Bachelor of Engineering (Honours) in Electrical Engineering

2017 – 2018

Full-time

Programme Code: 41470

DEFINITIVE PROGRAMME DOCUMENT
Bachelor of Engineering (Honours) in Electrical Engineering (4-year Curriculum) 2017-18

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Appendix II Minor Programme in Electrical Engineering

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

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

Aims and Rationale

2.1 Programme Philosophy

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

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

More and more industrial employers wish to recruit engineers who have a broad-based education as well as adequate professional knowledge to undertake detailed technical work in design and production. Therefore, the programme is also designed to provide training to our students who could develop a thorough understanding of electrical engineering, and acquire a broad and general appreciation of activities in other related disciplines. The students are guided to learn the interfaces between specialist engineering areas and be prepared to work in a multidisciplinary work environment which usually involves colleagues from other engineering backgrounds.

Students must become aware that ‘a good engineering solution’ is one which has to fulfil economic, financial, and social criteria as well as to comply with engineering design specifications. This necessitates the inclusion of the study of economics, accounting and management with particular reference to engineering activities, as well as the inter-relations between engineering activities and society as a whole.
Language competence of students is strengthened through the English and Chinese subjects stipulated in the General University Requirements (GUR), and is further enhanced by discipline specific professional communication subjects. The teaching approach adopted in the curriculum, which involves lectures, seminars, discussions, in-class feedback, assessed presentations, demonstration of project work and written laboratory reports, aims to improve students’ verbal and written communication skills.

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

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

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

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

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

2.2 Programme Objectives

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

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

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

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

Category A: Professional/Academic Knowledge and Skills

Upon successful completion of the programme, students will be able to:

A1 Apply fundamental principles of mathematics, science and engineering to identify, formulate and solve practical problems in the areas of electrical engineering and related disciplines.

A2 Design and conduct experiments with appropriate techniques and tools; and interpret and analyse the data.

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

A4 Identify constraints, other than technical considerations, which may influence engineering problems, systems or projects.

A5 Keep abreast of developments in electrical engineering and related disciplines and be aware of the need of lifelong learning.

A6 Appreciate and understand the ethical, managerial and social responsibilities of a professional engineer.

Category B: Attributes for All-roundedness

Upon successful completion of the programme, students will be able to:

B1 Communicate effectively via graphic, numeric, verbal and written media with proficiency in both English and Chinese.

B2 Reason critically and develop alternative views or solutions.

B3 Work in multi-disciplinary teams with professional interpersonal skills.

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

<table>
<thead>
<tr>
<th>Programme Outcomes</th>
<th>Programme Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(i)</td>
</tr>
<tr>
<td>A1</td>
<td>√</td>
</tr>
<tr>
<td>A2</td>
<td>√</td>
</tr>
<tr>
<td>A3</td>
<td>√</td>
</tr>
<tr>
<td>A4</td>
<td>√</td>
</tr>
<tr>
<td>A5</td>
<td>√</td>
</tr>
<tr>
<td>A6</td>
<td>√</td>
</tr>
<tr>
<td>B1</td>
<td>√</td>
</tr>
<tr>
<td>B2</td>
<td>√</td>
</tr>
<tr>
<td>B3</td>
<td>√</td>
</tr>
</tbody>
</table>

Table 2.3.1 Mapping between Programme Objectives and Programme Outcomes

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

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

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

<table>
<thead>
<tr>
<th>Programme Outcomes</th>
<th>Professional Competence</th>
<th>Critical Thinker</th>
<th>Effective Communicator</th>
<th>Innovative Problem Solver</th>
<th>Lifelong Learner</th>
<th>Ethical Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>✓</td>
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<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
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<td>A4</td>
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<td></td>
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</tr>
<tr>
<td>A6</td>
<td>✓</td>
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<td>✓</td>
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<td>B1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>B3</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

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

3.1 Programme Title

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

3.2 Duration and Mode of Attendance

<table>
<thead>
<tr>
<th>Mode</th>
<th>Normal Duration</th>
<th>Maximum Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>4 years</td>
<td>8 years</td>
</tr>
</tbody>
</table>

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

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

3.3 Final Award

The award is Bachelor of Engineering (Honours) in Electrical Engineering and it carries no speciality or stream.

3.4 Implementation Dates

September 2012 (Initial implementation)

3.5 Minimum Entrance Requirements

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

The general minimum entrance requirements are 4 core subjects and 2 elective subjects with:

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

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

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

(ii) Alternative Entry Route

A Higher Diploma in Electrical Engineering; OR
An Associate Degree in Engineering; OR
Equivalent qualifications
3.6 Study Options

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

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

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

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

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

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

(v) Subject to approval by the Minor-offering department, students may count up to 6 credits from their Major/General University Requirements (GUR) [including Language Communication Requirement (LCR) subjects at proficiency level] towards their chosen Minor; Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major-Minor studies must not be lower than the credit requirement of the single discipline Major programme.

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

(vii) Students are required to obtain a GPA of at least 2.0 in order to satisfy the requirement for graduation with a Major plus a Minor.

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

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

* Minor option is not available for those Senior Year intake students.
3.7 Summer Training / Industrial Placement

Summer Training at the Industrial Centre (IC) and practical work experience in industry are the vital components to meet the programme outcomes. The training/industrial placement is credit-bearing and compulsory in the programme, constituting the Work-Integrated Education (WIE) activities as stipulated by the University. Details of the required credits, structure and assessment of the WIE and IC training are given in Sections 4.8 and 4.9.

3.8 Student Exchange Programme

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

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

3.9 External Recognition

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

3.10 Summer Term Teaching

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

3.11 Daytime and Evening Teaching

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

3.12 Medium of Instruction

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

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

4.1 University Graduation Requirements

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

(i) the University Graduation Requirements (GUR); and

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

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

Summary of University Graduation Requirements for 4-Year Degree Students

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

(i) Complete successfully a minimum of 124 credits\(^1\);

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

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

(iv) Satisfy the following GUR requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Language and Communication Requirements(^2)</td>
<td>9</td>
</tr>
<tr>
<td>(b) Freshman Seminar</td>
<td>3</td>
</tr>
<tr>
<td>(c) Leadership and Intra-Personal Development</td>
<td>3</td>
</tr>
<tr>
<td>(d) Service-Learning</td>
<td>3</td>
</tr>
<tr>
<td>(e) Cluster Areas Requirement (CAR)</td>
<td>12</td>
</tr>
<tr>
<td>(f) China Studies Requirement</td>
<td>(3 of the 12 CAR credits)</td>
</tr>
<tr>
<td>(g) Healthy Lifestyle(^3)</td>
<td>Non-credit bearing</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>30</td>
</tr>
</tbody>
</table>

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

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

\(^1\) This minimum only applies to students who are admitted through the normal route.

\(^2\) Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the DSR - Chinese and CAR - Chinese Reading and Writing requirements. However, this group of students would still be required to take one Chinese LCR subject to fulfil their Chinese LCR.

\(^3\) Students admitted to the programmes as Senior Year intakes are not required to take the Healthy Lifestyle Programme. Advanced Standing students are required to take Healthy Lifestyle Programme (except for those who are HD/AD holders who follow the Senior Year/Articulation Degree programme GUR curriculum).
There are subjects which are designed to fulfil the credit requirement of different types of subject. Students passing these subjects will be regarded as having fulfilled the credit requirements of the particular types of subject concerned. Nevertheless, the subject passed will only be counted once in fulfilling the credit requirements of the award, and the students will be required to take another subject in order to meet the total credit requirement of the programme concerned.

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

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

Senior Year intakes admitted to the 4-year Undergraduate Degree programmes on the strength of the Associate Degree/Higher Diploma qualifications are required to complete at least 61 credits in order to be eligible for a Bachelor's degree. Exemption may be given from subjects already taken in the previous Associate Degree/Higher Diploma studies. In that case, students should take other electives (including free electives) instead to make up the total of 61 credits required. For students who are exceptionally admitted before 2017/18 on the basis of academic qualification(s) more advanced than Associate Degree/Higher Diploma, such as the advanced stage of a 4-year degree curriculum programme, Departments can continue to grant credit transfer as appropriate, so as to give recognition to the advanced study taken, and these students can take fewer than 61 credits for attaining the award. The proportion of these students should remain low. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 61 credits to be eligible for award.

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

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

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

(i) Complete successfully a minimum of 61 credits\(^5\);
(ii) Earn a cumulative GPA of 2.0 or above at graduation;
(iii) Complete successfully the mandatory Work-Integrated Education (WIE) component;
(iv) Satisfy the following GUR requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Cluster Areas Requirement (CAR)</td>
<td>6</td>
</tr>
<tr>
<td>(b) China Studies Requirement</td>
<td>(3 of the 12 CAR credits)</td>
</tr>
<tr>
<td>(c) Service-Learning(^6)</td>
<td>3</td>
</tr>
<tr>
<td>(d) Language and Communication Requirements(^7)</td>
<td>-</td>
</tr>
</tbody>
</table>

Total = 9 credits

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

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

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

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

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

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\(^5\) This minimum only applies to students who are admitted through the normal route.
\(^6\) Prior to its full implementation, students may take a 3-credit free elective in lieu of the Service Learning requirement.
\(^7\) This is normally not required. Only those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programmes and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement. The Programme offering department will refer to the guidelines provided by the Language Centres (ELC and CBS) to determine whether a new student has met the equivalent standard. Non-Chinese speakers and those students whose Chinese standards are at junior secondary level or below will by default be exempted from the DSR - Chinese and CAR - Chinese Reading and Writing requirements. However, this group of students would still be required to take one Chinese LCR subject to fulfil their Chinese LCR.
from the 2015/16 intake cohort, the regular credit requirement for award will count the lowest number of credits taken by the students in the same subject area. For example, some students in an engineering programme are required to take 10 credits of underpinning subjects in Mathematics, whilst others in the programme are required to take 6 credits of underpinning subjects in Mathematics. Only 6 credits will be recognized for counting towards the regular credit requirement of the programme. The extra 4 credits taken by some students will be counted outside the regular credit requirement.

In the case that students have already taken certain subject(s) in their previous Associate Degree/Higher Diploma studies, exemption may be given from these subjects and students should take other electives (including free electives) instead to make up the minimum of 61 credits required. For students who are exceptionally admitted before 2017/18 on the basis of academic qualification(s) more advanced than Associate Degree/Higher Diploma, such as the advanced stage of a 4-year degree curriculum programme, Departments can continue to grant credit transfer as appropriate when admitting them to an Articulation Degree programme, so as to give recognition to the advanced study taken, and these students can take fewer than 61 credits for attaining the award. The proportion of these students should remain low. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission, are required to complete at least 61 credits to be eligible for award.

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

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

4.2 **General University Requirements (GUR)**

(i) Language and Communication Requirements (LCR)

**English**

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

<table>
<thead>
<tr>
<th>HKDSE</th>
<th>Subject 1</th>
<th>Subject 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 5 or equivalent</td>
<td>Advanced English for University Studies (ELC1014) 3 credits</td>
<td>Any one of the English LCR Proficient Level subjects (see Table 4.2.2) 3 credits</td>
</tr>
<tr>
<td>Level 4 or equivalent</td>
<td>English for University Studies (ELC1013) 3 credits</td>
<td>Advanced English for University Studies (ELC1014) 3 credits</td>
</tr>
<tr>
<td>Level 3 or equivalent</td>
<td>Practical English for University Studies (ELC1011) 3 credits</td>
<td>English for University Studies (ELC1013) 3 credits</td>
</tr>
</tbody>
</table>

Table 4.2.1 Framework of English LCR subjects
Students who can demonstrate that they have achieved a level beyond that of the LCR proficient level subjects as listed in Table 4.2.2 (based on an assessment by ELC) may apply for subject exemption or credit transfer of the LCR subject or subjects concerned.

<table>
<thead>
<tr>
<th>For students entering with HKDSE Level 5 or at an equivalent level or above</th>
<th>Advanced English Reading and Writing Skills (ELC2011)</th>
<th>3 credits each</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persuasive Communication (ELC2012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>English in Literature and Film (ELC2013)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2.2  English LCR subjects at Proficient Level

**Chinese**

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

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

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

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

Table 4.2.3  Framework of Chinese LCR subjects
<table>
<thead>
<tr>
<th>Subject</th>
<th>Pre-requisite/Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary Cantonese (Taught in English / Putonghua) CBS1153 / CBS1153P</td>
<td>• For students whose native language is not Cantonese</td>
</tr>
<tr>
<td>Intermediate Cantonese (Taught in English) (CBS2153)</td>
<td>• Students who have completed “Elementary Cantonese” or meet a certain standard in a pre-course assessment</td>
</tr>
<tr>
<td>Putonghua in the Workplace (CBS2101P)</td>
<td>• Students who have completed “Fundamentals of Chinese Communication” or could demonstrate with proof their basic proficiency in Putonghua • For students whose native language is not Putonghua</td>
</tr>
<tr>
<td>Creative Writing in Chinese (CBS2102P)</td>
<td>• For students entering with HKDSE level 4 or above; or • Students with advanced competence level as determined by the entry assessment; or • Students who have completed “Fundamentals of Chinese Communication”</td>
</tr>
<tr>
<td>Chinese and the Multimedia (CBS2103P)</td>
<td>• For students entering with HKDSE level 4 or above; or • Students with advanced competence level as determined by the entry assessment; or • Students who have completed “Fundamentals of Chinese Communication”</td>
</tr>
</tbody>
</table>

Table 4.2.4 Chinese LCR Elective Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Pre-requisite/exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese I (for non-Chinese speaking students) (CBS1151)</td>
<td>• For non-Chinese speaking students at beginners’ level</td>
</tr>
<tr>
<td>Chinese II (for non-Chinese speaking students) (CBS1152)</td>
<td>• For non-Chinese speaking students; and • Students who have completed Chinese I or equivalent</td>
</tr>
<tr>
<td>Chinese III (for non-Chinese speaking students) (CBS2151)</td>
<td>• For non-Chinese speaking students at higher competence levels; and • Students who have completed Chinese II or equivalent</td>
</tr>
<tr>
<td>Chinese IV (for non-Chinese speaking students) (CBS2154)</td>
<td>• For non-Chinese students at intermediate competence levels; and • Students who have completed Chinese III or equivalent</td>
</tr>
<tr>
<td>Chinese Literature – Linguistics and Cultural Perspectives (for non-Chinese speaking students) (CBS2152)</td>
<td>• For non-Chinese speaking students at higher competence levels</td>
</tr>
</tbody>
</table>

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

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

Reading Requirement

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

A list of approved CAR subjects for meeting the Writing Requirement and the Reading Requirement is shown at: http://www.polyu.edu.hk/ogur/CAR-on-Offer.html

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

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

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

(ii) Freshman Seminar

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

A list of Freshman Seminars offered by the Broad Disciplines can be found at: http://www.polyu.edu.hk/ogur/ListOfFreshmanSeminars.html

(iii) Leadership and Intra-Personal Development

All students must successfully complete one 3-credit subject in the area of Leadership and Intra-Personal Development, which is designed to enable students to (a) understand and integrate theories, research and concepts on the qualities (particularly intra-personal and interpersonal qualities) of effective leaders in the Chinese context, (b) develop greater self-awareness and a better understanding of oneself, (c) acquire interpersonal skills essential for functioning as an effective leader, (d) develop self-reflection skills in their learning, and (e) recognise the importance of the active pursuit of knowledge on an intra-personal and interpersonal level and its relationship to leadership qualities.
A list of designated subjects for meeting the leadership and intra-personal development requirement is available at:
http://www.polyu.edu.hk/ogur/student/4yr/gur/leadership-intra-personal-development

(iv) Service-Learning

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

These subjects may take the form of:

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

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

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

(v) Cluster Areas Requirements (CAR)

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

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

A list of CAR subjects under each of the four Cluster Areas is available at:
http://www.polyu.edu.hk/ogur/CAR-on-Offer.html

(vi) China Studies Requirement

Of the 12 credits of CAR described in section (v) above, students are required to successfully complete a minimum of 3 credits on CAR subjects designated as “China-related”. The purpose is to enable students to gain an increased understanding of China (e.g., its history, culture and society, as well as emerging issues or challenges).
A list of approved CAR subjects for meeting the China Studies Requirement is available at: http://www.polyu.edu.hk/ogur/CAR-on-Offer.html

(vii) Healthy Lifestyle

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

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

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

4.3 Discipline Specific Requirements (DSR)

A student in the BEng (Hons) in Electrical Engineering programme should complete 94 credits of discipline-specific requirements (DSR) as detailed below:

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

The following subjects must be taken:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA1110</td>
<td>Basic Mathematics I – Calculus and Probability &amp; Statistics</td>
<td>3</td>
</tr>
<tr>
<td>AMA1120</td>
<td>Basic Mathematics II – Calculus and Linear algebra</td>
<td>3</td>
</tr>
<tr>
<td>AP10005</td>
<td>Physics I</td>
<td>3</td>
</tr>
<tr>
<td>AP10006</td>
<td>Physics II</td>
<td>3</td>
</tr>
</tbody>
</table>

12 credits

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

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF3625</td>
<td>Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>AMA2111</td>
<td>Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>AMA2112</td>
<td>Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>CBS3241P</td>
<td>Professional Communication in Chinese*</td>
<td>2</td>
</tr>
<tr>
<td>ELC3521</td>
<td>Professional Communication in English</td>
<td>2</td>
</tr>
<tr>
<td>ENG2001</td>
<td>Fundamentals of Materials Science and Engineering #</td>
<td>3</td>
</tr>
<tr>
<td>ENG2002</td>
<td>Computer Programming</td>
<td>3</td>
</tr>
<tr>
<td>ENG2003</td>
<td>Information Technology</td>
<td>3</td>
</tr>
<tr>
<td>ENG3003</td>
<td>Engineering Management</td>
<td>3</td>
</tr>
<tr>
<td>ENG3004</td>
<td>Society and the Engineer</td>
<td>3</td>
</tr>
</tbody>
</table>

28 credits
(iii) DSR subjects in Electrical Engineering discipline (54 credits)

The following DSR subjects in Electrical Engineering must be taken:

<table>
<thead>
<tr>
<th>Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE2001A Applied Electromagnetics (3)</td>
</tr>
<tr>
<td>EE2002A Circuit Analysis (3)</td>
</tr>
<tr>
<td>EE2003A Electronics (3)</td>
</tr>
<tr>
<td>EE2004A Electrical Energy Systems Fundamentals (3)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>12 credits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE3001A Analogue and Digital Circuits (3)</td>
</tr>
<tr>
<td>EE3002A Electromechanical Energy Conversion (3)</td>
</tr>
<tr>
<td>EE3003A Power Electronics and Drives (3)</td>
</tr>
<tr>
<td>EE3004A Power Transmission and Distribution (3)</td>
</tr>
<tr>
<td>EE3005A Systems and Control (3)</td>
</tr>
<tr>
<td>EE3006A Analysis Methods for Engineers (3)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>18 credits</td>
</tr>
</tbody>
</table>

*Any two electives*

| EE3007A Computer System Principles (3)       |
| EE3008A Linear Systems and Signal Processing (3) |
| EE3009A Electrical Services in Buildings (3)  |
|                                               |
| 6 credits                                    |

<table>
<thead>
<tr>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE4003A Electrical Machines (3)</td>
</tr>
<tr>
<td>EE4004A Power Systems (3)</td>
</tr>
<tr>
<td>EE4006A Individual Project (6)</td>
</tr>
<tr>
<td>EE4xxxA Advanced Elective 1 (3)</td>
</tr>
<tr>
<td>EE4xxxA Advanced Elective 2 (3)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>18 credits</td>
</tr>
</tbody>
</table>

Table 4.3

* Students who are non-Chinese speakers or those whose Chinese standard are at junior secondary level or below will be exempted from the Discipline-Specific Chinese Language requirement. Students of this category can take a replacement subject of any level to make up for credit requirement.

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

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

  Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)
4.4 Curriculum for Various Levels

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

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

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

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

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

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

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

Tables in Section 4.5 show the times (semesters) in which these subjects are recommended to be taken if the programme are to be completed in the minimum time.
Table 4.4.1

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Teaching Department</th>
<th>Credits</th>
<th>GPA Weight (W)</th>
<th>Continuous Assessment</th>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA1110</td>
<td>Basic Mathematics I – Calculus and Probability &amp; Statistics</td>
<td>AMA</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>AMA1120</td>
<td>Basic Mathematics II – Calculus and Linear Algebra</td>
<td>AMA</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>AP10001</td>
<td>Introduction to Physics*</td>
<td>AP</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>AP10005</td>
<td>Physics I</td>
<td>AP</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>AP1110</td>
<td>Physics II</td>
<td>AP</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>APS1101</td>
<td>Tomorrow’s Leaders</td>
<td>APSS</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>CBS1101P</td>
<td>Fundamentals of Chinese Communication*</td>
<td>CBS</td>
<td>3</td>
<td>0.2</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>CBS1102P</td>
<td>Advanced Communication Skills in Chinese*</td>
<td>CBS</td>
<td>3</td>
<td>0.2</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>ELC1111</td>
<td>Practical English for University Studies*</td>
<td>ELC</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>ELC1113</td>
<td>English for University Studies*</td>
<td>ELC</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>ELC1114</td>
<td>Advanced English for University Studies*</td>
<td>ELC</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>ENG1003</td>
<td>Freshman Seminar for Engineering</td>
<td>ENG</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
</tbody>
</table>

** Non-Def Subjects

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

Table 4.4.2

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Teaching Department</th>
<th>Credits</th>
<th>GPA Weight (W)</th>
<th>Continuous Assessment</th>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA2111</td>
<td>Mathematics I</td>
<td>AMA</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>AMA2112</td>
<td>Mathematics II</td>
<td>AMA</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>EE2001A</td>
<td>Applied Electromagnetics</td>
<td>EE</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>EE2002A</td>
<td>Circuit Analysis</td>
<td>EE</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>EE2003A</td>
<td>Electronics</td>
<td>EE</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>EE2004A</td>
<td>Electrical Energy Systems Fundamentals</td>
<td>EE</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>ELC2011</td>
<td>Advanced English Reading and Writing Skills*</td>
<td>ELC</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>ELC2012</td>
<td>Persuasive Communication*</td>
<td>ELC</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>ELC2013</td>
<td>English in Literature and Film*</td>
<td>ELC</td>
<td>3</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
</tr>
<tr>
<td>ENG2001</td>
<td>Fundamentals of Materials Science and Engineering*</td>
<td>ENG</td>
<td>3</td>
<td>0.2</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>ENG2002</td>
<td>Computer Programming</td>
<td>ENG</td>
<td>3</td>
<td>0.2</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>ENG2003</td>
<td>Information Technology</td>
<td>ENG</td>
<td>3</td>
<td>0.2</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

** Def Subjects

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

Table 4.4.3

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Teaching Department</th>
<th>Credits</th>
<th>GPA Weight (W)</th>
<th>Continuous Assessment</th>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC2105</td>
<td>Engineering Communication and Fundamentals</td>
<td>IC</td>
<td>4</td>
<td>-</td>
<td>100% assessed and graded</td>
<td>-</td>
</tr>
<tr>
<td>IC2112</td>
<td>IC Training (EE)</td>
<td>IC</td>
<td>4</td>
<td>-</td>
<td>100% assessed and graded</td>
<td>-</td>
</tr>
</tbody>
</table>


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

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

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

- Biology: Biotechnology and Human Health (ABCT1D03), Introductory Life Science (ABCT1D04), Bionic Human and the Future of Being Human (BME1D01)
- Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)

<table>
<thead>
<tr>
<th>The Hong Kong Polytechnic University</th>
<th>BEng (Hons) in Electrical Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Code</td>
<td>Subject Title</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Def Subjects</td>
<td></td>
</tr>
<tr>
<td>AF3625</td>
<td>Engineering Economics</td>
</tr>
<tr>
<td>EE3001A</td>
<td>Analogue and Digital Circuits</td>
</tr>
<tr>
<td>EE3002A</td>
<td>Electromechanical Energy Conversion</td>
</tr>
<tr>
<td>EE3003A</td>
<td>Power Electronics and Drives</td>
</tr>
<tr>
<td>EE3004A</td>
<td>Power Transmission and Distribution</td>
</tr>
<tr>
<td>EE3005A</td>
<td>Systems and Control</td>
</tr>
<tr>
<td>EE3006A</td>
<td>Analysis Methods for Engineers</td>
</tr>
<tr>
<td>ENG3003</td>
<td>Engineering Management</td>
</tr>
<tr>
<td>ENG3004</td>
<td>Society and the Engineer</td>
</tr>
<tr>
<td>Def Subjects</td>
<td></td>
</tr>
<tr>
<td>CBS3241P</td>
<td>Professional Communication in Chinese</td>
</tr>
<tr>
<td>ELC3521</td>
<td>Professional Communication in English</td>
</tr>
<tr>
<td>Level 3 Electives (Def Subjects)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EE3007A</td>
<td>Computer System Principles</td>
</tr>
<tr>
<td>EE3008A</td>
<td>Linear Systems and Signal Processing</td>
</tr>
<tr>
<td>EE3009A</td>
<td>Electrical Services in Buildings</td>
</tr>
<tr>
<td>EE310A</td>
<td>Summer Practical Training</td>
</tr>
</tbody>
</table>

Table 4.4.3

* The Department reserves the right of NOT offering all electives in each semester
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Teaching Department</th>
<th>Contact Hours</th>
<th>Credits</th>
<th>GPA Weight (W)</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Eligibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any two electives; at least one should be EE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>subjet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Specialist Electives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSE463</td>
<td>Design of Mechanical Systems in Buildings</td>
<td>BSE</td>
<td>33</td>
<td>3</td>
<td>0.3</td>
<td>40% 60%</td>
</tr>
<tr>
<td>EEG402A</td>
<td>Digital Control and Signal Processing</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EEG407A</td>
<td>Advanced Power Electronics</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EEG408A</td>
<td>Applied Digital Control</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EEG409A</td>
<td>Electric Traction and Drives</td>
<td>EE</td>
<td>39</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EE4010A</td>
<td>Fibre Optics</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EE4011A</td>
<td>Industrial Computer Applications</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EE4012A</td>
<td>Intelligent Buildings</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EE4013A</td>
<td>Power System Protection</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EE4014A</td>
<td>Intelligent Systems Applications in Electrical</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE4015A</td>
<td>Electrical Engineering Materials</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EE4022A</td>
<td>Fundamentals of Fibre-Optic Communications and</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>ENG4001</td>
<td>Project Management</td>
<td>ENG</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td></td>
<td><strong>Non-Technical Broadening Electives</strong></td>
<td></td>
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</tr>
<tr>
<td>AF5107</td>
<td>Accounting for Engineers</td>
<td>AF</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 50% 50%</td>
</tr>
<tr>
<td>CSE40462</td>
<td>Environmental Impact Assessment – Theory and</td>
<td>CEE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 50% 50%</td>
</tr>
<tr>
<td></td>
<td>Practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE516</td>
<td>Urban Transport Planning – Theory and Practice</td>
<td>CEE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>ISE404</td>
<td>Total Quality Management</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 55% 45%</td>
</tr>
<tr>
<td>MM44522</td>
<td>China Business Management</td>
<td>MM</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 50% 50%</td>
</tr>
<tr>
<td></td>
<td><strong>MSc Subjects as Electives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EES501A</td>
<td>Alternative Energy Technologies</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES502A</td>
<td>Modern Protection Methods</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES505A</td>
<td>Power System Control and Operation</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES509A</td>
<td>High Voltage Engineering</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES510A</td>
<td>Electrical Traction Engineering</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES512A</td>
<td>Electric Vehicles</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES514A</td>
<td>Real Time Computing</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES517A</td>
<td>Fibre Optic Components</td>
<td>EE</td>
<td>36</td>
<td>3</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES520A</td>
<td>Intelligent Motion Systems</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES521A</td>
<td>Industrial Power Electronics</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES522A</td>
<td>Optical Fibre Systems</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES524A</td>
<td>Open Electricity Market Operation</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES525A</td>
<td>Energy Policy and Restructuring of Electricity</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES526A</td>
<td>Power System Analysis and Dynamics</td>
<td>EE</td>
<td>33</td>
<td>6</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES527A</td>
<td>Auto-tuning for Industrial Processes</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES528A</td>
<td>System Modelling and Optimal Control</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES529A</td>
<td>Power Electronics for Utility Applications</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
<tr>
<td>EES530A</td>
<td>Electrical Energy Saving Systems</td>
<td>EE</td>
<td>39</td>
<td>-</td>
<td>3</td>
<td>0.3 40% 60%</td>
</tr>
</tbody>
</table>

Table 4.4.4

# Lecture/Tutorial: 33 hours; plus Seminar: 6 hours
+ Lecture/Tutorial: 33 hours; plus Mini-project presentation: 6 hours
* The Department reserves the right of NOT offering all electives in each semester
The progression pattern in Table 4.5.1 to Table 4.5.4 is recommended for HKDSE admittees who have attained Level 4 (Basic) in both English language and Chinese language, and who have attained Level 2 in Physics (or Combined Science with a component in Physics).

A student in the First Year is advised to take the following curriculum as indicated in Table 4.5.1 below and obtain a total of 30 academic credits and 4 training credits.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA1110</td>
<td>Basic Mathematics I – Calculus and Probability &amp; Statistics (3)</td>
</tr>
<tr>
<td>AP10005</td>
<td>Physics I (3)</td>
</tr>
<tr>
<td>APSS1L01</td>
<td>Tomorrow’s Leaders (3)</td>
</tr>
<tr>
<td>ELCXXXX</td>
<td>English LCR Subject* (3)</td>
</tr>
<tr>
<td>ENG1003</td>
<td>Freshman Seminars for Engineering (3)</td>
</tr>
</tbody>
</table>

**Total Credits:** 15

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA1120</td>
<td>Basic Mathematics II – Calculus and Linear Algebra (3)</td>
</tr>
<tr>
<td>AP10006</td>
<td>Physics II (3)</td>
</tr>
<tr>
<td>ELCXXXX</td>
<td>English LCR Subject* (3)</td>
</tr>
<tr>
<td>ENG2003</td>
<td>Information Technology (3)</td>
</tr>
<tr>
<td>CAR requirement</td>
<td>one Cluster Area Requirement Subject (3)</td>
</tr>
</tbody>
</table>

**Total Credits:** 15

**GUR requirement**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC2105</td>
<td>Engineering Communication and Fundamentals (4) (120 hours throughout the year)</td>
</tr>
</tbody>
</table>

**Total Training Credits:** 4

Table 4.5.1

* Students will take these subjects based on their HKDSE results (see Section 4.2 (i))
A student in the Second Year is advised to take the following curriculum as indicated in Table 4.5.2 below and obtain 30 academic credits and 4 training credits.

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Semester Two</th>
<th>Semester Three (Summer Period at the end of Year 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA2111  Mathematics I (3)</td>
<td>AF3625  Engineering Economics (3)</td>
<td>IC2112  IC Training I (EE) (4) (120 hours in summer)</td>
</tr>
<tr>
<td>CBSXXXX  Chinese LCR Subject* (3)</td>
<td>AMA2112  Mathematics II (3)</td>
<td></td>
</tr>
<tr>
<td>EE2002A  Circuit Analysis (3)</td>
<td>EE2003A  Electronics (3)</td>
<td></td>
</tr>
<tr>
<td>ENG2002  Computer Programming (3)</td>
<td>CAR requirement one Cluster Area Requirement Subject (3)</td>
<td>4 training credits</td>
</tr>
<tr>
<td></td>
<td>15 credits</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.5.2

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

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

 Biology: Biotechnology and Human Health (ABCT1D03), Introductory Life Science (ABCT1D04), Bionic Human and the Future of Being Human (BME1D01)
 Chemistry: Chemistry and Modern Living (ABCT1D01), Chemistry and Sustainable Development (ABCT1D14)

 ^ If you select one of these five subjects, you can fulfill the requirement of DSR and CAR-STE in “Science, Technology and Environment”. You are required to choose any 3-credit subject (from Level 1 to Level 4) to make up for the total credit requirement.
A student in the Third Year is advised to take the following curriculum as indicated in Table 4.5.3 below and obtain 34 academic credits and 3 training credits.

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Semester Two</th>
<th>Semester Three (Summer Period at the end of Year 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE2001A</td>
<td>CBS3241P</td>
<td>EE3010A</td>
</tr>
<tr>
<td>EE3001A</td>
<td>EE3002A</td>
<td></td>
</tr>
<tr>
<td>EE3003A</td>
<td>EE3004A</td>
<td></td>
</tr>
<tr>
<td>EE3005A</td>
<td>EE3006A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ELC3521</td>
<td></td>
</tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>EE3007A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EE3008A</td>
<td></td>
</tr>
</tbody>
</table>

**CAR requirement**

one Cluster Area Requirement Subject (3)

*any two EE Level 3 electives should be taken throughout the year*

<table>
<thead>
<tr>
<th>EE3007A</th>
<th>Computer System Principles (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE3008A</td>
<td>Linear Systems and Signal Processing (3)</td>
</tr>
</tbody>
</table>

18 ~ 21 credits

**Semester Two**

<table>
<thead>
<tr>
<th>EE3009A</th>
<th>Professional Communication in Chinese (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electromechanical Energy Conversion (3)</td>
</tr>
<tr>
<td></td>
<td>Power Transmission and Distribution (3)</td>
</tr>
<tr>
<td></td>
<td>Analysis Methods for Engineers (3)</td>
</tr>
<tr>
<td></td>
<td>Professional Communication in English (2)</td>
</tr>
<tr>
<td></td>
<td>Electrical Services in Buildings (3)</td>
</tr>
</tbody>
</table>

*any two EE Level 3 electives should be taken throughout the year*

13 ~ 16 credits

**Semester Three (Summer Period at the end of Year 3)**

| EE3010A      | Summer Practical Training (A minimum of 6 weeks) (3) |

3 training credits

Table 4.5.3
A student is advised to take the following curriculum in the final year as indicated in Table 4.5.4 and obtain 30 credits. He/she must accumulate a total of 124 academic credits and 11 training credits to qualify for graduation.

