ros, J. (2000). *Effective presentations*. London: Prentice Hall.

Leki, I. (1998). *Academic writing: Exploring processes and strategies*. Cambridge: Cambridge University Press.

McCarthy, M. & O'Dell, F. (2001). *English vocabulary in use: Upper-intermediate*. Cambridge: Cambridge University Press.

Reinhart, S. (2002). *Giving academic presentations*. Ann Arbor, MI: University of Michigan Press.

Verderber, R. F., Verderber, K. S. & Sellnow, D. D. (2008). *The challenge of effective speaking* (14th ed.). Belmont, CA: Thomson/Wadsworth.

Waters, M. & Waters, A. (1995). *Study tasks in English*. Cambridge: Cambridge University Press.

Subject Title: University English II
Subject Code: ELC2502
Level: 2
No. of Credits: 2
Mode of Study: Seminar
Hours: 28 hours (2 hours per week in Semester 2 of Year 1)
Pre-requisite: ELC2501 University English I
Assessment: Continuous assessment of coursework 100%
Minimum Pass Grade: D

Objective

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

Learning Outcomes

Having completed the subject, students should be able to:

1. participate actively in seminar discussions
2. write academic argumentative essays

Syllabus

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

The syllabus comprises four inter-related strands:

1. ***Spoken academic communication***: recognising the purposes of and differences between spoken and written communication in English in academic contexts; identifying and practising interactional and linguistic aspects of participation in seminar discussions; discussing issues requiring the development and application of creative and critical thinking.

2. ***Written academic communication***: note-taking from reading and listening inputs; evaluating an academic text, improving editing and proofreading skills; achieving appropriate tone and style in academic writing; writing persuasive and argumentative essays.

3. ***Reading and listening in academic contexts***: understanding the content and structure of ideas delivered both orally and in print form; distinguishing between 'fact' and 'opinion'.

4. ***Language development***: improving and extending relevant features of students' grammar, vocabulary and pronunciation.

Teaching and Learning Approach

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

Method of Assessment

Continuous assessment: 100%

Students' speaking and writing skills will be evaluated through assessment tasks related to the outcome areas. Students will be assessed on the accuracy as well as the appropriacy of the language used in fulfilling the assessment tasks.

References

Gelfand, H. (2001). *Mastering APA style: student's workbook and training guide*. American Psychological Association.

Lebauer, S. (1999). *Learn to listen, listen to learn: academic listening and note-taking*. New York: Pearson ESL.

Leki, I. (1998). *Academic writing: exploring processes and strategies*. Cambridge: Cambridge University Press.

Madden, C. G. and Rohlck T. (1997). *Discussion and interaction in the academic community*. Ann Arbor, MI: University of Michigan Press.

Staff responsible

Adam Tse and other ELC staff

Subject title: English for Effective Workplace Communication

Subject code: ELC3504 & ELC3508*

Credit value: 2

Pre-requisites: ELC2501 University I & ELC2502 University English II

Contact hours: 28

*ELC3504 is a two-semester course and ELC3508 is a one-semester course.

Objective

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

Learning outcomes

By the end of the subject, students should be able to communicate effectively in workplace contexts through
1. interacting professionally in a job interview,
2. writing appropriate correspondence related to engineering professions, and
3. writing logical and coherent reports.

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

Content

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

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

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

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

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

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

Teaching and learning approach

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

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

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

Assessment

Continuous assessment: 100%

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

Indicative references

Appleman, J. E. (2008). *10 steps to successful business writing*. Alexandria, VA.: ASTD.

Ashley, A. (1992). *A handbook of commercial correspondence* (2nd ed.). Oxford: Oxford University Press.

Aspinall, T. & Bethell, G. (2003). *Test your business vocabulary in use* (1st ed.). Cambridge: Cambridge University Press.

Bilbow, G. T. (2004). *Business writing for Hong Kong* (3rd ed.). Hong Kong: Longman.

Guffey, M. E. (2004). *Essentials of business communication* (6th ed.). Mason, OH: South-Western College Publication.

Krannich, C. R. & Krannich, R. L. (2003) *Interview for success: A practical guide to increasing job interviews, offers, and salaries*. Manassas Park, VA: Impact Publications.

Potter, J. (1992). *Common business English errors in Hong Kong*. Hong Kong: Longman.

White, A. (2003). *Interview styles and strategies*. Mason, OH: South-Western College Publication/Thomson Learning.

