Bachelor of Engineering (Honours) in Electrical Engineering

Full-time / Sandwich
Programme Code : 41070
2011/2012
DEFINITIVE PROGRAMME DOCUMENT
Bachelor of Engineering (Honours) in Electrical Engineering 2011/12

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Appendix I  Subject Description Forms

Appendix II  Foundation Year

Appendix III  Major Programme in Electrical Engineering

**Important**

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

The BEng (Hons) programme is the major Electrical Engineering degree programme in Hong Kong at the present time. Changes are introduced as necessary from time to time in order to reflect the latest technological development. Most of the changes have taken place since 1990 when a major revision was undertaken to enhance the programme.

The revised scheme in 1990, which was in place until 94/95, included two modifications of particular importance: the use of a semester structure and making the third year (industrial attachment/sandwich) optional.

In 1995, the BEng (Hons) programme in the Department required another revalidation. At that time the Department decided to take a natural step in converting all programmes from modular structure to credit-based framework. Both The Institution of Electrical Engineers (IEE) and The Hong Kong Institution of Engineers (HKIE) were invited to accredit the BEng (Hons) degree programme.

In the credit-based structure, the students are able to determine their own pace of study. This is very much in line with modern education philosophy. With the introduction of the credit-based structure, students are able to make up a specific programme to suit their personal aspirations within the confines of the framework of the BEng (Hons) curriculum. Being flexible, there is no ‘year’ concept in a credit-based system and the subjects are offered at distinct levels. The subjects in Level 2 must be taken by all students in the programme although they can defer a few subjects until later. Electives are available in Levels 3 and 4. However, students must take a compulsory set of subjects which are designed to give vertical integration in electrical engineering. The Department conducted a self critical review of the curriculum which included feedback from employers, graduates and current students. Hence, English and Chinese, telecommunication, environmental awareness, electrical building services and total quality management were all given increased weight in the 94/95 revision. Elective subjects in Level 4 were also reviewed to address changes in career aspirations of graduates and advances in technology.

The Undergraduate Programme Committee believes it is advantageous for budding potential engineers to undertake a sandwich training year since experience has shown that working in industry broadens the outlook of students, helps them to put their studies in a proper perspective and certainly makes them more mature. An added advantage of the credit-based structure is that, subject to timetable constraints, the sandwich students may make use of the evenings during the sandwich year to study Levels 2 or 3 subjects which have been deferred previously or, in some cases, take some Level 4 subjects in advance. Students have more flexibility in determining their study pace and the optional sandwich year is expected to have more appeal under the credit-based structure. Besides, students are still required to undertake a minimum of six weeks of employment in industry.

In early 2005, an institutional exercise was carried out to reduce credit number for undergraduate programmes. The programme components were then adjusted to fit the 90-credit requirement (excluding training components). Curriculum review was incorporated in this exercise to introduce outcome-oriented model in the curriculum design. The intended learning outcomes were clearly articulated at programme and subject levels and the teaching and assessment methods are aligned accordingly to achieve the intended outcomes. Further, the mandatory Work-Integrated Education (WIE) component was introduced, in which the activities must be structured and measurable.
From the 2007/08 academic year, the Department was given the flexibility to enhance the credit requirement of the programme up to 99. As a result, the English subjects were then substantially strengthened while the 2-credit technical subjects were expanded to 3 credits in alignment with other technical subjects. A subject to prepare the students on their Individual Projects, Project Methodologies, was also introduced. This programme thus seized the maximum increase of credit requirements, with a total of 99 credits.

With the notion of outcome-based education in full swing, the programme outcomes were reviewed after two years of operation and hence the subject outcomes were fine-tuned accordingly to fully support and reflect the programme outcomes. This timely revision was put into implementation for the 2008/09 cohort. To better equip students for the demands of the engineering careers in Hong Kong and China, subjects on accounting, finance and management were included in the curriculum.

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.

For the 2009/10 cohort, changes in Industrial Centre Training scheme and Summer Industrial Training requirements were implemented. Minor changes in General Assessment Regulations were also made to align with those approved by the University.

For the 2011/12 cohort and onwards, the curriculum is changed to comply with the university’s new requirements on languages. As a result the graduation requirement of the programme is increased from 99 credits to 102 credits.

2 General Information

2.1 Programme Title

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

2.2 Duration and Mode of Attendance

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

2.3 Final Award

The award is a bachelor degree with honours in Electrical Engineering and it carries no speciality or stream.
2.4 Implementation Dates

October, 1984 (initial implementation)
October, 1989 (first major revision)
October, 1995 (second major revision for *en bloc* introduction)
October, 1997 (alignment exercise for *phase in* implementation)
October, 2001 (minor revision with more broadening subjects in the first year)
September, 2005 (reduced credit requirement, outcome-based curriculum and WIE)
September, 2007 (enhanced credit requirement from 90 to 99 credits)
September, 2008 (revised outcome-based curriculum, inclusion of compulsory business and management subjects)
September, 2009 (revised Industrial Training scheme and Summer Industrial Training requirements; changes in General Assessment Regulations regarding retaking of subjects)
September, 2008 (revised outcome-based curriculum, inclusion of compulsory business and management subjects)
September, 2011 (revised Industrial Training scheme; credit requirement for graduation increased to 102 after the introduction of a compulsory 3-credit subject on Chinese language; abolition of the mandatory requirements of GSLPA for graduation)

2.5 Minimum Entrance Requirements

*For Entry with HKALE Qualifications*

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

<table>
<thead>
<tr>
<th>E in two of the following HKALE subjects: Physics, Engineering Science, Pure Mathematics, Applied Mathematics, Chemistry or Computer Studies</th>
<th>OR</th>
<th>E in one of the following HKALE subjects: Physics, Engineering Science, Pure Mathematics, Applied Mathematics, Chemistry or Computer Studies; and</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>E in two of the following HKALE(AS-Level) subjects: Physics, Design &amp; Technology, Mathematics &amp; Statistics, Electronics, Applied Mathematics, Chemistry or Computer Applications (similar subjects at HKALE and HKALE(AS-Level) are mutually exclusive)</td>
</tr>
</tbody>
</table>

AND

<table>
<thead>
<tr>
<th>C in HKCEE Mathematics or Additional Mathematics (only required for applicants without E in HKALE Applied Mathematics or Pure Mathematics, or HKALE(AS-Level) Applied Mathematics or Mathematics &amp; Statistics); and</th>
</tr>
</thead>
<tbody>
<tr>
<td>D in HKCEE Physics or Engineering Science (only required for applicants without E in HKALE Physics or Engineering Science, or HKALE(AS-Level) Physics or Design &amp; Technology)</td>
</tr>
</tbody>
</table>
Alternative Entry Route

<table>
<thead>
<tr>
<th>A Higher Diploma in Electrical Engineering</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Associate Degree in Engineering</td>
<td>OR</td>
</tr>
<tr>
<td>Equivalent qualifications</td>
<td></td>
</tr>
</tbody>
</table>

2.6 Major/Minor Option

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

Non-EE students opting to study ‘Minor’ in Electrical Engineering must take 18 credits of EE subjects, of which 9 credits must be of Level 3 or above.