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Semester Two</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EE4003A</strong></td>
<td><strong>EE4006A</strong></td>
</tr>
<tr>
<td><strong>EE4004A</strong></td>
<td><strong>ENG3004</strong></td>
</tr>
<tr>
<td><strong>EE4006A</strong></td>
<td><strong>GUR requirement</strong></td>
</tr>
<tr>
<td><strong>ENG3003</strong></td>
<td>Service-Learning Subject* (1.5 continues in Semester 2)</td>
</tr>
<tr>
<td></td>
<td>one CAR subject should be taken throughout the year</td>
</tr>
<tr>
<td></td>
<td>one Cluster Area Requirement Subject (3)</td>
</tr>
<tr>
<td></td>
<td>two electives should be taken throughout Year 4 (3)</td>
</tr>
<tr>
<td></td>
<td>Electives from Table 4.4.4</td>
</tr>
<tr>
<td></td>
<td>16.5 credits</td>
</tr>
</tbody>
</table>

| **EE4006A**  | Individual Project (3 continues from Semester 1) |
| **ENG3004**  | Society and the Engineer (3) |
|              | GUR requirement |
|              | Service-Learning Subject* (1.5 continues from Semester 2) |
|              | one CAR subject should be taken throughout the year |
|              | one Cluster Area Requirement Subject (3) |
|              | two electives should be taken throughout Year 4 (3 ~ 6) |
|              | Electives from Table 4.4.4 |
|              | 13.5 credits |

**Table 4.5.4**

* Students are encouraged to take this subject at an earlier stage of study.

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

**Total Credits Required for Graduation:** 61 academic credits + 11 training credits

The progression pattern in Table 4.6.1 to Table 4.6.2 is recommended for Senior Year Students.

A student in the First Year is advised to take the following curriculum as indicated in Table 4.6.1 below and obtain a total of 31 academic credits and 7 training credits.

<table>
<thead>
<tr>
<th>Semester One</th>
<th>15 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE2001A</td>
<td>Applied Electromagnetics (3)</td>
</tr>
<tr>
<td>ENG2001</td>
<td>Fundamentals of Materials Science and Engineering* (3)</td>
</tr>
<tr>
<td>EE3001A</td>
<td>Analogue and Digital Circuits (3)</td>
</tr>
<tr>
<td>EE3005A</td>
<td>Systems and Control (3)</td>
</tr>
<tr>
<td>CAR requirement</td>
<td>one Cluster Area Requirement Subject (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Two</th>
<th>16 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF3625</td>
<td>Engineering Economics (3)</td>
</tr>
<tr>
<td>CBS3241P</td>
<td>Professional Communication in Chinese (2)</td>
</tr>
<tr>
<td>EE3004A</td>
<td>Power Transmission and Distribution (3)</td>
</tr>
<tr>
<td>EE3006A</td>
<td>Analysis Methods for Engineers (3)</td>
</tr>
<tr>
<td>ELC3521</td>
<td>Professional Communication in English (2)</td>
</tr>
<tr>
<td>ENG2003</td>
<td>Information Technology (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Three (Summer Period at the end of Year 1)</th>
<th>3 training credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE3010A</td>
<td>Summer Practical Training (A minimum of 6 weeks) (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IC2105</th>
<th>4 training credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Engineering Communication and Fundamentals (4)</td>
</tr>
<tr>
<td></td>
<td>(120 hours throughout the year)</td>
</tr>
</tbody>
</table>

Table 4.6.1

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

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

* If you select one of these five subjects, you can fulfill the requirement of DSR and CAR-STE in “Science, Technology and Environment”. You are required to choose any 3-credit subject (from Level 1 to Level 4) to make up for the total credit requirement.
A student is advised to take the following curriculum in the final year as indicated in Table 4.6.2 and obtain 30 academic credits and 4 training credits. He/she must accumulate a total of 61 academic credits and 11 training credits to qualify for graduation.

<table>
<thead>
<tr>
<th>Semester One</th>
<th>16.5 credits</th>
</tr>
</thead>
<tbody>
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<td>CAR requirement one Cluster Area Requirement Subject (3)</td>
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<th>Semester Two</th>
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<td>Elective subjects* Two electives should be taken (6) Electives from Table 4.4.4</td>
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<th>Semester Three (Summer Period at the end of Year 2)</th>
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<td>IC2112 IC Training I (EE) (4) (120 hours in summer)</td>
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Table 4.6.2

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

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

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

Note 2 Those students not meeting the equivalent standard of the Undergraduate Degree LCR (based on their previous studies in AD/HD programmes and their academic performance) will be required to take degree LCR subjects on top of the normal curriculum requirement. The Programme offering department will refer to the guidelines provided by the Language Centres (ELC and CBS) to determine whether a new student has met the equivalent standard.
### 4.7 Subjects Support to Programme Outcomes

Table 4.7 illustrates how the subjects support the Programme Outcomes through teaching activities, practice on the part of students, and measurements.

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Table 4.7 Support of programme outcomes by individual subjects
4.8 Work-Integrated Education and Summer Practical Training

Work-Integrated Education (WIE) is defined as a structured and measureable learning experience which takes place in an organizational context relevant to a student’s future profession. It aims to prepare students for the realities of workplaces, develop students’ ability to learn in non-academic surroundings, allow students to assess their own strengths and weaknesses in a realistic working settings and develop students’ critical thinking and problem solving capabilities.

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

WIE activities may include placement, employment or attachment relevant to the context, knowledge and skills of the Programme. The Job Board arranged by the Office of Careers and Placement Services (CAPS) of the University is one of the main sources of placement opportunities for local students and students from Mainland China and overseas. The WIE activities may or may not involve any payment. Any payment by employers is completely at the employers’ discretion. Typical examples of WIE activities are as follows:

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

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

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

(i) Orientation

Students should start their preparatory work by the commencement of the second semester of their third year study. An orientation will be provided for the following:

- Basic skills in undertaking practical training
- Planning and scheduling for successful completion of assessment instruments
- Information on searching national/international work-base employment, attachments etc.
Students are required to indicate the expected training experiences prior to the commencement of their placements.

(ii) Progress Monitoring

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

(iii) Learning Evaluation

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

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

4.9 Industrial Centre (IC) Training

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

4.10 Language Enhancement Subjects

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

4.11 Physics Enhancement Subject

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

5.1 Administration

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

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

5.2 Academic Advisors

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

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

The admission, registration and assessment arrangements described below are in accordance with the University policies and regulations for all 4-year full-time undergraduate degree programmes.

6.1 Admission

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

6.2 Re-admission

Students who have been required to withdraw on the grounds of academic failure or have been de-registered, and those who have discontinued their studies without completing the proper procedures for official withdrawal, shall not be considered for re-admission to the same programme/stream in the following academic year.

6.3 Transfer of study within the University

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

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

6.4 Concurrent Enrolment

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

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

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

The maximum period of registration on, and for completion of, a programme is normally twice the duration of the programme, and must not exceed 8 years. This 8 year maximum period shall apply to programmes whose specified duration is more than 4 years. This period shall exclude deferment granted for justifiable reasons such as illness or posting to work outside Hong Kong, but any semester in which the students are allowed to take zero subject will be counted towards the maximum period of registration. For Senior Year intakes, students are normally expected to complete their study in 2 years, with a maximum period of registration of 4 years.
A student's registration shall lapse if it is no longer possible for him to obtain an award within the maximum period of registration.

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

6.6 Residential Requirement

In order to be considered for a PolyU award, a student must complete at least 1/3 of the normal credit requirement for the award he is currently enrolled, unless the professional bodies concerned stipulate otherwise. This 1/3 requirement is also applicable to Minor programme. Students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor.

6.7 Subject Registration and Withdrawal

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

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

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

6.8 Study Load

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

The normal study load is 15 credits in a semester. The maximum study load to be taken by a student in a semester is 21 credits, unless exceptional approval is given by the Head of the programme offering department. For such cases, students should be reminded that the study load approved should not be taken as the grounds for academic appeal.
To help improve the academic performance of students on academic probation, these students will be required to take a reduced study load in the following semester (Summer Term excluded). The maximum number of credits to be taken by the students varies according to the policies of individual Departments and will be subject to the approval of the authorities concerned.

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

6.9 Subject Exemption

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

6.10 Credit Transfer

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

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

Normally, not more than 50% of the credit requirement for award may be transferable from approved institutions outside the University. For transfer of credits from programmes offered by the University, normally not more than 67% of the credit requirement for award can be transferred. In cases where both types of credits are being transferred (i.e. from programmes offered by the University and from approved institutions outside the University), not more than 50% of the credit requirement for award may be transferred.
Credit transfer can be applicable to credits earned by students through study at an overseas institution under an approved exchange programme. Students should, before they go abroad for the exchange programme, seek prior approval from the programme offering department on their study plan and credit transferability. In order to overcome the problems associated with subject-to-subject mappings, block credit transfer rather than subject-by-subject credit transfer can be given.

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

For students admitted to an Articulation Degree or Senior Year curriculum which is already a reduced curriculum, they should not be given credit transfer for any required GUR subjects, and they must complete at least 61 credits to be eligible for award. Students exceptionally admitted to an Articulation Degree or Senior Year curriculum before 2017/18 based on qualification more advanced than Associate Degree/Higher Diploma may be given credit transfer for the required GUR subjects if they had completed comparable components in their earlier studies. These students can take fewer than 61 credits for attaining the award. As from the 2017/18 intake cohort, all students admitted to an Articulation Degree or Senior Year curriculum, irrespective of the entry qualifications they held when applying for admission to the programmes, are required to complete at least 61 credits to be eligible for award.

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

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

6.11 Deferment of Study

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

Application for deferment of study will be entertained only in exceptional circumstances from students who have not yet completed the first year of a full-time programme.

Where the period of deferment of study begins during a stage for which fees have been paid, no refund of such fees will be made.

Students who have been approved for deferment are not entitled to enjoy any campus facilities during the deferment period.
6.12 General Assessment Regulations

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

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

(i) Subject Level

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

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

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

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(ii) Language of assessment

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

6.13 Principles of Assessment

Assessment of learning and assessment for learning are both important for assuring the quality of student learning. Assessment of learning is to evaluate whether students have achieved the intended learning outcomes of the subjects that they have taken and have attained the overall learning outcomes of the academic programme at the end of their study at a standard appropriate to the award. Appropriate methods of assessment that align with the intended learning outcomes should be designed for this purpose. The assessment methods will also enable the teacher to differentiate students’ different levels of performance within the subject. Assessment for learning is to engage students in productive learning activities through purposefully designed assessment tasks.
Assessment will also serve as feedback to students. The assessment criteria and standards should be made explicit to students before the start of the assessment to facilitate student learning, and feedback provided should link to the criteria and standards. Timely feedback should be provided to students so that they are aware of their progress and attainment for the purpose of improvement.

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

6.14 Assessment Methods

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

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

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

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

6.15 Progression/Academic Probation/Deregistration

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

(a) eligible for progression towards an award; or

(b) eligible for an award; or

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

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

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

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

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

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

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

A student may be de-registered from the programme enrolled before the time frame specified at (b) or (c) of (ii) above if his academic performance is poor to the extent that the Board of Examiners considers that there is not much of a chance for him to attain a GPA of 2.0 at the end of the programme.

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

6.16 Retaking of Subjects

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

The number of retakes of a subject is not restricted. Only the grade obtained in the final attempt of retaking (even if the retake grade is lower than the original grade for originally passed subject) will be included in the calculation of the Grade Point Average (GPA). If students have passed a subject but failed after retake, credits accumulated for passing the subject in a previous attempt will remain valid for satisfying the credit requirement for award. (The grades obtained in previous attempts will only be reflected in transcript of studies.)
In cases where a student takes another subject to replace a failed elective subject, the fail grade will be taken into account in the calculation of the GPA, despite the passing of the replacement subject.\(^8\)

### 6.17 Absence from an assessment component

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

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

### 6.18 Assessment to be completed

For cases where students fail marginally in one of the components within a subject, the BoE can defer making a final decision until the students concerned have completed the necessary remedial work to the satisfaction of the subject examiner(s). The remedial work must not take the form of re-examination.

### 6.19 Aegrotat Award

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

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

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

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

---

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

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

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

'F' is a subject failure grade, whilst all others ('D' to 'A+') are subject passing grades. No credit will be earned if a subject is failed.
Codes to Denote Overall Subject Assessments (and subject components, if deemed appropriate)

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

^ For cases where students fail marginally in one of the components within a subject, the BoE can defer making a final decision until the students concerned have completed the necessary remedial work to the satisfaction of the subject examiner(s). The students can be assigned an ‘I’ code in this circumstance. The remedial work must not take the form of re-examination.

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.5</td>
</tr>
<tr>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>B+</td>
<td>3.5</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
</tr>
<tr>
<td>C+</td>
<td>2.5</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
</tr>
<tr>
<td>D+</td>
<td>1.5</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
</tr>
</tbody>
</table>

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

\[
GPA = \frac{\sum \text{Subject Grade Point} \times \text{Subject Credit Value}}{\sum \text{Subject Credit Value}}
\]

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

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

(i) Exempted subjects
(ii) Ungraded subjects
(iii) Incomplete subjects
(iv) Subjects for which credit transfer has been approved, but without any grade assigned
(v) Subjects from which a student has been allowed to withdraw (i.e. those with the code 'W')

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

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

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

10 "Training credits" is used as a generic term only, and also includes clinical/field credits for programmes in different study disciplines. Laboratory experiments done as a subject/an integral part of a subject to satisfy the academic requirements is not considered to be practical training.
In the event that grade is awarded to subject components, a grade point with the decimal value may be generated for the overall result of the subject. This grade point with decimal value will be converted to grade according to the conversion methodology for deriving the subject overall grades. The corresponding grade point for the subject overall grade, instead of the actual grade points obtained by students, will be used for GPA calculation. This methodology for deriving subject overall grades only serves as an aid to subject assessors. As assessment should be a matter of judgement, not merely a result of computation, the subject lecturer will have the discretion to assign a grade which is considered to reflect more appropriately the overall performance of the student in a subject to override the grade derived by the computer.

### 6.21 Different types of GPA

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

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

Along with the ‘cumulative’ GPA, a **weighted GPA** will also be calculated, to give an indication to the Board of Examiners on the award classification which a student will likely get if he makes steady progress on his academic studies.

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

For students taking the Major/Minor study route, a separate GPA will be calculated for their Major and Minor programmes. The **Major GPA** will be used to determine his award classification, which will be so reflected on the award parchment. The **Minor GPA** can be used as a reference for Board of Examiners to moderate the award classification for the Major.
<table>
<thead>
<tr>
<th>Types of GPA</th>
<th>Purpose</th>
<th>Rules for GPA calculation</th>
</tr>
</thead>
</table>
| GPA          | Determine Progression/Graduation | (1) All academic subjects taken by the student throughout his study, both inside and outside the programme curriculum, are included in the GPA calculation.  
(2) For training subjects, including WIE and Clinical/Field subjects, departments can decide whether to include them in the GPA calculation.  
(3) For retake subjects, only the last attempt will be taken in the GPA calculation.  
(4) Level weighting, if any, will be ignored. |
| Semester GPA | Determine Progression | Similar to the rules for GPA as described above, except that only subjects taken in that Semester, including retaken subjects, will be included in the calculation. |
| Weighted GPA | To give an interim indication on the likely Award GPA | (1) Similar to the rules for GPA, except that only subjects inside the programme curriculum concerned will be included in the calculation. Subjects outside the programme curriculum will be excluded.  
(2) Departments can decide whether the training subjects are to be counted towards the Weighted GPA.  
(3) For retake subjects, only the last attempt will be taken in the Weighted GPA calculation.  
(4) A weighting of 2 for Level 1 and 2 subjects, and a weighting of 3 for Level 3 and 4 subjects, will be included in the calculation to determine the Honours classifications.  
(5) The weighted GPA will be the same as the Award GPA unless a student has taken more subjects than required. |
<table>
<thead>
<tr>
<th>Types of GPA</th>
<th>Purpose</th>
<th>Rules for GPA calculation</th>
</tr>
</thead>
</table>
| Major/Minor GPA | For reference and determination of award classification | **Major/Minor GPA**  
1. Only subjects inside the curriculum of the Major/Minor Programmes will be taken in the Major/Minor GPA calculation.  
2. Departments can decide whether the training subjects, are to be counted towards the Major/Minor GPA.  
3. For retake subjects, only the last attempt will be taken in the Major/Minor GPA calculation.  
4. Up to 6 credits from the Major/GUR [including Language Communication Requirements (LCR) subjects at proficiency level] can be counted towards the chosen Minor. Nevertheless, students must take at least 6 credits from their chosen Minor programme in order to satisfy the residential requirement of their chosen Minor. In addition, to be eligible for the Major and Minor awards, the total number of credits taken by the students for their Major-Minor studies must not be lower than the credit requirement of the single discipline Major programme. |
| Award GPA | For determination of award classification | If the student has not taken more subjects than required, the Award GPA will be as follows:  
1. For single Major:  
   Award GPA = Weighted GPA  
2. For Major/Minor programmes:  
   Award GPA = Major GPA |
6.22 Guidelines for Award Classification

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

Weighted GPA will be computed as follows:

\[
\text{Weighted GPA} = \frac{\sum_{i} \text{Subject Grade Point} \times \text{Subject Credit Value} \times W_i}{\sum_{i} \text{Subject Credit Value} \times W_i}
\]

where \(W_i\) = weighting to be assigned according to the level of the subject

\(n\) = number of all subjects counted in GPA calculation

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

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

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

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

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

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Honours Degrees</th>
<th>Weighted GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>3.7+ - 4</td>
</tr>
<tr>
<td>2:i</td>
<td>3.2+ - 3.7+</td>
</tr>
<tr>
<td>2:ii</td>
<td>2.3+ - 3.2+</td>
</tr>
<tr>
<td>3rd</td>
<td>2.0 - 2.3+</td>
</tr>
</tbody>
</table>

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

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

6.24 Examination result announcements, transcripts, testimonials and references

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

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

(i) name and student number;
(ii) title of the programme(s) on which enrolled, or from which graduated;
(iii) medium of instruction for the programme (applicable only to programmes which are delivered in Chinese and for which both Chinese and English versions are offered);
(iv) a full academic record, giving subjects taken and grades attained, and the Grade Point Average (GPA) for all subjects;
(v) credit requirement of the student if different from the normal credit requirement of the programme;
(vi) where relevant, the final award(s) (including information on the Minor award, if appropriate), with classification and year of award;
(vii) a statement indicating that the student has completed the Graduating Students' Language Proficiency Assessment (GSLPA) / Work-integrated Education (WIE) activities / Co-curricular Activities / Healthy Lifestyle / e-learning course in Putonghua (to be offered as an option with effect from the 2018/19 intake cohort), as appropriate;
(viii) a statement showing the duration of supervised training (applicable to sandwich programmes); and
(ix) information on the partner institution, if the award is for a joint programme with another institution and leads to dual/joint awards.
Students may request for a testimonial which is a certification of their studies at the University, but without details on subjects and subject results. Students may also request for references direct from academic staff members concerned.

6.25 Recording of disciplinary actions in students’ records

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

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

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

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

Subject Description Forms
## Content

<table>
<thead>
<tr>
<th>Subject</th>
<th>Code</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Economics</td>
<td>AF3625</td>
<td>AI – 1</td>
</tr>
<tr>
<td>Accounting for Engineers</td>
<td>AF5107</td>
<td>AI – 2</td>
</tr>
<tr>
<td>Basic Mathematics I – Calculus and Probability &amp; Statistics</td>
<td>AMA1110</td>
<td>AI – 3</td>
</tr>
<tr>
<td>Basic Mathematics II – Calculus and Linear algebra</td>
<td>AMA1120</td>
<td>AI – 4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>AMA2111</td>
<td>AI – 5</td>
</tr>
<tr>
<td>Mathematics II</td>
<td>AMA2112</td>
<td>AI – 6</td>
</tr>
<tr>
<td>Introduction to Physics</td>
<td>AP10001</td>
<td>AI – 7</td>
</tr>
<tr>
<td>Physics I</td>
<td>AP10005</td>
<td>AI – 8</td>
</tr>
<tr>
<td>Physics II</td>
<td>AP10006</td>
<td>AI – 9</td>
</tr>
<tr>
<td>Tomorrow’s Leaders</td>
<td>APSS1L01</td>
<td>AI – 10</td>
</tr>
<tr>
<td>Design of Mechanical Systems in Buildings</td>
<td>BSE463</td>
<td>AI – 13</td>
</tr>
<tr>
<td>Fundamentals of Chinese Communication</td>
<td>CBS1101P</td>
<td>AI – 14</td>
</tr>
<tr>
<td>Advanced Communication Skills in Chinese</td>
<td>CBS1102P</td>
<td>AI – 16</td>
</tr>
<tr>
<td>Professional Communication in Chinese</td>
<td>CBS3241P</td>
<td>AI – 18</td>
</tr>
<tr>
<td>Environmental Impact Assessment – Theory and Practice</td>
<td>CSE40462</td>
<td>AI – 20</td>
</tr>
<tr>
<td>Urban Transport Planning - Theory and Practice</td>
<td>CSE516</td>
<td>AI – 21</td>
</tr>
<tr>
<td>Applied Electromagnetics</td>
<td>EE2001A</td>
<td>AI – 22</td>
</tr>
<tr>
<td>Circuit Analysis</td>
<td>EE2002A</td>
<td>AI – 23</td>
</tr>
<tr>
<td>Electronics</td>
<td>EE2003A</td>
<td>AI – 25</td>
</tr>
<tr>
<td>Analogue and Digital Circuits</td>
<td>EE3001A</td>
<td>AI – 28</td>
</tr>
<tr>
<td>Electromechanical Energy Conversion</td>
<td>EE3002A</td>
<td>AI – 29</td>
</tr>
<tr>
<td>Power Electronics and Drives</td>
<td>EE3003A</td>
<td>AI – 30</td>
</tr>
<tr>
<td>Power Transmission and Distribution</td>
<td>EE3004A</td>
<td>AI – 31</td>
</tr>
<tr>
<td>Systems and Control</td>
<td>EE3005A</td>
<td>AI – 32</td>
</tr>
<tr>
<td>Analysis Methods for Engineers</td>
<td>EE3006A</td>
<td>AI – 33</td>
</tr>
<tr>
<td>Computer System Principles</td>
<td>EE3007A</td>
<td>AI – 34</td>
</tr>
<tr>
<td>Linear Systems and Signal Processing</td>
<td>EE3008A</td>
<td>AI – 36</td>
</tr>
<tr>
<td>Electrical Services in Buildings</td>
<td>EE3009A</td>
<td>AI – 37</td>
</tr>
<tr>
<td>Summer Practical Training</td>
<td>EE3010A</td>
<td>AI – 39</td>
</tr>
<tr>
<td>Digital Control and Signal Processing</td>
<td>EE4002A</td>
<td>AI – 41</td>
</tr>
<tr>
<td>Electrical Machines</td>
<td>EE4003A</td>
<td>AI – 42</td>
</tr>
<tr>
<td>Power Systems</td>
<td>EE4004A</td>
<td>AI – 43</td>
</tr>
<tr>
<td>Individual Project</td>
<td>EE4006A</td>
<td>AI – 44</td>
</tr>
<tr>
<td>Advanced Power Electronics</td>
<td>EE4007A</td>
<td>AI – 47</td>
</tr>
<tr>
<td>Applied Digital Control</td>
<td>EE4008A</td>
<td>AI – 48</td>
</tr>
<tr>
<td>Electric Traction and Drives</td>
<td>EE4009A</td>
<td>AI – 49</td>
</tr>
<tr>
<td>Fibre Optics</td>
<td>EE4010A</td>
<td>AI – 51</td>
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<tr>
<td>Industrial Computer Applications</td>
<td>EE4011A</td>
<td>AI – 52</td>
</tr>
<tr>
<td>Intelligent Buildings</td>
<td>EE4012A</td>
<td>AI – 53</td>
</tr>
<tr>
<td>Power System Protection</td>
<td>EE4013A</td>
<td>AI – 55</td>
</tr>
<tr>
<td>Intelligent Systems Applications in Electrical Engineering</td>
<td>EE4014A</td>
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<tr>
<td>Electrical Engineering Materials</td>
<td>EE4015A</td>
<td>AI – 58</td>
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<tr>
<td>Fundamentals of Fibre-Optic Communications and Sensors</td>
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<tr>
<td>EE501A</td>
<td>Alternative Energy Technologies</td>
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<td>EE502A</td>
<td>Modern Protection Methods</td>
<td>AI – 63</td>
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<td>EE505A</td>
<td>Power System Control and Operation</td>
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<tr>
<td>EE509A</td>
<td>High Voltage Engineering</td>
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<td>EE510A</td>
<td>Electrical Traction Engineering</td>
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<td>EE512A</td>
<td>Electric Vehicles</td>
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<td>EE514A</td>
<td>Real Time Computing</td>
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<td>EE517A</td>
<td>Fibre Optic Components</td>
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<td>Intelligent Motion Systems</td>
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<td>Industrial Power Electronics</td>
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<td>EE522A</td>
<td>Optical Fibre Systems</td>
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<td>Open Electricity Market Operation</td>
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<td>Energy Policy and Restructuring of Electricity Supply Industry</td>
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<tr>
<td>EE526A</td>
<td>Power System Analysis and Dynamics</td>
<td>AI – 76</td>
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<td>EE527A</td>
<td>Auto-tuning for Industrial Processes</td>
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<td>EE528A</td>
<td>System Modelling and Optimal Control</td>
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<td>Power Electronics for Utility Applications</td>
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<td>ELC1013</td>
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<td>AI – 82</td>
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<td>ELC1014</td>
<td>Advanced English for University Studies</td>
<td>AI – 83</td>
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<td>ELC2011</td>
<td>Advanced English Reading and Writing Skills</td>
<td>AI – 84</td>
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<td>ELC2012</td>
<td>Persuasive Communication</td>
<td>AI – 85</td>
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<tr>
<td>ELC2013</td>
<td>English in Literature and Film</td>
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<td>Professional Communication in English</td>
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<tr>
<td>ENG1003</td>
<td>Freshman Seminar for Engineering</td>
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<tr>
<td>ENG2001</td>
<td>Fundamentals of Materials Science and Engineering</td>
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<tr>
<td>ENG2002</td>
<td>Computer Programming</td>
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<td>ENG2003</td>
<td>Information Technology</td>
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<tr>
<td>ENG3003</td>
<td>Engineering Management</td>
<td>AI – 96</td>
</tr>
<tr>
<td>ENG3004</td>
<td>Society and the Engineer</td>
<td>AI – 97</td>
</tr>
<tr>
<td>ENG4001</td>
<td>Project Management</td>
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<td>IC2105</td>
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<td>ISE404</td>
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<td>MM4522</td>
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</table>

* Subject

* AI: Academic Year

* Credits: For the academic year 2022-2023.
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>AF3625</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Engineering Economics</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Exclusion: AF2618</td>
</tr>
</tbody>
</table>

#### Objectives

This subject aims to equip students with
1. the fundamental concepts of micro- and macroeconomics related to the engineering industry;
2. the fundamental understanding of finance and costing for engineering operations, budgetary planning and control.

#### Intended Learning Outcomes

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

a. understand how the relevant economic factors shape the environment within which an engineering company operates;
b. evaluate the financial condition of a company based on the financial statements;
c. apply the basic cost accounting techniques in the planning and control of engineering and production activities.

#### Subject Synopsis/ Indicative Syllabus

**Economic Environment of a Firm**

**Microeconomic Factors**

Scarcity, choice and opportunity cost; Demand, supply and price; Profit-maximizing behavior of the firm; Organization of industry: perfect competition and monopoly

**Macroeconomic Factors**

International trade and globalization

**Accounting and Engineering Economics**

Financial statements; Financial ratio analysis; Return on investment; Composition of cost; Cost-volume-profit analysis; Accounting profit versus economic profit

**Fundamentals of Budgetary Planning and Control**

Principle types of budgets for production and service operations; Approaches to budgeting and the budgeting process; Investment and source of finance; Cost of capital; Evaluation of investment alternatives

#### Teaching/Learning Methodology

The two-hour lecture each week focuses on the introduction and explanation of key concepts of Engineering Economics. The one-hour tutorial provides students with directed studies to enhance their self-learning capacities. Individual and group activities including discussions and presentations are conducted to facilitate students’ understanding and application of the concepts they have learned to tackling real-life problems in Engineering Economics.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>50%</td>
<td>a</td>
</tr>
<tr>
<td>1. In-class activities</td>
<td>(15%)</td>
<td>✓</td>
</tr>
<tr>
<td>2. Written assignments</td>
<td>(15%)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3. Test</td>
<td>(20%)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Final Examination</td>
<td>50%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

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

### Student Study Effort Required

**Class contact:**
- Lecture: 26 Hrs.
- Tutorial: 13 Hrs.

**Other student study effort:**
- Study and self-learning: 48 Hrs.
- Written assignments: 18 Hrs.

Total student study effort: 105 Hrs.

### Reading List and References

**Recommended Textbooks**

**References**
Subject Description Form

Subject Code | AF5107
Subject Title | Accounting for Engineers
Credit Value | 3
Level | 5
Pre-requisite/Co-requisite/Exclusion | Nil

Objectives
To orient students to the purpose and the subject matter of accounting. To provide students with the techniques and tools to understand and interpret accounting information. To stimulate students’ interests in accounting.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Employ the accounting building blocks from the preparers’ perspective.
b. Understand accounting information from the users’ perspective and be able to interpret them.
c. Appreciate the role of quality accounting information in the decision making process.

Subject Synopsis/Indicative Syllabus
Understanding Accounting
Why accounting matters. Accounting and its building blocks. The recording process. The accounting information system. The financial statements. Corporate governance, internal control and cash. The application of accounting rules (GAAPs) in general and in particular to receivables and long-lived assets.

Interpretation of Accounts
The need for comparative analysis. Tools of financial statement analysis. Understanding the uses and limitations of the tools. Gaining meaningful insights from the numbers.

Managerial Accounting Concepts & Techniques

Financial Management
Basic concepts and funding needs. Capital Budgeting. Cashflow statement, budgeted income statement, budgeted balance sheet and cash budget

Accounting is Interesting
A case study of financial statements of a listed company.

Teaching/Learning Methodology
A three-hour seminar will be conducted each week to initiate students to ideas, concepts and techniques of the topics, which is then reinforced by their participation in class discussion, quiz and presentation. These are designed to consolidate and develop students’ understanding and analytical ability through problem solving and working on relevant cases.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>50%</td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>1. Class assignment and group discussion</td>
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</tr>
<tr>
<td>2. Individual writing task</td>
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<tr>
<td>3. Group Project</td>
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<td>✓</td>
</tr>
<tr>
<td>Final Examination</td>
<td>50%</td>
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<td>✓</td>
</tr>
</tbody>
</table>

Total 100%

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

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

Student Study Effort Expected

Class contact: Seminar 39 Hrs.

Other student study effort:
- Reading books and working through assigned problems 45 Hrs.
- Research, discussion & write-up 15 Hrs.

Total student study effort 99 Hrs.

Reading List and References

**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>AMA1110</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Basic Mathematics I – Calculus and Probability &amp; Statistics</td>
</tr>
<tr>
<td>Credit Value</td>
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</tr>
<tr>
<td>Level</td>
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<td>Pre-requisite/Co-requisite/Exclusion</td>
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**Objectives**

This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.

**Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

a. apply analytical reasoning to solve problems in science and engineering;

b. make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;

c. apply mathematical modeling in problem solving;

d. demonstrate abilities of logical and analytical thinking.

**Subject Synopsis/Indicative Syllabus**

Elementary calculus: Limit and continuity, derivatives and their geometric meaning, rules of differentiation including chain rule, Leibniz’s rule and l’Hopital’s rule, exponential and logarithmic functions, trigonometric functions and their inverses, hyperbolic and inverse hyperbolic functions, applications of differential calculus.


**Teaching/Learning Methodology**

Basic concepts and elementary techniques of differential and integral calculus, elementary statistics and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Homework, quizzes and mid-term test</td>
<td>40%</td>
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<tr>
<td>2. Examination</td>
<td>60%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
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</table>

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

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

**Student Study Effort Expected**

- **Class contact:** Lecture 26 Hrs., Tutorial 13 Hrs., Total 39 Hrs.
- **Other student study effort:** Homework and self-study 81 Hrs., Total student study effort 120 Hrs.

**Reading List and References**

- Walpole, R.E., Myers, R.H., Myers, S.L. Ye, K. *Probability and Statistics for Engineers and Scientists*, Prentice Hall, 2012

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

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

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

Subject Code | AMA1120
---|---
Subject Title | Basic Mathematics II – Calculus and Linear Algebra
Credit Value | 3
Level | 1
Pre-requisite/Co-requisite/Exclusion | Pre-requisite: AMA1110

Objectives
This subject aims to introduce students to the basic concepts and applications of elementary calculus and statistics. Emphasis will be on the understanding of fundamental concepts and the use of mathematical techniques in handling practical problems in science and engineering.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:
- apply analytical reasoning to solve problems in science and engineering;
- make use of the knowledge of mathematical/statistical techniques and adapt known solutions to various situations;
- apply mathematical modeling in problem solving;
- demonstrate abilities of logical and analytical thinking.

Subject Synopsis/Indicative Syllabus
Elementary calculus: Mean Value Theorem with applications to optimization and curve sketching. Definite and indefinite integrals, fundamental theorem of calculus, methods of integration (integration by substitution, integration by parts, integration of rational functions using partial fractions and integration of trigonometric and hyperbolic functions), reduction formulas, applications to geometry and physics. Improper Integrals.
Linear algebra: Basic properties of matrices and determinants, linear systems, Gaussian elimination, inverse of a square matrix, Cramer’s rule, vectors in 2-space or in 3-space, applications to geometry.

Teaching/Learning Methodology
Basic concepts and elementary techniques of differential and integral calculus and linear algebra will be taught in lectures. These will be further enhanced in tutorials through practical problem solving.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
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</thead>
<tbody>
<tr>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2. Examination</td>
<td>60%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td></td>
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</table>

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

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

Reading List and References

Student Study Effort Expected

| Class contact | 26 Hrs. |
| Tutorial | 13 Hrs. |
| Other student study effort | 81 Hrs. |
| Total student study effort | 120 Hrs. |

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

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

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

<table>
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<tr>
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<tr>
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</table>

**Objectives**

This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.

**Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

a. apply mathematical reasoning to analyze essential features of different problems in science and engineering;

b. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations;

c. develop and extrapolate the mathematical concepts in synthesizing and solving new problems;

d. demonstrate abilities of logical and analytical thinking;

e. search for useful information in the process of problem solving.