Subject Description Form

Subject Code	ENG232
Subject Title	Engineering Science
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil/Nil/Nil
Objectives	This subject aims: 1. to enable students to establish a broad knowledge base on the atomic structure and properties of materials with an emphasis on using this knowledge to solve engineering problems. 2. to provide a basic understanding on relationship between material properties and manufacturing processes so that they (students) are able to select those that are appropriate taking into consideration green design and environmental issues. 3. to enable students to understand the forms of energy and their conversion.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials. 2. select appropriate materials and manufacturing processes for different products taking into consideration of issues in cost, quality and environmental concerns. 3. familiarize and apply thermodynamic properties of common substances, such as air and water, for the reversibility and efficiency considerations of energy balance, usage , and waste disposal in common energy transformation devices and systems.
Subject Synopsis/ Indicative Syllabus	***Materials Science and Engineering*** (27 hours) **Atomic Structure and Structure of Crystalline Solids:** Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystal structures and energy levels; Introduction to phase diagram. **Electrical and Optical Properties of Materials:** Conductors and insulators; Semi-conductor materials; N-type and P-type semiconductors; P/N junction; Light interactions with materials; Light emitting diode (LED) and optical detectors; Laser; Light propagation in optical fibers. **Mechanical Properties of Materials:** Concept of stress and strain; Stress-strain behaviour; Elastic properties of materials; Tensile properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Design and safety factors; Fracture and fatigue. **Dislocations and Strengthening Mechanism:** Characteristics of dislocations; Mechanism of strengthening in metals; Grain size reduction; Solid solution strengthening; Strain hardening; Precipitation hardening. **Manufacturing Technology of Materials:** Role of materials in manufacturing; Relationship between manufacturing processes and material properties; Process capability. **Applications and Selection of Engineering Materials:** Metallic materials; Ferrous and non-ferrous alloys; Ceramics; Polymers; Thermoplastics and thermosets; Composite materials. **Process Selection and Ecological Design:** Cost consideration in materials selection; Selection of materials and manufacturing processes; Green manufacturing and environmentally conscious design. ***Energy Utilization*** (15 hours) **Energy Trends, Conversion and Engineering:** World consumption of primary energy sources; Technologies and issues in the conversion of different sources of energy.

	Basic Concepts and Laws of Energy Conversion: Thermodynamic states, variables and systems; Thermodynamic properties of H_2O; Work, heat, and internal energy; Conservation of mass and energy; Reversibility of energy exchange; Energy balance for a flow. **Basic Cycles and Common Thermal Systems:** Rankine cycle and the steam engine; Refrigeration and heat pump; Ideal gas basics; Otto cycle and the internal combustion engine; Brayton cycle and the gas turbine.
Teaching/Learning Methodology	This subject will be taught via lectures, tutorials, mini projects, case studies and experimental works. Tutorials, mini projects, case studies and experimental works will be conducted in small groups to facilitate discussion. ***Laboratory Experiment*** (4 hours) 1. Tensile strength of metallic and plastic materials. 2. Conversion of fuel energy into engine power.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Overall Assessment: 0.60 × End of Subject Examination + 0.40 × Continuous Assessment Continuous Assessment including tests, assignments, laboratory reports, mini projects and case studies. Examination is a close-book written examination.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		1	2	3
1. Tests	20	√	√	√
2. Assignments (including project reports, laboratory reports and case study reports)	20	√	√	√
3. Written examination	60	√	√	√
Total	100 %			

Student Study Effort Expected		
	Class contact:	
	▪ Lectures	42 Hrs.
	▪ Tutorials	12 Hrs.
	▪ Laboratory works	4 Hrs.
	Other student study effort:	
	▪ Performing assignments	36 Hrs.
	▪ Literature search and private study	32 Hrs.
	Total student study effort	126 Hrs.

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

Subject Description Form

Subject Code	ENG236
Subject Title	Computer Programming
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil/Nil/Nil
Objectives	(i) To introduce the fundamental concepts of computer programming (ii) To equip students with sound skills in C/C++ programming language (iii) To equip students with techniques for developing structured computer programs (iv) To demonstrate the techniques for implementing engineering applications using computer programs.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: Develop a good computer program using C/C++ programming language. To be specific, the students should be able to achieve the following: 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. f) Be able to solve problems by using systematic approaches in a team.
Subject Synopsis/ Indicative Syllabus	1. Introduction to programming - Components of a computer; Programming environment; Process of application development. 2. Bolts and Nuts of C/C++ - Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators. 3. Program Flow Control - Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables. 4. Program Design and Debugging - Structured program design; Modular programming; Exceptions and debugging. Case study: Using the Visual C++ debugger. 5. Basic Object Oriented Programming - Objects and classes; Private versus public; Implementing class methods; Constructors and destructors. 6. Pointer and Array - The stack and the free store; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command-line processing. 7. Stream I/O - Input and output as streams; File I/O using streams. 8. Using C/C++ in Engineering Applications - Solving practical problems using C/C++; Developing graphical user interfaces for engineering applications.
Teaching/Learning Methodology	The subject is delivered through weekly lectures. Tutorials in terms of exercises related to the lecturing materials follow in the same week. Tutors will aid the lecturers in helping the students finishing the exercises, and interactive Q&A will take place. The lectures and tutorials aim at achieving the learning outcomes a, b, c, d and e. To assure students' understanding of fundamental concepts, short-quizzes and closed-book tests are arranged regularly. The learning outcomes b, c and d can be evaluated at different check-points.