2.7 Summer Training/Industrial Placement

Summer Training at the Industrial Centre (IC) and practical work experience in industry are vital components to attain the programme outcomes. The training/industrial placement is credit-bearing and compulsory in the programme, constituting the Work-Integrated Education activities as stipulated by the University. The required credits, structure and assessment of the Work-Integrated Education and Industrial Centre training are described in details in Sections 4.3 and 4.4.

2.8 Student Exchanges

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

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

2.9 External Recognition

The BEng (Hons) degree programme has been internally validated by the University. It is also accredited by The Hong Kong Institution of Engineers (HKIE) as meeting the academic requirements for its Corporate and Graduate Membership.
2.10  Summer Term Teaching

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

2.11  Daytime and Evening Teaching

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

2.12  Mathematics Benchmark Test (MBT)

The following categories of students admitted to this programme will be requested to take a mandatory Mathematics Benchmark Test prior to the commencement of their studies:
1) JUPAS admittees who do not have a “pass” in any A-level Mathematics subjects; and
2) Non-JUPAS admittees who are not given credit-transfer for the subject AMA201, OR who do not have a “pass” in any A-level Mathematics subjects.

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

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

2.13  Foundation Mathematics (AMA106)

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

3.1 Programme Philosophy and Objectives

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

Bearing in mind that engineers frequently change activities and also employment during their careers, education to prepare students for working life, rather than their first jobs, is the aim. Emphasis is, therefore, placed on the understanding of fundamental concepts which will always be applicable and valid. The teaching of particular techniques which may have a shorter duration of applicability, however, cannot be neglected. Applications will change rapidly as technology develops but the underlying theories hardly change. It is therefore important not to emphasise training at the expense of education.

It is our perception that industrial employers recruit engineers who have a broad-based education, but, at the same time, possess adequate specialist knowledge to undertake detailed technical work in design and production. Therefore, the Programme is designed to produce graduates who have not only developed a thorough understanding of electrical engineering including interdisciplinary aspects, but also acquired a broad and general appreciation of engineering activity outside the confines of electrical engineering. The students are guided to learn the interfaces between specialist engineering areas and to be prepared to work in a multidisciplinary work environment which usually involves colleagues from other engineering backgrounds.

At the same time, the students must become aware that ‘a good engineering solution’ is one which fulfils economic and financial criteria as well as the engineering design specifications. This necessitates the inclusion of the study of finance, accounting and management with particular reference to engineering activities, as well as the inter-relations between engineering activities and society as a whole.

Engineers must be able to express themselves clearly, both in written reports or verbal presentations. This has led to the inclusion of English and communication subjects, as well as a teaching approach which involves seminars, discussions, in-class feedback, assessed presentations, demonstrations of project work and formal laboratory reports in the programme. The Department has increased the contact hours in the English-related subjects in order to curtail any deficiencies that our graduates may have.

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

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

- to develop their social abilities (personal and public relations, team work, handling of responsibility/authority etc).
In this undergraduate programme, the fundamentals of electrical engineering are covered in the non-deferrable subjects in Level 2, the basic knowledge areas are covered in Level 3 and the specialisms are introduced in Level 4. All the deferrable subjects in Level 2 must be completed before any student can graduate. Students should not be under the illusion that deferrable subjects are unimportant. The credit-based structure described in this booklet has been discussed extensively, and it has been reckoned that the students will benefit from such a structure as the subject materials are to be disseminated in better organised breadth and depth.

Students are provided with training at the Industrial Centre 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 second year of study, which gives them the opportunity to experience the industrial working environment. A full year spent in industrial attachment for the sandwich students allows a deeper appreciation of EE in the industrial context. Again the credit-based structure should make the sandwich year more attractive, since the students can take some of their academic subjects during the sandwich year, thereby maintaining their links with the Department whilst earning their professionally recognised training experience. The fact that the students are being trained to control their own pace of study without imposing any major burden upon the Department is seen as a good training for potential engineers, who must learn time management skills in order to cope with tight time schedules in their careers.

The programme objectives are given as follows:

1. To produce students with a broad base of knowledge in the fundamentals of electrical engineering and its current applications.
2. To prepare students for working life including the skills needed for lifelong learning.
3. To produce engineers with the understanding of their obligations to society.

### 3.2 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**

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

1. Apply fundamental principles of mathematics, science and engineering to identify, formulate and solve practical problems in the areas of electrical engineering and related disciplines.
2. Design and conduct experiments with appropriate techniques and tools; and interpret and analyse the data.
3. Design a system, component or process according to given specifications and requirements in the areas of electrical engineering and related disciplines.
4. Identify constraints, other than technical considerations, which may influence engineering problems, systems or projects.
5. Keep abreast of developments in electrical engineering and related disciplines and be aware of the need of lifelong learning.
6. Appreciate and understand the ethical, managerial and social responsibilities of a professional engineer.
Category B: Attributes for all-roundedness
On successful completion of the programme, a student will have shown that he or she can
1. Communicate effectively via graphic, numeric, verbal and written media with proficiency in both English and Chinese.
2. Reason critically and develop alternative views or solutions.
3. 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 3.2.

<table>
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<tr>
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<td>B3</td>
<td>✓ ✓</td>
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Table 3.2 Mapping between Programme Objectives and Programme Outcomes

The Subject Learning Outcomes are designed to be in alignment with the Programme Outcomes. The Subject Learning Outcomes are given in each subject and they can be found in the Subject Descriptions Forms in Appendix I.
4 Curricula

The time-tabled student hours for each subject and the type of activity (lecture [Lt], tutorial [Tu] and laboratory [Lab]) are given in the Tables 4.1.1-4.1.3. The abbreviations used in these tables are:

AF  Accounting and Finance  
AMA  Applied Mathematics  
BSE  Building Services Engineering  
CBS  Chinese & Bilingual Studies  
CSE  Civil & Structural Engineering  
EE   Electrical Engineering  
ELC  English Language Centre  
ENG  Engineering Faculty  
GEC  General Education Centre  
IC   Industrial Centre  
ISE  Industrial and Systems Engineering  
MM   Management and Marketing

In general, a normal student in the BEng (Hons) programme must complete 35, 40 and 27 credits in Levels 2, 3 and 4, respectively as shown in the typical progress patterns in Tables 4.2.1 to 4.2.4. In other words, a student must complete a total of 102 credits, in addition to the credits earned in IC training and WIE and the requirements on languages and co-curricular activities, before graduation.