**Subject Synopsis/ Indicative Syllabus**

1. Algebra of complex numbers
   - Complex numbers, geometric representation, complex exponential functions, n-th roots of a complex number.

2. Linear algebra
   - Systems of linear equations, vector spaces, inner product and orthogonality, eigenvalues and eigenvectors, applications.

3. Ordinary differential equations
   - ODE of first and second order, linear systems, Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits.

4. Differential calculus of functions of several variables
   - Partial derivatives, total differential, chain rule, Taylor’s expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.

**Teaching/Learning Methodology**

The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students’ problem solving ability.

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Homework, quizzes and mid-term test</td>
<td>40%</td>
<td>a b c d e</td>
</tr>
<tr>
<td>2. Examination</td>
<td>60%</td>
<td>a b c d e</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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

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

**Student Study Effort Expected**

- Class contact:
  - Lecture: 26 Hours
  - Tutorial: 13 Hours
  - Mid-term test and examination

- Other student study effort
  - Assignments and Self study: 78 Hours

Total student study effort: 117 Hours

**Reading List and References**


AI - 5
Subject Description Form

Subject Code: AMA2112
Subject Title: Mathematics II
Credit Value: 3
Level: 2
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: AMA2111

Objectives: This subject is a continuation of AMA2111. It aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.

Intended Learning Outcomes: Upon completion of the subject, students will be able to:
1. apply mathematical reasoning to analyze essential features of different problems in science and engineering;
2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations;
3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems;
4. demonstrate abilities of logical and analytical thinking;
5. search for useful information in the process of problem solving.

Subject Synopsis/Indicative Syllabus:
1. Multiple integrals
   Double and triple integrals, change of variables, applications to problems in geometry and mechanics.
2. Vector calculus
   Vector and scalar fields, the del operator, line and surface integrals, the theorems of Green, Gauss and Stokes, applications to electromagnetic theory and fluid mechanics.
3. Series expansion
   Infinite series, Taylor’s expansion, Fourier series expansion of a periodic function.
4. Partial differential equations
   Formulation of PDE of mathematical physics, separation of variables, initial-boundary value problems, introduction to Fourier transforms.

Teaching/Learning Methodology: The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students’ problem solving ability.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework, quizzes and mid-term test</td>
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</tr>
<tr>
<td>Examination</td>
<td>60%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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

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

Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
</tr>
<tr>
<td>Tutorial</td>
</tr>
<tr>
<td>Mid-term test and examination</td>
</tr>
</tbody>
</table>

Other student study effort

| Assignments and Self study | 78 Hours |

Total student study effort: 117 Hours

Reading List and References

Subject Description Form

Subject Code  AP10001
Subject Title  Introduction to Physics
Credit Value  3
Level  1
Pre-requisite/ Co-requisite/ Exclusion  Nil

Objectives
This is a subject designed for students with no background in physics studies. Fundamental concepts in major topics of physics (mechanics, heat, wave and electromagnetism) will be discussed. The aim of this subject is to equip students with some basic physics knowledge, and to appreciate its applications in various branches of science and technology.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. solve simple problems in kinematics Newton’s law and Energy;
b. solve problems in heat capacity and latent heat;
c. explain phenomena related to the wave character of light;
d. apply the superposition of waves;
e. understand electrostatic field and potential;
f. solve problems on interaction between current and magnetic field; and

g. describe and demonstrate the phenomenon of electromagnetism.

Subject Synopsis/ Indicative Syllabus
Mechanics: scalars and vectors; kinematics and dynamics; Newton’s laws; momentum, impulse, work and energy; conservation of momentum and conservation of energy.

Thermal physics: heat and internal energy; heat capacity; conduction, convection and radiation; latent heat.

Waves: nature of waves; wave motion; reflection and refraction; image formation by mirrors and lenses; superposition of waves; standing waves; diffraction and interference; electromagnetic spectrum; sound waves.

Electromagnetism: charges; Coulomb’s law; electric field and potential; current and resistance; Ohm’s law; magnetic field; magnetic force on moving charges and current-carrying conductors; Faraday’s law and Lenz’s law.

Teaching/Learning Methodology
Lecture: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given.

Student-centered Tutorial: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience.

e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

ASSessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Intended subject learning outcomes to be assessed</th>
<th>% weighting</th>
<th>Specific assessment methods/tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. solve simple problems in kinematics Newton’s law and Energy;</td>
<td>✓</td>
<td>Continuous assessment 40%</td>
</tr>
<tr>
<td>b. solve problems in heat capacity and latent heat;</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>c. explain phenomena related to the wave character of light;</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>d. apply the superposition of waves;</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>e. understand electrostatic field and potential;</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>f. solve problems on interaction between current and magnetic field; and</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>g. describe and demonstrate the phenomenon of electromagnetism.</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Total 100%

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

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

Reading List and References

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

Subject Code: AP10005

Subject Title: Physics I

Credit Value: 3

Level: 1

Pre-requisite/Co-requisite/Exclusion: Nil

Objectives
This course provides a broad foundation in mechanics and thermal physics to those students who are going to study science, engineering, or related programmes.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. solve simple problems in single-particle mechanics using calculus and vectors;
b. solve problems in mechanics of many-particle systems using calculus and vectors;
c. understand simple harmonic motion and solve simple problems;
d. solve problems related to acoustic standing waves;
e. calculate changes in frequency received due to Doppler’s effect;
f. apply ideal gas laws to solve problems;
g. apply the first law of thermodynamics to simple processes; and
h. solve simple problems related to the cyclic processes.

Subject Synopsis/Indicative Syllabus
Mechanics: calculus-based kinematics, dynamics and Newton’s laws; calculus-based Newtonian mechanics, involving the application of impulse, momentum, work and energy, etc.; conservation law; gravitational force; systems of particles; collisions; rigid body rotation; angular momentum; oscillations and simple harmonic motion; pendulum; statics; longitudinal and transverse waves; travelling wave and standing wave; Doppler effect; sound waves and beats.

Thermal physics: conduction, convection and radiation; black body radiation; ideal gas and kinetic theory; work, heat and internal energy; first law of thermodynamics; entropy and the second law of thermodynamics; Carnot cycle; heat engine and refrigerators.

Teaching/Learning Methodology
Lecture: Fundamentals in mechanics, waves and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given.

Student-centered Tutorial: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience.

e-learning: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous assessment</td>
<td>40%</td>
</tr>
<tr>
<td>Examination</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</table>

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

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

Student Study Effort Expected

Class contact:
- Lecture: 33 Hrs.
- Tutorial: 6 Hrs.

Other student study effort:
- Self-study: 81 Hrs.

Total student study effort: 120 Hrs.

Reading List and References
# Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>AP10006</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Physics II</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
</tbody>
</table>

**Pre-requisite/Co-requisite/Exclusion**

Nil

**Objectives**

To provide students with fundamental knowledge in physics focusing on the topics of waves and electromagnetism. This course prepares students to study science, engineering or related programmes.

**Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

a. apply simple laws in optics to explain image formation;

b. understand phenomena related to the wave character of light;

c. solve problems in electrostatics;

d. solve problems on interaction between current and magnetic field;

e. apply electromagnetic induction to various phenomena; and

f. solve problems in simple circuits.

**Subject Synopsis/Indicative Syllabus**

- **Waves and optics**: nature of light, reflection and refraction; Snell’s law; image formation by mirrors and lenses; compound lens; microscope and telescope; superposition of waves; Huygen’s principle; interference and diffraction; diffraction grating; Rayleigh’s criterion and optical resolution; polarization.

- **Electromagnetism**: charge and field; Coulomb’s law and Gauss’ law; electrostatic field and potential difference; capacitors and dielectric; current and resistance; Ohm’s law; electromotive force, potential difference; Lorentz force; magnetic force on moving charges and current; Hall effect; Biot-Savart law and Ampere’s law; Faraday’s law and Lenz’s law; induction; transformers; AC circuits and applications.

**Teaching/Learning Methodology**

- **Lecture**: The fundamentals in optics and electromagnetism will be explained. Examples will be used to illustrate the concepts and ideas in the lecture. Students are free to request help. Homework problem sets will be given.

  **Student-centered Tutorial**: Students will work on a set of problems in tutorials. Students are encouraged to solve problems and to use their own knowledge to verify their solutions before seeking assistance. These problem sets provide them opportunities to apply their knowledge gained from the lecture. They also help the students to consolidate what they have learned. Furthermore, students can develop a deeper understanding of the subject in relation to daily life phenomena or experience.

  **e-learning**: In order to enhance the effectiveness of teaching and learning processes, electronic means and multimedia technologies would be adopted for presentations of lectures; communication between students and lecturer; delivery of handouts, homework and notices etc.

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous assessment</td>
<td>40%</td>
<td>✔ ✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>2. Examination</td>
<td>60%</td>
<td>✔ ✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✔ ✔ ✔ ✔ ✔ ✔</td>
</tr>
</tbody>
</table>

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

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

**Student Study Effort Expected**

- **Class contact**: Lecture 33 Hrs.

- **Tutorial**: 6 Hrs.

- **Other student study effort**: Self-study 81 Hrs.

Total student study effort 120 Hrs.

**Reading List and References**

## Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Tomorrow’s Leaders</td>
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<tr>
<td>Credit Value</td>
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</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
<tr>
<td>GUR Requirements</td>
<td>Intended to Fulfill</td>
</tr>
<tr>
<td></td>
<td>Leadership and Intra-Personal Development</td>
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### Pre-requisite/Co-requisite/Exclusion
Nil

### Assessment Methods

<table>
<thead>
<tr>
<th>100% Continuous Assessment</th>
<th>Individual Assessment</th>
<th>Group Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Class Participation</td>
<td>20%</td>
<td>--</td>
</tr>
<tr>
<td>2. Group Project</td>
<td>--</td>
<td>30%</td>
</tr>
<tr>
<td>3. Term Paper</td>
<td>--</td>
<td>50%</td>
</tr>
</tbody>
</table>

Note:
- The grade is calculated according to the percentage assigned;
- The completion and submission of all component assignments are required for passing the subject.

### Objectives

The course is designed to enable students to learn and integrate theories, research and concepts of the basic personal qualities (particularly intrapersonal and interpersonal qualities) of effective leaders. This subject also intends to help students develop and reflect on their intrapersonal qualities, interpersonal qualities and connection of learning to oneself. Finally, the subject cultivates students’ appreciation of the importance of intrapersonal and interpersonal qualities in effective leadership.

### Intended Learning Outcomes

Upon completion of the subject, students will be able to:

a. understand and integrate theories, research and concepts on the basic qualities (particularly intrapersonal and interpersonal qualities) of effective leaders;
b. develop self-awareness and self-understanding;
c. acquire interpersonal skills;
d. develop self-reflection skills;
e. understand the importance of intrapersonal and interpersonal qualities in effective leadership, particularly the connection of learning in the subject to one’s personal development.

### Subject Synopsis/Indicative Syllabus

1. An overview of the personal attributes of effective leaders: roles of self-understanding and interpersonal relationship qualities in effective leadership.
2. Cognitive competence: different types of thinking styles; higher-order thinking; experiential learning; role of cognitive competence, critical thinking and problem solving in effective leadership.
3. Emotional competence: awareness and understanding of emotions; emotional quotient (EQ); role of emotional management in effective leadership; mental health and stress management.
4. Resilience: stresses faced by adolescents; life adversities; coping with life stresses; role of resilience in effective leadership.
5. Morality and integrity: moral issues and moral competence; role of morality in effective leadership; ethical leadership; integrity and effective leadership.
7. Spirituality: meaning of life and adolescent development; role of spirituality in effective leadership; servant leadership.
8. Social competence and egocentrism: basic social competence skills; roles of social competence, care and compassion in effective leadership; egocentrism in university students.
9. Relationship building, team building and conflict management: relationship quality and effective leadership; conflict management and effective leadership.
10. Interpersonal communication: theories, concepts, skills and blocks of interpersonal communication; role of communication skills in effective leadership.
11. Self-leadership and sense of responsibility in effective leaders; life-long learning and leadership.
12. Mental health and effective leadership: stress management; importance of mental health and wellness among university students.

### Teaching/Learning Methodology

Students taking this course are expected to be sensitive to their own behavior in intrapersonal and interpersonal contexts. Intellectual thinking, reflective learning, experiential learning and collaborative learning are emphasized in the course. Case studies on successful and fallen leaders will also be covered in the course. The teaching/learning methodology includes:

1. Lectures;
2. Experiential classroom activities;
3. Group project presentation;
4. Written assignment.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Class Participation*</td>
<td>20%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Group Project*</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Term Paper*</td>
<td>50%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

*assessment is based on group effort
^assessment is based on individual effort
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

1. Assessment of Class Participation (20%): It is expected that classroom activities and preparation for lectures can help students understand the subject matter and oneself, develop social skills, connect learning to oneself, and promote an appreciation of the importance of intrapersonal and interpersonal leadership qualities. Hence, marks for class participation and preparation for lectures will be given. Students will be assessed by: a) preparation for class (e.g., complete online assignment and dig up materials before class), b) participation in class (e.g., completion of worksheets and sharing) and c) volunteering to answer questions and join discussions in class. Also, students will be invited to rate the performance and learning of other group members in an honest and authentic manner. The marks will reflect the mastery of knowledge, self-reflection, and quality of interpersonal skills (such as collaboration with other members and contribution to the group) of the group members. Peer assessment will contribute to marks in class participation.

2. Assessment of Group Project (30%): Group project presentation can give an indication of the students’ understanding and integration of theories and concepts on personal qualities in effective leadership, personal and group reflections, interpersonal skills, and degree of recognition of the importance of active pursuit of knowledge covered in the course.

3. Assessment of Term Paper (50%): Individual paper can give an indication of the students’ understanding and integration of theories and concepts on personal qualities in effective leadership, self-assessment, self-reflection, connection of the subject matter to oneself and degree of recognition of the importance of active pursuit of knowledge covered in the course.

Based on the implementation of this subject in the past four academic years (2010-2011; 2011-2012; 2012-2013; 2013-2014), evaluation findings consistently showed that this subject was able to achieve the intended learning outcomes in the students. The positive evaluation findings are documented as follows:


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

Supplementary References:
Subject Description Form

Subject Code: BSE463

Subject Title: Design of Mechanical Systems in Buildings

Credit Value: 3

Level: 4

Pre-requisite/Co-requisite/Exclusion: Pre-requisite: ENG2001 and EE3009A

Objectives:
1. To provide students with a comprehensive understanding of air conditioning system, refrigeration and indoor environmental issues for different kinds of buildings common to Hong Kong; and
2. To provide students with a comprehensive understanding in formulating practical energy policies.

Intended Learning Outcomes:
Upon successful completion of the subject, students are expected to:

Professional / academic knowledge and skills:
(a) Be able to have basic knowledge of thermal systems in buildings.
(b) Be able to undertake the thermodynamic and application analysis of vapour compression refrigeration systems.
(c) Be able to select a proper method for estimating operation energy use for a given building air-conditioning system on the basis of understanding the energy analysis requirement, and the calculation principles of current major building energy analysis methods.
(d) Be able to undertake the design and analysis of ventilation systems for general contaminants control on the basis of understanding the function and working principles of contaminants control, and able to undertake the ventilation measurements for evaluating the ventilation of contaminants control.

Attributes for all roundedness:
(e) Be able to communicate to others in a clear and concise manner through written reports, drawings and oral presentation; and
(f) Be able to develop the skills and abilities to undertake, independently, a major piece of investigation work in a specialist subject area.

Subject Synopsis/Indicative Syllabus:
This subject provides a basic understanding of air conditioning system, refrigeration and indoor environment issues for different kinds of buildings common to Hong Kong. The syllabus includes air conditioning fundamentals, loads estimation, fan and duct sizing, ventilation for acceptable air quality and refrigeration plant exclusively designed for non-BSE students.

Teaching/Learning Methodology:
Students are briefed in the first lecture for the expected subject outcomes. Teaching is conducted in the form of interactive lecture, supplemented by worked examples, case study and mini project. Handouts were distributed one week before the lecture session.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group assignment</td>
<td>15%</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>2. Test</td>
<td>25%</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>3. End-of-semester examination</td>
<td>60%</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Required:

Class contact:
- Lectures 27 Hrs.
- Tutorials 6 Hrs.

Other student study effort:
- Test & Examination 6 Hrs.
- Mini Project 11 Hrs.
- Self-study 80 Hrs.

Total student study effort 130 Hrs.

Reading List and References:
Authors: Shan K Wang, Zalman Lavan & Paul Norton
Title: Air Conditioning and Refrigeration Engineering
Publisher: Boca Raton, Fla.: CRC Press, c2000
PolyU Call Number: TH7687.W363 2000

Authors: A.F.E. Wise & J.A. Swaffield
Title: Water, Sanitary and Waste Services for Buildings
PolyU Call Number: TD345.W5 2002

Authors: T.D. Eastop & A. McConkey
Title: Applied Engineering Thermodynamics for Technologists
PolyU Call Number: TJ265.E3 1993

Author: Hazim B. Awbi
Title: Ventilation of Buildings
PolyU Call Number: TH7653.A9 2003
Subject Description Form

Subject Code: CBS1101P  
Subject Title: Fundamentals of Chinese Communication (大學中文傳意)  
Credit Value: 3  
Level: 1  
Pre-requisite / Co-requisite/ Exclusion: Remarks: For students entering with HKDSE Chinese subject result at Level 3 or equivalent

Objectives: This subject aims to foster students’ communicative competence in using both written and spoken Chinese to communicate effectively, appropriately, flexibly and politely in real situated social settings.

Intended Learning Outcomes: Upon completion of the subject, students will be able to:
(a) develop effective communication skills in written Chinese required for basic usage in the workplace such as email-letter, notice, news release, report, discussion, presentation and negotiation;
(b) master the written format, organization, language and style of expression of various genres of Chinese practical writing such as official correspondences, publicity materials, reports and proposals for communication;
(c) give formal presentation in Putonghua effectively and appropriately;
(d) engage in formal discussion in Putonghua effectively and politely.

Subject Synopsis/Indicative Syllabus:
1. Enhancement of Basic Competence in Written Chinese and Skill of Summarizing
2. Written Chinese for Practical Purposes
   - Format, organization, language of each genre;
   - Coherence in Chinese writing
   - Style of expression of different genres such as official correspondences, publicity materials;
   - Context dependent stylistic variation
   - Appropriateness in communication
3. Enhancement of Basic Skills in Putonghua Pronunciation
4. Formal Presentation in Putonghua
   - Choice of words in Putonghua
   - The flow of speaking
   - Manner of speaking and gesture
5. Formal Discussion in Putonghua
   - Identification of main idea and key messages
   - Evaluation of relevancy of information in a message
   - Skills of summarizing
   - Agreeing/disagreeing/answering to questions politely

Teaching/Learning Methodology:
The subject will be conducted in Putonghua, in highly interactive seminars. The subject will motivate the students’ active participation by assigning group presentation/discussion in class. In a forum-like format, students are guided to:
(1) present to the class, their understanding of each genre designed for the syllabus for discussions and improvement;
(2) modify passages in a given genre/style into other genres/styles for addressing different audiences and purposes;
(3) give a power-point presentation in Putonghua in front of the whole class, then receive on spot feedback for discussion and improvement;
(4) prepare a written report/proposal on the same topic;
(5) engage in formal discussion in Putonghua on topics related to current issues and/or business operation;
(6) produce a written document on the same topic using a chosen genre.

E-learning materials for enhancing students’ proficiency in both Putonghua and written Chinese are included in Chinese LCR teaching. Students are expected to follow teachers’ guidelines and get access to the materials on e-Learning platform for self-study on voluntary basis.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Written Assignment</td>
<td>45%</td>
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</tr>
<tr>
<td>2. Oral Presentation</td>
<td>25%</td>
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<tr>
<td>3. Final Examination</td>
<td>30%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Class contact:</th>
<th></th>
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<tr>
<td>Seminar</td>
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<thead>
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<th>Additional activity:</th>
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<tbody>
<tr>
<td>e-Learning in Putonghua and Written Chinese</td>
<td>9 Hrs.</td>
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<table>
<thead>
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<th>Other student study effort:</th>
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<tbody>
<tr>
<td>Outside Class Practice</td>
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<tr>
<td>Self-study</td>
<td>39 Hrs.</td>
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</table>

**Total student study effort** 126 Hrs.

### Reading List and References

1. 于成鲲，陳瑞端，秦扶一，金振邦主編：《當代應用文寫作規範叢書》，復旦大學出版社，2011年。
2. 鍾文佳：《漢語口才學》，西南師範大學出版社，2004年。
3. 李白堅、丁鐵蒙：《大學體型寫作訓練規程》，上海大學出版社，2004年。
4. 于成鲲主編：《現代應用文》，復旦大學出版社，2003年。
5. 邢福義、汪國勝主編：《現代漢語》，華中師範大學出版社，2003年。
6. 陳瑞端著：《生活錯別字》，中華書局，2000年。
7. 李軍華：《口才學》，華中理工大學出版社，1996年。
8. 陳建民：《說話的藝術》，語文出版社，1994年。
9. 邵守義：《演講全書》，吉林人民出版社，1991年。
10. 路德慶主編：《寫作教程》，華東師範大學出版社，1982年。
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>CBS1102P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Advanced Communication Skills in Chinese (高階中文傳意)</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
</tbody>
</table>

**Pre-requisite/ Co-requisite/ Exclusion**

Remarks: For students entering with HKDSE Chinese subject result at Level 4 and 5 or equivalent

### Objectives

This subject aims to develop students’ ability to communicate effectively in both Putonghua and written Chinese, with particular reference to the stylistic variations of expression in different communicative settings.

### Subject Intended Learning Outcomes

Upon completion of the subject, students will be able to:

a. Develop effective communication skills in both spoken and written Chinese required for workplace such as email-letter, notice, news release, report, presentation and negotiation as well as other settings such as speech delivery and/or special column in newspaper or magazine in the business and professional setting;

b. Master the format, organization, language and style of expression of the following genres of Chinese practical writing: argumentative and persuasive writing;

c. Give public speech;

d. Produce a piece of prose.

### Subject Synopsis/ Indicative Syllabus

1. Enhancement of Basic Competence in Written Chinese and Skill of Summarizing
2. Written Chinese for Practical Purposes
   2.1. Uses of words and sentences, choice of diction
   2.2. Coherence and thread of thinking in Chinese writing
   2.3. Context dependent stylistic variation
   2.4. Format, organization, language and style of expression of speeches, argumentative & persuasive writing
3. Enhancement of Basic Skills in Putonghua Pronunciation
4. Public Speech
   4.1. Contextual elements: the audiences, the purpose and the topic
   4.2. Identification of key points and collection of supporting information
   4.3. Articulation and flow of speaking
   4.4. Choice of words, manner and gesture
   4.5. Using of visual aids
   4.6. Handling of question and answer session
5. Creative Writing
   5.1. The language, the structure and style of expression in creative writing

### Teaching/Learning Methodology

The subject will be conducted in highly interactive seminars. The subject will motivate the students’ active participation by assigning group presentation/discussion in class. In a forum-like format, students are guided to:

1. present to the class, their understanding of each genre designed for the syllabus for discussions and improvement;
2. modify passages in a given genre/style into other genres/styles for addressing different audiences and purposes;
3. prepare a script for public speaking;
4. give a public speech in front of the whole class, then receive on spot feedback for discussion and improvement;
5. engage in formal discussion on topics related to current issues and/or business operation that require persuasive and argumentative skills;
6. produce an argumentative article on the same topic;
7. analyze selected prose in terms of contents, structure and styles of expression.

E-learning materials for enhancing students’ proficiency in both Putonghua and written Chinese are included in Chinese LCR teaching. Students are expected to follow teachers’ guidelines and get access to the materials on e-Learning platform for self-study on voluntary basis.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Prose Writing</td>
<td>30%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>b. Formal Speech</td>
<td>15%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>c. Feature Article</td>
<td>15%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>d. Class Participation</td>
<td>10%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>e. Final Examination</td>
<td>30%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
</tbody>
</table>

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

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

Students obtaining a subject pass must pass both components, i.e. the continuous assessment and examination of the subject. Students will get failure of the subject if he/she fails in either one of the two components.
<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seminar 39 Hrs.</td>
</tr>
<tr>
<td>Additional activity:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e-Learning in Putonghua and written Chinese 9 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outside Class Practice 39 Hrs.</td>
</tr>
<tr>
<td></td>
<td>Self-study 39 Hrs.</td>
</tr>
<tr>
<td>Total student study effort</td>
<td>126 Hrs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading List and References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 吳禮權，《演講的技巧》，香港：商務印書館，2013年。</td>
</tr>
<tr>
<td>2. 李錫昌，《商業溝通與應用文大全》，香港：商務印書館，2012年。</td>
</tr>
<tr>
<td>3. 傅鶴年，《傳媒中文寫作（全新修訂本）》，香港：中華書局，2012年。</td>
</tr>
<tr>
<td>4. 于成鶴，陳瑞端，秦扶一，金振邦主編，《當代應用文寫作規範叢書》，上海：復旦大學出版社，2011年。</td>
</tr>
<tr>
<td>5. 邵敬敏，《現代漢語通論》，上海：上海教育出版社，2007年。</td>
</tr>
<tr>
<td>6. 任伯江，《口語傳意權能：人際關係策略與潛力》，香港：香港中文大學出版社，2006年。</td>
</tr>
<tr>
<td>7. 于成鶴，方延明主編，《新聞寫作教程》，北京：高等教育出版社，2005年。</td>
</tr>
<tr>
<td>8. 宋春陽，孟德東，張志鶴，《實用新聞寫作概論》，上海：復旦大學出版社，2004年。</td>
</tr>
<tr>
<td>9. 李白堅，丁迪蒙，《大學體型寫作訓練規程》，上海：上海大學出版社，2004年。</td>
</tr>
<tr>
<td>10. 劉文佳，《漢語口才學》，西南師範大學出版社，2004年。</td>
</tr>
<tr>
<td>11. 方延明主編，《現代應用文》，復旦大學出版社，2003年。</td>
</tr>
<tr>
<td>12. 裴顯生，方延明主編，《新聞寫作教程》，北京：高等教育出版社，2003年。</td>
</tr>
<tr>
<td>13. 孙光萱，《中國現代散文名家名篇賞讀》，上海：上海教育出版社，2001年。</td>
</tr>
<tr>
<td>14. 陳瑞端著，《生活錯別字》，香港：中華書局，2000年。</td>
</tr>
<tr>
<td>15. 陳建民，《說話的藝術》，語文出版社，1994年。</td>
</tr>
</tbody>
</table>
Subject Description Form

Subject Code  CBS3241P
Subject Title  Professional Communication in Chinese
Credit Value  2
Level  3
Pre-requisite/Co-requisite/Exclusion  Pre-requisite/Co-requisite: Chinese LCR subjects (in Semester 2 of Year 3 or Semester 1 of Year 4)

Objectives
This subject aims to develop the language competence for professional communication in Chinese required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals and reports.

Subject Intended Learning Outcomes
Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in Chinese, students will be able to:

a. plan, organize and produce professionally acceptable project proposals and reports with appropriate text structures and language for different intended readers
b. plan, organize and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences
c. adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences

Subject Synopsis/Indicative Syllabus
1. Project proposals and reports in Chinese
   - Planning and organizing project proposals and reports
   - Explaining the background, rationale, objectives, scope and significance of a project
   - Referring to the literature to substantiate project proposals
   - Describing the methods of study
   - Describing and discussing project results, including anticipated results and results of pilot study
   - Presenting the budget, schedule and/or method of evaluation
   - Writing executive summaries/abstracts
   - Writing professional reports

2. Oral presentations of projects
   - Selecting content for audience-focused presentations
   - Choosing language and style appropriate to the intended audience
   - Using appropriate transitions and maintaining coherence in team presentations
   - Using effective verbal and non-verbal interactive strategies

Teaching/Learning Methodology
Learning and teaching approach
The subject is designed to develop the students’ Chinese language skills, both oral and written, that students need to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Project proposal and report in Chinese</td>
<td>60%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>2. Oral presentation of project proposal and report</td>
<td>40%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The assessments will arise from the course-long engineering-related project.
- Students will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students’ ability to select content and use language and style appropriate to the purposes and intended readers/audiences.
- Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. The written proposals will be individual work to ensure that students will be rigorously engaged in the application of language skills for the entire document.

Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars</td>
<td>26 Hrs.</td>
</tr>
<tr>
<td>Researching, planning, writing, and preparing the project</td>
<td>44 Hrs.</td>
</tr>
</tbody>
</table>

Total student study effort 70 Hrs.
Reading List and References

a) 司有和 (1984)：《科技写作简明教程》，安徽教育出版社。
b) 葛圣陶、吕叔湘、朱德熙、林素 (1992)：《文章讲评》，语文出版社。
c) 于成鲲主编 (2003)：《现代应用文》，复旦大学出版社。
d) 岑绍基、谢锡金、祁永华 (2006)：《应用文的语音・语境・语用》，香港教育图书公司。
e) 邵敬敏主编 (2010)：《现代汉语通论 (第二版)》，上海教育出版社。
f) 于成鲲、陈瑞端、秦扶一、金振邦主编 (2010)：《中国现代应用文作规范》，复旦大学出版社。
g) 香港特别行政区政府教育局・课程发展处・中国语文教育组 (2012)：《常用字字形表》，政府物流服务署印。
Subject Description Form

Subject Code: CSE40462

Subject Title: Environmental Impact Assessment – Theory and Practice

Credit Value: 3

Level: 4

Pre-requisite/Co-requisite/Exclusion: Exclusion: CSE462

Objectives: To provide students with an overview of the principles and current practices of environmental impact assessment (EIA), especially in Hong Kong.

Intended Learning Outcomes: Upon completion of the subject, students will be able to:

a. understand the EIA process;
b. analyze major environmental issues for large development projects;
c. conduct necessary monitoring and modeling tasks within an EIA cycle;
d. function on multi-disciplinary teams;
e. understand environmental protection and sustainable development responsibility.

Subject Synopsis/Indicative Syllabus:

Keyword syllabus:

1. Development of Environmental Impact Assessment
   Historical review. Environmental assessment development in the world and Hong Kong.
2. Scope and Objectives of Environmental Impact Assessment
   Environmental considerations: land use, planning, development and management. EIA aims and objectives.
3. Methodology and Assessment Techniques
   Methods for air, water, noise and ecology assessment. Other environmental issues (risk, visual, cultural and social-economical impacts).
4. Monitoring and Baseline Studies
   Baseline studies, Environmental monitoring and audit, Environmental quality and regulatory requirements, Mitigation and control measures.
5. Environmental Impact Statement
   Role of Environmental Impact Statement, Statement scope & content.

Teaching/Learning Methodology: The subject teaching will include the following elements:

(a) Lectures – to introduce the basic concepts and assessment methods;
(b) Tutorials – to answer student questions in the learning processes;
(c) Group discussion and presentations – to let students play different roles in the EIA process;
(d) Reading materials and video presentations – to give students examples in local EIA case studies;
(e) Seminars on EIA practices by invited speakers from government agencies and professional environmental consultants; and
(f) Course work.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous assessments</td>
<td>50%</td>
<td>a, b, c, d, e</td>
</tr>
<tr>
<td>2. Final examination</td>
<td>50%</td>
<td>a, b, c</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Written examination is evaluated by final examination.

Student Study Effort Expected:

Class contact:
- Lectures: 2 Hrs.
- Tutorials / Seminars: 1 Hr.

Other student study effort:
- Coursework exercise: 1.4 Hrs.
- Seminar reports: 0.2 Hr.
- Self Study: 4.4 Hrs.

Total student study effort: 9 Hrs.

Reading List and References:

1. The following texts provide the majority of the basic materials to be covered in lectures. Students will need to study other publications, including local case studies.
6. Hong Kong Environmental Protection Department http://www.epd.gov.hk/eia/
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>CSE516</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject Title</strong></td>
<td>Urban Transport Planning - Theory and Practice</td>
</tr>
<tr>
<td><strong>Credit Value</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>5</td>
</tr>
</tbody>
</table>

**Pre-requisite/Co-requisite/Exclusion**
- Recommended background knowledge:
  - It is expected that students will have a fundamental understanding of mathematics and computers consistent with undergraduate level study in science or engineering.

**Objectives**
- To provide a comprehensive theoretically based, yet practical approach to transport planning in urban areas. Emphasis is also placed on the application of rigorous transport models and analytical techniques in case studies.

**Intended Learning Outcomes**
- Upon completion of the subject, students will be able:
  1. a. to apply basic traffic engineering approaches to determine appropriate solutions for solving traffic problems, particularly in the planning stage for transport infrastructure projects;
  2. b. to design and conduct traffic surveys for assessment of the impacts due to transport improvement projects, and other travel demand management measures;
  3. c. to analyze and interpret data systematically from traffic and behavior surveys for strategic transport planning and travel demand forecasting; and
  4. d. to utilize the four-steps modelling techniques for forecasting future travel demand and analyzing the effects of transport infrastructure facilities on a transport system.

**Subject Synopsis/Indicative Syllabus**

**Keyword Syllabus**
1. **Fundamentals of Urban Transport Planning**
   - The fundamentals of land-use and transport planning; the planning process; planning studies; traffic problems and transport policy.
2. **Urban Transport Technology**
   - Urban transport modes and technologies; intelligent transport systems.
3. **Travel Demand and Data Collection**
   - Characteristics of travel demand; travel demand forecasting; travel surveys.
4. **Travel Demand Analysis**
   - Model development; nature of modelling errors. Four step models: trip generation; trip distribution; modal split; traffic assignment. Simplified approach to small area planning.
5. **Generation and Evaluation of Solutions**
   - Evaluation techniques: economics, operation and environmental evaluation; multi-criteria assessment; public participation; case studies.
6. **Traffic Impact Assessment**
   - TIA guidelines, methodology, and examples
7. **Project and Laboratory**
   - This course will be augmented by computer modelling and case studies for input to calibrate transport planning models: Network building; trip generation; trip distribution and modal split; traffic assignment; transport system evaluation.
   - Computer laboratory: transportation network modeling
   - Course Project: solutions to contemporary urban transportation problem

**Teaching/Learning Methodology**
- The underlying principles and techniques relating to traffic survey and transport planning will be dealt with in lectures. However, it is important that the students are exposed to the interdependence between theories and practice in transport planning. Students are therefore required to undertake survey design and data collection in order to understand the associated techniques in practice. Individual assignments will consist of numerical problems on transport modelling and analysis while computer laboratory sessions will be held to demonstrate the applications of transport model and to provide opportunity for students to appreciate the difference between manual calculation and computer modelling. The course project aims at developing a holistic understanding on contemporary urban transportation problems and devising solutions from both theoretical and practical perspectives.
- Professionals from government or industry may be invited to give lectures on current issues of transport planning in Hong Kong.