	To enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly. The learning outcomes a, b, c, d and e can be evaluated at different check-points. After all the subject materials have been delivered, students are asked to finish a mini-project in a team. The project involves a practical engineering problem of some stated specifications. Apart from meeting the learning outcomes a-e, the students have to practice solving problems using systematic approaches in a team. The learning outcome f should be reflected from the mini-project result.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1.In-class exercises	10	✓	✓	✓	✓	✓	
2. Short-quizzes	10		✓	✓	✓		
3. Closed-book tests	20		✓	✓	✓		
4. Programming tests	30	✓	✓	✓	✓	✓	
5. Mini-project	30	✓	✓	✓	✓	✓	✓
Total	100 %						

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

The short-quizzes and closed-book tests are for assessing the understanding of fundamental concepts. The in-class exercises and programming tests are conducted within the programming environment to help students familiarized with it. The problems to be solved by the students are typically presented as practical engineering problems. Through conducting the mini-project that lasts for several weeks, students would be able to experience how to solve problems by using systematic approaches in a team.

Student Study Effort Expected	Class contact:	65 Hrs.
	▪ Lecture	27 Hrs.
	▪ Tutorial	26 Hrs.
	▪ Test/Quiz	11 Hrs.
	▪ Mini-project presentation	1 Hrs.
	Other student study effort:	81 Hrs
	▪ Self-studying	52 Hrs.
	▪ Homework	17 Hrs.
	▪ Mini-project/Report	12 Hrs.
	Total student study effort	146 Hrs.

Reading List and References

Textbook:

1. J. Liberty, S. Rao, and B. Jones, *Sams Teach Yourself C++ in One Hour a Day.* Sams, 2009.

Reference Book:

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

Subject Description Form

Subject Code	ENG237
Subject Title	Basic Electricity and Electronics I
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	1. Introduce the fundamental concepts of operation of electric circuits applicable to all engineering students. 2. Develop the ability on 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 the electric circuit operating principles; 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	1. DC Circuits Introduction to electric circuits. Potential and potential difference. Charge and flow of charge. Voltage and current as two basic variables. Kirchhoff's current and voltage laws. Independent and dependent sources. Resistance. Simple circuit styles: voltage divider, current divider, series and parallel circuits. Nodal and mesh analyses. Thévenin and Norton theorems. Power dissipation. Source loading and maximum power transfer. 2. Capacitance, Inductance and First Order Transients Constitutive relations of capacitor and inductor. Brief introduction to physics (electric and magnetic fields). Introduction to time-varying circuits. Simple RC and LC circuits. Important concept of independent state variables. First-order differential equation (with simple solution of exponential form). First order transient analysis. Time-domain solution and transient behaviour of first order circuits. Time constant. 3. Transformers Concept of ideal transformer (assuming sinusoidal voltages and currents). Dot convention. Analyze circuit with ideal transformer. Calculate reflected sources and impedances across ideal transformers. Applications in galvanic isolation and voltage/current level conversion. 4. Steady-state Analysis of AC Circuits Average and rms values. Phasors (rotating vectors). Steady-state analysis of circuits driven by single fixed frequency sinusoidal sources. Impedance and admittance. Analysis approach 1: phasor diagrams for simple circuits. Analysis approach 2: systematic complex number analysis, i.e., same treatment as DC circuits but with complex numbers representing phase and magnitude of AC voltages and currents. Real and reactive powers. Power factor. 5. Digital Logic Circuits Binary number system: addition, subtraction, multiplication and division in binary number systems. Conversion between binary and decimal numbers. Two's complement. Boolean algebra. Basic logic gates. Flip-flops. Karnaugh maps. Don't care condition. Combinational Logic circuit designs and modules. **Laboratory Experiments:** 1. Instrumentation and circuit theorems 2. First order transient 3. Simple digital circuits

Teaching/Learning Methodology	On a subject of fundamental nature with large classes, lectures are the primary and effective means of conveying the basic circuit principles (outcome a) and demonstrating suitable application (outcome b). In order to strengthen the understanding of the basic concepts (outcome a) and to facilitate small-group discussions on examples and exercises (outcome b), tutorials with a maximum class size of 20 are provided. Experiments are essential for students to relate the concepts to practical applications (outcome b) and they are exposed to hand-on experience and proper use of equipment and also analytical skills on interpreting experimental results (outcome c).

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

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c			
1. Examination	60	√	√				
2. Class Tests	16	√	√				
3. Assignments	12	√	√				
4. Lab Logbooks & Report	12		√	√			
Total	100 %						

It is a level-2 subject covering fundamental concepts of circuit analysis and basic applications. Examination is adopted to assess students on the overall understanding and the ability of applying the concepts. It is supplemented by the mid-term class tests and regular quizzes which provide timely feedbacks to both lecturers and students on various topics of the syllabus. Experiment logbooks and reports reflect the students' laboratory skills, usages of appropriate equipment and data analysis on experiment results.