Students who opt for the “Major in Electrical Engineering” are required to complete 81 credits in prescribed subjects, and 18 credits in a Minor programme, before they are qualified to graduate.

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

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

‘Def’ are those subjects which must be satisfactorily completed before the student becomes eligible for an award but the timing of the subject is determined by the student. Tables in Section 4.1 show the times (semesters) in which these subjects are recommended to be taken if the programmes are to be completed in the minimum time.

‘Electives’ are those subjects which are optional. Electives give students choices in composing their study programme. All elective subjects are deferrable.
## 4.1 Curricula for Various Levels

### The Hong Kong Polytechnic University

**BEng (Hons) in Electrical Engineering**

### Level 2

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<tr>
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<th>Credits</th>
<th>GPA Weight (W)</th>
<th>Assessment Method</th>
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<tbody>
<tr>
<td>AMA201</td>
<td>Mathematics I</td>
<td>AMA</td>
<td>42 - 3</td>
<td>0.2</td>
<td>40%</td>
<td>Continuous</td>
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<tr>
<td>AMA202</td>
<td>Mathematics II</td>
<td>AMA</td>
<td>42 - 3</td>
<td>0.2</td>
<td>40%</td>
<td>Continuous</td>
</tr>
<tr>
<td>EE2011</td>
<td>Applied Electromagnetics</td>
<td>EE</td>
<td>36 12 3</td>
<td>0.2</td>
<td>40%</td>
<td>Continuous</td>
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<tr>
<td>ENG224</td>
<td>Information Technology</td>
<td>ENG</td>
<td>37 17 3</td>
<td>0.2</td>
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<td>Continuous</td>
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<tr>
<td>ENG232</td>
<td>Engineering Science</td>
<td>ENG</td>
<td>54 3</td>
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<tr>
<td>ENG236</td>
<td>Computer Programming</td>
<td>ENG</td>
<td>53 - 3</td>
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<tr>
<td>ENG237</td>
<td>Basic Electricity and Electronics I</td>
<td>ENG</td>
<td>51 3</td>
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<tr>
<td>ENG238</td>
<td>Basic Electricity and Electronics II</td>
<td>ENG</td>
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<td>Continuous</td>
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<tr>
<td>MM2021</td>
<td>Management &amp; Organisation</td>
<td>MM</td>
<td>42 - 3</td>
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<td>50%</td>
<td>Continuous</td>
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<tr>
<td>AF2108</td>
<td>Financial Accounting</td>
<td>AF</td>
<td>42 - 3</td>
<td>0.2</td>
<td>50%</td>
<td>Continuous</td>
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<tr>
<td>ELC2501</td>
<td>University English I</td>
<td>ELC</td>
<td>28 - 2</td>
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<td>-</td>
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<td>ELC2502</td>
<td>University English II</td>
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<td>28 - 2</td>
<td>0.2</td>
<td>100%</td>
<td>-</td>
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<tr>
<td>CBS2080</td>
<td>Fundamentals of Chinese Communication</td>
<td>CBS</td>
<td>42 - 3</td>
<td>0.2</td>
<td>60%</td>
<td>Continuous Assessed and graded</td>
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<tr>
<td><strong>GEC2801</strong></td>
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<td>GEC</td>
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<td>#</td>
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<td><strong>GEC2xxx</strong></td>
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<td>GEC/other</td>
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### IC Training

<table>
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<th>Duration</th>
<th>Credits</th>
<th>Assessment Method</th>
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<tbody>
<tr>
<td>IC2131 Freshman Seminars for EE</td>
<td>57 hours in Semesters 1 and 2</td>
<td>2</td>
<td>100% Assessed and graded</td>
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<tr>
<td>IC2132 Engineering Drawing &amp; Safety</td>
<td>63 hours in Semesters 1, 2 and 3</td>
<td>2</td>
<td>100% Assessed and graded</td>
</tr>
<tr>
<td>IC2112 IC Training (EE)</td>
<td>120 hours in Summer</td>
<td>4</td>
<td>100% Assessed and graded</td>
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</tbody>
</table>

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*All students can take one of the China Studies subjects in lieu of GEC2801 to satisfy their China Studies category GE requirement. The China Studies subjects and their syllabi are available at: [www.polyu.edu.hk/~gec/geprogramme/101-ChiStudies.php](http://www.polyu.edu.hk/~gec/geprogramme/101-ChiStudies.php)*

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

# Depends on the subject chosen.
### BEng (Hons) in Electrical Engineering 2011/2012

#### THE HONG KONG POLYTECHNIC UNIVERSITY

**BEng (Hons) in Electrical Engineering**

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Curriculum</th>
<th>Assessment Method</th>
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<table>
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<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Teaching Dept.</th>
<th>Contact Hours</th>
<th>Credits</th>
<th>GPA Weight (Wi)</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>LT/Tu</td>
<td>Lab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE3011</td>
<td>Analogue and Digital Circuits</td>
<td>EE</td>
<td>36</td>
<td>12</td>
<td>3</td>
<td>0.3</td>
<td>40%</td>
</tr>
<tr>
<td>EE3021</td>
<td>Electromechanical Energy Conversion</td>
<td>EE</td>
<td>36</td>
<td>12</td>
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</tr>
<tr>
<td>EE3031</td>
<td>Power Electronics and Drives</td>
<td>EE</td>
<td>36</td>
<td>12</td>
<td>3</td>
<td>0.3</td>
<td>40%</td>
</tr>
<tr>
<td>EE3041</td>
<td>Power Transmission and Distribution</td>
<td>EE</td>
<td>36</td>
<td>12</td>
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<td>40%</td>
</tr>
<tr>
<td>EE3051</td>
<td>Systems and Control</td>
<td>EE</td>
<td>38</td>
<td>8</td>
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<td>Analysis Methods for Engineers</td>
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<tr>
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<td>Society and the Engineer</td>
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<td>Project Methodologies</td>
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</tr>
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<td>Computer System Principles</td>
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<td>12</td>
<td>3</td>
<td>0.3</td>
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</tr>
<tr>
<td>EE3131</td>
<td>Telecommunication Fundamentals</td>
<td>EE</td>
<td>39</td>
<td>6</td>
<td>3</td>
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</tr>
<tr>
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<td>Electrical Services in Buildings</td>
<td>EE</td>
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<td>-</td>
<td>3</td>
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<tr>
<td>AF3901</td>
<td>Economics for Engineers</td>
<td>AF</td>
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<td>-</td>
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<td>50%</td>
</tr>
<tr>
<td>EE302</td>
<td>Summer Practical Training</td>
<td>Industry</td>
<td>A minimum of 6 weeks (Full-time BEng (Hons) Students). Optional for Sandwich Students</td>
<td>3 Training credits</td>
<td>100% assessed on Pass/Fail basis</td>
<td>-</td>
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</tr>
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</table>