<table>
<thead>
<tr>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous Assessment</td>
<td>40%</td>
<td>a.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>2. Written Examination</td>
<td>60%</td>
<td>b.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>c. d.</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
</tbody>
</table>

**Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:**
- Continuous assessment will be based on written assignment(s), lab report, and course project.
- 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:**

**Reference Books:**
Subject Description Form

Subject Code: EE2001A
Subject Title: Applied Electromagnetics
Credit Value: 3
Level: 2
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To introduce to students the physical laws that govern the electromagnetic phenomena commonly encountered in electrical engineering systems.
2. To familiarise students with the techniques for solving problems in electromagnetics and electrical energy systems.
3. To provide students the foundation of electromagnetic field theory and electrical energy systems required for pursuing the electrical engineering subjects.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Understand the electromagnetism and its physical meaning behind. Know the meanings of physical quantities of electromagnetism and their basic relationships.
b. Be able to analyse electromagnetic phenomena related to electrical engineering systems by selecting the most appropriate laws/theorems/solution techniques.
c. To identify, analyze, and solve technical problems using mathematics and engineering techniques.
d. Have hands-on experience in electromagnetic measurements.

Subject Synopsis/Indicative Syllabus:
5. Electrical energy systems fundamentals: Phasor, real and reactive power, power circuit analysis, power transmission and distribution, power system layout and components.

Laboratory Experiments:
Field plotting using resistance and impedance networks.
Field plotting using the Electrolytic tank.
Field plotting using the resistive paper.

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

Assessment Methods in Alignment with Intended Learning Outcomes:
Specific assessment methods/tasks %
<table>
<thead>
<tr>
<th>Intended subject learning outcomes to be assessed</th>
<th>% weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
</tr>
<tr>
<td>2. Class Test</td>
<td>30%</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

Reading List and References:
**Subject Description Form**

<table>
<thead>
<tr>
<th><strong>Subject Code</strong></th>
<th>EE2002A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject Title</strong></td>
<td>Circuit Analysis</td>
</tr>
<tr>
<td><strong>Credit Value</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Pre-requisite/ Co-requisite/ Exclusion</strong></td>
<td>Pre-requisite: AP10006</td>
</tr>
</tbody>
</table>

**Objectives**

1. Introduce fundamental circuit theory.
2. Develop ability for solving problems involving electric circuits.
3. Develop skills for experimentation on electric circuits.

**Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

a. Acquire a good understanding of fundamental circuit theory.
b. Solve simple problems in electric circuits.
c. Use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations.

**Subject Synopsis/Indicative Syllabus**

**Syllabus:**

1. **DC Circuits**

2. **Capacitance, Inductance and First Order Transients**

3. **Steady-state Analysis of AC Circuits**

4. **Mutual Inductance and Transformer**
   - Basic coupled inductance equation. Concept of ideal transformer (assuming sinusoidal voltages and currents). Dot convention. Physical transformer as ideal transformer with leakage and magnetizing inductances. Applications in galvanic isolation and voltage/current level conversion.

5. **Electrical Measurement**

**Teaching/ Learning Methodology**

<table>
<thead>
<tr>
<th><strong>Laboratory Experiments:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kirchhoff’s laws and the maximum power transfer theorem</td>
</tr>
<tr>
<td>2. Transients in RC and RL circuits</td>
</tr>
<tr>
<td>3. AC Circuits and Transformer Tests</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assessment Methods in Alignment with Intended Learning Outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific assessment methods/task</strong></td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Continuous Assessment (Total 40%)</td>
</tr>
<tr>
<td>- Laboratory works and reports</td>
</tr>
<tr>
<td>- Mid-semester test</td>
</tr>
<tr>
<td>2. Examination</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
### Specific assessment methods/task

<table>
<thead>
<tr>
<th>Task</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment/ Homework</td>
<td>Assignment are given to students to assess their competence level of knowledge and comprehension. The criteria (i.e. what to be demonstrated) and level (i.e. the extent of achievement) will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment/homework is given. Feedback about their performance will be given promptly to students to help them improve their learning.</td>
</tr>
<tr>
<td>Laboratory works and reports</td>
<td>Students will be required to perform three experiments and submit a report on one of the experiments. Expectation and grading criteria will be given as in the case of assignment/homework.</td>
</tr>
<tr>
<td>Mid-semester test</td>
<td>There will be a mid-semester test to evaluate students’ achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignment/homework.</td>
</tr>
<tr>
<td>Examination</td>
<td>There will be an examination to assess students’ achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignment/homework.</td>
</tr>
</tbody>
</table>

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lecture 22 Hrs.</td>
</tr>
<tr>
<td>• Tutorial 8 Hrs.</td>
</tr>
<tr>
<td>• Laboratory 9 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
</tr>
<tr>
<td>• Revision and Assignments 40 Hrs.</td>
</tr>
<tr>
<td>• Report Writing 18 Hrs.</td>
</tr>
<tr>
<td>Total student study effort 97 Hrs.</td>
</tr>
</tbody>
</table>

### Reading List and References

<table>
<thead>
<tr>
<th>Textbook:</th>
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</thead>
<tbody>
<tr>
<td>References:</td>
</tr>
</tbody>
</table>
Subject Description Form

Subject Code: EE2003A
Subject Title: Electronics
Credit Value: 3
Level: 2
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: EE2002A

Objectives:
1. To introduce the principles and techniques used in the operations and analysis of fundamental classes of semiconductor-based electronic devices and circuits, including diodes and diode circuits, bipolar junction transistors (BJTs) and BJT amplifiers, metal-oxide-semiconductor field-effect transistors (MOSFETs) and MOSFET amplifiers as well as operational amplifiers (op-amps) and op-amp circuits.
2. To introduce the principles and techniques used in the implementation of frequency domain analysis on first-order ac circuits with sinusoidal driving sources.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Describe the operating principles of the fundamental classes of semiconductor based electronic devices and circuits.
b. Apply the appropriate techniques to analyze the fundamental classes of semiconductor-based electronic devices and circuits.
c. Implement the frequency domain analysis on first-order ac circuits with sinusoidal driving sources.
d. Conduct relevant laboratory experiments and report the findings with appropriate techniques and tools.

Subject Synopsis/Indicative Syllabus:

1. Diodes and Diode Circuits
   - Semiconductor materials and properties. Properties of p-n junctions. Structure, operation and characteristics of p-n junction diodes. Ideal and practical p-n junction diodes. Analysis of basic diode circuits. Analysis of specific diode circuits: rectifiers, peak detectors, clippers, clamping. Load line concept and analysis.

2. BJTs and BJT Amplifiers
   - Structures, operations and characteristics of n-p-n and p-n-p BJTs. DC analysis, load line and design techniques of BJT circuits. DC biasing schemes. Basic configurations, operations and characteristics of BJT amplifiers. AC analysis, load line and design techniques. Small-signal equivalent circuits and parameters. Small-signal voltage gain, current gain, input resistance and output resistance. Loading effect.

3. MOSFETs and MOSFET Amplifiers
   - Structures, operations and characteristics of n-channel and p-channel MOSFETs. DC analysis, load line and design techniques of MOSFET circuits. DC biasing schemes. Basic configurations, operations and characteristics of MOSFET amplifiers. AC analysis, load line and design techniques. Small-signal equivalent circuits and parameters. Small-signal voltage gain, current gain, input resistance and output resistance. Loading effect.

4. Op-Amps and Op-Amp Circuits

5. Frequency Domain Analysis
   - Power, voltage and current gains on linear and logarithmic scales. Concepts of “bel” and “decibel”. Concepts of time t, angular frequency ω and complex angular frequency s domains. Transfer functions in ω and s domains. Introduction to Bode plot. Derivation of transfer functions of first-order ac circuits with sinusoidal driving sources. Implementation of Bode magnitude and phase plots. Concepts of pole and zero, corner/cutoff frequency as well as bandwidth.

Laboratory Experiments:
1. EE2003-E01: Basic Diode Circuits.

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

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous Assessment</td>
<td>40%</td>
</tr>
<tr>
<td>2. Examination</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

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

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 24 Hrs.</td>
</tr>
<tr>
<td>Tutorial 6 Hrs.</td>
</tr>
<tr>
<td>Laboratory 9 Hrs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other student study effort:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-study 41 Hrs.</td>
</tr>
<tr>
<td>Assignments 12 Hrs.</td>
</tr>
<tr>
<td>Laboratory logbook &amp; report writings 8 Hrs.</td>
</tr>
</tbody>
</table>

Total student study effort 100 Hrs.

### Reading List and References

**Textbook:**


**References:**

Subject Description Form

Subject Code: EE2004A
Subject Title: Electrical Energy Systems Fundamentals
Credit Value: 3
Level: 2
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: EE2002A

Objectives:
1. To provide an overview of the supply, utilization, and control of electrical energy.
2. To introduce energy and environmental issues, and assist students in placing these topics and technologies in perspective.

Intended Learning Outcomes:
Upon completion of the subject, students will be able:
a. To master the fundamental knowledge on electrical energy systems.
b. To identify, analyze, and solve technical problems using mathematics and engineering techniques.
c. To be aware of equipment characteristics and environment issues on modern electrical power systems.
d. To be able to conduct laboratory work in teams and present the findings.

Subject Synopsis/Indicative Syllabus:
1. Nature of electrical energy system: Power system layout, transmission and distribution structure, role of transformers. The interconnected power system. HVDC transmission. Layout of a substation, distribution structure, overhead lines and cables, circuit breaking, overvoltage protection, protection concepts.

Laboratory Experiment:
Experiments on single phase transformer.
Experiments on three phase transformer.
Computer exercises on transmission line parameters calculations.

Case study:
The environmental impacts of nuclear power generation.
The environmental impacts of fossil fuel power generation.
The environmental impacts on the development of large scale hydropower station.
Why modern electric power systems are often interconnected.
The renewable energy sources which may be used in Hong Kong.

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

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a  ✓  ✓  ✓</td>
</tr>
<tr>
<td>2. Class tests</td>
<td>20%</td>
<td>b  ✓  ✓  ✓</td>
</tr>
<tr>
<td>3. Lab performance and report</td>
<td>10%</td>
<td>c  ✓  ✓</td>
</tr>
<tr>
<td>4. Case studies</td>
<td>10%</td>
<td>d  ✓  ✓  ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Expected:
Class contact:
- Lecture: 33 Hrs.
- Laboratory: 6 Hrs.

Other student study effort:
- Laboratory preparation / report: 12 Hrs.
- Case study / Self-study: 49 Hrs.
Total student study effort: 100 Hrs.

Reading List and References:
Textbooks:

Reference books:
Laboratory Experiments:
1. EE3001-E01: TTL and CMOS Characteristics.
2. EE3001-E02: Design of 2-bit Seven Segment Decoder and Ripple Counter.
3. EE3001-E03: Analog-to-Digital (ADC) and Digital-to-Analog (DAC) Converter.

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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>2. Class Test</td>
<td>12%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>16%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>4. Home work</td>
<td>12%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>☑ ☑ ☑ ☑</td>
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</table>

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

Student Study Effort Expected
Class contact:
- Lecture/Tutorial 30 Hrs.
- Laboratory 9 Hrs.

Other student study effort:
- Laboratory preparation/report 12 Hrs.
- Self-study 51 Hrs.

Total student study effort 102 Hrs.

Reading List and References
Textbooks:
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Credit Value</th>
<th>Level</th>
<th>Pre-requisite/Co-requisite/Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE3002A</td>
<td>Electromechanical Energy Conversion</td>
<td>3</td>
<td>3</td>
<td>Pre-requisite: EE2002A</td>
</tr>
</tbody>
</table>

**Objectives**

1. To provide students a general knowledge on common types of electric machines.
2. To provide students the basic techniques of steady-state electric machine analysis

**Subject Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

a. Explain the construction, operating principles, performance characteristics, control and applications of transformers and major types of rotating electric machines.
b. Analyse the steady-state performance of electric machines using appropriate equivalent circuit models.
c. Operate practical electric machines and to conduct relevant tests and experiments.
d. Present results of electric machine studies in the form of tables, graphs, and written reports.

**Subject Synopsis/Indicative Syllabus**


**Laboratory Experiments:**

**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.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Laboratory work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Mid-term Test</td>
<td>20%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Laboratory work and reports</td>
<td>15%</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>4. Assignment</td>
<td>5%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✓</td>
</tr>
</tbody>
</table>

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:                      | 33 Hrs. |
|                                   | Lecture/Tutorial  |
|                                   | Laboratory |
| Other student study effort:       | 42 Hrs.  |
|                                   | Revision, self-study, and assignment |
|                                   | Write-up of laboratory reports       |
| Total student study effort        | 18 Hrs.  |
|                                   | 99 Hrs.  |

**Reading List and References**

<table>
<thead>
<tr>
<th>Reference books:</th>
</tr>
</thead>
</table>
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE3003A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Power Electronics and Drives</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Objectives**

1. To understand the characteristics and operation of power electronics devices.
2. To expose the students to the conversion and utilization of large amount of electrical power using latest power semiconductor devices and modern control techniques.
3. To ensure the students develop an understanding of various drive systems.

**Subject Intended Learning Outcomes**

Upon completion of the subject, students will:

a. Be able to explain major semiconductor devices that can be used as switches, and their electrical characteristics which include basic idealised models as well as extension to some important non-ideal characteristics both verbally and in written form.

b. Be able to explain the processes of efficient energy conversion through the use of power semiconductor switches.

c. Be able to apply the concepts of switching power conversion to analyse a variety of circuits including:
   i. DC to DC conversion
   ii. AC to DC conversion
   iii. DC to AC conversion

d. Be able to present the results of study and experiments in the form of a technical report.

**Subject Synopsis/Indicative Syllabus**

1. **Power electronics fundamentals**: power conversion, energy balance principle, review of fundamentals.
2. **Power semiconductor devices**: Diodes, power transistor, MOSFET, SCR, GTO, IGBT, switching characteristics.
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**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td>a     b        c        d</td>
</tr>
<tr>
<td>2. Class tests</td>
<td>30%</td>
<td>✓     ✓         ✓        ✓</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>10%</td>
<td>✓     ✓         ✓        ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✓     ✓         ✓        ✓</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Class contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial</td>
</tr>
<tr>
<td>Laboratory</td>
</tr>
</tbody>
</table>

Other student study effort:

- Laboratory preparation/report: 12 Hrs.
- Self-study: 48 Hrs.

Total student study effort: 99 Hrs.

**Reading List and References**

Subject Code: EE3004A  
Subject Title: Power Transmission and Distribution  
Credit Value: 3  
Level: 3  
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: EE2004A  
Objectives: To introduce students to the fundamental knowledge which is essential for electrical power engineers. It leads to a deeper insight into the design, planning, operation, equipment characteristics and environmental impacts of modern electrical power systems.  
Subject Intended Learning Outcomes: Upon completion of the subject, students will:  
   a. Have acquired the fundamental knowledge and analytical techniques on electrical power systems.  
   b. Be able to identify, analyze, and solve technical problems in power system design, planning, and operation, making use of mathematics and engineering techniques.  
   c. Be able to work in teams when conducting laboratory investigations.  
   d. Be able to write a technical report and present the findings.  
Subject Synopsis/Indicative Syllabus:  
Laboratory Experiment:  
   • Voltage regulation and reactive power compensation for short and medium length transmission lines.  
   • Static and electromechanical current measuring relays.  
   • Studies of surges on transmission lines.  
   • Symmetric and asymmetric fault using interactive package “Powerworld”.  
   • Symmetrical components.  
   • Effects of different earthing methods in distribution system.  
   • Grading of overcurrent relays.  
Teaching/Learning Methodology: Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on system analysis, design and practical applications are given through experiments, in which students are expected to solve the power system design, planning, and operation problems with practical constraints and to attain pragmatic solutions with critical and analytical thinking. Experiments are designed to supplement the lecturing materials so that students are encouraged to take extra readings and to look for relevant information.  
Teaching/Learning Methodology Outcomes:  
<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Assessment Methods, its alignment of Intended Subject Learning Outcomes:  
Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed |  
| 1. Examination | 60% | a b c d |  
| 2. Class Tests | 25% |  
| 3. Laboratory Performance & Report | 15% | a b |  
| Total | 100% |  
The outcomes on concepts, design and applications are assessed by the usual means of examination and tests. Experiments and written reports assess those on analytical skills, problem-solving techniques and practical considerations of power system design, as well as technical reporting and teamwork.  
Student Study Effort Expected:  
Class contact:  
• Lecture/Tutorial | 33 Hrs.  
• Laboratory | 6 Hrs.  
Other student study effort:  
• Laboratory preparation/report | 13 Hrs.  
• Self-study | 48 Hrs.  
Total student study effort | 100 Hrs.  
Reading List and References:  
Textbooks:  
Reference Books:  
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE3005A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Systems and Control</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: AMA2111</td>
</tr>
</tbody>
</table>

#### Objectives
1. To introduce the principles and techniques used in the analysis and design of feedback control systems.
2. To provide the foundation for the later subjects in the areas of power systems, drives and control.

#### Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:

- a. Analyse the stability, transient response and steady-state response of continuous time systems.
- b. Design compensators and controllers for control systems.
- c. Model systems using block diagram and signal flow graph and evaluate the properties of the overall systems.
- d. Write technical reports and present the findings.

#### Subject Synopsis/Indicative Syllabus
1. **Introduction to control system analysis:** Open-loop control systems, Closed-loop control systems, Effects of feedback, Examples of control systems.
2. **Mathematical modelling of dynamic systems:** Electrical and electro-mechanical system components, Transducers and actuators, Laplace transform, Transfer functions.
3. **System diagrams and simulations:** Block diagram, Signal flow graphs, Mason’s formula, Simulation of continuous systems using MATLAB.
5. **Frequency domain analysis of linear systems:** Frequency response, Bode Diagrams, Gain margin and phase margin, Polar plots, Nyquist stability criterion, Nichols plots.
6. **Compensators and PID controllers:** Compensators, PID controllers, Controller tuning.
7. **State-space analysis:** State-space models, Transfer matrix, State transition matrix.

#### Laboratory Experiment:
- Three-term controller
- Open-loop frequency response
- Modular position control system

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Lectures</td>
<td>✔️</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✔️</td>
</tr>
<tr>
<td>Experiments</td>
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</tr>
</tbody>
</table>

#### Assessment Methods, its alignment of Intended Subject Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✔️</td>
</tr>
<tr>
<td>2. Class test</td>
<td>20%</td>
<td>✔️</td>
</tr>
<tr>
<td>3. Laboratory reports</td>
<td>15%</td>
<td>✔️</td>
</tr>
<tr>
<td>4. Assignment</td>
<td>5%</td>
<td>✔️</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✔️</td>
</tr>
</tbody>
</table>

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

#### Student Study Effort Expected

- **Class contact:**
  - Lecture/Tutorial: 30 Hrs.
  - Laboratory: 9 Hrs.

- **Other student study effort:**
  - Laboratory preparation/report: 12 Hrs.
  - Self-study, revision and assignment: 49 Hrs.

- **Total student study effort:** 100 Hrs.

#### Reading List and References
Subject Code: EE3006A

Subject Title: Analysis Methods for Engineers

Credit Value: 3

Level: 3

Pre-requisite/Co-requisite/Exclusion: Pre-requisite: AMA2111

Objectives:
1. To familiarise students with the essential numerical techniques and operations research methods which are applicable in most engineering problems.
2. To enable students to analyse the advantages and limitations of the commonly adopted numerical techniques and operations research methods.
3. To prepare students for tackling practical engineering problems, with a combination of strong theoretical background and sound engineering sense.

Subject Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Match the numerical techniques and operations research techniques with the corresponding mathematical theories and compare their advantages and limitations.
b. Given an engineering problem, justify the application of an appropriate technique, formulate the solution process and evaluate the results.
c. Analyse essential features of different statistical problems in engineering.
d. Apply computer software to develop iterative numerical algorithms.
e. Write technical reports and present the findings in logical and organised manner.

Subject Synopsis/Indicative Syllabus:
1. Basics: Error propagation, numerical stability, solutions by iterations, Lagrange interpolation; solution of non-linear simultaneous equation; numerical differentiation and integration.
3. Operations research: Linear programming, simple Simplex algorithms, sensitivity analysis, shortest path and maximum flow problems, integer programming, combinatorial optimisation problems, applications in power systems and transportation.
4. Optimisations: Direct search and simple gradient methods; optimisations with constraints.
5. Probability & statistics: Random variables, probability distributions, sample distributions and means, Central Limit Theorem, significance and hypothesis testing, stochastic processes.

Laboratory Experiments:
- Numerical analysis and algorithm implementation through Matlab
- Numerical evaluation of partial differential equations of voltage or heat distribution
- Optimization and sensitivity analysis in electrical systems

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

Assessment Methods, its alignment of Intended Subject Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
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<tbody>
<tr>
<td>1. Examination</td>
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<tr>
<td>2. Tests</td>
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<td>3. Assignments &amp; class works</td>
<td>10%</td>
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<tr>
<td>4. Laboratory performance &amp; reports</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
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Teaching/Learning Methodology Outcomes:

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>✓</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Experiments</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

Student Study Effort Expected:
- Class contact:
  - Lecture/Tutorial: 33 Hrs.
  - Laboratory: 6 Hrs.
- Other student study effort:
  - Laboratory preparation/report: 12 Hrs.
  - Self-study and assignments: 46 Hrs.
- Total student study effort: 97 Hrs.

Reading List and References:
Textbooks:
2. F.S. Hillier, Introduction to operations research, McGraw Hill, 2005

Reference books:
2. A.V. Balakrishnan, Introduction to random processes in engineering, John Wiley & Sons, 2005
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tr>
<td>Subject Title</td>
<td>Computer System Principles</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Pre-requisite/Co-requisite/Exclusion
Pre-requisite: ENG2003

#### Objectives
1. To enable students to establish a broad knowledge of the organization and components included in a computer system.
2. To enable students to understand and apply assembly language programming.
3. To enable students to develop a simple embedded computer system.

#### Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:

1. Given specifications of an application and the instruction set of the microprocessor, design an assembly program to carry out the necessary operations.
2. Appreciate advanced features of the latest microprocessors and understand functions of basic computer peripherals.
3. Given a set of conditions, design a basic computer system.
4. Think logically and be able to analyze data as well as present results in writing.

#### Subject Synopsis/Indicative Syllabus

**Computer Systems Hardware and Operations**
1. Processor operation and internal architecture: Operations of data registers, buses and data path, operations of ALU, arithmetic hardware, and general pipeline architecture. Introduction to structure and operation of a modern microprocessor.
3. Input and output systems: Direct I/O system and memory mapped I/O, interrupt and polling mechanisms. Introduction to advanced protocol for serial data communications.
4. Microprocessor hardware and interfacing: System bus organization and interfacing techniques, design of input/output system.

**Assembly Language Programming**
5. Memory addressing space and data representation: Internal registers of 8086, Addressing modes in 8086 soft-ware model.
6. Assembly language program: Basic elements of an assembly language program, instruction mnemonics and directives, arithmetic operations and logical operations.

**Microcontroller in I/O applications**
7. The general operation of the Arduino microcontroller is discussed. Use of IDE for developing general input/output communication programs. Programming language for Arduino programs are introduced – Structure, Variables, and Functions.
8. Open built-in examples to demonstrate how Arduino software can interface with digital and analogue input/output devices. How to make communication connection with sensors and display.

### Laboratory Experiment:
Perform basic input/output operations of a microcontroller by assembly language programming.
Control of different types of devices using a Arduino microcontroller and its software programs

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

#### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>c</td>
<td>✓</td>
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<td>d</td>
<td>✓</td>
<td>✓</td>
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#### Assessment Methods, its alignment of Intended Subject Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>2. Mid-term quiz</td>
<td>15%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
</tr>
<tr>
<td>3. Laboratory performance &amp; report</td>
<td>15%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Online assignments and in-class activities</td>
<td>10%</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Total</td>
<td>100%</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>

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

#### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lecture/Tutorial</td>
</tr>
<tr>
<td>• Laboratory</td>
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</tbody>
</table>

Other student study effort:

| • Laboratory preparation/report | 11 Hrs. |
| • Self-study                   | 50 Hrs. |

Total student study effort: 100 Hrs.
<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Textbooks:</th>
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</table>

<table>
<thead>
<tr>
<th>Reference books:</th>
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## Subject Description Form

<table>
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<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Linear Systems and Signal Processing</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

### Objectives
To provide an introduction to the fundamentals of linear systems, frequency domain analysis with applications to telecommunication systems.

### Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:

- a. Understand the fundamentals of signals and linear systems.
- b. Understand and analyze problems in different disciplines of engineering (with an emphasis on communication systems) under the framework of signals and linear systems.
- c. Understand the characteristics, operating principles, performance metrics and limitations of some typical telecommunication systems.

### Subject Synopsis/Indicative Syllabus
1. **Signal representation and analysis**: Mathematical representation of a signal; time-domain representation. Classification of signal and systems; Special functions. Linear and Time-Invariant Systems; Convolution.
2. **Fourier series and Fourier Transforms**: Complex exponentials; Frequency domain representation of signals; Fourier Series; Fourier transform; Fourier Transform pairs; Fourier Transform properties; Parseval’s theorem; Transfer functions; filters. Applications to music, electromagnetic radiation and imaging.
3. **Sinusoidal carrier modulation**: Amplitude and frequency modulation; Operating principle; Double side-band suppressed carrier, single side-band; Frequency division multiplexing; generation and detection circuitry; Modulation system performance comparison.
5. **Digital communications**: Digital transmission. Intersymbol interference; Eye diagram. Digital carrier modulation; Pulse shaping; modulation format and spectral efficiency; probability and random variables; bit error ratio (BER) characterization and system performance.
6. **Introduction to copper-wire, wireless and optical fiber communications**: channel characterization; Electromagnetic radiation in wireless systems; multi-path interference; Light sources in optical communication systems. Light transmission in optical fibers. Light detection. Communication networks; Current research trends and challenges.

**Laboratory Experiments:**
1) Transfer function characterization of copper wires
2) Pulse code modulation (PCM)

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>✓</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✓</td>
</tr>
<tr>
<td>Experiments</td>
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</table>

### Assessment Methods, its alignment of Intended Subject Learning Outcomes
Specific assessment methods/tasks % weighting

<table>
<thead>
<tr>
<th>Intended subject learning outcomes to be assessed</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
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<td>✓</td>
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<tr>
<td>2. Class test</td>
<td>30%</td>
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<td>✓</td>
</tr>
<tr>
<td>3. Laboratory</td>
<td>10%</td>
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<td>✓</td>
</tr>
<tr>
<td>4. Home work or in-class exercises</td>
<td>10%</td>
<td>✓</td>
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<tr>
<td>Total</td>
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</table>

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

### Student Study Effort Expected
- **Class contact**: 33 Hrs.
- **Laboratory**: 6 Hrs.
- **Laboratory preparation/report**: 6 Hrs.
- **Self-study**: 49 Hrs.
- **Total student study effort**: 94 Hrs.

### Reading List and References
Subject Description Form

**Subject Code**: EE3009A

**Subject Title**: Electrical Services in Buildings

**Credit Value**: 3

**Level**: 3

**Pre-requisite/Co-requisite/Exclusion**: Pre-requisite: EE2002A

**Objectives**

1. To enable students to understand the major design features, operating characteristics and functions of electrical and electronic equipment used in building services.
2. To enable students to implement technical data, regulations, standards and guidance notes prepared by statutory bodies in the design of reliable, safe and efficient electrical power distribution, lightning protection, vertical transportation, lighting and fire fighting systems in buildings.

**Subject Intended Learning Outcomes**

Upon completion of the subject, students will:

a. Be able to plan efficient, safe and high quality distribution systems for domestic, commercial and industrial buildings.

b. Be proficient to assess the suitability of different vertical transportation systems and fire fighting systems for buildings.

c. Be able to design and evaluate the effectiveness of lightning protection systems.

d. Be able to integrate the lighting requirements and operating characteristics of light sources to the design of interior lighting and exterior lighting.

e. Be able to search for information in solving technical problems.

**Subject Synopsis/Indicative Syllabus**


3. **Interference and power quality**: Installation requirements, grouping, interference, noise suppression and power supply in communication systems. Electromagnetic compatibility. Harmonics and voltage dips issues.


5. **Vertical transportation systems**: Lift. Hoist and escalator drives. Safety requirements and drive characteristics. Grade of service and round trip time.


7. **Fire Fighting Systems**: Outline, regulations, requirements and components of fire fighting systems. Fire sprinkler systems. Heat and smoke detector systems. Fire-fighting gases.

**Case Study**

1. Distribution systems design for typical buildings in Hong Kong
2. Applications of overcurrent and earth fault protection
3. Co-ordination of various types of protective devices
4. Electrical power quality issues in building services
5. Lightning protection systems design
6. Interior lighting and exterior lighting designs
7. Fire protection for domestic, commercial and industrial buildings

**Teaching/Learning Methodology**

In lectures and tutorials, materials that emphasize practical problem-solving methods are balanced with materials that emphasize fundamental understanding. Students are expected to take initiative to learn through the process of engagement and participation in lectures and tutorial sessions. Practical designs used in industry, where appropriate, are discussed interactively in class. Mini-Projects are used to enhance students learning experiences and practical applications. They provide students with the opportunity to develop independent design/planning and technical report writing skills pertinent to the field of electrical services in buildings.

**Teaching/Learning Methodology Outcomes**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Mini-projects</th>
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<tbody>
<tr>
<td>✅</td>
<td>✅</td>
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**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>a b c d e</td>
<td></td>
</tr>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✅</td>
</tr>
<tr>
<td>2. Class Test/Quiz</td>
<td>25%</td>
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<tr>
<td>3. Mini-project &amp; report</td>
<td>15%</td>
<td>✅</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✅</td>
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</tbody>
</table>

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

**Student Study Effort Expected**

Class contact:

- Lecture/Tutorial

Other student study effort:

- Mini-project discussion/report
- Self-study

Total student study effort

<table>
<thead>
<tr>
<th></th>
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<td>Mini-project discussion/report</td>
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<td>Total student study effort</td>
<td>100 Hrs.</td>
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<td>Textbooks and Reference books:</td>
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### Subject Description Form

<table>
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<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Summer Practical Training</td>
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<tr>
<td>Credit Value</td>
<td>3 training credits (not counted towards GPA)</td>
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<td>Level</td>
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<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

#### Objectives
1. To give students an exposure to the industrial/engineering working environments before they complete their formal education.
2. To explore and extend their understanding of engineering study in a broader perspective.
3. To enrich students’ all-round and global learning experience.

#### Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:

- a. Develop and deliver a learning portfolio for presenting learning experiences and outcomes.
- b. Demonstrate the awareness of the practical contexts in engineering.
- c. Appreciate the work of others in an industrial or engineering sector.
- d. Demonstrate good working practices to show a developing maturity and sense of responsibility.

#### Subject Synopsis/Indicative Syllabus

**INDICATIVE CONTENT**

In order to ensure that students have useful experience, the summer practical training must be suitably chosen and properly organized. Students are expected to carry out a minimum of 6 weeks (or equivalent) industrial training. Students are required to indicate the expected training experiences prior to the commencement of their placement, as well as to submit a learning portfolio to report on the learning outcomes and achievements.

Accordingly, the following learning support activities will be coordinated.

**I. Orientation**

Students should start their preparatory work by the commencement of the second semester usually at their third-year of study. An orientation will be provided for the following:

- Basic skills in undertaking practical training
- Planning and scheduling for successful completion of assessment instruments
- Information on searching national/international work-base employment, attachments etc.

Students are required to indicate the expected training experiences prior to the commencement of their placements.

**II. Progress Monitoring**

During the training period, students should maintain a training journal to identify their progress of their training. The journal may include:

- Location: Summarize where practical training took place and where the work team fits into the overall host organization.

#### Responsibilities
- **Responsibilities:** Describe the actual responsibilities. Explain the role in terms of the mission of the immediate work team.

#### Skills and Knowledge
- **Skills and Knowledge:** Describe the skills and knowledge needed to fulfill the work responsibilities. Describe how the knowledge and skill set evolved during the work experiences. Explain how these are relevant to the academic studies and future goals.

#### Outcome
- **Outcome:** Describe the placement experiences and major achievements with concrete examples.

#### (III) Learning Evaluation

After returning from the practical training, students are required to submit a report about the work experience. It provides an opportunity for the student to reflect upon the learning gained at the work site. The framework of the portfolio includes:

- A summary or an abstract to highlight major issues included in the portfolio.
- Detail description of activities carried out during the work term.
- A self-reflection: students articulate their thinking about each piece in the report, as well as on the entire report. Through this process of reflection, students draw connections between work experience and university-based learning, construct new knowledge, and become increasingly aware of themselves as learners.

- Conclusion: after reflection on their workplace experience, students set goals and directions for future learning, such as formulate the objectives of their Final Year Project.

### Examples of valid industrial placement

- Full-time placement in a suitable organization for 6 weeks.
- Assisting in PolyU activities that have an external collaboration or service component such as, Innovation and Technology Fund projects, RAPRODS projects, IGARD projects, high-level consultancy projects, collaborative research projects that were undertaken with external organizations, jobs undertaken by the Industrial Centre as a service for an external organization.
- Placement within the IAESTE (International Association for the Exchange of Students for Technical Experience) Programme in which the student is attached to a workplace abroad during the training.
- The student works on his final-year degree project which involves an industrial partner or external client. The student need not be placed in the company but make frequent visits to ensure that the project will meet the specifications required by the company/client.