Student Study Effort Required		
	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Laboratory experiment	9 Hrs.
	Other student study effort:	
	▪ Supplementary tutorials/consultations	25 Hrs.
	▪ Self-study	42 Hrs.
	Total student study effort	102 Hrs.

Reading List and References

Textbooks:

1. G. Rizzoni, Fundamentals of Electrical Engineering, First Edition, New York: McGraw-Hill, 2009.

References:

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

Subject Description Form

Subject Code	ENG238
Subject Title	Basic Electricity and Electronics II
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	ENG237 (Basic Electricity and Electronics I)
Objectives	To introduce students to an extended aspect of basic electricity and electronics applicable to engineering students. Several classes of electronic devices and circuits will be covered, including bipolar junction transistor (BJT) and amplifiers, metal-oxide-semiconductor field-effect transistor (MOSFET) and amplifiers, and operational amplifiers. An introduction to electrical machines will be given.
Intended Learning Outcomes	Upon satisfactory completion of the subject, the students are expected to: a) describe the fundamental aspects of diodes, bipolar junction transistor (BJT) and amplifiers, metal-oxide-semiconductor field-effect transistor (MOSFET) and amplifiers, and operational amplifiers. b) describe the fundamental aspects of electrical machines.
Subject Synopsis/ Indicative Syllabus	1. Diode Fundamentals Semiconductor basics. P-N junction basics. Input, output and transfer characteristics of practical diodes. Biasing through load line concept. (3 hours) 2. Transistors and Biasing Circuits Bipolar junction transistor (BJT). DC biasing and analysis of BJT circuits. Metal-oxide-semiconductor field-effect transistor (MOSFET). DC biasing and analysis of MOSFET circuits. Load line and graphical large-signal analysis. Transistor amplification concept. (6 hours) 3. Transistor Amplifiers and Small-signal Concepts Basic BJT and MOSFET amplifier configurations: common emitter and common source configurations. Small-signal models and parameters. Concept of transconductance. Voltage gain. Input and output impedances. Introduction to loading effect. (9 hours) 4. Operational Amplifiers Ideal operational amplifier. Defining characteristics (i.e., infinite gain and infinite input resistance). Basic op-amp circuits: inverting amplifier, non-inverting amplifier, summing amplifier, difference amplifier, integrating amplifier and differentiating amplifier. Specific op-amp circuits: instrumentation amplifier; current-to-voltage converter and voltage-to-current converter. Design applications. (9 hours) 5. Frequency Domain Analysis Transfer functions from ac circuits in terms of $j\omega$. Introduction to frequency domain, from $j\omega$ to s. General s-domain transfer functions. Simple first-order filter circuits. Concepts of pole, corner frequency and bandwidth. Use of $j\omega$ axis for magnitude and phase plots for sinusoidal driving sources. Extension to asymptotic plots and Bode plots. (6 hours) 6. Fundamentals of Electrical Machines Electromagnetics. Transformer analysis using magnetic circuit models. DC motors and generators. (9 hours)

Teaching/Learning Methodology	Lectures are the primary means of conveying the fundamental knowledge to understand the concepts pertaining to the fundamental aspects of electrical and electronic principles. Tutorials with problem-based questions are given, and the students are expected to solve those problems and to know the basic approaches to solving the problems. Students will be required to form groups to work on laboratories which will give them a hands-on experience in the devices, circuits and machines that are taught in the lectures.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
1. Examination	60	√	√				
2. Test	24	√	√				
3. Laboratory	16	√	√				
Total	100 %						

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

The assessment methods include an end-of-subject examination (60%), two tests (12% each), and four laboratory works (8% for formal report and 8% for logbook). The examination and continuous assessments (two tests and four laboratory works) cover intended subject learning outcomes a) and b). The examination is a three-hour, closed-book examination and the two tests are closed book and 1.5 hours each. A logbook with four laboratory recordings and a formal report on one particular laboratory work will be assessed.

Student Study Effort Expected

Class contact:	
▪ Lecture	42 Hrs.
▪ Tutorial (13 hrs) and laboratory (11 hrs)	24 Hrs.
Other student study effort:	
▪ Self study	33 Hrs.
▪ Report writing for laboratory	6 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Textbook:
1. Donald A. Neamen, *Microelectronics: Circuit Analysis and Design*, Third Edition, Boston: McGraw-Hill, 2006.