**Table 4.1.2**

Note: The Department reserves the right of NOT offering all electives in each year.
<table>
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<th>Subject Code</th>
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<th>Teaching Dept.</th>
<th>Contact Hours</th>
<th>Credits</th>
<th>GPA Weight (Wt)</th>
<th>Assessment Method</th>
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<td>Lab</td>
<td>Continuous</td>
<td>Examination</td>
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<td>Electrical Machines</td>
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<td>Power System Control &amp; Operation</td>
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<td>EE509</td>
<td>High Voltage Engineering</td>
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<td>Electric Vehicles</td>
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<td>Fibre Optic Components</td>
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<td>Open Electricity Market Operation</td>
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<td>EE525</td>
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<td>EE</td>
<td>42</td>
<td>-</td>
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<tr>
<td>EE526</td>
<td>Power System Analysis and Dynamics</td>
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<td>38</td>
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<td>EE528</td>
<td>System Modelling and Optimal Control</td>
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<td>9</td>
<td>3</td>
<td>0.5</td>
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<td>Electrical Energy-saving Systems</td>
<td>EE</td>
<td>42</td>
<td>-</td>
<td>3</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Table 4.1.3

Note: The Department reserves the right of NOT offering all electives in each year. Students must seek approval for enrolling on Level 5 subjects.

* Lecture: 39 hrs; Seminar: 6 hrs.
+ Miniproject: 12 hrs.
4.2 Normal Progression Pattern

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

<table>
<thead>
<tr>
<th>Semester One</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA201</td>
</tr>
<tr>
<td>ELC2501</td>
</tr>
<tr>
<td>ENG224</td>
</tr>
<tr>
<td>ENG232</td>
</tr>
<tr>
<td>ENG236</td>
</tr>
<tr>
<td>ENG237</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA202</td>
</tr>
<tr>
<td>CBS2080</td>
</tr>
<tr>
<td>ELC2502</td>
</tr>
<tr>
<td>EE3061</td>
</tr>
<tr>
<td>ENG236</td>
</tr>
<tr>
<td>ENG238</td>
</tr>
<tr>
<td>GEC2801 or equivalent</td>
</tr>
<tr>
<td>MM2021</td>
</tr>
</tbody>
</table>

| IC2131 | Freshman Seminars for Engineering (57 hours in semester 1 and 2) (2 training credits) |
| IC2132 | Engineering Drawing and Industrial Safety (63 hours in semester 1, 2 and 3) (2 training credits) |
| IC2112 | IC Training I (EE) (120 hours in summer) (4 training credits) |

16 credits

<table>
<thead>
<tr>
<th>Semester Three (Summer Period at the end of Year 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELC3504</td>
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<tr>
<td>EE2011</td>
</tr>
<tr>
<td>EE3011</td>
</tr>
<tr>
<td>EE3041</td>
</tr>
<tr>
<td>EE3131</td>
</tr>
<tr>
<td>AF2108</td>
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<tr>
<td>GEC2XXX</td>
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</tbody>
</table>

18 credits

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

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<td>EE3011</td>
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<td>EE3131</td>
</tr>
<tr>
<td>AF2108</td>
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<tr>
<td>GEC2XXX</td>
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</table>

18 credits

<table>
<thead>
<tr>
<th>Semester Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELC3504</td>
</tr>
<tr>
<td>EE3021</td>
</tr>
<tr>
<td>EE3121</td>
</tr>
<tr>
<td>EE3031</td>
</tr>
<tr>
<td>EE3111</td>
</tr>
<tr>
<td>EE321</td>
</tr>
<tr>
<td>AF3901</td>
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</table>

18 credits

<table>
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<tr>
<th>Semester Three (Summer Period at the end of Year 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE3502</td>
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</tbody>
</table>

Table 4.2.1

Table 4.2.2
A student may opt for sandwich training after the second year of study and he or she is required to take the following training subject in Table 4.2.3 during the sandwich year.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>EE4001</td>
<td>External Industrial Training (Students are required to take a minimum of 44 weeks of training in industry) (22 training credits)</td>
</tr>
</tbody>
</table>

**Table 4.2.3**

A student is advised to take the following curriculum as indicated in Table 4.2.4 and obtain 30 credits in the final year. He/she must accumulate a total of 99 academic credits to qualify for graduation.

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<tbody>
<tr>
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</tr>
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<td>EE4021</td>
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<td>EE4031</td>
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<td>EE4041</td>
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<td>EE4121</td>
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</table>

**Electives**

1 elective should be taken*. A number of electives from Table 4.1.3 will be offered in each semester of Year 3. 15 credits

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>EE4121</td>
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<tr>
<td>ENG307</td>
</tr>
</tbody>
</table>

**Electives**

1 elective should be taken*. A number of electives from Table 4.1.3 will be offered in each semester of Year 3. 15 credits

**Table 4.2.4**

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

* Out of the two electives taken in Year 3, no more than one should be a Non-technical Broadening Elective.
### 4.3 Subject Support to Programme Outcomes

Table 4.3 illustrates how the subjects support the Programme Outcomes through teaching activities, practice on the part of students, and measurements.

<table>
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<th>SUBJECTS</th>
<th>PROGRAMME OUTCOMES</th>
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<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>B1</th>
<th>B2</th>
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Table 4.3 Support of programme outcomes by individual subjects
4.4 Work-Integrated Education and Summer Practical Training

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

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

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

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

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

(I) Orientation

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

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

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

(II) Progress Monitoring

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

(III) Learning Evaluation

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

Learning Portfolio

In writing the portfolio, the following should be observed:

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

- Content: The major portion of the portfolio should be set out as a technical report, divided into suitable sections, and with an introduction to each major or different aspect of work. Students need to report on all projects listed in the employment
details. Noteworthy technical details of projects in which the student was directly involved, or of projects which the student observed, should also be included. These may include investigation, feasibility, design, management, commissioning or operational aspects etc. Students should openly discuss aspects of the work they have performed or observed and indicate their involvement in their work throughout the text. To be able to produce an accurate and comprehensive portfolio it is recommended that students keep a diary, along with photographs and any other information regarding their work. This diary will not be assessed; it will however be helpful in writing the final portfolio. All project data and information must be cleared by the employers for confidentiality prior to its incorporation in the portfolio. It is generally advisable to avoid all sensitive information related to the employment by limiting the contents to the general or public aspects of each specific project. References should be made in the text to books, technical papers, standards etc., used during the training period and should be listed. Finally, a conclusion should include comprehensive comments on the type and value of experience gained, and how this relates to the student’s future professional career.