#### Teaching/Learning Methodology

Through on-the-job work placements, students learn to connect classroom theory with practical workplace applications, prepare themselves for the realities of workplaces and develop their generic skills in a real working setting. In addition to the orientation, students consult with teaching staff on a one-to-one basis.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
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<tr>
<td>Industrial placement</td>
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### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
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<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>1. Learning Portfolio</td>
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<tr>
<td>2. Placement Questionnaire</td>
<td>20%</td>
<td>✓</td>
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<td>Total</td>
<td>100%</td>
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</table>

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

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
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</thead>
<tbody>
<tr>
<td>N/A</td>
</tr>
</tbody>
</table>

Other student study effort:

- Industrial Placement: 6 weeks

Total student study effort: 6 weeks

### Reading List and References

Nil
## Subject Description Form

<table>
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<tr>
<th>Subject Code</th>
<th>EE4002A</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Digital Control and Signal Processing</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
</tbody>
</table>

**Pre-requisite/Co-requisite/Exclusion**
Pre-requisite: EE3005A

### Objectives
To introduce the fundamentals and design techniques in digital control, filtering and signal processing. The analysis and design of these digital systems will be described with the aid of practical examples and CAD packages.

### Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:
- b. Design digital controllers for sampled-data systems.
- c. Analyse discrete-time signals and extract features using different digital signal processing techniques.
- d. Design a range of FIR and IIR filters.

### Subject Synopsis/Indicative Syllabus
1. **Stability and transient analysis**: Sampling and z-transform, Sampled-data systems, Stability of closed-loop systems, Transient and steady state responses.
2. **Digital control design**: Translation of analogue design to digital design, Designs based on frequency response methods, Analytical design method.
3. **Design in state space**: Controllability, Observability, Pole placement, State observer, Output feedback, Servo problem.
4. **Digital filters**: Forms of realization, Design of nonrecursive and recursive filters, Finite word length effect.

### Laboratory Experiment:
- Digital controllers
- Digital signal analysis and filter design

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Experiments</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment Methods/Tasks</th>
<th>% Weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Class tests</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Laboratory reports</td>
<td>10%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

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

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

### Reading List and References

<table>
<thead>
<tr>
<th>Reference books</th>
</tr>
</thead>
</table>
Subject Description Form

Subject Code: EE4003A
Subject Title: Electrical Machines
Credit Value: 3
Level: 4
Pre-requisite/ Co-requisite/ Exclusion: Pre-requisite: EE3002A

Objectives
1. After completing an elementary subject on electromechanical energy conversion, the students are exposed to more challenging topics such as electrical machine design methods, transient and unbalanced operations of electrical machines in this course.
2. This course is designed to ensure the students developing an in-depth understanding of various drive systems in local industry.
3. To give the knowledge of various electrical machines such as AC, DC and power electronic driven motors.

Subject Intended Learning Outcomes
Upon completion of the subject, students will:

a. Have acquired a good understanding of the basic design methods of electric machines.
b. Have had experience in synchronous machines including load characteristics, oscillations equations, and displacement stability.
c. Be able to analyse the unbalanced and dynamic operation, condition monitoring and temperature-rise for the single and 3-phase induction machines.
d. Be able to understand the drives for induction machines and their harmonics analysis for drives. Be aware of various switched-mode driven machines.
e. Be capable to understand the control method for induction machines including closed loop and vector control.

Subject Synopsis/ Indicative Syllabus
6. Control of machines: Open loop and closed loop control. Concept of vector control, torque control.

Laboratory/Mini-project Experiments:
The students are required to team up to work on laboratory session or mini-project. The mini-project is problem-based learning type and they are required to research for information, and do the design and analysis on the topics selected.

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>a  b  c  d  e</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✓  ✓  ✓  ✓  ✓</td>
</tr>
<tr>
<td>Mini-projects</td>
<td>✓  ✓  ✓  ✓  ✓</td>
</tr>
</tbody>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weightings</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a  b  c  d  e</td>
</tr>
<tr>
<td>2. Class test</td>
<td>24%</td>
<td>✓  ✓</td>
</tr>
<tr>
<td>3. Mini-project &amp; report</td>
<td>16%</td>
<td>✓  ✓  ✓  ✓  ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial</td>
</tr>
<tr>
<td>Laboratory/Mini-project</td>
</tr>
</tbody>
</table>

Other student study effort:

| Mini-project/report | 15 Hrs. |
| Self-study          | 48 Hrs. |

Total student study effort 102 Hrs.

Reading List and References

Reference books:

AI - 42
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4004A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Power Systems</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: EE3004A</td>
</tr>
</tbody>
</table>

#### Objectives

1. To provide students with a sound knowledge of modern power systems that is essential for the understanding of the operation and control of power systems.
2. To provide a continuation of study of power systems in level 3 subject EE3004A/B/D “Power Transmission and Distribution” and lead to more advanced topics of power systems study in final year electives.

#### Subject Intended Learning Outcomes

- Upon completion of the subject, students will:
  a. Have acquired in-depth understanding of power system analysis, stability and operation.
  b. Have acquired skills in identification, formulation and solution of power system analysis, operation and control problems.
  c. Have acquired ability to evaluate the design and operational performance of basic power systems.
  d. Have acquired skills in presentation and interpretation of experimental results and communication with others in a team environment.

#### Subject Synopsis/Indicative Syllabus

1. **Power flow analysis:** Load flow concepts and formulation. Solution methods, including Gauss-Seidel, Newton-Raphson and Fast Decoupled Methods. Applications of load flow study to system operation.
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.

#### Laboratory Experiment:

- Power system load flow and security operation simulation.
- Transient stability assessment of power system.

---

### Teaching/Learning Methodology

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

#### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Experiments</th>
<th>Mini-projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>2. Class tests</td>
<td>20%</td>
<td>✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>3. Lab performance and report</td>
<td>10%</td>
<td>✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>4. Mini-project and report</td>
<td>10%</td>
<td>✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✔️ ✔️ ✔️</td>
</tr>
</tbody>
</table>

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

#### Student Study Effort Expected

- **Class contact:** 33 Hrs.
- **Laboratory:** 6 Hrs.

Other student study effort:

- **Laboratory preparation / report:** 12 Hrs.
- **Mini-project / self-study:** 49 Hrs.

Total student study effort: 100 Hrs.

#### Reading List and References


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AI - 43
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4006A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Individual Project</td>
</tr>
<tr>
<td>Credit Value</td>
<td>6</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: The student should have completed most of the subjects required in previous years of the programme before taking this subject. The enrollment of this subject is subject to the approval of the Project Coordinator.</td>
</tr>
</tbody>
</table>

#### Objectives
To provide an opportunity for students:
1. to apply specialized professional engineering knowledge independently in the creative design, implementation, monitoring and evaluation of an engineering project, and
2. to achieve this goal, students are required to identify key engineering problems, to solve them and to communicate the findings in oral and written report format.

#### Subject Intended Learning Outcomes
Upon completion of the subject, students will be able:
- a. To apply specialized knowledge independently.
- b. To identify key engineering problems, to solve them and to communicate what is achieved orally and in a written report.
- c. To develop a project which is creative, rich in intellectual content and sufficiently challenging.
- d. To monitor the progress of a project from concept to final implementation and testing, through problem definition and the selection of alternative solutions.
- e. To synthesize and apply their knowledge and analytical skills gained in various engineering domains.
- f. To build self-confidence, demonstrate independence, and develop professionalism by successfully completing the project in a competent manner.

#### Choice of Project
Projects are proposed by staff or by an industrial partner. Projects may also be jointly proposed by student and staff. Industrial experience, research and consultancy activities are fertile ground for ideas. Project proposals must include an objective, describe the method of approach, describe any innovative features, and provide an estimate of cost. The suitability of a proposal may be judged by factors such as its intellectual level, relevance to the aims of the Programme, practicality in terms of time, funding and availability of resources.

#### Project Plan
At the beginning of the project, students are required to submit a clear project plan (formal project proposal). The plan should not be too long but should cover such matters as:
- an abstract
- problem statement and objectives
- brief literature research
- initial problem identification
- preliminary suggestion on methodology
- preliminary time schedule
- cost estimate and references

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### Interim Progress Report
At about the midpoint of the project, the students have executed their projects for a few months and they need to submit an Interim Progress Report and carry out a presentation to summarize their progress. This gives the supervisor and an assessor a more formal opportunity than at discussions to indicate his/her assessment of student’s progress and to eliminate discrepancies if necessary.

### Final Project Report
A good project schedule includes adequate time for preparing a report of the appropriate standard. The final report should be submitted before the examination period. These will be given to the Assessment Panel (see Assessment below) for understanding of the student’s work and for assessment purpose. To ensure that the project reports are prepared properly and of appropriate standard, students must first submit a draft of the report to the supervisor for comments before final submission.

At the end of a project, each project is assessed by an Assessment Panel of three members, including a Chairman, an independent examiner and the project Supervisor.

The Project Supervisor will provide information on student’s progress, originality, initiative and ability to work independently. The supervisor will also be in a position to contribute views on the student’s technical achievement. All members of the Assessment Panel will read the project report before the assessment meeting. The Assessment Panel will reach their decision after:
- listening to the student’s presentation (can be a video clip),
- examining the student orally during the poster presentation, and
- evaluate the project’s outcome based on the demonstration (can be a video clip).

### Assessment
In assessing the project, the panel will typically consider the following aspects:
- Intellectual achievement;
- In-depth of understanding of the topic and the relevant allied topics;
- Quality and quality of work done, including design and construction of equipment, experimentation, mathematical models, program writing, verification;
- Presentation including the written report, oral presentation and response to questions.

The Chairman will ensure that all aspects of the project are thoroughly discussed by the Panel. In arriving at a decision, Panel members should bear in mind their experiences in respect of the achievements in other projects in the Department in the current and previous years.

### Method of Assessment: 100% continuous assessment

#### (I) Formal Project Proposal
Students are required to submit a formal project proposal when the project commences. This will contribute to 5% of the final grade.

The contents of the proposal should include:
- A. Objectives of the project
- B. Proposed specifications of the product (no matter it is a hardware or software project)
- C. Summary of the literature search done up-to-date.
- D. Proposed approach/methodology to be used
- E. Some brief descriptions on the theory of the approach/methodology
- F. Schedule of your work of the entire project
- G. References
Assessment Criteria
1. Literature research.
2. Project plan
3. Problem definition and methodology.
4. Writing quality.

(II) The Interim Progress Report

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

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

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

(III) Mid-term progress presentation

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

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

(IV) The Final Report

The final project report should contain all the work carried out by the student in the project. The length of the main body of the final report should be at least 45 pages in standard report format. Students are advised to form a framework for the report first, and then proceed to the formation of the titles of the chapters. The titles and structure of the sections within each chapter are then decided. Continuing the process, each section may be further expanded into appropriate sub-sections, divisions and sub-divisions etc., until a complete framework is formed. The final report will contribute to 40% of the final grade.

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

Assessment Criteria
1. Abstract and introduction
2. Literature review and background
3. Methodology and technical skills
4. Results, discussions and conclusion
5. Overall presentation and organization of the report

(V) The Presentation and Demonstration

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

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

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

The presentation and demonstration will contribute to 25% of the final grade.

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

(VI) Continuous Assessment

The supervisor of the project will assess the student’s overall performance based on the following items. This will contribute to 10% of the final grade.
1. Motivation and perseverance
2. Originality and innovation of the project
3. Execution and problem solving skills
4. Communication
5. Self-discipline and time management

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

Note 2: The final grade for the FYP will be calculated by taking the weighted average of the grades from the above six components.
As the nature of the subject implies, there will not be formal lecture in the subject, other than a few of hours of briefings on general information, some official procedures in administration of the project and some techniques on information/components searching. Students learn the technical contents by a substantial number of individual discussions with their project supervisors and a large number of hours of self-learning. The planning of the project will be conducted under the direction of the supervisor. Through the execution of the project plan with guidance from the supervisor, the student should be able to achieve the learning outcomes.

### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion with the project Supervisor</td>
<td>✓</td>
</tr>
<tr>
<td>Wiring of the project proposal</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Writing of the interim report</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Writing of the final report</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Presentation and demonstration</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Formal project proposal</td>
<td>5%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>2. Interim progress report</td>
<td>10%</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Mid-term presentation</td>
<td>10%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>4. Final report</td>
<td>40%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>5. Presentation and demonstration</td>
<td>25%</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>6. Continuous assessment</td>
<td>10%</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

### Student Study Effort Expected

- **Class contact:**
  - Briefings: 3 Hrs.
  - Individual discussions with supervisor: 36 Hrs.
- **Other student study effort:**
  - Information search, self study, execution of the project, report writing, preparation of presentation: 161 Hrs.

Total student study effort: 200 Hrs.

### Reading List and References

To be advised by supervisor
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4007A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Advanced Power Electronics</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: EE3003A</td>
</tr>
</tbody>
</table>

Objectives
1. To provide the students with the knowledge of advanced power electronic conversion.
2. To ensure the students having an in-depth understanding of the design and control of various power electronics converters.
3. To give the knowledge of AC switched-mode conversion.
4. To provide a concept of impact of power electronics on power quality.

Subject Intended Learning Outcomes
Upon completion of the subject, students will:
- Have acquired a good understanding of basic switched-mode DC/DC topologies, operation, performance and modelling.
- Have acquired a basic understanding of resonant converters and its method of loss reduction.
- Be able to apply switched-mode techniques to inverters (DC/AC converters).
- Be able to perform study on power electronics circuit simulation.
- Be aware of impacts of electromagnetic interference (EMI) and reduction of EMI using power electronics techniques.
- Be able to present results of study in the form of computer simulation, design equations and basic models, working independently and in teams when conducting laboratory investigations and power electronics circuit design.

Subject Synopsis/Indicative Syllabus
1. **Pulse-width-modulated DC/DC Converters**: Basic topologies and higher order converters, transformer-isolated topologies, snubber circuits, continuous and discontinuous conduction modes of operation, ripple analysis.
2. **Resonant-mode DC/DC Converters**: Classification, zero-current switching and zero-voltage switching techniques, quasi-resonant converters, resonant transition converters.
4. **Modelling and Control of Power Converters**: Small-signal modelling, traditional PID control method, modern control techniques, analogue and digital circuit simulation for power electronics, simulation techniques.

Laboratory Experiments (select one out of three labs):
- DC-DC Converter II.
- Quasi-resonant zero-current-switching converter simulation by using Saber.

Teaching/Learning Methodology
- Lectures and tutorials are effective teaching methods:
  1. To provide an overview or outline of recent development of power electronics.
  2. To introduce new concepts and knowledge in advance power electronic converter design, soft switching techniques, control methods and electromagnetic interference (EMI) aspects.
  3. To explain difficult ideas and concepts.
  4. To provide students feedback in relation to their learning.
  5. To encourage students responsibility for their learning by extra reference books reading and computer-based circuit simulations.

Lectures and tutorials are effective teaching methods:
- To supplement the lecturing materials.
- To provide power converter design experience for the students.
- To provide deep understanding of various power converter design aspects.
- To enable students to organise principles and challenge ideas.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>2. Two in-class tests</td>
<td>20%</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>3. Laboratory reports</td>
<td>10%</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>4. Assignments</td>
<td>10%</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>a b c d e f</td>
</tr>
</tbody>
</table>

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

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

Reading List and References
- **Textbooks**:
  2. K.W.E. Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

**Reference books**:
Subject Description Form

Subject Code  EE4008A
Subject Title  Applied Digital Control
Credit Value  3
Level  4
Pre-requisite/ Co-requisite/ Exclusion  Pre-requisite: EE3005A
Objectives
1. To facilitate a working knowledge of principles of reduced-order modelling, digital control algorithms, system identification, and adaptive control.
2. To enable students designing industrial control systems for applications in different engineering areas.

Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:
a. Understand the concepts of reduced-order modelling, deadbeat control algorithm, system identification and adaptive control.
b. Understand the notions of offline and online system identification.
c. Design conventional and adaptive controllers based on user specifications.
d. Use CAD package for design and simulation.

Subject Synopsis/ Indicative Syllabus
2. Direct digital control algorithms: PID algorithm, Cascade control, Dead-time compensation, Internal model control.
3. Computer control methods: Hierarchical control configurations, Distributed approach, Programmable logic controllers (PLC).
5. Self-tuning control: Introduction to adaptive control, Self-tuning controller.

Laboratory Experiment:
There will be two laboratory experiments on the topics of reduced order modeling, digital control design and system identification by least-squares technique.

Case study:
Individual assignment related to above methods. Students will write a report and present their finding to the class.

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Tutorials</td>
<td></td>
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<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Experiments and case study</td>
<td></td>
<td></td>
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Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Class test</td>
<td>20%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3. Laboratory and case study reports</td>
<td>20%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

Student Study Effort Expected
Class contact:
- Lecture/Tutorial 33 Hrs.
- Laboratory 6 Hrs.

Other student study effort:
- Laboratory preparation/report 12 Hrs.
- Case study preparation/report 14 Hrs.
- Self-study 35 Hrs.

Total student study effort 100 Hrs.

Reading List and References
Reference books:
Subject Description Form

Subject Code: EE4009A

Subject Title: Electric Traction and Drives

Credit Value: 3

Level: 4

Pre-requisite/Co-requisite/Exclusion:
Pre-requisite: EE3003A and EE4003A

Objectives:
1. To enable students to develop a sound understanding of operation of modern electrified railway systems.
2. To provide an appreciation of the design and application of electric drives and operation principles of railway signalling.
3. To enable students to understand the implications of design of traction and signalling systems on railway operations and traffic control.
4. To introduce to students the vital problems of electromagnetic interference and hardware design of enhanced electromagnetic compatibility.
5. To enhance students’ awareness on the use of computer simulation in railway planning and operation, as well as the future technologies in railway systems.

Subject Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Outline the operation principles of the sub-systems and their components in an electrified railway system and compare their advantages and limitations with reference to practical railway lines.

b. Elaborate on the impacts of the performance and properties of the sub-systems to the overall system safety and reliability.

c. Engage in self-learning on latest technologies on railway systems at this advanced level of study.

Subject Synopsis/Indicative Syllabus:


3. A.C. drives: Performance characteristics of induction motors: VVVF control, PWM control: mode transition, pulse dropping; CVVF control; Vector Control.


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

<table>
<thead>
<tr>
<th>Methodology</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tutorials</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Experiments</td>
<td></td>
<td>✓</td>
<td></td>
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<tr>
<td>Mini-Projects</td>
<td></td>
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Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mini-project (group project)</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>3. Examination</td>
<td>60%</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

This is an advanced and yet appreciation subject for students who are interested in railway engineering. The subject encompasses all the important elements in a typical railway and a number of case studies are used to supplement the analytical discussions. The outcomes are assessed through a mini-project (which aims to integrate the various aspects learnt), tests and written examinations.

Student Study Effort Expected

Class contact:
- Lecture/Tutorial: 33 Hrs.
- Seminar: 6 Hrs.

Other student study effort:
- Assignment and self-studies: 65 Hrs.

Total student study effort: 104 Hrs.
<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Textbooks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference books/journals:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Selected papers from IEE/IET Proceedings – Electric Power Applications</td>
</tr>
</tbody>
</table>
Subject Description Form

Subject Code: EE4010A
Subject Title: Fibre Optics
Credit Value: 3
Level: 4
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: EE3008A or EIE331

Objectives:
1. To introduce students to the physical laws that govern the behaviour of optical fibres and fibre-optic components.
2. To teach students the principles of fibre-optic sensing and optical fibre communications.
3. To equip students with the knowledge to design simple fibre-optics sensor systems.

Subject Intended Learning Outcomes:
Upon completion of the subject, students will be able to:
a. Understand the basics of light propagation in optical fibres and analyze the attenuation and dispersion properties.
b. Learn the functions and test the performance of various fibre-optic components and sub-systems.
c. Understand the basics of generation, modulation and detection of light signals in fibre-optic communication and sensor systems.
d. Design simple optical fibre sensors and communication systems considering the performance of the fibres (e.g., dispersion, loss) and component constraints.
e. Appreciate recent developments and the importance of optical fibre technologies for communications and sensing.

Subject Synopsis/Indicative Syllabus:

Laboratory Experiments/Demonstrations:
1. Insertion loss measurement using optical power meters and optical spectrum analyzers
2. Optical spectrum analyzer for spectral measurements of light sources
3. Fibre Bragg grating sensors

Teaching/Learning Methodology
Lectures, quizzes, tests, laboratory experiments, mini-projects, and examination.

Assessment Methods in Alignment with Intended Learning Outcomes
Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed
--- | --- | ---
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 33 Hrs.
Laboratory 6 Hrs.

Other student study effort:
Mini-projects 15 Hrs.
Self-study 45 hrs.
Total student study effort 99 Hrs.

Reading List and References
5. J. Hecht, Understanding Fiber Optics, 5th edn., Prentice Hall, 2006
Subject Description Form

Subject Code: EE4011A
Subject Title: Industrial Computer Applications
Credit Value: 3
Level: 4
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives
Introduce the applications of computing techniques in solving industrial problems. The topics included are shown in the following: embedded control system; applications of computer vision; Internet of Things (IoT) applications and mobile applications.

Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:
a. Design and develop embedded computer control systems
b. Understand the use of industrial networks on process data acquisition and control.
c. Apply image processing techniques in industrial automation.
d. Design Internet of Thing system and basic mobile applications
f. Think logically and be able to analyze data as well as present results in writing.

Subject Synopsis/Indicative Syllabus
1. Embedded Computer control: Modelling of the computer process control system, practical approaches to digital control implementation, microprocessor based control systems.
2. Intelligent instrumentation and systems: applications of distributed digital control algorithms, industrial networks and SCADA system.
3. Computer vision: Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation.
4. IoT and Mobile applications: Wireless LAN, WiFi technology and advantages, IoT design and implementation. Introduction to server-side and client-side mobile applications.

Mini-project cases:
- PC based digital controller for temperature control
- Power failure monitoring using embedded controller
- Computer vision applications
- Wireless communication developments
- Air disaster investigation

Teaching/Learning Methodology
Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>2. In-class Test</td>
<td>20%</td>
<td>a b c</td>
</tr>
<tr>
<td>3. Mini-project Report</td>
<td>20%</td>
<td>a b c</td>
</tr>
<tr>
<td>4. Exercise</td>
<td>10%</td>
<td>a b c</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>a b c</td>
</tr>
</tbody>
</table>

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

Student Study Effort Expected

- Lecture/Tutorial: 33 Hrs.
- Laboratory (mini-project): 6 Hrs.

Other student study effort:
- Mini-project report and preparation: 16 Hrs.
- Self-study: 45 Hrs.

Total student study effort: 100 Hrs.

Reading List and References
Reference books:
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4012A</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Intelligent Buildings</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
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</table>

**Pre-requisite/ Co-requisite/ Exclusion**
Pre-requisite: EE3009A

**Objectives**
1. To enable students to establish a broad knowledge on the concepts of intelligent buildings.
2. To enable students to understand that intelligence of a building can be achieved by integration and optimization of building structure, services systems, information technology, management and value-added services.
3. To enable students to understand basic features of an intelligent building and the required services system to support these features.
4. To enable students to understand the operation principle and characteristics of various service systems/technologies of an intelligent building; such as the building automation system, intelligent vertical transportation systems, communications, structured cabling and etc.
5. To enable student to understand the impacts these services systems/technologies on the building and people.

**Subject Intended Learning Outcomes**
Upon completion of the subject, students will be able to:

a. Identify benefits, impacts and driving forces of intelligent buildings, and its subsystems.
b. Describe design philosophy at system level, system configurations, system sub-modules of vertical modern vertical transportation systems and building automation systems, including the out-stations, etc.
c. Describe general design concept and principles of communication systems in intelligent building, such as voice communication system, video communication systems, LAN, wireless LAN, mobile phone system, data networks, office automation systems, etc.
d. Describe the general principle, concepts and system configurations of structure cabling, including the features, characteristics and applications of different categories of cables.
e. Given a technical topic, carry out literature search and present the findings in a technical report.

**Subject Synopsis/ Indicative Syllabus**
1. **Intelligent building characteristics:** Features and benefits of intelligent buildings. The anatomy of intelligent buildings. Environmental aspect. The marketplace and other driving forces behind the emergence of intelligent buildings. (6 hours)
2. **Building automation systems & controls:** Philosophy, system configuration, system modules, distributed systems and on-line measurements. Fire protection, security and energy management. Control objectives. Sensors, controllers and actuators. Control system schematics, system design, and internal elements of outstations. Microprocessor based controllers & digital controls. Examples of sub-systems such as: Digital Addressable Lighting Interface (DALI) (9 hours)
3. **Modern intelligent vertical transportation systems:** Sky lobby, double-deck lifts, twin lifts, advanced call registration systems, large scale monitoring systems, applications of artificial intelligence in supervisory control, energy saving measures related to lift systems/escator systems, other modern vertical transportation systems, such as: gondola systems, materials handling systems, etc. (6 hours)
4. **Communication and security systems:** Voice communication systems, local area network, wireless LAN, Digital TV, CCTV, digital CCTV, teleconferencing, cellular phone system, and CABD. SMATV. Data networking. Public address/sound reinforcement systems. Digital public address system. Modern security systems (10 hours)
5. **Structured cabling systems:** Characteristics and benefits. Standards, configurations and physical media. EMI/EMC issues, grounding problems. System design. Different Categories of cables. (6 hours)
6. **Integrating the technologies and systems:** The impact of information technology on buildings and people. Interaction and integration between building structure, systems, services, management, control and information technology. (5 hours)

**Teaching/Learning Methodology**
Lectures and tutorials are effective teaching methods:
1. To provide an overview or outline of the subject.
2. To introduce new concepts and knowledge to the students.
3. To explain difficult ideas and concepts of the subject.
4. To motivate and stimulate students interest.
5. To provide students feedback in relation to their learning.

Mini-project works/Assignments are essential ingredients of this subject:
1. To supplement the lecturing materials.
2. To add real experience for the students.
3. To provide deep understanding of the subject.
4. To enable students to organize principle and challenge ideas.

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>✔️ ✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>Mini-project</td>
<td>✔️ ✔️</td>
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</table>

**Specific assessment methods/tasks**

<table>
<thead>
<tr>
<th>Intended subject learning outcomes to be assessed</th>
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<tr>
<td>% weighting</td>
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<tr>
<td>1. Examination</td>
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<tr>
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<td>✔️</td>
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<tr>
<td>✔️</td>
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<td>20%</td>
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<td>✔️</td>
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<td>✔️</td>
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<tr>
<td>✔️</td>
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<tr>
<td>3. Mini-project/Assignments</td>
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<tr>
<td>20%</td>
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<tr>
<td>✔️</td>
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</table>

The understanding on theoretical principle and practical considerations, analytical skills and problem solving technique will be evaluated. Examination, class tests and mini-project report are an integrated approach to validly assess students’ performance with respect to the intended subject learning outcomes.
<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Lecture/Tutorial 39 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mini-project/Assignments 20 Hrs.</td>
</tr>
<tr>
<td></td>
<td>• Self-study 41 Hrs.</td>
</tr>
<tr>
<td>Total student study effort</td>
<td>100 Hrs.</td>
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<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Reference books:</th>
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<tbody>
<tr>
<td></td>
<td>5. A. Dobbelsteen, Smart Building in a Changing Climate, Techne Press, 2009</td>
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### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4013A</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Power System Protection</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
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</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Pre-requisite: EE3004A</td>
</tr>
</tbody>
</table>

#### Objectives

1. To introduce students the modern knowledge of power system protection.
2. To enable students to understand the design philosophy and working principle of different protective schemes, and how they are applied to power systems.

#### Subject Intended Learning Outcomes

Upon completion of the subject, students will:

a. Have acquired a good understanding of knowledge, techniques and skills of power system protection.
b. Have the ability to apply and adapt applications of mathematics, engineering skills in the analysis, comparison, and interpretation of various power system protection schemes.
c. Be able to interpret nameplate data and able to select the most appropriate transducers for various protection schemes.
d. Be able to carry out tests and analyze the performance of transducers and protection relays.
e. Be able to present technical results in the form of a technical report.

#### Subject Synopsis/ Indicative Syllabus

2. **Transducers**: Input sources for protection system. Current and voltage transformers; sources of error; their performance under normal and abnormal conditions.
3. **Non-unit protection**: Non-unit protection for distribution networks – overcurrent and directional protection, techniques used to analyze their performances. Non-unit protection for transmission networks – distance relays, distance protection schemes, protection characteristics and impedance seen by distance relays.

**Laboratory Experiment:**

- Current Transformer Saturation.
- Directional Overcurrent Protection.
- Low Impedance and High Impedance Busbar Protection.
- Fault Simulation and Simulation of Digital Relay in EHV Transmission Line.

### Case study:

1. Explain how source impedance and fault location affect the performance of protective relays.
2. What do you understand about the terms reliability and stability of protective relays?
3. How protective relays achieve selectivity? Give examples and explain.
4. Explain the meaning of sensitivity of protective relays. How to decide a suitable sensitivity for protective relays?
5. What factors will affect CT accuracy and how to control them?
6. How to choose a suitable CT for protective relays?
7. Describe the voltage measurement methods in different voltage levels in a power network.
9. How to achieve discrimination between overcurrent relays installed in radial feeders in distribution system?
10. When we grade overcurrent relays of different time / current characteristics, what precautions should we take? Give examples.
11. What are directional relay schemes? Explain how the relays are connected and how they are used.
12. Will directional relays mal-operate? Give one example.
13. What is the effect of load on distance relay operation?
14. What will affect the accuracy of measurement on distance protection relays?
15. Describe the communication methods used for protective relays in a power network.
16. What is the effect of power swing on distance protection relays?
17. How differential protection is applied in feeders, busbars, and transformers?
18. What is the difference between low impedance and high impedance differential protection? How can we achieve through fault stability in both protection systems?
19. How the inrush current on power transformer is formed and what is its effect on transformer protection?
20. Why bias is required in transformer differential protection? What is its effect on the range of windings to be protected?
21. Explain the working principle of harmonic bias used in transformer differential protection.
22. What is restricted earth fault protection and what is unrestricted earth fault protection? Why are they needed? What is the range of winding they can protect comparing to the bias differential protection?
23. Why digital relay is different from conventional protective relays? What additional features a digital relay can offer?
24. Compare the performance of the two basic digital relay algorithms, the sample and derivative algorithm, and the differential equation algorithm. What is the problem when they are applied in a power system?
25. Explain the working principle of the Fourier algorithm in digital relay technology. Why it has better performance than other algorithm? What is its drawback?
Both the fundamental understanding and practical problem-solving methods would be emphasized in lectures. Students shall take initiative to learn through the process of engagement and participation in lectures. Practical protection schemes used in industry, where appropriate, are discussed interactively in class. In laboratory classes, experiments are planned to let students design and carry-out an experimental strategy, record and critically analyze their results, reach conclusions about the interpretation and performance of power system protective schemes. Students would have to make preparations such as information gathering before laboratory classes. Mini-Projects are used to enhance students learning experiences and practical applications. They provide students with the opportunity to develop independent design/planning and technical report writing skills pertinent to the field of power system protection.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
</tr>
<tr>
<td>Experiments</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
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</table>

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
</tr>
<tr>
<td>2. Class Test/Quiz</td>
<td>20%</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>10%</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
</tr>
<tr>
<td>4. Mini-project &amp; report</td>
<td>10%</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✔ a  ✔ b  ✔ c  ✔ d  ✔ e</td>
</tr>
</tbody>
</table>

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

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>33 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>6 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td></td>
</tr>
<tr>
<td>Laboratory preparation / report</td>
<td>12 Hrs.</td>
</tr>
<tr>
<td>Mini-project / self-study</td>
<td>49 Hrs.</td>
</tr>
<tr>
<td>Total student study effort</td>
<td>100 Hrs.</td>
</tr>
</tbody>
</table>

### Reading List and References

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.

Subject Synopsis/Indicative Syllabus

6. **Applications of intelligent systems**: Applications in Control and Utilization – Intelligent process control. Intelligent robot control and Utilization.

**Mini-project:**
Performance of intelligent systems including GA, Fuzzy systems and ANN comparing to traditional control system such as PID control

**Case study:**
To study the performance of genetic algorithm on solving different functions such as De Jong problems and Colville problems.
To investigate the effects of parameter setting on the performance of genetic algorithm.
To apply genetic algorithm to different Electrical Engineering problems.

**References**
## Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4015A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Electrical Engineering Materials</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
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<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: ENG2001</td>
</tr>
</tbody>
</table>

### Objectives

To introduce the students of electrical engineering or related discipline to basic electrical engineering materials. An introduction to materials in electrical engineering design and an advanced topic on smart materials will also be given.

### Subject Intended Learning Outcomes

Upon completion of the subject, students will be able to:

**Category A: Professional/academic knowledge and skills**

- a. Acquire some understanding in basic and advanced electrical engineering materials.
- b. Solve basic problems in electrical engineering materials.
- c. Acquire better skills in performing projects / laboratory experiments.

**Category B: Attributes for all-roundedness**

- d. Perform independent learning in electrical engineering materials.
- e. Work as a team in projects / laboratory sessions.

### Subject Synopsis/Indicative Syllabus

**Syllabus:**

2. **Types and Applications of Materials**
   Materials for engineering. Classification of materials. Types and applications of engineering metals, ceramics, polymers and composites.

3. **Conducting, Semiconducting, Insulating and Superconducting Materials**

4. **Magnetic Materials**

5. **Materials in Electrical Engineering Design**
   Corrosion, oxidation and degradation. Selection of materials for electrical engineering design (case studies). Applications to electrochemical energy storage: batteries, fuel cells, etc.

6. **Smart Materials**

### Examples of Possible Laboratory Experiment:

1. Electrical conduction and dielectric behavior of materials.
2. Ferromagnetic behavior and Hall Effect in materials.
3. Ferroelectric, piezoelectric, and magnetostrictive behaviors of materials.

**Teaching/Learning Methodology**

- Lectures, supplemented with interactive questions and answers
  - a, b, d
  - In lectures, students are introduced to the knowledge of the subject, and comprehension is strengthened with interactive Q&A.

- Tutorials, where problems are discussed and are given to students for them to solve
  - a, b, d
  - In tutorials, students apply what they have learnt in solving the problems given by the tutor.

- Projects / Laboratory sessions, where students will interactively investigate materials or material properties
  - b, c, e
  - Students acquire hands-on experience in using electronic equipment and apply what they have learnt in lectures/tutorials to experimentally validate the theoretical investigations.