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

Subject Description Form

Subject Code	ENG307
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 about the role of the professional engineer in practice and their responsibilities towards the profession, colleagues, employers, clients and the public. The objectives of the subject are to enable students to: 1. Appreciate the historical context of modern technology and the nature of the process whereby technology develops and its relationship between technology and environment and the implied social costs and benefits. 2. Understand the social, political, legal and economic responsibility and accountability of a profession in engineering and the organizational activities of professional engineering institutions. 3. Be aware of the short-term and long-term effects on the use of technology relating to safety and health aspects. 4. Observe the professional conduct, the legal and more constraints relating to various engineering aspects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Identify and evaluate the effects on the use of technology relating to social, culture, economic, legal, health and safety, environment and welfare of the society. (b) Explain the importance of professional training of institutions, professional conduct, ethics and responsibilities in various engineering activities (local and overseas). Particularly the Washington Accord. (c) Work in a team setting to discuss the specific project of the eight dimensions on project issues related to engineers and present the findings.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** Impact of technology on society: Innovation and creativity, the history and the trend of technology on the social and culture on society. Environmental protection and related issues. Role of the engineer in energy conservation, ecological balance and sustainable development. The outlook of Hong Kong's industry, its supporting organizations and impact on development from the China Markets. Industrial health and safety including the work of the Labour Department and the Occupational Health and Safety Council and the legal dimension such as contract law and industrial legislation. The Professional Institutions: both local and overseas. Washington Accord and the qualification and criteria of professional engineers. Professional ethics, bribery and corruption including the work of the ICAC. Social responsibilities of engineers.
Teaching/Learning Methodology	In class, there will be short lectures to provide essential knowledge and information on the relationship between society and the engineer under a range of dimensions. There will be discussions, case studies, seminars to engage student's in-depth analysis of the relationship. Students will form into groups and throughout the course, students will work on engineering cases by completing the following learning activities: 1. Case analysis; students will base on the case analysis, and provide weekly summary report on the relationship of dimensions to the project. 2. The final report will be the Case portfolio which includes i. Presentation slides; ii. Feedback critique; iii. Weekly summary report and iv. Reflection. 3. Final presentation. The coursework of this subject involves students to work in groups to study cases from the perspectives of eight dimensions 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 portfolio reports on these case studies.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below
Student Study Effort Expected	See table below
Reading List and References	**Reference books:** (1) Johnston, F. Stephen, Gostelow, J.P. and King, W. Joseph (2000) Engineering and society challenges of professional practice. Upper Saddle River, N.J.: Prentice Hall (2) Hjorth, Linda; Eichler, Barbara; Khan, Ahmed (2003) Technology and Society Abridge to the 21st Century. Upper Saddle River, N.J.: Prentice Hall **Reading material:** Engineering journals: - Engineers by The Hong Kong Institution of Engineers - Engineering and Technology by The Institution of Engineers and Technology Magazines: - Times - Far East Economics Current newspaper: - South China Morning Post - China Daily - Ming Pao Daily

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
1. Continuous	60%						
• Group weekly learning activities (40%)		✓	✓	✓			
• Final presentation (individual presentation) (30%)		✓	✓				
• Group report and individual reflection report (30%)		✓	✓	✓			
2. Examination	40%	✓	✓				
Total	100 %						

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

Continuous Assessment: 60 % Examination: 40%

Class contact:	
▪ Lectures and Review	30 Hrs.
▪ Tutorial and Presentation	12 Hrs.
Other student study effort:	
▪ Research and Preparation	60Hrs.
▪ Report writing	14Hrs.
Total student study effort	116 Hrs.

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 coverage on various engineering fundamental matters, including Engineering Drawing and CAD, Basic Scientific Computing, Basic Mechatronic Practice, and Industrial Safety, that aims at providing the necessary fundamental knowledge and computing skills to all year 1 students interested in engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) explain the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice with application in mechanical, industrial systems, electrical, electronic and information engineering; b) apply scientific computing software for computing in science and engineering including visualization and programming; c) design and analyze practical controller hardware, software, actuation devices and human-machine interface for simple mechatronic systems including basic practice in hydraulic, pneumatic and electric systems with common engineering components such as motor drives, mechanical drives, gears, cams, belts, pulleys, couplings, bearings, seals and fasteners; and d) explain basic occupational health and industrial safety requirements for engineering practice.

Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. <u>(TM8050) Engineering Drawing and CAD</u> 1.1. Fundamentals of Engineering Drawing and CAD Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances and surface finishes; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing. Introduction to CAD; 2D drawings and general concepts on 3D computer modeling including extruding, revolving, sweeping, and lofting; 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. 1.3. Electronic Design Automation Introduction to electronic design automation software; circuit schematics capture and representation; placement of components, capturing, annotation, labeling, net list. Electronic parts library, symbols, decals, physical packages, discrete components, integrated circuits, logic and analogue circuits, electronic parts creation and application. 2. <u>(TM3012) Basic Scientific Computing</u> 2.1. 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. 2.2. Basic plotting, formatting graph, 2D and 3D plots, annotations, contour, mesh and surface plots, colormap. 2.3. M-file programming and debugging; scripts, functions, logic operations, flow control and graphic user interfaces.