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

1. Fulfilment of at least 6 weeks of summer practical training for full time students or 44 weeks for students taking the sandwich mode option, with at least 2 weeks of valid WIE activities as recognised by the University.

2. Punctual submission of training proposals and/or learning contracts, training journal and learning portfolio.

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

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

### 4.5 IC Training

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

### 4.6 Language Requirements and Programmes

With effect from the 2011/12 cohort of intakes, students on UGC-funded full-time undergraduate degree programmes (including the 2-year articulation degree programmes) will be required to complete two compulsory 3-credit language subjects (one in English and one in Chinese).
To comply with the above and other language requirements prescribed by the university, all students in the BEng (Hons) in Electrical Engineering programme are required to study three compulsory English subjects (totalling 6 credits). Starting from the 2011/12 intake cohort, all students are also required to study a compulsory 3-credit subject Fundamentals of Chinese Communication.

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

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

4.7 Co-curricular Activities

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

All students admitted on and after 2005/06 are required to participate in at least one non-credit bearing co-curricular activity during their study period, which is a mandatory requirement of general education for graduation. Starting from the 2008/09 entry cohort of full-time undergraduate degree students, a minimum of 6 hours’ participation in co-curricular activities is required.

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

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

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

Students’ participation in co-curricular activities will be recorded in the Co-curricular Achievement Transcript (CAT) administered by the SAO.

Further information is available at the website: http://www.polyu.edu.hk/sao/cca/.
5. Management and Operation

5.1 Administration

The daily operation of the programme, such as General administration of admission, registrations, student records, preparation for Board-of-Examiners meetings and documentations, is overseen by the Programme Leader and the Administrative Officer and fully supported by the General Office 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 Programme 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 Class Tutors and Personal Tutors

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

As the ‘Year’ concept does not always apply in a credit-based system and the boundaries between years may become vague as a result of credit transfers/exemptions, the Class Tutors are responsible for the general welfare of the students progressing through the three years of study according to the normal study pattern. A Class Tutor may thus look after students at different years of study. Students may seek help from Class Tutors on general enquiry, subject selection and academic counselling at the respective years.

From 2003, a Personal Tutor, usually an academic staff member, is assigned to each newly admitted student and he/she will be with the student till graduation. Personal Tutors provide continuous and individual counselling and help guide the students through various difficulties, if any, which might affect their studies. The scope of counselling may sometimes go beyond academic matters.

6. Admission, Registration and Assessment

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

6.1 Admission/Registration

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

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

In cases that credit transfer is accompanied with grade, the actual grade as approved will be used in calculating the GPA/WGPA. The Department will not approve more than 27 credits normally but special consideration will be given in certain cases, such as advanced-standing students, subject to the University’s guideline on maximum number of credits to be transferred (i.e. If the credits attained from previous study are from the PolyU, the total credit transferred should not exceed 67% of the required credits for the award. If the credits earned are from other institutions, the total credit transferred should not exceed 50%).

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

The validity period of subject credits earned is 8 years from the year of attainment, i.e. the year in which the subject is completed. Credits earned from previous study should remain valid at the time when the student applies for transfer of credits; students should submit all applications for credit transfer at the point of admission, i.e. Year 1.

6.3 Subject Registration/Add-drop of Subjects

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

The University has a limit on the maximum study load that a student can take in a semester. For students admitted in 2005-06 or after, the maximum study load in a semester is 21 credits.

Students should study the definitive programme document, the subject pre-requisite, co-requisite and exclusion requirements and the specified progression pattern, if any, of the programme before subject registration. It is the student’s responsibility to check if his/her subject registration will fulfil the graduation requirements.

Students are allowed to take additional subjects before graduation to broaden their interest. The selection of additional subjects will be done during the add/drop period. Full-time students can take additional subjects from within or outside his/her programme curriculum. Grades obtained from the additional subjects from outside curriculum will only be counted towards the student’s GPA (Grade Point Average) but not towards the student’s GPA for award classification. Additional fees will not be charged for students paying a fixed tuition fee per semester but will be charged for students paying a credit fee.
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 (or an alternate academic staff authorised by the programme host Department). The application should be made to the Department no later than one month before the commencement of the examination period. For approved applications, the tuition fee paid for the subject will be forfeited and the withdrawal status of the subject will be shown in the examination result notification and transcript of studies but will not be counted towards the calculation of GPA. A handling fee will be charged by the University.

6.4 Zero Subject Enrolment/Deferment of Study

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

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

6.5 General Assessment Regulations

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

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

A ‘level’ in a credit-based programme indicates the intellectual demand placed upon students and may characterise each subject with respect to its recommended sequencing within that programme.

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

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

6.6 Principles of Assessment

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

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

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

6.7 Assessment Methods

Students’ performance in a subject is assessed by continuous assessment and/or examinations. Where both methods are used, the weighting of each in the overall subject grade is clearly stated.

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 will nevertheless include some individual components therein. The contribution made by each student in continuous assessment involving a group effort is determined and assessed separately.

Assessment methods and parameters of subjects are determined by the subject-offering Departments.

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

6.8 Progression/Academic Probation/Deregistration

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

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

If the Grade Point Average (GPA) of a student is below 2.0, he/she will be put on academic probation in the following semester. If the student is able to pull his/her GPA up to 2.0 or above at the end of the probation semester, the status of ‘academic probation’ will be lifted. The status of ‘academic probation’ will be reflected in the examination result notification but not in the transcript of studies.
A student is referred to the Board of Examiners of the Programme with the probable consequence of being de-registered from the programme if he/she falls within one of the following categories:

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

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

In the event that there are good reasons, the Board of Examiners has the discretion to recommend that students who fall in categories (a) and (b) above to stay on the programme, and these recommendations should be presented to the relevant Faculty/School Board for final decision.

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

6.9 Retaking Subjects

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

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

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

A student may appeal against the decision of the Board of Examiners within 7 working days after the public announcement of the examination results. (This refers to the date when results are announced to students via the web.) Students appealing against the decision of a Subject Lecturer/Subject Assessment Review Panel/Board of Examiners shall pay a fee. This fee shall be refunded if the appeal is upheld.