- Assignments and In-Class Quizzes
  - a, b, c, d
  - Through working assignments, students will develop a firm understanding and comprehension of the knowledge taught.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous assessment</td>
<td>60 %</td>
<td>✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>2. Examination</td>
<td>40 %</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
<td></td>
</tr>
</tbody>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments and In-Class Quizzes</td>
<td>Assignments and quizzes are given to students to assess their competence level of knowledge and comprehension. The criteria (i.e. what to be demonstrated) and level (i.e. the extent of achievement) will be graded according to six levels: (A+ and A), Good (B+ and B), Satisfactory (C+ and C), Marginal (D) and Failure (F). These will be made known to the students before an assignment is given. Feedback about their performance will be given promptly to students to help them improve their learning.</td>
</tr>
<tr>
<td>Laboratory works / projects</td>
<td>Students will be required to perform one or two experiments or projects and submit reports explaining the outcome of these activities. Expectation and grading criteria will be given as in the case of assignments.</td>
</tr>
<tr>
<td>Mid-semester test and an End-of-semester test</td>
<td>There will be two tests to evaluate students' achievement of all the learning outcomes and give feedback to them for prompt improvement. Expectation and grading criteria will be given as in the case of assignments.</td>
</tr>
<tr>
<td>Examination</td>
<td>There will be an end-of-semester test and examination to assess students' achievement of all the learning outcomes. These are mainly summative in nature. Expectation and grading criteria will be given as in the case of assignments.</td>
</tr>
</tbody>
</table>

Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
</tr>
<tr>
<td>Tutorial</td>
</tr>
<tr>
<td>Laboratory / Project</td>
</tr>
</tbody>
</table>

Other student study effort:

| Revision | 34 Hrs. |
| Tutorial & assignments | 15 Hrs. |
| Laboratory logbook & report writings | 8 Hrs. |

Total student study effort | 96 Hrs. |

Reading List and References

Textbooks:

References:
Subject Description Form

Subject Code: EE4022A

Subject Title: Fundamentals of Fibre-Optic Communications and Sensors

Credit Value: 3

Level: 4

Pre-requisite/Co-requisite/Exclusion: Pre-requisite: EE3008A or EIE331

Objectives
1. To introduce students to the physical laws that govern the behaviour of fibre-optics components.
2. To give students an understanding of the principles of fibre-optic sensing and optical fibre communications.
3. To equip students with the knowledge to design simple fibre-optics sensor systems.

Subject Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Understand the attenuation and dispersion of optical fibres and their physical meaning and phenomena behind mathematical equations and computed results.

b. Understand the most appropriate passive and active fibre-optic components for fibre-optic sensor systems and communication links.

c. Use the appropriate fibre-optic equipment/instrument to perform optical power and spectrum measurements and have had hands-on experience in the use fusion splicer to make low-loss fibre joints.

d. Apply fibre optic sensors for temperature and strain measurement in practical engineering applications.

e. Appreciate recent developments and the importance of fibre optics technologies for communications and fibre-optic sensors.

Subject Synopsis/Indicative Syllabus


5. **Optical detectors:** Photo-detectors: noise, response time, materials. PIN and avalanche photodiodes. Receivers.

6. Fibre optic systems design: Fibre optic communication system design considerations. Attenuation and dispersion budgets. Digital system design.


**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**

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>√</td>
</tr>
<tr>
<td>Tutorials</td>
<td>√</td>
</tr>
<tr>
<td>Laboratory/Experiments</td>
<td>√</td>
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</tbody>
</table>

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>10%</td>
<td>√   √   √   √   √   √</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>√   √   √   √   √   √</td>
</tr>
<tr>
<td>3. Laboratory report</td>
<td>10%</td>
<td>√   √   √   √   √   √</td>
</tr>
<tr>
<td>4. Examination</td>
<td>60%</td>
<td>√   √   √   √   √   √</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>√   √   √   √   √   √</td>
</tr>
</tbody>
</table>

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-optic communication and sensor systems. The outcomes are assessed by assignments, tests, laboratory experiments and examination.
<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Lecture/Tutorial: 33 Hrs.</td>
</tr>
<tr>
<td></td>
<td>• Laboratory: 6 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td>• Assignments: 20 Hrs.</td>
</tr>
<tr>
<td></td>
<td>• Self-study: 41 hrs.</td>
</tr>
<tr>
<td></td>
<td>Total student study effort: 100 Hrs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Reference books:</th>
</tr>
</thead>
</table>
Lectures and tutorials are effective teaching methods:
1. To provide an overview or outline of the subject contents.
2. To introduce new concepts and knowledge to the students.
3. To explain difficult ideas and concepts of the subject.
4. To allow students to feedback on aspects related to their learning.

Mini-project works/Assignments are essential ingredients of this subject:
1. To supplement the lecturing materials.
2. To add real experience for the students.
3. To provide deeper understanding of the subject.
4. To enable students to organise principles and challenge ideas.

Seminars from industrial experts may also be arranged, this will give student up-to-date status of the development in alternative energy area, as well as market trends.

### Subject Description Form

#### Subject Code
EE501A

#### Subject Title
Alternative Energy Technologies

#### Credit Value
3

#### Level
5

#### Pre-requisite/Co-requisite/Exclusion
Nil

### Objectives
1. To enable students to establish a broad concept on alternative energy techniques in engineering.
2. To provide an in-depth knowledge on selected topics of alternative energy systems in engineering.
3. To enable students to understand typical alternative energy technologies, its associated issues of application and related technical considerations.
4. To enable students to understand the potential of alternative energy and characteristics & performance of various types of alternative energy systems.
5. To enable students to understand various techniques and systems for control and monitoring of alternative energy technologies, as well as the related communication protocol and interfacing requirements.

### Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Describe the operation principle & control strategy of various alternative energy systems and topologies of these systems.
b. Identify benefits & impacts of the applications of these alternative energy systems; such as their effects on environment and utility energy efficiencies.
c. Describe the operation principle, characteristics and performance of various alternative energy devices/systems.
d. Identify different alternative energy technologies for industrial & commercial plants and multi-storey buildings, including giving examples.
e. Able to carry out literature search and report the findings in a presentation, when given a technical topic.

### Subject Synopsis/Indicative Syllabus

1. **Energy resources and types:** Renewable and non-renewable energy resources. World potential and trends. Environmental effects. Alternative energy types and present developments. Role and importance of alternative energy.
5. **Co-generation and combine-cycle plants:** New technologies for co-generation and CCGT. Efficiency and environmental benefits. Case study examples. Future development potentials.
6. **Better utilization of energy resources:** Pollution reduction techniques and emission trading mechanisms and practices around the world. Clean coal technologies. Nuclear power. Environmental impacts of better utilization of energy.

### Reading List and References

1. J. Twidell, Renewable Energy Sources, E&F N Spon

### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Mini-project/Assignments/Presentations</th>
</tr>
</thead>
</table>

#### Specific assessment methods/tasks

- **1. Class tests**
  - Weighting: 20%
  - % Intended subject learning outcomes to be assessed
  - a. b. c. d. e.

- **2. Mini-project/Assignments/Presentations**
  - Weighting: 20%
  - % Intended subject learning outcomes to be assessed
  - a. b. c. d. e.

- **3. Examination**
  - Weighting: 60%
  - % Intended subject learning outcomes to be assessed
  - a. b. c. d. e.

- **Total**
  - Weighting: 100%
  - % Intended subject learning outcomes to be assessed
  - a. b. c. d. e.

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

### Student Study Effort Expected

- **Class contact:**
  - Lecture/Tutorial: 33 Hrs.
  - Seminar/Case studies: 6 Hrs.

- **Other student study effort:**
  - Mini-project/Assignments: 22 Hrs.
  - Self-study: 44 Hrs.

- **Total student study effort:** 105 Hrs.

### Student Study Effort Expected

- **Class contact:**
  - Lecture/Tutorial: 33 Hrs.
  - Seminar/Case studies: 6 Hrs.

- **Other student study effort:**
  - Mini-project/Assignments: 22 Hrs.
  - Self-study: 44 Hrs.

- **Total student study effort:** 105 Hrs.

### Reference books:
1. J. Twidell, Renewable Energy Sources, E&F N Spon
Subject Description Form

Subject Code: EE502A
Subject Title: Modern Protection Methods
Credit Value: 3
Level: 5

Pre-requisite/Co-requisite/Exclusion:
Student should have some prior knowledge in Power Transmission and Distribution

Objectives:
1. To introduce the concept of modern power system protection to students.
2. To integrate theory and practical knowledge of power system protection.
3. To understand the design philosophy and working principle of power system protection.
4. To master the analytical techniques.
5. To apply protective relaying in power systems.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Master the concept and philosophy on power system protection.
b. Apply and adapt applications of mathematics, engineering skills in the analysis, comparison, interpretation of various protection schemes in power systems.
c. Integrate and justify techniques to be used in the planning and operation of power system protection.
d. Solve technical problems for power system protection.
e. Present technical results in the form of a technical report.

Subject Synopsis/Indicative Syllabus:
2. Fault and transient in power systems: Fault transient behaviour in power systems. Computer simulations of the transient behaviour in power systems.
3. Current and voltage transducers: Sources of errors. Requirements of transducers for measurement and protection. Their features and characteristics under steady state and transient conditions.
5. Protection systems for transmission networks: Distance protection system and characteristics. Differential line protection. Phase comparison line protection. Use of line carrier and communication for protection systems.

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

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>√</td>
</tr>
<tr>
<td>2. Class Tests</td>
<td>20%</td>
<td>√</td>
</tr>
<tr>
<td>3. Mini-project and report</td>
<td>10%</td>
<td>√</td>
</tr>
<tr>
<td>4. Laboratory and report</td>
<td>10%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</tbody>
</table>

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

Student Study Effort Expected:

- Class contact:
  - Lecture/Tutorial: 33 Hrs.
  - Laboratory: 6 Hrs.

- Other student study effort:
  - Laboratory preparation/report: 12 Hrs.
  - Mini-projects/Self-study: 54 Hrs.

Total student study effort: 105 Hrs.

Reading List and References:

Reference books:
1. L. Hewitson, M. Brown and R. Balakrishnan, Practical Power System Protection, Newnes, 2005
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE505A</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Power System Control and Operation</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
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<tr>
<td>Level</td>
<td>5</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

#### Objectives

1. To introduce the concept of modern power system control & operation to students;
2. To integrate theory and practical knowledge of power system control & operation;
3. To understand the working principle of power system control and operation;
4. To apply the theory in power system control & operation; and
5. To understand the industrial practice and tools used in power system control and operations.

#### Intended Learning Outcomes

Upon completion of the subject, students will be able to:

- a. Ability to analyse power system security control & operation;
- b. Ability to analyse interconnected power system interchange and economic operation.
- c. Ability to analyse power system computer control and applications;
- d. Understand the functionalities and able to use to appropriate level of competence of selected specialty software for power system control and operation purpose;
- e. To be aware of new technologies development trends and environmental impacts of modern power system control and operation techniques; and
- f. Ability to write technical reports and present the findings through individual effort as well as team work.

#### Subject Synopsis/Indicative Syllabus

2. **Unit commitment and economic dispatch:** Priority lists. Methodologies for large system economic dispatch and unit commitment. Programming methods.
3. **Frequency and voltage control:** Frequency and voltage control concepts. Control loops and analysis. Automatic generation control (AGC) concepts, methodology and implementation.
4. **Interconnected systems operation:** System interconnection merits and problems. Economic interchange and control. Multi-area operation.

**Case Study:**

1. Local system control centre arrangement.
2. Case study of past system blackout in overseas countries.
3. AGC and voltage control case studies.
4. Power system developments in HK and China as well as overseas countries.
5. Applications of computer technology in power system control and monitoring.

### Teaching/Learning Methodology

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

#### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exam</td>
<td>60%</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>2. Class test</td>
<td>20%</td>
<td>√ √ √ √ √ √</td>
</tr>
<tr>
<td>3. Mini-project/report</td>
<td>20%</td>
<td>√ √ √ √ √ √</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

#### Student Study Effort Expected

- **Class contact:** Lecture/Tutorial 39 Hrs.
- **Other student study effort:**
  - Mini-project preparation/report 12 Hrs.
  - Self-study 54 Hrs.
- **Total student study effort:** 105 Hrs.

#### Reading List and References

1. W.D. Stevenson, Elements of Power System Analysis, McGraw Hill
2. Wood & Wollenberg, Power Generation, Operation and Control, J. Wiley.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE509A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>High Voltage Engineering</td>
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</table>

<table>
<thead>
<tr>
<th>Credit Value</th>
<th>3</th>
</tr>
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<tbody>
<tr>
<td>Level</td>
<td>5</td>
</tr>
</tbody>
</table>

Pre-requisite/Co-requisite/Exclusion
Nil

Collaboration Institute
HK Electric Institute

Objectives
To provide students with knowledge to understand the techniques of design and analysis pertaining to high voltage engineering, including causes and manner of insulation failure and problems encountered in practice.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:
1. Describe the insulation breakdown mechanisms so as to identify the failure phenomena of different insulation systems.
2. Understand the principles and practises of high voltage equipment so as to get on to the pragmatic design and applications of the high voltage equipment in industry.

Subject Synopsis/Indicative Syllabus
1. Introduction to Electrical Insulation: Electric fields; Dielectric breakdown; Electrical insulating materials; Industrial applications of electrical insulating materials.
2. Breakdown of Gaseous Insulation: Ionization processes; Townsend breakdown mechanism; Experimental determination of Townsend’s ionization coefficients; Breakdown in electronegative gases; Streamer breakdown mechanism; Paschen’s law; Corona discharges; Breakdown in non-uniform fields; Post-breakdown phenomena and applications; Vacuum insulation and breakdown.
3. Breakdown of Liquid Insulation: Breakdown in pure liquids and commercial liquids; Purification and breakdown test; Power law for commercial liquids.
4. Breakdown of Solid Insulation: Breakdown due to treeing, surface flashover, and surface tracking; Breakdown in composite insulation.
5. Partial Discharges: Classification of partial discharges by origin; Partial discharge measurements; Recent development.
6. High Voltage Equipment for Power System Networks: Hierarchy of power system networks; Introduction to high voltage equipment and their general specifications.
7. Transmission Gas Insulated Switchgears: Design and busbar topologies; Layout and internal construction; Environmental, health, and safety precautions in handling SF6 gas; Type and routine tests; Inspection before installation; Commissioning test and precautions; Typical incidents around the world.
8. High Voltage Cables: Basic high voltage cable technology; Dielectric properties; Types and constructions; Type, routine, and diagnostic tests; Health index; Water tree formation; Accessory design, operations, and maintenance considerations; Reliability reviews and failure analysis; Faulty joint dissections and lessons learnt.
9. Site Visit: Site visit to HK Electric; On-site demonstrations of transmission gas insulated switchgears and relevant high voltage test equipment used in the electricity transmission industry.

Teaching/Learning Methodology
Lectures are the primary means of conveying the fundamental knowledge to understand the techniques of analysis and design pertaining to high voltage engineering. Experiences on pragmatic design and applications are given through in-house demonstration and site visit to HK Electric. Students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>√</td>
</tr>
<tr>
<td>In-house demonstration</td>
<td>√</td>
</tr>
<tr>
<td>Site visit to HK Electric</td>
<td>√</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>√</td>
</tr>
<tr>
<td>2. Assignments</td>
<td>40%</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Student Study Effort Expected
- Lecture/In-house demonstration/Site visit to HK Electric: 39 Hrs.
- Assignments: 16 Hrs.
- Self-study: 50 Hrs.
- Total student study effort: 105 Hrs.

Reading List and References
Textbooks:
- NIL (Refer to Lecture Notes).

Reference books:
Subject Description Form

Subject Code: EE510A

Subject Title: Electrical Traction Engineering

Credit Value: 3

Level: 5

Pre-requisite/Co-requisite/Exclusion:
Pre-requisite: EE3003A and EE4003A
Exclusion: EE4009A/B/D

Objectives:
1. To provide students with a comprehensive understanding of traction systems from an engineering viewpoint, with emphasis on the applications to railways.
2. To provide students with an appreciation of the current state-of-the-art design and applications of electric drives.
3. To enable students to understand the implications of design of traction system for railway applications.
4. To introduce the quality indicators of railway operations and their relationships with the performance of traction drives and traction power supply systems.
5. To identify the necessary future technologies to improve the service quality in railway from the perspectives of traction drives and traction power supply systems.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Analyse the operation principles of the sub-systems in an electrified railway system with the state-of-the-art approaches and critically review their advantages and limitations with reference to operating railway lines.

b. Identify the railway service quality parameters and evaluate the impact of the performance of the sub-systems to the overall system reliability, availability, safety and maintainability.

c. Recognise the importance to engage in self-learning on latest technologies on railway systems at this advanced level of study.

Subject Synopsis/Indicative Syllabus:

2. Computer-aided design and operation of traction systems: Elements of design and analysis of traction systems: cost/benefit analysis; digital simulation of AC/DC power converter drives and traction equipment; power-factor, control, maximum-demand and energy-efficient operation; digital simulation of train performance for optimum headway, schedule speed and energy consumption; use of expert systems for system control and train scheduling. Computer modeling of non-linear source and traction load. Power quality issues of single phase AC traction: imbalance, harmonics and voltage dip; impact to traction system and public. Corrective measures and filter design.


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.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>a b c</td>
</tr>
<tr>
<td>Tutorials</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Project Work</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mini-project (group project)</td>
<td>20% a b c</td>
<td>✓</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20% ✓ ✓ ✓</td>
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</tr>
<tr>
<td>3. Examination</td>
<td>60% ✓ ✓ ✓</td>
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</table>

This is an advanced and yet introductory subject for students, particularly practicing engineers in the railway industry. The subject encompasses all the important elements in a typical railway and a number of case studies are used to supplement the analytical discussions. The outcomes are assessed through a mini-project (which aims to integrate the various aspects learnt), tests and written examinations.

Student Study Effort Expected:
Class contact: 36 Hrs.
Invited lecture: 3 Hrs.
Assignment and self-studies: 66 Hrs.
Total student study effort: 105 Hrs.

Reading List and References:

Textbooks:

Reference books/journals:
4. Selected papers from IEE/IET Proceedings – Electric Power Applications
Subject Description Form

Subject Code: EE512A
Subject Title: Electric Vehicles
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Exclusion: EE543

Objectives
1. To acquire a broad knowledge on modern electric vehicles (EVs).
2. To understand the development of EVs from technological, environmental, and societal perspectives.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Understand the importance of EVs for environment, energy sustainability and climate change.
b. Understand various underpinning technologies for modern EVs, including electric motor drives, energy storage, batteries, charging methods, infrastructure and auxiliary systems.
c. Explain the emerging technologies such as hybrid electric vehicles (HEVs), fuel cell electric vehicles (FEVs) and energy storage methods.

Subject Synopsis/Indicative Syllabus
1. Introduction to electric vehicles (EVs): Historical perspective. EV advantages and impacts. EV market and promotion: infrastructure needs, legislation and regulation, standardization.
2. Electric vehicle (EV) design options: EV configurations: fixed vs. variable gearing, single- vs. multiple-motor drive, in-wheel drives. EV parameters, driving cycles and performance specifications. Choice of system voltage levels: electrical safety and protection.

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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
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<tr>
<td>2. Test</td>
<td>30%</td>
<td>√</td>
</tr>
<tr>
<td>3. Term paper</td>
<td>5%</td>
<td>√</td>
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<tr>
<td>4. Oral presentation</td>
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Student Study Effort Expected

Class contact:
- Lecture/Tutorial 30 Hrs.
- Presentation/Tests 9 Hrs.

Other student study effort:
- Self-study and revision 48 Hrs.
- Report – Case Study 18 Hrs.

Total study effort 105 Hrs.

Reading List and References
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE514A</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Real Time Computing</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
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<tr>
<td>Level</td>
<td>5</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
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</table>

#### Objectives
1. To understand the properties of real time programming languages, operating systems and associated hardware.
2. To apply real time system technologies and concepts in engineering applications.
3. To demonstrate and realize advantages in real time system underlying in today advanced technological evolutions.

#### Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Appreciate the important issues in real time computing systems, and their relations in engineering applications.
b. Identify and understand the complications in a real time computing system. The mechanism of overcoming these obstacles is explored.
c. Communicate effectively with concerned topics during discussions and presentations.
d. Equip individual the ability to analyse related issues and identify the proper solution in a real-time computing design.

#### Subject Synopsis/Indicative Syllabus
3. **Relevant requirements in facilitating real time operations:** Demand responsive programs, protocols in providing information needed to interact with industrial application, e.g. smart grid. Modelling information that need to be exchanged within a facility to participate in industry operation.
4. **Real time system applications:** System supervision in Power System Process Operation. Implementation of IoT technology to resolve the real-time system operation issues. Integration of high-speed communication network in favourable of speed performance in system operation.

#### Project Experiment:
Develop a cluster computing platform using multiple microcontrollers.

#### Case study:
SCADA system in Power system using FSGIM (Facility Smart Grid Information Model) techniques to the efficiency and security throughout the power distribution system and generation process.

### Teaching/Learning Methodology

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<tr>
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<tbody>
<tr>
<td>Lectures</td>
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<td>Tutorials</td>
<td>a b c d</td>
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<tr>
<td>Experiments</td>
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### Assessment Methods in Alignment with Intended Learning Outcomes

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

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

### Student Study Effort Expected

- **Class contact:**
  - Lecture/Seminar: 36 Hrs.
  - Case presentation demonstration: 3 Hrs.

- **Other student study effort:**
  - Case Study: 20 Hrs.
  - Self-study: 48 Hrs.

**Total student study effort:** 107 Hrs.

### Reading List and References

**Textbooks:**

**Reference books/materials:**
4. Selected papers from Proceedings of Real-time Systems Symposium (IEEE)
5. Chris Moyer, Building Applications in the Cloud, Pearson Education, 2011
**Subject Description Form**

**Subject Code**  
EE517A

**Subject Title**  
Fibre Optic Components

**Credit Value**  
3

**Level**  
5

**Pre-requisite/Co-requisite/Exclusion**  
Nil

**Objectives**

1. To enable students to understand the fundamentals of light emission, detection, amplification, and light propagation in optical fibres.
2. To learn the operation principles of key fibre components and apply the knowledge learned to design fibre components and devices.
3. To appreciate the applications of fibre components in communication and sensing systems.

**Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

a. Appreciate the importance of optic fibre development from a historical perspective; understand the important role of advanced fibre components in enhancing the performance of modern fibre systems.

b. Understand the operating principle of various fibre components and analyze/characterize the performance of fibre components.

c. Understand the same function may be achieved by using different technology (e.g., electro-optic and acoustic modulation) and understand the advantage and limitations of each technology.

d. Select the most appropriate principles/techniques to design a fibre optic component with required specification, read the data sheet of various fibre optic components.

**Subject Synopsis/Indicative Syllabus**

5. **Optical amplifiers**: Rare-earth doped fibres, optical fibre amplifiers, semiconductor amplifiers.
6. **Photo-detectors**: Photomultipliers, photoconductive detectors, junction detectors (p-i-n diode, avalanche photodiode).

**Laboratory Demonstration:**
Observation of fibre modal patterns  
Characterization of single mode fibres: loss, dispersion, polarization dependent loss  
Measurement of source (LED, multi and single mode diode lasers) spectrums and power-current relations

**Group-project Topics:**
To choose from a list of 15 topics and write a study report and give a presentation

**Teaching/Learning Methodology**

Lectures are the primary means of teaching the basic concepts and theories. The understanding of basic principle is further enhanced through tutorials and laboratory demonstrations. Experiences and knowledge on design and applications of various integrated/fibre optic components, and on the use of alternative technologies to realise similar functionalities are gained through the use of examples during lectures and discussions during tutorials, and through assignments and group-study projects.

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
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<th>b</th>
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<tbody>
<tr>
<td>Lectures</td>
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<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>Tutorials</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Experiments</td>
<td>✓</td>
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**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>√ √ √ √</td>
</tr>
<tr>
<td>2. Tests and assignments</td>
<td>25%</td>
<td>√ √ √ √</td>
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<tr>
<td>3. Lab report</td>
<td>5%</td>
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<td>4. Group-project &amp; report</td>
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<td>Total</td>
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The outcomes on concepts, design and applications are assessed by examinations, tests and assignments whilst those on practical considerations of optical components and systems design, as well as team work and technical report writing abilities are evaluated by group projects and the reports.

**Student Study Effort Expected**

- **Class contact:**
  - Lecture/Tutorial 36 Hrs.
  - Laboratory demo 3 Hrs.

- **Other student study effort:**
  - Self-study and assignments 50 Hrs.
  - Group project and Report 10 Hrs.

Total student study effort 99 Hrs.
<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Reference books:</th>
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<tbody>
<tr>
<td>5. Selected papers from relevant journals</td>
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</table>
7. Case studies in intelligent motion systems:
Three examples will be selected from the following list:
- Optical based position tracking in CD-ROMs and Laser discs.
- Magnetic head positioning in hard disk drives.
- Motion control system design in multi-axis robot manipulators.
- Gantry robot motion systems for SMT component insertion machines.
- Motion systems in high precision CNC tooling machines.

Case study:
Report on a high performance motion control application example

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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment methods/tasks</th>
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<th>% weighting</th>
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</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>√</td>
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<tr>
<td>2. Test</td>
<td>30%</td>
<td>√</td>
<td>√</td>
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<tr>
<td>3. Report</td>
<td>5%</td>
<td>√</td>
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<tr>
<td>4. Oral presentation</td>
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One end-of-semester written examination; one mid-semester-test; one end-of-semester test; a report on an assigned topic; and a power point presentation for the particular topic.

Student Study Effort Expected
Class contact:
- Lecture/Tutorial          30 Hrs.
- Presentation/Test         9 Hrs.
Other student study effort:
- Case study                18 Hrs.
- Self-study                48 Hrs.
Total student study effort 105 Hrs.

Reading List and References
- 1. Precision Motion Control: Design and Implementation (Advances in Industrial Control) Dec 10, 2010 by Kok Kiong Tan and Tong Heng Lee, Springer
- 3. S. Meshkat, Advanced Motion Control, PCIM reference series in Power Conversion and Intelligent Motion, 1988
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE521A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Industrial Power Electronics</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>5</td>
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<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
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</tbody>
</table>

Objectives
1. To provide power electronics engineers with in depth knowledge of the industrial power electronics.
2. To provide latest development in power supplies, industrial power electronics system and renewable energy systems.
3. To give industrial concern in power electronics design including passive components and standards.
4. To introduce to students to the various topologies of the power electronics circuits.
5. To enable students to understand the power quality issues and the active and reactive power flow.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Acquire a good understanding of power supply concept and design and be able to analyse the industrial needs for static power conversion.

b. Understand the international standards on power electronics design.

c. Have a global view on recent development on power electronics and be aware of applications of power electronics in various industries.

d. Understand the various topologies and working principles of basic power converters.

e. Work in teams and independently when conducting power electronics design and testing.

Subject Synopsis/Indicative Syllabus
1. **Industrial power systems:** Static power systems, battery systems, AC systems, DC systems, AC-DC power conversion and recent advance in renewable energy systems such as wind and solar power.

2. **Power conversion:** Soft-switching, power factor correction, inverter configurations and static converters.

3. **Special environment power electronics:** Power electronics distribution system, industrial guidelines, variable speed and constant frequency systems, actuation systems, brushless drives and other applications of power electronics in industry.

4. **Industrial power supplies:** Converter topologies, decentralized power, power modules, electro-magnetic compatibility, international standards and reliability.

5. **Power quality improvement:** Fourier analysis of voltage an current waveforms, total harmonic distortion, power quality issues, reactive power compensation.

6. **Magnetics and capacitors:** High frequency inductors and transformers, winding techniques, core loss analysis, optimization of magnetics and power capacitors.

Laboratory Experiments (select two out of four labs):
- Computer aided design for power electronics
- Power electronics for DC brushless motor
- Power Factor correction
- DC-DC converter

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

Assessment Methods in Alignment with Intended Learning Outcomes
Specific assessment methods/tasks | % weight | Intended subject learning outcomes to be assessed |
--- | --- | --- |
Examination | 60% | a b c d e |
Test | 20% | √ √ √ √ √ |
Laboratory performance & report | 10% | √ √ √ √ √ |
Mini-project & report | 10% | √ √ √ √ √ |
Total | 100% | a b c d e |

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

Student Study Effort Expected
Class contact:
- Lecture/tutorial 33 Hrs.
- Laboratory 6 Hrs.

Other student study effort:
- Lab report/Mini-project 15 Hrs.
- Self-study 51 Hrs.

Total student study effort 105 Hrs.

Reading List and References
4. G. M. Masters, Renewable and efficient electric power systems, John Wiley & Sons, 2004
5. K.W.E. Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002
## Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE522A</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Optical Fibre Systems</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
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<tr>
<td>Level</td>
<td>5</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
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</table>

### Objectives

1. To re-introduce to students the fundamentals of light emission, modulation, detection, amplification, and light propagation in optical fibres.
2. To enable students to understand the operating principle and performance specifications of various fibre-optic components, as well as their applications in modern fibre-optic systems.
3. To equip students with the ability to analyse and design simple fibre-optic communication and sensing systems.

### Intended Learning Outcomes

Upon completion of the subject, students will be able to:

- a. Appreciate recent developments in fibre optic communication systems, importance of fibre optic technology to the development of communications, engineering applications of fibre-optic technologies, and advantages of fibre optic sensors to the electrical engineering industry.
- b. Understand the principles of different types of optical fibres, fibre components, sensors, and communication systems.
- c. Know the same function may be achieved by using different technologies and understand the advantages and limitations of each technology.
- d. Select the most appropriate passive and active fibre-optic components to design fibre-optic sensor systems and fibre optic communication links.
- e. Have hands-on experience in the use of fusion splicer to make low-loss fibre joints, optical spectrum analyzer to perform spectral measurements, and fibre grating sensors for temperature and strain measurements.

### Subject Synopsis/Indicative Syllabus

1. **Overview:** Introduction to lightwave communication and sensor systems. Historical perspective. Basic concept and components. Channel capacity.
5. **Optical amplifiers:** Rare-earth doped fibres. Optical fibre amplifiers. Semiconductor amplifiers.
7. **Optical fibre communication:** System architectures. Operating wavelength and system limitations. Power and rise-time budgets. Noise effects and other source of power penalty.

### Laboratory Experiments/Demonstrations:

- Observation of fibre modal patterns.
- Measurement of source spectrums and power-current relations of LED, multi and single mode diode lasers.
- Fibre splicing and insertion loss measurement.
- Fibre Bragg grating sensors

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
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<tbody>
<tr>
<td>1. Tests/Quizzes/Assignments</td>
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<tr>
<td>2. Lab and report</td>
<td>5%</td>
<td>√ √ √</td>
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<tr>
<td>3. Mini-project and report</td>
<td>5%</td>
<td>√ √ √</td>
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<tr>
<td>4. Examination</td>
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</table>

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

### Reading List and References


### Student Study Effort Expected

- **Class contact:**
  - Lectures/Tutorials/Laboratory demo 39 Hrs.
- **Other student study effort:**
  - Mini-project and report 20 Hrs.
  - Self-study and assignments 46 Hrs.
- **Total student study effort** 105 Hrs.
Subject Description Form

Subject Code: EE524A

Subject Title: Open Electricity Market Operation

Credit Value: 3

Level: 5

Pre-requisite/Co-requisite/Exclusion: Nil

Objectives
1. To enable students to understand the key and practical issues of restructuring electricity supply industry and to establish a broad knowledge of open electricity market operation.
2. To enable students to understand the key issues in open electricity market operation including deregulated power system operation, transmission pricing, procurement of ancillary services, congestion management, available transmission capacity so that students are provided with knowledge and techniques they need to meet the electric industry’s challenges in the 21st century.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Acquire a good understanding of the rationale and key issues for restructuring electricity supply industry and financial tools to hedge risks used in electricity supply industries.

b. Analyse the available transmission capacity and formulate equitable transmission pricing in electricity markets.

c. Assess ancillary services requirements based on security and economic considerations.

d. Present technical results in the form of technical report and verbal presentation.

Subject Synopsis/Indicative Syllabus
1. Restructuring of the Electricity supply industry (ESI): ESI structures; Privatisation and competition; Market structures and architectures; Regulation of Electricity Markets; Role of existing players.


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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
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<tr>
<th>Specific assessment methods/tasks</th>
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<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
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<tr>
<td>2. In-class tests</td>
<td>20%</td>
<td>√</td>
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<tr>
<td>3. Cases study &amp; presentation</td>
<td>20%</td>
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<tr>
<td>Total</td>
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</table>

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

Assessment Methodology Outcomes

| Lectures | Case Studies & Presentation | √ | √ | √ |

Student Study Effort Expected

Class contact:
- Lecture/Tutorial 33 Hrs.
- Presentation 6 Hrs.

Other student study effort:
- Case study and report 15 Hrs.
- Self-study 51 Hrs.

Total student study effort 105 Hrs.

Reading List and References

Reference books:

AI - 74
Subject Description Form

Subject Code: EE525A
Subject Title: Energy Policy and Restructuring of Electricity Supply Industry
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To provide students with a comprehensive knowledge in formulating practical energy policies for sustainable energy utilization.
2. To develop a conceptual framework for understanding key and practical issues of restructuring electricity supply industry.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Identify, evaluate and formulate energy policies for sustainable energy utilization.

b. Identify the rationale and key issues for restructuring electricity supply industry.

c. Explain the market structures and regulatory framework for electricity supply industry.

d. Explain and evaluate different pricing concepts and pricing contracts in restructured electricity supply industry.

e. Present the results of study in the form of written technical reports and oral presentation.

Subject Synopsis/Indicative Syllabus:

2. **Energy conservation and demand side management**: Energy conservation policy: efficient utilization and transformation, recycling of materials and waste heat extraction. Load management: energy and load growth, direct and indirect load control. Integrated Resources Planning: system cost, end-use development and environment cost.

3. **Restructuring of the ESI**: Electricity supply industry structures; Privatisation and competition; Market structures and architectures; Regulation of Electricity Markets; Key issues for China and Hong Kong.

4. **Electricity pricing and management**: Short range marginal cost. Real time and time-of-day pricing applications. Analysis of BOT option. Transmission contracts pricing.