	3. (TM0510) Basic Mechatronic Practice 3.1. 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. 3.2. 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. 4. (TM2009) Industrial Safety 4.1. Safety Management: Overview, essential elements of safety management, safety training, accident management, and emergency procedures. 4.2. Safety Law: F&IU Ordinance and principal regulations, OSH Ordinance and principal regulations. 4.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling. 4.4. 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.
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
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 Required

Class Contact	**TM8050**	**TM3012**	**TM0510**	**TM2009**
▪ Lecture	18 Hrs.	9 Hrs.	6 Hrs.	14 Hrs.
▪ Tutorial	13 Hrs.			
▪ In-class Assignment/ Hands-on Practice	17 Hrs.	18 Hrs.	24 Hrs.	1 Hr.
Other Study Effort				
▪ Coursework	8 Hrs.			
Total Study Effort	**128 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. 4. PADS from Mentor Graphics 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) undertake the design, construction, testing and commissioning electrical distribution and control system in buildings on the basis of recognize the engineering standards, regulations and practices; 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	<u>(TM0367) Lighting and Electrical System Design</u> 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. <u>(TM0372) Electrical Installation, Basic Automation and Electronic Practice</u> 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. <u>(TM1213) Structural Concrete and Steelwork</u> • 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. <u>(TM1232) Site Formation and Anchoring Practice</u> 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 (TM0367) Lighting and Electrical System Design (TM0372) Electrical Installation, Basic Automation and Electronic Practice	Weighting (%)	Intended Learning Outcomes Assessed				
		a	b	c	d	e
1. Assignment	40	✓	✓	✓		
2. Test	30	✓	✓			
3. Report	30	✓	✓	✓		
Total	100					

Assessment Methods (TM1213) Structural Concrete and Steelwork	Weighting (%)	Intended Learning Outcomes Assessed				
		a	b	c	d	e
1. Test	30				✓	
2. Report	70				✓	
Total	100					

Assessment Methods (TM1232) Site Formation and Anchoring Practice	Weighting (%)	Intended Learning Outcomes Assessed				
		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.

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	
▪ Coursework	16 Hrs.
Total Study Effort	**136 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	LGT3019
Subject Title	Economics of International Transport Logistics
Credit Value	3
Level	3
Normal Duration	1-semester
Pre-requisite / Co-requisite/ Exclusion	Nil
Role and Purposes	This subject provides students with fundamental concepts in economics and how these might be applied to international air and maritime industries. It provides students with knowledge of appropriate sources of information and data in maritime sector as well as developments in the air transport industry.
Subject Learning Outcomes	Upon completion of the subject, students will be able to: a. To develop an ability to build economic models to analyse the behaviors of different shipping markets; b. To instill an understanding of the interaction between economic, operational and technological aspects of the different maritime industries; c. To establish an awareness of the range of perspectives which may be adopted, theoretically, legally and practically towards the air transport system; d. To analyse market data and forecast the trend in different shipping markets. Studying this subject will also help develop students' critical thinking, and oral and written communication skills.
Subject Synopsis/ Indicative Syllabus	Maritime section Fundamentals of economic theory and applications; Economic development, patterns of trade and maritime transport; Function of maritime transport; Demand for maritime transport: elasticity of demand; Supply of maritime transport: elasticity of supply; Shipping costs; Pricing mechanism in maritime transport: liner tariffs and tramp market freight rates; Economies of scale in shipping; Optimum ship size and optimum speed of ships; Shipping market analysis; Maritime policy and regulation. Air Transport section Aircraft characteristics; Air transport in national, regional and local patterns and networks; Size and scale problems; Route selection and principles of timetable production, load factors and frequency; The interrelationship between passenger and freight transport; Marketing policy, strategy and analysis in airline industry; Role of IATA in relation to marketing; elasticity of demand for airline operations; Pooling procedures and bilateral operating agreements; Performance indicators, total factor productivity; economic and operational Regulation; liberalization and deregulation.
Teaching/Learning Methodology	In the lectures the general principles of the syllabus topic will be presented and developed, together with guidance on further reading and activities. Lectures may also be used for the presentation and discussion of leading cases. In the seminars, students will develop and apply the general principles of the topic in student-centred activities, including role-plays, student presentations and discussions.
Assessment Methods in Alignment with Intended Learning Outcomes	See table below.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
Coursework	50%		✓	✓	✓		
Examination	50%	✓			✓		
Total	100 %						

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

The coursework includes writing a project report (40%) and a group project presentation (10%). Students are required to apply some basic economic modeling skills learnt in this course in their project study. Examination is mainly used to test students' knowledge on economic models and calculation. Some common practices used in the industry will also be tested.

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:	
	▪ Lecture	28 Hrs.
	▪ Seminar	14 Hrs.
	Other student study effort:	
	▪ Team Project	42 Hrs.
	▪ Reading	42 Hrs.
	Total student study effort	126 Hrs.

Reading List and References

Recommended Textbooks

Handbook of Airline Economics (2000), McGraw Hill.

Stopford, M. (1997), *Maritime Economics* (2nd ed.), Routledge, London.