The appeal should be made to the Head of Department in writing. The appeal should be accompanied by a copy of the fee receipt, for inspection by the Department concerned. The student should give a complete account of the grounds for the appeal in the letter, and provide any supporting evidence. The person authorised to deal with the appeal will inform the student of the appeal results within 7 working days upon the receipt of all required information. Students may refer to the Student Handbook for more details on appeal procedures.

6.11 Grades, GPA and Award Classifications

Assessment grades are awarded on a criterion-referenced basis. A student’s overall performance in a subject is graded as follows:

<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>

Table 6.11.1 Descriptions of Grades

‘F’ is a subject failure grade, whilst all others (‘D’ to ‘A+’) are subject-passing grades. No credit will be earned if a subject is failed.
Each grade is assigned a numerical value as indicated in Table 6.11.2. At the end of each semester, the GPA will be computed to indicate the student’s performance up to and including the last semester. Exempted, incomplete and ungraded subjects for which credit transfer has been approved without assigning a grade, and subjects from which a student has been allowed to withdraw (i.e. those with grade ‘W’) will be excluded from the GPA calculation. Subject which has been given a ‘S’ subject code i.e. absent from examination, will be included in the GPA calculation and will be counted as ‘zero’ grade point. IC training credits are included in the GPA calculation.

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

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

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

Table 6.11.2 Grade/Codes used in Grade Point Average System

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

For cases where students fail marginally in one of the components within a subject, the BoE can defer making a final decision until the students concerned have completed the necessary remedial work to the satisfaction of the subject examiner(s). The students can be assigned an ‘I’ code in this circumstance.
Subjects with the assigned codes I, P, L, U, M, W, Z, T (if the subject is without grade transferred) will be omitted in the calculation of the GPA. A subject assigned code S will be taken as zero in the calculation.

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

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

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

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

(a) Accumulation of the requisite number of credits for the particular award.
(b) Satisfying all the requirements as defined in the definitive programme document and as specified by the University.
(c) Satisfying the WIE and IC Training requirements.
(d) Satisfying the residential requirement for at least one-third of the credits required for the award to be completed under the current enrolment at the PolyU, unless professional bodies stipulate the otherwise.
(e) Having a Grade Point Average (GPA) of 2.0 or above at the end of the programme.
(f) Having participated in a minimum of 6 hours’ co-curricular activities.
(g) Having sat for GSLPA\(^\#\) in both Chinese and English (unless exemption is given).
(h) A pass in Foundation Mathematics (AMA106)*.

\(^\#\) The mandatory requirements for GSLPA will be abolished with effect from the 2011/12 cohort of intakes, including students on Foundation Year programmes in 2010/11 who progress to Stage 1 of FT undergraduate degree programmes in 2011/12. However, students admitted to Senior Years in 2011/12 either on advanced standing or under the Senior Year quota are required to take GSLPA before graduation.

\(^*\) It is only applicable to admittees who do not have a “pass” in the A-level Mathematics subject(s) and who have not been given credit transfer for the subject AMA201. These students are required to take a mandatory Mathematics Benchmark Test (MBT) prior to the commencement of their studies. Those who pass the MBT are exempted from this graduation requirement and they follow the normal study pattern. Those who fail or do not attend the MBT are required to take a non-credit bearing subject AMA106 “Foundation Mathematics”, which is a pre-requisite for AMA201. A pass in AMA106 “Foundation Mathematics” is thus a graduation requirement for such students.
Table 6.11.3 shows the guidelines for the classifications. These are meant to be guidelines for reference only. The Board of Examiners shall exercise its judgement in coming to its conclusions as to the award for each student, and where appropriate, may use other relevant information.

<table>
<thead>
<tr>
<th>Honours degrees</th>
<th>GPA or Weighted GPA@</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>3.7+ - 4</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>3.2+ - 3.7-</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>2.3+ - 3.2-</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>2.0 - 2.3-</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>

@ Note: “+” sign denotes ‘equal to and more than’; “-” sign denotes ‘less than’.

Table 6.11.3 Degree Classification Guidelines

A Pass-without-Honours degree award will be recommended only under exceptional circumstances. When a student has demonstrated a level of attainment which is below the ‘essential minimum’ required for graduation with Honours from the programme but when he/she has nonetheless covered the prescribed work of the programme in an adequate fashion, while failing to show sufficient evidence of the intellectual capability expected of Honours degree graduates. For example, if a student in an Honours degree programme has a GPA of 2.0 or more, but his WGPA is less than 2.0, he/she may be considered for a Pass-without-Honours classification.