Case Study:
1. Functional analysis on energy policies
2. Practical application of sustainable energy measures
3. Analysis on key issues of ESI restructuring
4. Implementation issues on ESI restructuring

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

Teaching/Learning Methodology: Outcomes

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Mini-projects</th>
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Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a b c d e</td>
</tr>
<tr>
<td>2. Class test/Quiz</td>
<td>25%</td>
<td>√ √ √ √</td>
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<tr>
<td>3. Mini-project &amp; report</td>
<td>15%</td>
<td>√ √ √ √</td>
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<tr>
<td>Total</td>
<td>100%</td>
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</table>

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

Student Study Effort Expected:

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

Reading List and References:

AI - 75
Subject Description Form

Subject Code: EE526A
Subject Title: Power System Analysis and Dynamics
Credit Value: 3
Level: 5
Pre-requisite/ Co-requisite/ Exclusion: Nil

Objectives:
1. To introduce the students to the advanced concepts and analytical skills for the stability analysis in modern power systems.
2. To understand the impact due to different system instabilities.
3. To analyse and provide solutions to the power system stability problems.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Acquire in-depth understanding of different types of power system stability problems.
b. Model the dynamic behaviours of system components under disturbances.
c. Apply and adapt applications of mathematics and engineering skills in the analysis of stability problems.
d. Discuss the causes and effects of instabilities and recommend possible solutions.
e. Acquire skills in presentation and interpretation of experimental results and communicate in written form.

Subject Synopsis/ Indicative Syllabus:
1. **Power system stability**: Basic concepts and classification. Past incidents of system instability and consequences. Power system stability issues and solutions.
5. **Application of HVDC, FACTS and ESS in improving stability**: HVDC link operation and its control for stability improvement. Flexible AC transmission devices, power angle control. Energy storage system, e.g. BESS, SOFC, FESS, and its application in stability control.

Mini-projects:
1. Power system stability analysis using industrial power systems design and analysis software
2. Power system stabiliser design for damping of low frequency power oscillation

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>a</th>
<th>b</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>✓</td>
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<tr>
<td>Tutorials</td>
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<td>✓</td>
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<tr>
<td>Experiments</td>
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Assessment Methods in Alignment with Intended Learning Outcomes:

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<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>2. Class Test</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>3. Mini-project/report</td>
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<td>✓ ✓ ✓ ✓ ✓</td>
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</table>

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

Student Study Effort Expected:

**Class contact:**
- Lecture/Tutorial: 33 Hrs.
- Laboratory: 6 Hrs.

**Other student study effort:**
- Laboratory preparation/report: 15 Hrs.
- Mini-project/self-study: 51 Hrs.

Total student study effort: 105 Hrs.

Reading List and References:

Subject Description Form

Subject Code: EE527A

Subject Title: Auto-tuning for Industrial Processes

Credit Value: 3

Level: 5

Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To facilitate a solid understanding of system identification.
2. To provide students with a solid knowledge of adaptive control.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:

a. Conduct parametric and non-parametric estimation for unknown processes.
c. Design auto-tuning control systems based on relay auto-tuner.
d. Use CAD package for design and simulation.

Subject Synopsis/Indicative Syllabus:

Case study:
Individual assignment related to above methods. Students will write a report and present their finding to the class.

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

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<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>a</td>
<td>b</td>
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<tr>
<td>Lectures</td>
<td>✓</td>
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<tr>
<td>Tutorials</td>
<td>✓</td>
</tr>
<tr>
<td>Case studies</td>
<td>✓</td>
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</table>

Assessment Methods in Alignment with Intended Learning Outcomes:

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<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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</thead>
<tbody>
<tr>
<td>1. Examination</td>
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<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Case studies</td>
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<tr>
<td>Total</td>
<td>100%</td>
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</table>

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

Student Study Effort Expected:

Class contact: 30 Hrs.
• Lecture/Tutorial

Other student study effort:
• Case study preparation/report 21 Hrs.
• Self-study 45 Hrs.

Total student study effort 105 Hrs.

Reading List and References:
3. Selected papers from IEEE Transactions and IEE proceeding and other relevant journals
# Subject Description Form

**Subject Code** | EE528A  
---|---  
**Subject Title** | System Modelling and Optimal Control  
**Credit Value** | 3  
**Level** | 5  
**Pre-requisite/Co-requisite/Exclusion** | Nil  

**Objectives**
Provide students with a sound knowledge of system modelling techniques in areas of prediction and control. In addition, modern control design techniques will also be introduced.

**Intended Learning Outcomes**
Upon completion of the subject, students will be able to:

- a. Model systems using State Variable and Transfer Functions.
- b. Design optimal controllers for system models.
- c. Apply computer packages for control system modelling and design.
- d. Report and present the technical findings in logical and organised manner.
- e. Practice their knowledge in team work.

**Subject Synopsis/Indicative Syllabus**

1. **System models**: functions, transformations and mapping, Laplace transformation and z-transformation, state variables and state space models of dynamic systems, relations between state space models and transfer function models, solutions of unforced linear state equations, matrix exponential, eigenvalues and eigenvectors, Jordan form, solutions of linear state equations, transition matrix.

2. **Modelling of physical systems**: power, energy, sources, passive elements (C-, I-, R-, transformer, and Gyrator), through and across variables, linear graph, modelling examples for typical mechanical systems such as vehicle suspension, electrical motor, etc.

3. **Stability, controllability, and observability**: stability, Lyapunov stability, Lyapunov function, controllability and observability, definition and criteria, stabilizability and detectability, feedback control.

4. **Optimal control**: Calculus of variations, formulation of optimal control problems, Pontryagin maximum principle, Riccati equation, application to linear regulator.

**Teaching/Learning Methodology**
Basic concepts and theories are taught in lectures and tutorials. Computer experiments will be assigned as part of the interactive assignments, where the students are expected to solve theoretical and practical control problems with critical and analytical thinking.

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<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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<tbody>
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<td>a</td>
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<tr>
<td>Lectures</td>
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<tr>
<td>Tutorials</td>
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<td>Assignments</td>
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**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
<td>a ✓ b ✓ c ✓ d ✓</td>
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<tr>
<td>2. Assignments &amp; lab experiment reports</td>
<td>40%</td>
<td>a ✓ b ✓ c ✓ d ✓ e ✓</td>
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<tr>
<td>Total</td>
<td>100%</td>
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</table>

The outcomes on concepts, design and applications are assessed by the usual means of examination and assignments. The outcomes on analytical skills, problem-solving techniques and practical considerations of designing control systems are evaluated by lab experiments and the reports.

**Student Study Effort Expected**

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>39 Hrs.</th>
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<tr>
<td>Other student study effort:</td>
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<tr>
<td>▪ Reading and studying</td>
<td>43 Hrs.</td>
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<tr>
<td>▪ Completing assignments</td>
<td>23 Hrs.</td>
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<tr>
<td>Total student study effort</td>
<td>105 Hrs.</td>
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</table>

**Reading List and References**


AI - 78
Subject Description Form

Subject Code: EE529A
Subject Title: Power Electronics for Utility Applications
Credit Value: 3
Level: 5
Pre-requisite/ Co-requisite/ Exclusion: Nil

Objectives
1. To enable students to understand the problems faced by modern power utilities and how power electronics can overcome these problems.
2. To introduce students to the various topologies of the power electronics circuits.
3. To provide basic understanding of the emerging power electronics technologies for power utility applications.
4. To enable students to understand the harmonics issues in power utility and means of controlling it using power electronics.
5. To enable students to design power electronics circuit that can control active and reactive power flow.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Explain why power electronics are needed in modern power system and understand of various emerging power electronics technologies for power utility applications.
b. Explain the main topologies of power electronic circuits used in utility applications and how these differ from low power applications.
c. Determine the harmonic filter required to satisfy the harmonic standard for a given harmonic load in a power system.
d. Identify power electronics topologies for used in controlling active and reactive power in a power system.
e. Communicate and work effectively on why and how power electronics can be used for power utility applications in terms of written reports and oral presentations.

Subject Synopsis/ Indicative Syllabus
1. Power electronics revolutions in utility applications: High power devices, Power Electronics and utility needs, control of power flow in the utility grid, distributed generation, improvement of electrical energy efficiencies, power quality, an overview of power electronics systems and their applications.
2. Inverters for high power applications: Basic principles of current and voltage source inverters for high power applications, Multi-level Inverters, Analysis of their performance, AC and DC harmonics, Interaction with power grid.
5. Reactive power compensations: concepts of reactive power, traditional means of controlling reactive powers, Power electronics applications for Static VAr Compensation (SVC), control of SVC, Harmonic issues, Analysis of performance and instabilities, Voltage Source Static Condensers (STATCON).

Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Mini-project</th>
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Assessment Methods in Alignment with Intended Learning Outcomes

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<th>Specific assessment methods/tasks</th>
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<tbody>
<tr>
<td>1. Examination</td>
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<tr>
<td>2. Class Test</td>
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<tr>
<td>3. Mini-project &amp; Report</td>
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<td>Total</td>
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Reading List and References

Textbooks:

Student Study Effort Expected

Class contact:
- Lecture: 33 Hrs.
- Tutorial/Student presentation: 6 Hrs.

Other student study effort:
- Mini-project/report: 15 Hrs.
- Self-study: 46 Hrs.

Total student study effort: 100 Hrs.
Subject Description Form

Subject Code: EE530A
Subject Title: Electrical Energy Saving Systems
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives
1. To enable students to establish a broad concept on energy saving using techniques of electrical engineering.
2. To provide an in-depth knowledge on selected topics of energy-saving systems in electrical engineering.
3. To enable students to understand typical energy storage systems, its associated issues of grid connection and related technical considerations.
4. To enable students to understand the potential of solar energy and characteristics & performance of various kinds solar energy systems.
5. To enable students to understand various techniques and systems for control and monitoring of energy saving, as well as the related communication protocol and interfacing requirements.
6. To enable students to understand control gears for lighting systems and variable speed drives for HVAC systems & elevators.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Describe the operation principle & control strategy of various energy storage systems and topologies of these systems and identify their benefits & impacts.

b. Describe the principle and characteristics of various solar energy devices, and identify the potentials of solar energy. Calculate available solar irradiation for a given location.

c. Describe the operation principle and characteristics of typical control and monitoring systems for energy saving, including the communication protocols.

d. Identify different energy saving control for industrial plants and multi-storey buildings, including giving examples.

e. Describe the operation principle and characteristics of typical control gear for lighting and variables speed drives.

f. Given a technical topic, carry out literature search and report the findings in a presentation and be able to work and communicate effectively in a team setting.

Subject Synopsis/Indicative Syllabus
1. Energy storage systems: Utility Load Factor, peak lopping and valley filling, energy storage systems, battery energy storage, super-capacitor, power electronics topologies, control strategy, grid connection, voltage support, power quality improvement, environmental impact, improvement of utility energy efficiencies.

2. Solar energy utilization: Solar irradiation on earth, potentials of solar energy, solar thermal system systems, photovoltaic systems, characteristics and performance of typical BIPV systems and estimation of its energy output, distributed power generation, passive solar devices on buildings for energy saving, and case study.

<table>
<thead>
<tr>
<th>Reading List and References</th>
<th>Reference books:</th>
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<tbody>
<tr>
<td></td>
<td>Battery Storage Systems</td>
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<td></td>
<td>Solar Energy Utilisation</td>
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<td></td>
<td>Energy Saving Control and Monitoring Systems</td>
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<tr>
<td></td>
<td>10. EMSD of HKSAR Govt, Code of Practice for Energy Efficiency of Building Services Installation, 2012</td>
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<tr>
<td></td>
<td>11. EMSD of HKSAR Govt, Code of Practice for Building Energy Audit, 2012</td>
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<tr>
<td></td>
<td>Lighting, Ballast, and Variable Speed Drives</td>
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</tbody>
</table>
Subject Description Form

Subject Code: ELC1011
Subject Title: Practical English for University Studies
Credit Value: 3
Level: 1
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives: This subject aims to develop and enhance students’ general proficiency and communication skills in English. A strong focus will be given to enhancing competence and confidence in writing, grammar, vocabulary, pronunciation and fluency.

Intended Learning Outcomes: Upon successful completion of the subject, students will be able to:

a. organise and write accurate and coherent short texts
b. improve language accuracy and the ability to proofread for common errors in written texts
c. use appropriate verbal and non-verbal skills to enhance fluency and accuracy in spoken communication such as short presentations

To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, and present their views logically and coherently.

Subject Synopsis/Indicative Syllabus:
1. Written communication
   Enhancing the use of accurate and appropriate grammatical structures and vocabulary for various communicative purposes; improving the ability to organise written texts logically; and improving cohesion and coherence in writing.

2. Spoken communication
   Developing verbal and non-verbal interaction strategies appropriate to the context and level of formality.

3. Reading and listening
   Understanding the content and structure of information delivered in written and spoken texts; developing effective reading and listening strategies.

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

Teaching/Learning Methodology: The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting of texts, information search, mini-presentations and discussions. Students will make use of elearning resources and web-based work to improve their grammar and other language skills.

Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC’s Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
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<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tbody>
<tr>
<td>1. In-class paragraph writing</td>
<td>25%</td>
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<tr>
<td>2. Essay writing</td>
<td>40%</td>
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<tr>
<td>3. Documentary presentation</td>
<td>35%</td>
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<tr>
<td>Total</td>
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</table>

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

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

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

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

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

Student Study Effort Expected:

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>39 Hrs.</th>
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<tbody>
<tr>
<td>Seminar</td>
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<tr>
<td>Other student study effort:</td>
<td>78 Hrs.</td>
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<tr>
<td>• Self-study/preparation</td>
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<tr>
<td>Total student study effort</td>
<td>117 Hrs.</td>
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</table>

Reading List and References:

Course material
1. Learning materials developed by the English Language Centre

Recommended references
Subject Description Form

Subject Code: ELC1013

Subject Title: English for University Studies

(This subject will be offered in two versions for students who will primarily be using (1) APA/Harvard referencing styles or (2) IEEE/Vancouver referencing styles in their university studies.)

Credit Value: 3

Level: 1

Pre-requisite / Co-requisite/ Exclusion:

Students entering the University with Level 5 from the HKDSE will be exempted from this subject. They can proceed to Advanced English for University Studies (ELC1014).

Objectives:

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

Intended Learning Outcomes:

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

a. refer to sources in written texts and oral presentations
b. paraphrase and summarise materials from written and spoken sources
c. plan, write and revise expository essays with references to sources
d. deliver effective oral presentations

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

Subject Synopsis/ Indicative Syllabus:

1. Written communication

- Analysing and practising common writing functions; improving the ability of writing topic sentences and strategies for paragraph development; understanding common patterns of organisation in expository writing; taking notes from written and spoken sources; practising summarising and paraphrasing skills; improving coherence and cohesion in writing; developing revision and proofreading skills.

2. Spoken communication

- Recognising the purposes of and differences between spoken and written communication in English in university study contexts; identifying and practising the verbal and non-verbal interaction strategies in oral presentations; developing and applying critical thinking skills to discussions of issues.

3. Language development

- Improving and extending relevant features of grammar, vocabulary and pronunciation.

Teaching/Learning Methodology:

The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. The process approach to writing is adopted, and students make use of elearning resources to engage in academic discussions and to reflect on their learning.

Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC’s Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
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</thead>
<tbody>
<tr>
<td>1. Academic essay 1</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓</td>
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<tr>
<td>2. Academic essay 2</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Oral presentation</td>
<td>40%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✓ ✓ ✓ ✓</td>
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</table>

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

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

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

Student Study Effort Expected:

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

Reading List and References:

Course material

1. Learning materials developed by the English Language Centre

Recommended references:

Subject Description Form

Subject Code: ELC1014
Subject Title: Advanced English for University Studies
Credit Value: 3
Level: 1
Pre-requisite / Co-requisite/ Exclusion: Pre-requisite: ELC1012/ELC1013 (unless exempted)

Objectives: This subject aims to help students study effectively in the University’s English medium learning environment, and to improve and develop their English language proficiency within a framework of university study contexts.

Intended Learning Outcomes: Upon successful completion of the subject, students will be able to:

a. research relevant academic texts for a topic and integrate the sources into a position argument essay appropriately and effectively;

b. plan, research for, write and revise a position argument essay; and

c. present and justify views effectively in a mini oral defence.

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

Subject Synopsis/ Indicative Syllabus:

1. Written communication
   Developing logical and persuasive arguments; applying a variety of organisation patterns in discursive writing, including the writing of explanatory and evaluative texts; selecting information from academic texts critically; supporting stance; maintaining cohesion and coherence in discursive writing; achieving appropriate style and tone.

2. Spoken communication
   Enhancing and practising the specific oral and aural skills required to participate effectively in an academic discussion and to present and justify views in an oral defence.

3. Reading and listening
   Understanding the content and structure of information in oral and written texts; comprehending, inferring and evaluating messages and attitude.

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

Teaching/Learning Methodology: The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving drafting and evaluating texts, mini-presentations, discussions and simulations. The process approach to writing is adopted, and students make use of learning resources to engage in academic discussions and to reflect on their learning.

Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC’s Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Position Argument Essay (draft)</td>
<td>20%</td>
<td>a ✓ b ✓ c</td>
</tr>
<tr>
<td>2. Academic Presentation &amp; discussion</td>
<td>35%</td>
<td>a ✓ b ✓ c</td>
</tr>
<tr>
<td>3. Position Argument Essay (final)</td>
<td>45%</td>
<td>a ✓ b ✓ c</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>a ✓ b ✓ c</td>
</tr>
</tbody>
</table>

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

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

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

Reading List and References:

1. Learning materials developed by the English Language Centre

Recommended references:


Subject Description Form

Subject Code: ELC2011

Subject Title: Advanced English Reading and Writing Skills

Credit Value: 3

Level: 2

Pre-requisite / Co-requisite/ Exclusion: Pre-requisite: ELC1014

Objectives

This subject aims to help students become more effective readers and writers. It focuses on developing students’ facility to read a variety of texts in a critical manner, both intensively and extensively; and to write texts that demonstrate knowledge and insight.

Intended Learning Outcomes

Upon successful completion of the subject, students will be able to examine a variety of texts, including literary texts, and:

- reflect on and critically analyze texts of different genres and styles, identifying the writer’s aims and stance
- identify and evaluate language used to make claims and support these with valid arguments
- write a text on a chosen topic that includes their opinion and interpretation of some key issues and demonstrates critical thinking and creativity

Subject Synopsis / Indicative Syllabus

Reading strategies

Reading extensively to appreciate the use of language, acquire information, promote understanding, and develop empathy. Reading intensively to investigate a particular topic and develop an in-depth understanding of issues and stances. Reading critically to extract implications, identify writers’ assumptions and purposes, and analyze issues raised in texts written from different perspectives.

Writing strategies

Describing and analyzing the structure, meaning and characteristics of a variety of texts. Presenting views and arguments to educated readers with sophisticated language and appropriate visual images and formats.

Teaching/Learning Methodology

The study method is primarily seminar-based. Following a blended learning approach, activities include teacher input as well as in- and out-of-class work involving sharing and discussion of reading experiences; and reading, evaluating and drafting texts. The process approach to writing is adopted, and students make use of e-learning resources to engage in discussions and to reflect on their learning.

Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC’s Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reflective writing</td>
<td>20%</td>
<td>✔</td>
</tr>
<tr>
<td>2. Analyzing genres of writing</td>
<td>40%</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>3. Feature article writing</td>
<td>40%</td>
<td>✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Student Study Effort Expected

Class contact:

- Seminars 39 Hrs.

Other student study effort:

- Online forums and blogs
- Readings and sharing session preparation
- Research and drafting/revising of texts

Total student study effort: 117 Hrs.

Reading List and References

Course material

1. Learning materials developed by the English Language Centre

Recommended references

Subject Description Form

Subject Code: ELC2012

Subject Title: Persuasive Communication

Credit Value: 3

Level: 2

Pre-requisite/Co-requisite/Exclusion: Pre-requisite: ELC1014

Objectives:
This subject aims to help students become more persuasive communicators in a variety of contexts that they may encounter at university and in the workplace.

Intended Learning Outcomes:
By the end of the subject, students should be able to communicate effectively in an English-medium environment through:

- a) writing persuasive texts intended for a variety of audiences
- b) communicating persuasively in oral contexts
- c) make persuasive arguments in formal discussions

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

Subject Synopsis/Indicative Syllabus:
1. Preparing for effective persuasion
   Assessing the situation; selecting relevant content; organising ideas and information; selecting an appropriate tone, distance and level of formality to support the communication of messages.

2. Persuasion through writing
   Developing and practising appropriate language, tone, style and structure; achieving cohesion and coherence.

3. Persuasion through speaking
   Developing and practising appropriate verbal and non-verbal skills for persuasive oral communication; improving and extending relevant pronunciation features, including articulation, pausing, intonation, word stress and sentence stress.

Teaching/Learning Methodology:
The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving reading and appreciating texts, discussions and presentations of ideas.

Learning materials developed by the English Language Centre are used throughout the course. Students will be referred to learning resources on the Internet and in the ELC’s Centre for Independent Language Learning. Additional reference materials will be recommended as required.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weightings</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>b)</td>
<td>c)</td>
</tr>
<tr>
<td>1. Speech</td>
<td>30%</td>
<td>✓</td>
</tr>
<tr>
<td>2. Persuasive written text</td>
<td>40%</td>
<td>✓</td>
</tr>
<tr>
<td>3. Debate</td>
<td>30%</td>
<td>✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Assessment 1 is an individual speech. Assessment 2 concentrates on persuasive writing. Assessment 3 examines a different aspect of persuasion, the debate.

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

Reading List and References:

Required readings
1. ELC-provided subject materials.

Other readings
### Objectives

This subject aims to introduce students to a range of literary genres in English as well as to enable them to consider differences in media representations of genres, and to appreciate and negotiate the meanings of a variety of literary texts.

It is also intended that the subject will help students further develop literacy, as well as higher order thinking and life-long learning skills.

### Intended Learning Outcomes

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

- a. examine and analyse literary texts from different perspectives
- b. discuss literary techniques employed by writers
- c. appreciate and articulate differences in textual and visual media representations

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

### Subject Synopsis/Indicative Syllabus

1. **Written communication**
   Describing and interpreting content and language in literary texts; employing appropriate grammatical structures and vocabulary.

2. **Spoken communication**
   Presenting critical evaluation of literary works effectively and convincingly.

3. **Reading**
   Developing understanding of and competence in using literary devices such as metaphor, simile and symbolism, via reading literary texts and viewing film versions.

4. **Language development**
   Improving fluency and pronunciation, and extending grammatical and lexical competence.

### Teaching/Learning Methodology

The study method is primarily seminar-based. Following a blended delivery approach, activities include teacher input as well as in- and out-of-class individual and group work involving listening to and viewing a variety of audio-visual sources, reading and drafting texts, conducting internet research, making mini-presentations, participating in discussions, and comparing various representations of literature. Students will make use of elearning resources and web-based work to further improve their English literacy skills.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Individual paper</td>
<td>30%</td>
<td>✓     ✓     ✓</td>
</tr>
<tr>
<td>2. Written test</td>
<td>40%</td>
<td>✓     ✓     ✓</td>
</tr>
<tr>
<td>3. Group project</td>
<td>30%</td>
<td>✓     ✓     ✓</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

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

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

### Student Study Effort Expected

- **Class contact:** Seminars 39 Hrs.
- **Other student study effort:** Self study/preparation 78 Hrs.

Total student study effort 117 Hrs.

### Reading List and References

**Recommended reading**

1. The PolyU library retains either hardcopies or electronic copies of the following titles. The titles can also be found online.


Other readings will be specified by the ELC teacher, and may contain short fiction, novelettes, plays and poetry.
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ELC3521</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Professional Communication in English</td>
</tr>
<tr>
<td>Credit Value</td>
<td>2</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite / Co-requisite / Exclusion</td>
<td>Pre-requisite / Co-requisite: English LCR subjects</td>
</tr>
</tbody>
</table>

**Objectives**

This subject aims to develop the language competence for professional communication in English required by students to communicate effectively with various parties and stakeholders in regard to engineering-related project proposals.

**Intended Learning Outcomes**

Upon completion of the subject, and in relation to effective communication with a variety of intended readers/audiences in English, students will be able to:

a. plan, organise and produce professionally acceptable project proposals with appropriate text structures and language for different intended readers
b. plan, organise and deliver effective project-related oral presentations with appropriate interactive strategies and language for different intended audiences
c. adjust the style of expression and interactive strategies in writing and speaking in accordance with different intended readers/audiences

**Subject Synopsis / Indicative Syllabus**

1. Project proposal in English
   - Planning and organising a project proposal
   - Explaining the background, rationale, objectives, scope and significance of a project
   - Referring to the current situation or existing literature to substantiate a project proposal
   - Describing the methods of study
   - Describing and discussing anticipated project results and (if applicable) results of a pilot study
   - Presenting the budget, schedule and (if applicable) method of evaluation
   - Writing an executive summary

2. Oral presentation of project proposal in English
   - Selecting content for an audience-focused presentation
   - Choosing language and style appropriate to the intended audience
   - Using appropriate transitions and maintaining coherence in a team presentation
   - Using effective verbal and non-verbal interactive strategies

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Project proposal in English</td>
<td>40%</td>
<td>✔</td>
</tr>
<tr>
<td>2. Oral presentation of project proposal in English</td>
<td>60%</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**Teaching/Learning Methodology**

The subject is designed to develop the English language skills, both oral and written, that students need to use to communicate effectively and professionally with a variety of stakeholders of engineering-related projects. It builds upon the language and communication skills covered in GUR language training subjects.

The study approach is primarily seminar-based. Seminar activities include instructor input as well as individual and group work, involving drafting and evaluating texts, mini-presentations, discussions and simulations.

The learning and teaching activities in the subject will focus on a course-long project which will engage students in proposing and reporting on an engineering-related project to different intended readers/audiences. During the course, students will be involved in:

- planning and researching the project
- writing project-related documents such as project proposals
- giving oral presentations to intended stakeholders of the project

**Assessment**

**Type** | Intended readers/audience | Timing  
---|--------------------------|---------|
1. Project proposal in English | Mainly engineering experts | Week 8  
Each team writes a proposal of 2000-2500 words; and each member writes a report of 200-250 words explaining his/her contribution to the project

2. Oral presentation of project proposal in English | Mainly non-experts | Weeks 12-13  
Each team delivers a speech (30 minutes for a team of four), simulating a presentation of the final proposal

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

The assessments will arise from a course-long engineering-related project. Students will collaborate in groups in planning, researching, discussing and giving oral presentations on the project. They will be assessed on written documents and oral presentations targeted at different intended readers/audiences. This facilitates assessment of students’ ability to select content and use language and style appropriate to the purposes and intended readers/audiences.
### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class contact:</td>
<td>0</td>
</tr>
<tr>
<td>Seminars</td>
<td>26</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td></td>
</tr>
<tr>
<td>Researching, planning and writing the project</td>
<td>52</td>
</tr>
<tr>
<td>Rehearsing the presentation</td>
<td></td>
</tr>
<tr>
<td>Total student study effort</td>
<td>78</td>
</tr>
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</table>

### Reading List and References

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG1003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Freshman Seminar for Engineering</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>1</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

#### Objectives

The objectives of this subject are to:
1. Introduce students to the engineering broad discipline and enthuse them about their major study
2. Cultivate students' creativity and problem-solving ability, and global outlook
3. Introduce students to the concept of entrepreneurship
4. Engage the students in desirable forms of learning at university that emphasizes self-regulation, autonomous learning and deep understanding

#### Intended Learning Outcomes

Upon completion of the subject, students will:

- Be able to demonstrate an understanding and an enthusiasm about the engineering broad discipline and their major study
- Develop their problem-solving ability and global outlook
- Be able to demonstrate an understanding of entrepreneurship
- Be able to research for information, formulate a project plan, and manage a project with initiative
- Be able to demonstrate an understanding of academic integrity.

#### Subject Synopsis/ Indicative Syllabus

1. **Online Tutorial on Academic Integrity**
   - Students will be required to complete successfully an Online Tutorial on Academic Integrity on or before week 5 of the first semester. The students will understand the importance of academic integrity by completing the Online Tutorial.

2. **Seminars**
   - There will be seminars given by various speakers on various topics to introduce students to the engineering broad discipline, to enthuse them about their major study, to arouse students' interests in engineering and to cultivate their understanding of and sense of belonging to the discipline and the engineering profession, and to cultivate students' global outlook. The formats of the seminars may be, but not limited to, Departmental Seminars, and Renowned Speaker Seminar.

3. **Freshman Project**
   - There will be practical workshops, presentation and demonstration sessions for the Freshman Project. The freshman project aims at developing students' creativity, problem-solving skills, research for information, and project management abilities through practical and hands-on tasks at a level commensurate with their first-year engineering backgrounds. Students will work in small groups under the guidance of teachers/instructors to design and implement an engineering solution to some given problems.

4. **Entrepreneurship Project**
   - The entrepreneurship project is designed to develop students' appreciation and understanding about entrepreneurship and the commercialization process by attending lectures, workshops and tutorials. In the course of the Entrepreneurship Project, students will identify technology opportunities and learn the skills of preparing a simple business plan.

#### Teaching/Learning Methodology

**Online Tutorial on Academic Integrity**

The Online Tutorial on Academic Integrity is developed by the University to help the students understand the importance of academic integrity. By going through the Online Tutorial, students will be aware of the importance of upholding academic integrity during University study. They will also learn good practices by which to stay clear of dishonest behaviors and academic plagiarism.

**Seminars**

The seminars (such as renowned speaker seminars and departmental seminars) are designed to arouse students' interest about engineering. The delivery mode will be interactive and engaging. Students will be motivated to search for information and do background reading. They will be encouraged to raise questions and discuss with the presenters. Assessment tasks (quizzes) will be designed to measure students' learning outcomes as well as to encourage participation and interaction.

**Freshman Project**

For the Freshman Project, students will work collaboratively with their group members to design and implement an engineering solution to a given problem under the guidance of instructors. There will be close staff-students and students-students interaction. Students will be given opportunities to develop creativity, problem-solving skills, research for information and project management abilities. Assessment tasks will consist of demonstration, presentation, reports, and reflective essay writings. These are designed to evaluate individual student’s performance and achievement of the relevant intended learning outcomes as well as to encourage active participation.

**Entrepreneurship Project**

There will be lectures, workshops, and tutorials. A general overview of the concepts required to conduct the project will be provided to students through lectures. They will then work in small groups in a workshop to appreciate the essential elements in the development of a business plan and subsequently to produce a simple business plan and to present it to fellow classmates. Assessment will focus towards students’ understanding about entrepreneurship, innovation and creativity.

#### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Tutorial on Academic Integrity</td>
<td>0%</td>
<td>✓</td>
</tr>
<tr>
<td>Seminars</td>
<td>10%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Quizzes</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Freshman Project</td>
<td>45%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Project demonstration, presentation, report and reflective essay writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurship Project</td>
<td>45%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Business plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Quizzes (online or paper-based) can measure the students’ understanding about the engineering discipline. Through reflective essays, students can reflect on their appreciation and understanding about the engineering discipline. Through project demonstration, presentation and project reports, students can demonstrate their creativity and problem-solving skills abilities. They can also demonstrate their ability to research for information, formulate a project plan, and manage a project with initiative. Through business plan, students can demonstrate their understanding about entrepreneurship.

Pass Conditions

In order to pass this subject, students must obtain a Grade D or above for total marks comprising the Seminars, Freshman Project and Entrepreneurship Project as described here AND pass the Online Tutorial on Academic Integrity on or before week 5 of semester 1 as described in the previous section.

<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction and Seminars (such as Departmental Seminars, Renowned Speaker Seminar)</td>
<td>6 Hrs.</td>
<td></td>
</tr>
<tr>
<td>Freshman project: 3 hours per week for 5 weeks</td>
<td>15 Hrs.</td>
<td></td>
</tr>
<tr>
<td>Entrepreneurship project: 3 hours per week for 5 weeks</td>
<td>15 Hrs.</td>
<td></td>
</tr>
<tr>
<td>Other student study effort:</td>
<td>70 Hrs.</td>
<td></td>
</tr>
<tr>
<td>4 hours for Online Tutorial on Academic Integrity; 6 hours for seminars quizzes preparation; 60 hours for Freshman project and Entrepreneurship project: background information search, project work preparation, meeting and discussion, presentation and demonstration, and report writing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total student study effort</td>
<td>106 Hrs.</td>
<td></td>
</tr>
</tbody>
</table>

Reading and References List


The Hong Kong Institution of Engineers, “Engineering Our City”, Youtube clip ref. no. nYMm6vIVeQ

HKIE Corporate Video, Youtube clip ref. no. INMV88MnNEY
**Subject Description Form**

**Subject Code**
ENG2001

**Subject Title**
Fundamentals of Materials Science and Engineering

**Credit Value**
3

**Level**
2

**Pre-requisite/Co-requisite/Exclusion**
Nil

**Objectives**
1. To realize the impact of the development of engineering materials on human civilization;
2. To enable students to establish a broad knowledge base on the structure and properties of materials for solving engineering problems.
3. To enable students to understand the applications and selection of engineering materials based on the consideration of properties, cost, ease of manufacture, environmental issues and their in-service performance.

**Intended Learning Outcomes**
Upon completion of the subject, students will be able to:

- a. comprehend the importance of materials in engineering and society;
- b. explain the properties and behaviour of materials using fundamental knowledge of materials science.
- c. apply the knowledge of materials science to analyze and solve basic engineering problems related to stress, strain and fracture of materials;
- d. select appropriate materials for various engineering applications taking into consideration of issues in cost, quality and environmental concerns.

**Subject Synopsis/Indicative Syllabus**

1. **Introduction**
   Historical perspective; Evolution of engineering materials; Materials science and engineering; Classification of materials

2. **Atomic Structure and Structures of Materials**
   Atomic structure; Bonding forces and energies; Primary interatomic bonds and secondary bonding; Crystalline and non-crystalline materials; Phase diagram and microstructure of alloys

3. **Electrical and Optical Properties of Materials**
   Conductors and insulators; Semi-conductor materials; N-type and P-type semiconductors; P/N junction; Light interactions with materials; Light emitting diode (LED) and photovoltaics; Light propagation in optical fibers; Liquid crystal; Photoelasticity

4. **Mechanical Properties of Materials**
   Concept of stress and strain; Stress-strain behaviour; Elastic and plastic properties of materials; Concepts of dislocations and strengthening mechanisms; Tensile properties; Elastic recovery after plastic deformation; Hardness; Stress concentration; Impact energy, Fracture toughness; Design and safety factors

5. **Introduction to Failure Analysis and Prevention**
   Fundamentals of fracture: ductile, brittle, fatigue and creep; Corrosion; Nondestructive testing; Techniques for failure analysis and prevention

6. **Selection of Engineering Materials**
   Characteristics of metallic, polymeric, ceramic, electronic and composite materials; Economic, environmental and recycling issues

**Teaching/Learning Methodology**
The subject will be delivered mainly through lectures but tutorials, case studies and laboratory work will substantially supplement which. Practical problems and case studies of material applications will be raised as a focal point for discussion in tutorial classes, also laboratory sessions will be used to illustrate and assimilate some fundamental principles of materials science. The subject emphasizes on developing students’ problem solving skills.