Wells Alexander (2003), *Air Transportation: A Management Perspective*, Belmont.

References

Bannister, Chan, Mak, Ng and Bennett (1998), *Managing Human Resources in Hong Kong - A Practical Approach*, 2nd ed., Pitman.

Branch, A. (1988), *Economics of Shipping Practice & Management*, Chapman & Hall, London.

Branch, A. (1996), *Elements of Shipping*, Chapman & Hall, London.

Evans, J. and Marlow, P. (1990), *Quantitative Methods in Maritime Economics*, Fairplay, London.

Farthing, B. and Brownrigg, M. (1997), *Farthing on International Shipping* (3rd ed.), LLP, London.

Gialloreto, L. (1988), *Strategic Airline Management*, Pitman.

Joseph P. Schwieterman (1993), *Air Cargo and the Opening of China*, CU Press.

Kai-sun Kwong (1988), *Towards Open Skies and Uncongested Airports - An opportunity for HK*, CU.

Kelly Monaghan (1992), *Air Courier Bargains*, Intrepid Traveler.

McConville, J. (1999), *Economics of Maritime Transport: Theory and Practice*, Witherby, London.

Michael J. Kroes (1993), *Aircraft Basic Science*, Glencoe.

Rigas Doganis (1991), *Flying Off Course*, Routledge.

Rigas Doganis (1992), *The Airport Business*, Routledge.

Shaw, S. (1993), *Air Transport – A Marketing Perspective*, Pitman.

Stephen Holloway (1992), *Air Finance: Aircraft Acquisition Finance and Airline Credit Analysis*, Pitman.

Wilnolst, N. and Wergeland, T. (1996), *Shipping*, Delft University Press, The Netherlands.

Subject Description Form

Subject Code	ME4503
Subject Title	Aviation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite: AMA296 Mathematics II or AMA294 Mathematics II
Objectives	1. To provide an overview of aviation systems to a student that has an interest in the development of careers in aviation. 2. To develop students' understanding of the aviation industry, which comprises various supporting unit systems, operating within one framework to achieve the global objectives of air transport safety and security and the unit-system objectives of operational efficiency and cost-effectiveness. 3. To develop students' understanding of the up-to-date operational concepts, technology applications and practices.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Explain the relationship among major aviation systems and to identify future directions of the industry, taking account of national and global events within and outside the industry. b. Demonstrate an understanding of air traffic management, flight standards and airworthiness services provided by regulatory bodies. c. Understand the management operations of an international airline. d. Understand the logistics issues to be considered in the future development of the Hong Kong International Airport. e. Explain the key role and future plan of the Government Flying Service. f. Identify the quality assurance procedures adopted in aircraft maintenance organizations within Hong Kong and China. g. Identify the environmental impacts of aviation-related activities. h. Analyze the activities of various local aviation organizations in the 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, fire fighting, 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. Aviation Development Council. Guild of Air Pilots and Navigators.
Teaching/Learning Methodology	Lectures are used to deliver the fundamental knowledge in relation to various aspects of aviation systems (outcomes a to h). Tutorials are used to illustrate the application of fundamental knowledge to practical situations (outcomes a to h). Group mini-projects are used to allow students to deepen their knowledge on a specific topic through search of information, analysis of data and report writing (outcomes a, c and h). 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 various aspects of aviation systems (outcomes a, b, c, e, f and h).

Teaching/Learning Methodology	Outcomes							
	a	b	c	d	e	f	g	h
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 (Please tick as appropriate)							
		a	b	c	d	e	f	g	h
1. Assignment	30 %	√	√	√	√	√	√	√	√
2. Group mini-project (including presentation and report)	50 %	√		√					√
3. Industrial field visit and visit report, report for special seminar	20 %	√	√	√		√	√		√
Total	100 %								

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

Overall Assessment: 1.0 × Continuous Assessment

The assessment of the subject is fully based on continuous assessment, including assignments, group mini-projects, industrial visits and special seminars on various topics of the syllabus.

In particular, the assignments are aimed at assisting the students in preparation for the examination and checking the study progress.

Group mini-project is aimed at assessing the students' capacities of self-learning and problem-solving and communication skill in English.

The reports for field visits and special seminars are aimed at enhancing the students' comprehension and assimilation of various topics of the syllabus.

Student Study Effort Expected

Class contact:	
▪ Lecture	34 Hrs.
▪ Tutorial	8 Hrs.
Other student study effort:	
▪ Course work	20 Hrs.
▪ Self-study	42 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.
5. Aviation Week and Space Technology, McGraw-Hill.

Appendix II

Major Programme

in Transportation Systems Engineering

With the growing demand of graduates having broad educational qualifications, in addition to those with specialised skills, the University is introducing degree programmes combining "Major" and "Minor" disciplines. In response to this, the Department of Electrical Engineering offers a Major in Transportation Systems Engineering option for students.