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

6.13 Aegrotat Award

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

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

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

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

6.14 Compulsory Graduation

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

Subject Description Forms
### Subjects

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>AI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF2108</td>
<td>Financial Accounting</td>
<td>1</td>
</tr>
<tr>
<td>AF3901</td>
<td>Economics for Engineers</td>
<td>2</td>
</tr>
<tr>
<td>AF5107</td>
<td>Accounting for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>AMA201</td>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>AMA202</td>
<td>Mathematics II</td>
<td>5</td>
</tr>
<tr>
<td>BSE463</td>
<td>Design of Mechanical Systems in Buildings</td>
<td>6</td>
</tr>
<tr>
<td>CBS2080</td>
<td>Fundamentals of Chinese Communication</td>
<td>7</td>
</tr>
<tr>
<td>CSE462</td>
<td>Environmental Impact Assessment – Theory and Practice</td>
<td>9</td>
</tr>
<tr>
<td>CSE516</td>
<td>Urban Transport Planning – Theory and Practice</td>
<td>11</td>
</tr>
<tr>
<td>EE2011</td>
<td>Applied Electromagnetics</td>
<td>12</td>
</tr>
<tr>
<td>EE3011</td>
<td>Analogue and Digital Circuits</td>
<td>13</td>
</tr>
<tr>
<td>EE3021</td>
<td>Electromechanical Energy Conversion</td>
<td>14</td>
</tr>
<tr>
<td>EE3031</td>
<td>Power Electronics and Drives</td>
<td>15</td>
</tr>
<tr>
<td>EE3041</td>
<td>Power Transmission and Distribution</td>
<td>16</td>
</tr>
<tr>
<td>EE3051</td>
<td>Systems and Control</td>
<td>17</td>
</tr>
<tr>
<td>EE3061</td>
<td>Analysis Methods for Engineers</td>
<td>18</td>
</tr>
<tr>
<td>EE3111</td>
<td>Project Methodologies</td>
<td>19</td>
</tr>
<tr>
<td>EE3121</td>
<td>Computer System Principles</td>
<td>20</td>
</tr>
<tr>
<td>EE3131</td>
<td>Telecommunication Fundamentals</td>
<td>21</td>
</tr>
<tr>
<td>EE321</td>
<td>Electrical Services in Buildings</td>
<td>22</td>
</tr>
<tr>
<td>EE3502</td>
<td>Summer Practical Training</td>
<td>23</td>
</tr>
<tr>
<td>EE4011</td>
<td>Digital Control and Signal Processing</td>
<td>24</td>
</tr>
<tr>
<td>EE4021</td>
<td>Electrical Machines</td>
<td>25</td>
</tr>
<tr>
<td>EE4031</td>
<td>Power Systems</td>
<td>26</td>
</tr>
<tr>
<td>EE4041</td>
<td>Engineering Project Management</td>
<td>27</td>
</tr>
<tr>
<td>EE4121</td>
<td>Individual Project</td>
<td>28</td>
</tr>
<tr>
<td>EE4211</td>
<td>Advanced Power Electronics</td>
<td>31</td>
</tr>
<tr>
<td>EE4221</td>
<td>Applied Digital Control</td>
<td>32</td>
</tr>
<tr>
<td>EE4251</td>
<td>Electric Traction and Drives</td>
<td>33</td>
</tr>
<tr>
<td>EE4261</td>
<td>Fibre Optics</td>
<td>34</td>
</tr>
<tr>
<td>EE4281</td>
<td>Industrial Computer Applications</td>
<td>35</td>
</tr>
<tr>
<td>EE4291</td>
<td>Intelligent Buildings</td>
<td>36</td>
</tr>
<tr>
<td>EE4301</td>
<td>Power System Protection</td>
<td>37</td>
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<tr>
<td>EE4341</td>
<td>Intelligent Systems Applications in Electrical Engineering</td>
<td>39</td>
</tr>
<tr>
<td>EE501</td>
<td>Alternative Energy Technologies</td>
<td>40</td>
</tr>
<tr>
<td>EE502</td>
<td>Modern Protection Methods</td>
<td>41</td>
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<tr>
<td>EE505</td>
<td>Power System Control &amp; Operation</td>
<td>42</td>
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<tr>
<td>EE509</td>
<td>High Voltage Engineering</td>
<td>43</td>
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<tr>
<td>EE510</td>
<td>Electrical Traction Engineering</td>
<td>44</td>
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<tr>
<td>EE512</td>
<td>Electric Vehicles</td>
<td>45</td>
</tr>
<tr>
<td>EE514</td>
<td>Real Time Computing</td>
<td>46</td>
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<tr>
<td>EE517</td>
<td>Fibre Optic Components</td>
<td>47</td>
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<tr>
<td>EE520</td>
<td>Intelligent Motion Systems</td>
<td>48</td>
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<td>EE521</td>
<td>Industrial Power Electronics</td>
<td>49</td>
</tr>
<tr>
<td>EE522</td>
<td>Optical Fibre Systems</td>
<td>50</td>
</tr>
<tr>
<td>EE524</td>
<td>Open Electricity Market Operation</td>
<td>51</td>
</tr>
<tr>
<td>EE525</td>
<td>Energy Policy and Restructuring of Electricity Supply Industry</td>
<td>52</td>
</tr>
<tr>
<td>EE526</td>
<td>Power System Analysis and Dynamics</td>
<td>53</td>
</tr>
<tr>
<td>EE527</td>
<td>Auto-tuning for Industrial Processes</td>
<td>54</td>
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<tr>
<td>EE528</td>
<td>System Modelling and Optimal Control</td>
<td>55</td>
</tr>
<tr>
<td>EE529</td>
<td>Power Electronics for Utility Applications</td>
<td>56</td>
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<tr>
<td>EE530</td>
<td>Electrical Energy-saving Systems</td>
<td>57</td>
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<tr>
<td>ELC2501</td>
<td>University English I</td>
<td>58</td>
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<tr>
<td>ELC2502</td>
<td>University English II</td>
<td>59</td>
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<tr>
<td>ELC3504</td>
<td>English for Effective Workplace Communication</td>
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<tr>
<td>ENG224</td>
<td>Information Technology</td>
<td>61</td>
</tr>
<tr>
<td>ENG232</td>
<td>Engineering Science</td>
<td>62</td>
</tr>
<tr>
<td>ENG236</td>
<td>Computer Programming</td>
<td>63</td>
</tr>
<tr>
<td>ENG237</td>
<td>Basic Electricity and Electronics I</td>
<td>64</td>
</tr>
<tr>
<td>ENG238</td>
<td>Basic Electricity and Electronics II</td>
<td>65</td>
</tr>
<tr>
<td>ENG307</td>
<td>Society and the Engineer</td>
<td>66</td>
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<tr>
<td>IC2112</td>
<td>IC Training I (EE)</td>
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<td>IC2131</td>
<td>Freshman Seminars for Engineering</td>
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<td>IC2132</td>
<td>Engineering Drawing and Industrial Safety</td>
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<tr>
<td>ISE404</td>
<td>Total Quality Management</td>
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<td>MM2021</td>
<td>Management &amp; Organisation</td>
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</tr>
<tr>
<td>MM4521</td>
<td>China Trade Management</td>
<td>76</td>
</tr>
</tbody>
</table>
Subject Description Form

Subject Code: AF2108
Subject Title: Financial Accounting
Credit Value: 3
Level: 2
Pre-requisite / Co-requisite / Exclusion: None

Role and Purposes
This subject contributes to the achievement of BBA Outcomes by enabling students to analyse financial reports (Outcome 9), apply accounting conceptual framework in the business problems analysis (Outcome 7) and process a foundation of financial accounting skills and knowledge, on which to base the process of continuous professional development (Outcome 13). It also contributes to the development of information technology skill (Outcome 6) and ethical reasoning (Outcome 5).

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

a. Explain the role and importance of accounting information in assisting decision-making in a business context.

b. Apply the financial accounting conceptual framework in the recording, processing, summarizing and reporting phases of the accounting cycle.

c. Evaluate the assumptions, principles and conventions underlying financial accounting processes.

d. Identify and resolve accounting related ethical issues as they arise.

e. Apply appropriate analytical tools for the interpretation of financial statements.

Subject Synopsis/ Indicative Syllabus

The Business and Accounting Environment
Different types of businesses, their common objectives and basic features. The need for accounting as a basis for decision making. Ethical considerations in financial reporting.

The Financial Accounting Framework
Accounting equation and double entry bookkeeping system. Differences between cash and accrual basis of accounting. Preparation and accuracy of accounts receivables, inventory and fixed assets. Quality of earnings and earnings management. Internal control of cash through bank reconciliation system.

Accounting Principles and Concepts
Fundamental accounting concepts and other accounting principles that underlie the preparation of financial statements.