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>15%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>2. Test</td>
<td>20%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>3. Laboratory report</td>
<td>5%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>3. Examination</td>
<td>60%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>☑ ☑ ☑ ☑</td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The assignments are designed to reflect students’ understanding of the subject and to assist them in self-monitoring of their progress.
The laboratory report is designed to assess the capability of students in analyzing and reporting experimental data relates to learning outcome (b).
The test and examination are for determining students’ understanding of key concepts as well as for assessing their achievement of the learning outcomes.

**Student Study Effort Expected**

- Class contact:
  - Lectures, tutorials, practical 39 Hrs.

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

Total student study effort 123 Hrs.
<table>
<thead>
<tr>
<th>Reading List and References</th>
</tr>
</thead>
</table>
| 3. Materials World  
  (Magazine of the Institute of Materials, Minerals and Mining) |
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Computer Programming</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>2</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

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

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. Familiarize themselves with at least one C/C++ programming environment.

b. Be proficient in using the basic constructs of C/C++ to develop a computer program.

c. Be able to develop a structured and documented computer program.

d. Understand the fundamentals of object-oriented programming and be able to apply it in computer program development.

e. Be able to apply the computer programming techniques to solve practical engineering problems.

Subject Synopsis/ Indicative Syllabus

Syllabus:
1. Introduction to programming - Components of a computer; Programming environment; Process of application development.

2. Bolts and Nuts of C/C++ - Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators.

3. Program Flow Control - Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables.

4. Program Design and Debugging - Structured program design; Debugging a program. Case study: Using the Visual C++ debugger.

5. Basic Object Oriented Programming - Objects and classes; Private versus public; Implementing class methods; Constructors and destructors.

6. Pointer and Array - Stack and Free store; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command-line processing.

7. Stream I/O - Input and output as streams; File I/O using streams.

Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Teaching and Learning Method</th>
<th>Intended Subject Learning Outcome</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures, supplemented with short quizzes</td>
<td>2,3,4</td>
<td>Students are introduced to the knowledge of computer programming through explanation and illustrative examples. Comprehension of the knowledge is strengthened with short quizzes. Students will be able to monitor the skills of using C/C++ and apply the techniques of developing structured object-oriented applications.</td>
</tr>
<tr>
<td>Laboratories/tutorials where problems are given to students for them to solve</td>
<td>1,2,3,4,5</td>
<td>Students apply what they have learnt in lectures and solve problems in exercises. The purpose is to ensure students have captured the important points. Tutors will aid the lecturer in helping the students finishing the exercises, and interactive Q&amp;A will take place.</td>
</tr>
<tr>
<td>Homework, tests and final examination</td>
<td>1,2,3,4,5</td>
<td>By doing homework, students will develop a firm understanding and comprehension of the knowledge taught. They will analyse given C/C++ applications and apply knowledge in solving problems. For some design type of problems, they will have to synthesize solutions by evaluating different alternatives. To enhance the students’ problem solving skill in a given programming environment, open-book programming tests are arranged regularly. To assure students' understanding of fundamental concepts, a closed-book final examination is arranged.</td>
</tr>
</tbody>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In-class exercises</td>
<td>10%</td>
<td>✔ ✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>2. Short-quizzes</td>
<td>15%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>3. Programming tests</td>
<td>30%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>4. Homework</td>
<td>15%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>5. Final examination</td>
<td>30%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>☑ ☑ ☑ ☑ ☑</td>
</tr>
</tbody>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The short-quizzes are for assessing the understanding of fundamental concepts. The in-class exercises are conducted to help students familiarized with the programming language and skills. The programming tests are for assessing the ability of students on solving computer problems through programming within a specified period. Through doing homework, students will be able to experience how to solve computer problems and design solutions by using a systematic approach. The final examination is for assessing the students’ ability on using the programming language and analysing computer problems.

<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th>Class contact:</th>
<th>39 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lectures, Tests and Quizzes</td>
<td>26 Hrs.</td>
</tr>
<tr>
<td></td>
<td>Laboratory/Tutorial</td>
<td>13 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
<td></td>
<td>71 Hrs.</td>
</tr>
<tr>
<td></td>
<td>Self-studying</td>
<td>57 Hrs.</td>
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<tr>
<td></td>
<td>Homework</td>
<td>14 Hrs.</td>
</tr>
<tr>
<td>Total student study effort</td>
<td></td>
<td>110 Hrs.</td>
</tr>
</tbody>
</table>

Reading List and References

Reference Books:
1. S. Rao, Sams Teach Yourself C++ in One Hour a Day. Indianapolis, IN: Sams, 2012.
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG2003</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Information Technology</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
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<td>Level</td>
<td>2</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Objectives**
To provide the foundation knowledge in internet applications, computer networks, and database management that is essential to modern information system design.

**Intended Learning Outcomes**
Upon completion of the subject, students will be able to:

**Category A: Professional/academic knowledge and skills**
1. Understand the functions and features of modern computing systems.
2. Understand the client-server architecture and be able to set up multiple internet applications.
3. Understand the principles of computer networks and be able to set up simple computer networks.
4. Understand the basic structure of a database system and be able to set up a simple database system.

**Category B: Attributes for all-roundedness**
1. Solve problems using systematic approaches.

**Subject Synopsis/Indicative Syllabus**
1. Introduction to computers
   - Introduction to information technology using Internet of Things as a real life example. Introduction to modern computing systems.

2. Computer Networks
   - Introduction to computer networks (Client-Server Architecture). Study different internet applications (HTTP/FTP/DNS). Explain basic concepts on packet routing (Data Encapsulation/IP Addressing/Functions of Routers). Introduction to basic network security measures.

3. Introduction to data processing and information systems
   - Database systems – architecture, relational database concept, structural query language (SQL), database management systems, Web and database linking, database application development. Introduction to Information systems. Workflow management.
   - Case study: Database design, implementation and management.

**Teaching/Learning Methodology**
There will be a mix of lectures, tutorials, and laboratory sessions/workshops to facilitate effective learning. Students will be given case studies to understand and practice the usage of modern information systems.

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous Assessment</td>
<td>50%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Examination</td>
<td>50%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The assessment methods include an end-of-subject 2-hour closed-book examination (50%) and continuous assessment (50%), including open-booked quizzes, a closed-book mid-term test, laboratory sessions/workshops, and assignments. The examination, mid-term test, and quizzes cover intended subject learning outcomes A1, A2, A3, A4, and B1. The laboratory sessions/workshops cover intended subject learning outcomes A2, A3, A4, and B1. The laboratory sessions/workshops give students hands-on experience on setting up internet applications, building computer networks, and constructing database.

**Student Study Effort Expected**
- Class contact:
  - Lectures (18), tutorials (6), and workshops (15) 39 Hrs.
- Other student study effort:
  - Workshops preparation (6/workshop) 30 Hrs.
  - Self study (3/week) 39 Hrs.
- Total student study effort 108 Hrs.

**Reading List and References**
## Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG3003</th>
</tr>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Engineering Management</td>
</tr>
<tr>
<td>Credit Value</td>
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</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
</tbody>
</table>

### Pre-requisite/ Co-requisite/ Exclusion
Nil

### Objectives

This subject provides students with:

1. A practical introduction to management and a comprehensive guide to the tools and techniques used in managing people and other resources.
2. Opportunities to trace the historical development and describe the functions of management, from planning, and decision making to organizing, staffing, leading, motivating, and controlling. It also includes a discussion on engineering ethics.
3. Opportunities to explore the core business strategy, technology, and innovation, and examine how these functions intertwine to play a central role in structural design, as well as supporting an organization's overall success.

### Intended Learning Outcomes

Upon completion of the subject, students will be able to:

a. perform tasks in an organization related to organizing, planning, leading, and controlling project and process activities;

b. select appropriate management techniques for improving organizational structures, work procedures, and quality performance of operational tasks;

c. analyze the factors that affect changes in the work environment, and be aware of the approaches in implementing change in an organization;

d. be aware of the imperatives of ethical and business behaviors in engineering organizations in a fast-changing business environment.

### Subject Synopsis/Indicative Syllabus

1. **Introduction**
   - General management concepts in organizations; Functions and types of industrial organizations; Organizational structures; Corporate objectives, strategy, and policy

2. **Industrial Management**
   - Roles of managers: Process of management, leadership, planning, organizing, motivating, and control of social and engineering activities; Quality management: Related tools and techniques

3. **Project Management**
   - Project scope and objectives; Network analysis; Tools that support engineering operations and task scheduling

4. **Management of Change**
   - Change leadership; Organizational change; Phases of planned change; Stress management; Factors that affect the execution of change

5. **Effects of Environmental Factors**
   - The effects of extraneous factors on the operations of engineering organizations, such as ethics and corporate social responsibilities issues

### Teaching/Learning Methodology
A mixture of lectures, tutorial exercises, and case studies are used to deliver various topics in this subject. Some topics are covered by problem-based format whenever applicable in enhancing the learning objectives. Other topics are covered by directed study so as to develop students’ “life-long learning” ability.

The case studies, largely based on real experience, are designed to integrate the topics covered in the subject and to illustrate the ways various techniques are inter-related and applied in real life situations.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>a   b   c   d</td>
</tr>
<tr>
<td>1. Coursework:</td>
<td>40%</td>
<td>✔    ✔    ✔    ✔</td>
</tr>
<tr>
<td>• Group learning activities (10%)</td>
<td></td>
<td>✔    ✔    ✔    ✔</td>
</tr>
<tr>
<td>• Presentation (individual) (30%)</td>
<td></td>
<td>✔    ✔    ✔    ✔</td>
</tr>
<tr>
<td>2. Final examination</td>
<td>60%</td>
<td>✔    ✔    ✔    ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>✔    ✔    ✔    ✔</td>
</tr>
</tbody>
</table>

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

The coursework of this subject involves students working in groups to study cases that reflect the realities of management situations in an engineering setting. Through such exercises, students’ ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their written reports on these case studies. A written final examination is also designed to assess the intended learning outcomes.

### Student Study Effort Expected

- Class contact:
  - Lectures and review 27 Hrs.
  - Tutorials and presentations 12 Hrs.

- Other student study effort:
  - Research and preparation 30 Hrs.
  - Report writing 10 Hrs.
  - Preparation for oral presentation and examination 37 Hrs.

Total student study effort 116 Hrs.

### Reading List and References

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG3004</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Society and the Engineer</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>3</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Objectives**

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

1. appreciate the historical context of modern technology and the nature of the process whereby technology develops and the relationship between technology and the environment, as well as the implied social costs and benefits;
2. understand the social, political, legal, and economic responsibilities and accountability of the engineering profession and the organizational activities of professional engineering institutions;
3. be aware of the short-term and long-term effects related to safety and health, and the environmental impacts of technology;
4. observe professional conduct, as well as the legal and other applicable constraints, related to various engineering issues; and
5. develop a strong vision to optimize their contribution to sustainable development.

**Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

- identify and evaluate the effects of technology as it applies to the social, cultural, economic, legal, health, safety, and environmental dimensions of society;
- explain the importance of local and international professional training, professional conduct and ethics, and responsibilities in various engineering disciplines, particularly the Washington Accord;
- evaluate and estimate, in a team setting, the impact of contemporary issues, planned projects, and unforeseen technological advances related to engineers; effectively communicate and present the findings to laymen and peers.

### Subject Synopsis/ Indicative Syllabus

1. **Impact of Technology on Society**
   - Historical cases and trends of technological innovation explored through their impact on social and cultural developments of civilization and their commonalities.

2. **Environmental Protection and Related Issues**
   - Roles of the engineer in energy conservation, ecological balance, and sustainable development.

3. **Global Outlook for Hong Kong’s Economy and Industries**
   - Support organizations, policies and their impacts on industrial and economic development in Greater China, the Pacific Rim, and the world.

### Teaching/Learning Methodology

Class comprises short lectures to provide essential knowledge and information on the relationships between society and the engineer under a range of dimensions. Other methods include discussions, case studies, and seminars to develop students’ in-depth analysis of the relationships. Students are assembled into groups; throughout the course, they will work on engineering cases by completing the following learning activities:

1. Case analysis where students explore the relationships between society and the engineering issues of a project under specific dimensions;
2. Construction and assembly of a case portfolio which includes:
   - Presentation slides
   - Feedback critiques
   - Weekly summary reports
   - A report on Sustainable Development
   - Individual Reflections
3. Final oral presentation

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Continuous assessment</td>
<td>60%</td>
<td>a, b, c</td>
</tr>
<tr>
<td>• Group weekly learning activities</td>
<td>(24%)</td>
<td>✓, ✓, ✓</td>
</tr>
<tr>
<td>• Individual final presentation</td>
<td>(18%)</td>
<td>✓, ✓</td>
</tr>
<tr>
<td>• Group project report, SD report, individual reflection report</td>
<td>(18%)</td>
<td>✓, ✓, ✓</td>
</tr>
<tr>
<td>2. Examination</td>
<td>40%</td>
<td>✓, ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

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

- Regulatory Organizations and Compliance
  - Discussion of engineer’s responsibilities within different regulatory frameworks and environments; Examples from various entities such as the Labour Department and the Occupational Health and Safety Council; Legal dimensions to engineering such as liability, contract law, and industrial legislation.

- Professional Institutions
  - Local and overseas professional institutions; Washington Accord and the qualifications and criteria of professional engineers.

- Professional Ethics
  - Prevention of bribery and corruption; The work of the Independent Commission Against Corruption (ICAC); Social responsibilities of engineers.
The coursework requires students to work in groups to study cases from the perspectives of the eight dimensions in an engineering setting. Through these exercises, students' ability to apply and synthesize acquired knowledge can be assessed on the basis of their performance in group discussion, oral presentations, and the quality of their portfolio reports on the case studies.

The open-book examination is used to assess students' critical thinking and problem-solving skills when working on their own.

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures and review</td>
<td>27</td>
</tr>
<tr>
<td>Tutorial and presentation</td>
<td>12</td>
</tr>
</tbody>
</table>

Other study efforts:

- Research and preparation: 63 Hrs.
- Report writing: 14 Hrs.

**Total student study effort**: 116 Hrs.

### Reading List and References

**Reference Books & Articles:**

2. Engineering-Issues, Challenges and Opportunities for Development, USECO, 2010
4. Securing the future: delivering UK sustainable development strategy, 2005

**Reading materials:**

*Engineering journals:*
- Engineers by The Hong Kong Institution of Engineers
- Engineering and Technology by The Institution of Engineers and Technology

*Magazines:*
- Time, Far East Economic Review

*Current newspapers:*
- South China Morning Post, China Daily, Ming Pao Daily
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Project Management</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Objectives
This subject provides students with knowledge in:
1. project management tools in business organizations, taking into account the time-cost relationships, resources, processes, risks, the project life cycle, organization, and management principles;
2. project management methodologies and their application;
3. choosing project variables for effective project management; and
4. various developments of project management.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a. demonstrate good understanding of definition of a project, the characteristics and project life cycle;
b. identify appropriate project variables and practices that are applicable to engineering projects;
c. perform project planning, cost/resources estimation, evaluate and monitor of project progress; and
d. propose project management solutions, taking into consideration the project objectives and constraints.

Subject Synopsis/ Indicative Syllabus

2. Project Methodologies and Planning Techniques

3. Cost Estimation and Cost Control for Projects

4. Evaluation and Control of Projects
   Earned value measurement system. Managing project risks. Status reporting. Project closeout and termination.

Teaching/Learning Methodology
A mixture of lectures, tutorial exercises, case studies, and laboratory work are used to deliver the various topics in this subject. Some material is covered using a problem-based format where this advances the learning objectives. Other material is covered through directed study to enhance the students’ “learning to learn” ability. Some case studies are from best practices of projects, based on a literature review. They are used to integrate the topics and demonstrate to students how the various techniques are interrelated and applied in real-life situations.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tutorial exercises/ written report</td>
<td>20%</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>2. Mid Term Test</td>
<td>20%</td>
<td>✔ ✔ ✔</td>
</tr>
<tr>
<td>3. Written examination</td>
<td>60%</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Continuous assessment (1) & (2): Test, written reports and tutorial exercises are used to assess students’ understanding and application of the knowledge that they have learnt relative to learning outcomes (a), (b) and (c).
Written examination: questions are designed to assess learning outcomes (a), (b), (c), and (d).

Student Study Effort Expected
Class contact:
- Lectures 3 hours/week for 9 weeks 27 Hrs.
- Tutorials / Case studies 3 hours/week for 4 weeks 12 Hrs.

Other student study effort:
- Preparation for assignments, short tests, and the written examination 79 Hrs.

Total student study effort 118 Hrs.

Reading List and References
Subject Description Form

<table>
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<tr>
<th>Subject Code</th>
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<tbody>
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<td>Subject Title</td>
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<tr>
<td>Credit Value</td>
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<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
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</table>

### Objectives
This subject offers a wide spectrum of fundamental engineering practice that are essential for a professional engineer. This subject includes Engineering Drawing and CAD, Industrial Safety and Electronic Product Safety Test and Practice, Basic Mechatronic Practice and Basic Scientific Computing with MATLAB that aims at providing fundamental and necessary technical skills to all year 1 students interested in engineering.

### Intended Learning Outcomes
Upon completion of the subject, students will be able to:

a) Describe the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice with application in mechanical, industrial systems and electrical engineering;

b) Interpret basic occupational health and industrial safety requirements for engineering practice;

c) Explain common electronic product safety tests;

d) Design and implement simple mechatronic systems with programmable controller, software, actuation devices, sensing devices and mechanism; and

e) Apply scientific computing software for computing in science and engineering including visualization and programming;

### Subject Synopsis/Indicative Syllabus

#### (TM8059) Engineering Drawing and CAD

1. Fundamentals of Engineering Drawing and CAD
   - Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing.
   - Introduction to CAD; features of 2D CAD system (layer; draw; modify; block & attributes; standard library); techniques for the creation of titleblock; setup of 2D plotting; general concepts on 3D computer modeling; parametric feature based solid modeling; construction and detailing of solid features; solid model modification and its limitations; concepts of assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly; virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, and part list.

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

2. (TM2009) Industrial Safety
   - 2.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling.
   - 2.4. Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, personal protective equipment.

3. (TM1116) Electronic Product Safety Test and Practice
   - 3.1. Use of basic electronic test instruments, current and voltage measurements, waveform measurement, power supply and signal sources;

4. (TM0510) Basic Mechatronic Practice
   - 4.1. Definitions of mechatronics; design and operation of typical mechatronic systems; appreciation of measurement system, actuator system, motor drives, mechanical drives, gear train and linkage, pneumatic and hydraulic systems, signal conditioning, and human-machine interfaces.
   - 4.2. Integration of system components using appropriate controller hardware and software such as PLC, PAC, and Microcontroller system; use of simulation software packages for pneumatic and hydraulic circuit design.

5. (TM3014) Basic Scientific Computing with MATLAB
   - 5.1. Overview to scientific computing; introduction to MATLAB; interactive calculations, random number generators, variables, vectors, matrices and string; mathematical operations, polynomial operation, data analysis and curve fitting, file I/O functions. Basic 2D and 3D plots.
   - 5.2. M-file programming & debugging; scripts, functions, logic operations, flow control, introduction to graphical user interface.

### Learning Methodology
The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials are aimed at enhancing students’ in-depth knowledge and ability in applying the knowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem solving in a unified activity.
### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>% Weighting</th>
<th>Intended Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>a</td>
</tr>
<tr>
<td>Continuous Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Assignment / Project</td>
<td>Refer to individual Module Description Form</td>
<td>✓</td>
</tr>
<tr>
<td>2. Test</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3. Report / Logbook</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Total</td>
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<td></td>
</tr>
</tbody>
</table>

**Assessment Methods Remarks**

1. **Assignment / Project**
   - The project is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.

2. **Test**
   - Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.

3. **Report / Logbook**
   - Report / Logbook is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class Contact</th>
<th>TM8059</th>
<th>TM2009</th>
<th>TM1116</th>
<th>TM0510</th>
<th>TM3014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-lecture</td>
<td>11 Hrs.</td>
<td>7 Hrs.</td>
<td>2 Hrs.</td>
<td>6 Hrs.</td>
<td>6 Hrs.</td>
</tr>
<tr>
<td>In-class Assignment/Hands-on Practice</td>
<td>40 Hrs.</td>
<td>8 Hrs.</td>
<td>4 Hrs.</td>
<td>21 Hrs.</td>
<td>15 Hrs.</td>
</tr>
</tbody>
</table>

### Other Study Effort

- Nil

**Total Study Effort**

- 120 Hrs.

---

### Reading List and References

<table>
<thead>
<tr>
<th>Reference Software List:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AutoCAD from Autodesk Inc.</td>
</tr>
<tr>
<td>2. SolidWorks from Dassault Systèmes Solidworks Corp.</td>
</tr>
<tr>
<td>3. MATLAB from The Mathworks Inc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference Standards and Handbooks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. IEC 61082 Preparation of Documents used in Electrotechnology.</td>
</tr>
</tbody>
</table>

### Reference Books:

Training material, manual and articles published by Industrial Centre.
Subject Description Form

Subject Code: IC2112
Subject Title: IC Training I (EE)
Credit Value: 4 Training Credits
Level: 2
Pre-requisite/ Co-requisite/ Exclusion: Nil

Objectives
1) To provide trainees with simulated working environments and training of industrial practices in Electrical Engineering.
2) This subject covers a wide range of fundamental electrical engineering application technology that including electrical installation practice, lighting and electrical system design, LV switchboard and power monitoring, integral building system and basic electronic practice.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:
a) identify relevant engineering theories and principles and to apply them in hands-on training exercises to determine system feasibility;
b) compare and contrast conceptual design, develop actual work sequences and methods for various electrical installations;
c) recognize the engineering standards, regulations and practices to undertake the design, construction, testing and commissioning electrical distribution system in buildings.;
d) apply intelligent building control technology effectively and evaluate new building automation/intelligent control schemes; and
e) apply their knowledge and skills for system analysis.

Subject Synopsis/ Indicative Syllabus
(TM0367) Lighting and Electrical System Design
Interior lighting design and calculation; daylight illumination consideration; lumens and reflectors; T5, T8 and T11 lamps; energy conservation.
Introduction of low-voltage power distribution system and code of practices of electrical design in Hong Kong; examine architectural drawings; design lighting and electrical services; prepare layout drawings and schematics.

(TM0389) Low-voltage Switchboard and Power Monitoring, AC Control and PLC
Specifications, standards and requirements of LV switchboard; IDMTL and electronic protection relays; schematic diagram, testing, commissioning and maintenance.
Power monitoring and analysis, noise and harmonics; active filters and real-time capacitor bank.
Introduction of programmable controller systems, sensors, actuators, drives, timers, counters, ladder logic programming and testing.

(TM0383) Integrated Building Systems
Proprietary and open systems (BMS, EIB and DALI); sensors and actuators; wiring circuit, scenes control; system design, programming and commissioning; intelligent building system integration.

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

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>% Weighting</th>
<th>Intended Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM0367 Lighting and Electrical System Design</td>
<td></td>
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</tr>
<tr>
<td>1. Assignment</td>
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</tr>
<tr>
<td>2. Test</td>
<td>30%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Assessment Methods
(TM0373) Electrical Installation and Basic Electronic Practice
Wiring for conventional low voltage installations and intelligent building control systems (EIB and DALI); final lighting and power circuits, control gears and protective devices; inspection, testing, Identification of electronic circuit components, soldering and de-soldering, Dry film process, Etching process.

Assessment Methods | % Weighting | Intended Learning Outcomes Assessed |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TM0389 Low-Voltage Switchboard and Power Monitoring, AC Control and PLC</td>
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<td></td>
</tr>
<tr>
<td>1. Assignment</td>
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<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Test</td>
<td>30%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>
The assignment is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.

Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.

Training Report is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

### Assessment Methods

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>% Weighting</th>
<th>Intended Learning Outcomes Assessed</th>
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</thead>
<tbody>
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<td>TM0373 Electrical Installation and Basic Electronic Practice</td>
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<tr>
<td>1. Assignment</td>
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</tr>
<tr>
<td>2. Test</td>
<td>30%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>% Weighting</th>
<th>Intended Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM0383 Integrated Building Systems</td>
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<tr>
<td>1. Assignment</td>
<td>40%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Test</td>
<td>30%</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>3. Training Report</td>
<td>30%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</tr>
</tbody>
</table>

The assignment is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.

Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.

Training Report is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

### Student Study Effort Required

<table>
<thead>
<tr>
<th>Class Contact</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture / Tutorial / Demonstration</td>
<td>32 Hrs.</td>
</tr>
<tr>
<td>Workshop Practice</td>
<td>86 Hrs.</td>
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<tr>
<td>Test</td>
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<tr>
<td>Other Study Effort</td>
<td>0 Hr.</td>
</tr>
<tr>
<td>Total Study Effort</td>
<td>120 Hrs.</td>
</tr>
</tbody>
</table>

### Reading List and References

1. Training material, manual and articles published by the Industrial Centre.
Subject Description Form

Subject Code: ISE404
Subject Title: Total Quality Management
Credit Value: 3
Level: 4

Pre-requisite/Co-requisite/Exclusion:
Students who do not have background knowledge in quality control and quality engineering should be prepared to do additional reading.

Objectives:
This subject provides students with the knowledge to
1. understand the philosophy and core values of Total Quality Management (TQM);
2. determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization;
3. apply and evaluate best practices for the attainment of total quality.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to
a. select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies;
b. measure the cost of poor quality and process effectiveness and efficiency to track performance quality and to identify areas for improvement;
c. understand proven methodologies to enhance management processes, such as benchmarking and business process reengineering;
d. choose a framework to evaluate the performance excellence of an organization, and determine the set of performance indicators that will align people with the objectives of the organization.

Subject Synopsis/Indicative Syllabus:

1. Principles of Total Quality
   - Concepts of quality; Core values and paradigms for TQM, including corporate citizenship and protection of the environment; Models for performance excellence: Deming Prize, Baldrige Quality Award, European Quality Award
2. Customer Needs
   - Internal and external customers; Voice of the customer; Customer satisfaction; Customer loyalty; Service recovery; Crisis management
3. Economics of Quality
   - Classification and analysis of quality costs; Implementing quality costing systems; Economic value of customer loyalty and employee loyalty
4. TQM Methodologies
   - Quality Function Deployment (QFD); Benchmarking; Business process reengineering; Process improvement
5. Learning and Growth
   - Organizational learning; Organizational renewal; Change management; Employee empowerment
6. Strategic Quality Management
   - Vision, strategy, goals, and action plans; Measurement of organizational performance

Teaching/Learning Methodology:
A mixture of lectures, group discussions (tutorials), and mini-case studies are used to achieve the objectives of this subject. Some topics are taught in the classroom environment; students have to learn these topics by themselves in the process of writing problem-based assignments. Directed study is also used to develop the self-learning ability of students.

Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>35%</td>
<td>❖         ❖         ❖         ❖</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>❖         ❖         ❖         ❖</td>
</tr>
<tr>
<td>3. Examination</td>
<td>45%</td>
<td>❖         ❖         ❖         ❖</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>❖         ❖         ❖         ❖</td>
</tr>
</tbody>
</table>

The assignments, reflective journals, essays, and case studies facilitate the application of concepts and skills learned in analyzing and attaining total quality while emphasizing factors that may affect decisions.

Examination/tests allow students to demonstrate the extent of their understanding of concepts, as well as their abilities to analyze and solve problems related to the subject.

Student Study Effort Expected:

Class contact:
- Lecture/Tutorial: 2 hours/week for 13 weeks = 26 Hrs.
- Tutorial/Case Study: 1 hour/week for 13 weeks = 13 Hrs.

Other student study effort:
- Studying and self learning = 50 Hrs.
- Assignment and report writing = 28 Hrs.

Total student study effort = 117 Hrs.

Reading List and References:

4. Selected articles in Quality Progress and the web site of American Society for Quality
**Subject Description Form**

<table>
<thead>
<tr>
<th>Subject Code</th>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
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<tr>
<td>Credit Value</td>
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<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Exclusion: MM4521</td>
</tr>
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</table>

**Objectives**

This course covers the business environment and key issues about doing business in China. The course offers a broad survey of a wide range of topics related to China business rather than in-depth study of particular aspects. The primary objectives are to introduce the students to the broad terrain, and help them to explore those aspects in their future pursuit.

**Subject Intended Learning Outcomes**

Upon completion of the subject, students will be able to:

- **a.** understand, analyse, and evaluate the nature and changing shape of business connection between Hong Kong and the Chinese Mainland.
- **b.** explain and assess the institutional and legal issues of doing business in China. (BBA Outcome 3)
- **c.** describe, analyse and evaluate business strategies and practices in China. (BBA Outcome 3)
- **d.** develop critical thinking about how different contextual and cultural factors affect business success, and learn to better communicate with people in different institutional environment. (BBA Outcome 3)
- **e.** have further developed their oral and written communication skills (BBA Outcome 1)

**Subject Synopsis/Indicative Syllabus**

1. The economic system and economic reforms in China
2. Understanding the Chinese bureaucracy
3. China's integration into the global economy
4. China - Hong Kong Business relations
5. The regulations of China's foreign trade
6. China's tax system
7. Foreign direct Investment and management
8. Marketing strategies in China

**Teaching/Learning Methodology**

Lectures, tutorial discussion, group project (presentation and written report)

**Assessment Methods in Alignment with Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group Project</td>
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<td>a b c d e</td>
</tr>
<tr>
<td>• Presentation</td>
<td>15%</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>• Written Report</td>
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<td>✓</td>
</tr>
<tr>
<td>2. Class Participation</td>
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<tr>
<td>Examination</td>
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</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
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</table>

*Weighting of assessment methods/tasks in continuous assessment may be different, subject to each subject lecturer.

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

**Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:** the various methods are designed to ensure that all students taking this subject

The assessments are designed to motivate the students to read the recommended materials and participate in the required activities to achieve the learning outcomes.

**Student Study Effort Expected**

- **Class contact:**
  - Lecture: 26 Hrs.
  - Tutorial: 13 Hrs.

- **Other student study effort:**
  - Group project: 20 Hrs.
  - Reading: 48 Hrs.

Total student study effort: 107 Hrs.

**Reading List and References**

This course does not have a textbook. Readings are drawn from *China Hand*, a data base compiled and edited by the Economist Intelligence Unit, and *China Business Review*, a publication of the US-China Business Council, and other sources. The readings have been uploaded to WebCT.

**References**

1. Tim Clissold’s *Mr. China* (Constable & Robinson, 2004)
Appendix II

Minor Programme in Electrical Engineering
1 Objective

The present-day engineering profession has become more and more multi-disciplinary in nature. The possession of adequate knowledge in electrical engineering will be an asset for engineering personnel whose major is in other disciplines. The objective of the programme is to provide a working knowledge on selected topic areas in electrical engineering for students with non-electrical-engineering background.

2 Programme Outcomes

After completing the programme, students should be able to

(i) Apply fundamental principles of mathematics, science and engineering to solve practical problems in selected areas of electrical engineering.

(ii) Conduct experiments with appropriate techniques and tools and interpret and analyse the data.

(iii) Keep abreast of developments in certain areas of electrical engineering.

3 Eligibility

Full-time students pursuing a four-year undergraduate degree in Faculty of Engineering or Faculty of Civil & Structural Engineering (excluding a Major in Transportation Systems Engineering or a Major in Electrical Engineering) may choose this programme. Only students with a GPA of 2.5 or above can be considered for Minor study. The department may set a quota for admitting students into this Minor programme.

4 Curriculum

The student has to complete 18 credits of discipline-specific subjects in Electrical Engineering as shown in the following table, with at least 9 credits at level 3 or above.
<table>
<thead>
<tr>
<th>Subject code</th>
<th>Subject Title</th>
<th>Number of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE2001A</td>
<td>Applied Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>EE2002A</td>
<td>Circuit Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EE2003A</td>
<td>Electronics</td>
<td>3</td>
</tr>
<tr>
<td>EE2004A</td>
<td>Electrical Energy Systems Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>EE3001A</td>
<td>Analogue and Digital Circuits</td>
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</tr>
<tr>
<td>EE3002A</td>
<td>Electromechanical Energy Conversion</td>
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</tr>
<tr>
<td>EE3003A</td>
<td>Power Electronics and Drives</td>
<td>3</td>
</tr>
<tr>
<td>EE3004A</td>
<td>Power Transmission and Distribution</td>
<td>3</td>
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<tr>
<td>EE3005A</td>
<td>Systems and Control</td>
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<td>EE3006A</td>
<td>Analysis Methods for Engineers</td>
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<td>EE3007A</td>
<td>Computer System Principles</td>
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<td>EE3008A</td>
<td>Linear Systems and Signal Processing</td>
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<td>EE4002A</td>
<td>Digital Control and Signal Processing</td>
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<td>Electrical Machines</td>
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<td>Power Systems</td>
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<tr>
<td>EE4007A</td>
<td>Advanced Power Electronics</td>
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<td>EE4008A</td>
<td>Applied Digital Control</td>
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<td>EE4009A</td>
<td>Electric Traction and Drives</td>
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<tr>
<td>EE4010A</td>
<td>Fibre Optics</td>
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</tr>
<tr>
<td>EE4011A</td>
<td>Industrial Computer Applications</td>
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<td>EE4012A</td>
<td>Intelligent Buildings</td>
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<td>EE4013A</td>
<td>Power System Protection</td>
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<tr>
<td>EE4014A</td>
<td>Intelligent Applications in Electrical Engineering</td>
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<td>EE4015A</td>
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<tr>
<td>EE4022A</td>
<td>Fundamentals of Fibre-Optic Communications and Sensors</td>
<td>3</td>
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</tbody>
</table>

*Note: The Department reserves the right of NOT offering all these subjects in each semester.*

## 5 Award Classification

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

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

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

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

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