Students taking this option must obtain 84 credits in the Major Programme in Transportation Systems Engineering; and 18 credits from a minor programme. If the 18 credits taken are a free collection of electives in any combination of disciplines in conjunction with a Major programme, these students will graduate with a Major only. For the Minor credits, at least 9 credits must be of level 3 or above.

1. Programme Requirement

Students are required to complete the following 84 credits for graduation in the Major Programme in Transportation Systems Engineering. They must include the following credits:

(a) all first-year subjects (36 credits);
(b) all second-year subjects (36 credits);
(c) the compulsory final-year subjects, except ENG307 (12 credits);
(e) all training credits.

A student is eligible for award if he/she also satisfies the following graduation requirements.

- Satisfying the WIE and IC Training requirements
- Having a Grade Point Average (GPA) of 2.0 or above at the end of the programme
- Satisfying the co-curricular activities requirements
- A pass in Foundation Mathematics (AMA106). *It is only applicable to admittees who do not have a "pass" in the A-level Mathematics subject(s) and who have not been given credit transfer for the subject AMA201 stipulated in the curriculum. These students are required to take a mandatory Mathematics Benchmark Test (MBT) prior to the commencement of their studies. Those who passs the MBT are exempted from this graduation requirement and they follow the normal study pattern. Those who fail or do not attend the MBT are required to take a non-credit bearing subject AMA106 "Foundation Mathematics", which is a pre-requisite for AMA201. A pass in AMA106 is thus a graduation requirement for such students.*

2. Programme Curriculum

To be eligible for graduation in the major in Transportation Systems Engineering, students are required to complete 84 credits as specified. All the subjects in the table below are compulsory. The tables below illustrate the typical progress pattern.

Typical Study Pattern:

Year 1

	Semester One
AMA106*	Foundation Mathematics
AMA201*	Mathematics I
ELC2501	University English I (2 credits)
ENG232	Engineering Science
ENG236	Computer Programming (2 credits in semester 1)
ENG237	Basic Electricity and Electronics I
CSE291	Transportation Engineering Fundamentals
	16 credits
	Semester Two
AMA202	Mathematics II
ELC2502	University English II (2 credits)
ENG236	Computer Programming (1 credit in semester 2)
ENG238	Basic Electricity and Electronics II
CSE292	Transportation Operations and Management
GEC2801 or equivalent	China Studies (2 credits)
AF2601	Introduction to Economics
CBS2080	Fundamentals of Chinese Communication
	20 credits
IC2105	Engineering Communication and Fundamentals (Taken during year 1, 4 training credits)
	Semester Three (Summer Period at the end of Year 1)
IC2113	IC Training for Transportation Systems Engineering (4 training credits)

***** refers to Section 6.11 (page 25, Graduation Requirement 'g') on the condition of taking AMA106 and AMA201.

Year 2

	Semester One
ELC3508	English for Effective Workplace Communication (2 credits)
EE207	Engineering Electromagnetics (2 credits)
EE309	Control Systems and Signal Processing
CSE312	Transportation and Highway Engineering
CSE331	Air and Noise Pollution Studies
AF2108	Financial Accounting
	(1 subject from the Minor Programme)
	19 credits
	Semester Two
EE3021	Electromechanical Energy Conversion
EE3031	Power Electronics and Drives
EE310	Safety in Systems Engineering
CSE390	Transportation Systems Analysis
GEC2XXX	Broadening General Education Subject (2 credits)
	(1 subject from the Minor Programme)
	17 credits
	Semester Three (Summer Period at the end of Year 2)
EE3502	Summer Practical Training (6 weeks in summer) (3 training credits)

Year 3

	Semester One
EE3041	Power Transmission and Distribution
EE437	Intelligent Transportation Systems
CSE490	Transport Management and Highway Maintenance
	(2 subjects from the Minor Programme)
	15 credits
	Semester Two
CSE407	Design of Transport Infrastructure
CSE408	Traffic Surveys and Transport Planning
	Choose one of the following core subjects
AF3313	Business Finance
LGT3019	Economics of International Transport Logistics
	(2 subjects from the Minor Programme)
	15 credits

3. Professional Recognition

Students who wish to take the major/minor option should note that the Major programme may not meet the academic requirements for Graduate Membership from the professional bodies, such as The Hong Kong Institution of Engineers and Chartered Institute of Logistics and Transport.

4. Admission and Registration

Same as in Full-time BEng (Hons) Degree Programme in Transportation Systems Engineering

5. Award Classification

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

"Major GPA" is derived based on all subjects of the Major programme plus the University mandatory subjects in general education. The "Major GPA" is weighted and the level weightings are the same as set for the full degree from which the Major programme is developed.

The mechanism for deriving the "Major GPA" is same as that for the GPA for award classifications of students on the single-discipline degree, except that there will be fewer subjects to be counted for the "Major GPA" due to the difference in the curriculum between a Major programme and a single-discipline degree.

"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 Boards of Examiners for consideration.

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.