Teaching/Learning Methodology
A two hour lecture will be conducted each week to initiate students into the ideas, concepts and techniques of the topics in the syllabus, which is then reinforced by a one hour tutorial. Additional learning activities include a group project which simulates the maintenance of a set of accounting records for a company.

Assessment Methods

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Methodology</th>
<th>Class contact</th>
<th>Total student study effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>50%</td>
<td>Lectures, Tutorials, Assignments (3 hours X 12 topics) and project (10 hours)</td>
<td>20 Hrs.</td>
</tr>
<tr>
<td>Final Examination</td>
<td>(closed book)</td>
<td>50%</td>
<td>Total student study effort</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.

Reading List and References

Recommended Textbook

Recommended References

Student Study Effort

<table>
<thead>
<tr>
<th>Topic</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class contact</td>
<td>28 Hrs.</td>
</tr>
<tr>
<td>Tutorials</td>
<td>14 Hrs.</td>
</tr>
<tr>
<td>Weekly preparation and review</td>
<td>3 Hrs.</td>
</tr>
<tr>
<td>Assignments (3 hours X 12 topics) and project (10 hours)</td>
<td>46 Hrs.</td>
</tr>
</tbody>
</table>

Total student study effort: 124 Hrs.

Analysis and Interpretation of Financial Statement
Need for analysis and interpretation of financial statements. Limitations of ratio analysis.
Subject Description Form

Subject Code    AF3901
Subject Title   Economics for Engineers
Credit Value    3
Level           3
Pre-requisite  / Co-requisite/ Exclusion: Exclusion: AF2617

Role and Purposes
This subject aims to equip students with the fundamental concepts of economics/finance/costing and to develop their ability to analyze and solve economic problems by applying these concepts in general (Outcomes 7, 10, and 12) and in the context of decision making in an engineering company in particular (Outcome 13). It aims to broaden students’ global outlook by exposing them to economic issues in Hong Kong and in the world (Outcome 3). The assessment tools of the subject help students to develop their critical thinking and enhance their oral and written skills in English to enable them to communicate and work effectively with others (Outcomes 1 and 2).

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

a. understand the fundamental concepts of microeconomics, finance and costing in general, and in global business operations in particular;
b. conduct analyses of economic and financial issues in real-life situations;
c. assess the strategies and behaviors of firms operating under various market structures in the global economy;
d. apply the budgetary planning and capital budgeting skills to appraise economic and financial issues in the context of engineering operations; and
e. communicate and work effectively with others.

Subject Synopsis/ Indicative Syllabus
Part I: Principles of Microeconomics
Basic principles of economics; Price mechanism; Theory of demand and supply; Behavior of the firm; Organization of industry.

Part II: Engineering Economics
Economic model of an engineering company; Composition of costs; Costing systems; Activity and time-based costing; Profit and loss control; Budgetary planning and control; Investment and sources of finance; Time value of money and investment appraisal.

Teaching/Learning Methodology
There is a two-hour lecture each week that focuses on the introduction and explanation of key concepts of engineering economics with specific reference to current issues wherever appropriate. The one-hour tutorial provides students with the opportunity to deepen their understanding of the concepts taught in lectures and to apply the theories to the analysis of real-life issues. The activities in tutorials include student presentations and discussions of examples and cases relevant to the subject.

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 (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>1. In-class participation and presentation</td>
<td>10%</td>
<td>a ☑ b ☑ c ☑ d ☑ e ☑</td>
</tr>
<tr>
<td>2. Written assignments</td>
<td>20%</td>
<td>a ☑ b ☑ c ☑ d ☑ e ☑</td>
</tr>
<tr>
<td>3. Tests</td>
<td>20%</td>
<td>a ☑ b ☑ c ☑ d ☑ e ☑</td>
</tr>
<tr>
<td>Final Examination</td>
<td>50%</td>
<td>a ☑ b ☑ c ☑ d ☑ e ☑</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 Expected
Class contact:
- Lectures: 28 Hrs.
- Tutorials: 14 Hrs.

Other student study effort:
- Reading textbooks and other study materials: 30 Hrs.
- Preparation for presentation and assignments: 15 Hrs.

Total student study effort: 87 Hrs.

Reading List and References
Textbooks

Reference books
Subject: Accounting for Engineers

Credit Value: 3
Level: 5

Pre-requisite / Exclusion: None

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

Intended Learning Outcomes:
- Upon completion of the subject, students will be able to:
  a. Employ the accounting building blocks from the preparers' perspective.
  b. Understand accounting information from the users' perspective and be able to interpret them.
  c. Appreciate the role of quality accounting information in the decision making process.

Subject Synopsis/Indicative Syllabus:
- Understanding Accounting
  - The accounting information system. The financial statements. Corporate governance, and in particular to receivables and long-lived assets.
- Interpretation of Accounts
- Managerial accounting concepts & techniques
  - Cost-Variation-Profit Analysis. Costing techniques, tracking costs.
- 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 thorough seminar will be conducted each week to give maximum to the concepts and techniques of the topic. These are designed to consolidate and develop student understanding and analytical ability through problem solving and working on current case studies.

Assessment Methods in Alignment with Intended Learning Outcomes:
- Continuous Assessment
  1. Class Participation (assignments) 15%
  2. Quiz 10%
  3. Project & Presentation 15%
  4. Individual writing task 10%
- Final Examination 50%

Explanation of the appropriateness of the assessment methods in assessing the 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.

Intended subject learning outcomes to be assessed (Please tick as appropriate):
- a. Class Participation (assignments)
- b. Quiz
- c. Project & Presentation
- d. Individual writing task

Assessment:
- Specific assessment methods/tasks
- % weight
- Alignment with Intended Learning Outcomes
- % weight

Explanation of the appropriateness of the assessment methods in assessing the 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.

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

Student Study Effort Expected:
- Class contact: 42 Hrs.
- Reading books and working through assigned problems 45 Hrs.
- Research, discussion & write-up 15 Hrs.

Total student study effort: 102 Hrs.

Reading List and References:
- Glautier and Underdown, Accounting Theory and Practice, latest edition, Practice Hall.
### Subject Description Form

**Subject Code**
AMA201

**Subject Title**
Mathematics I

**Credit Value**
3

**Level**
2

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

### Objectives

To introduce students the fundamentals of basic engineering mathematics. Emphasis will be on the basic theory as well as application of mathematical methods to solving engineering problems.

### Intended Learning Outcomes

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

1. apply mathematical reasoning to analyse essential features of different engineering problems;
2. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations;
3. apply appropriate mathematical concepts and techniques and adapt known solutions to different situations;
4. develop and extrapolate the mathematical concepts in synthesizing and solving new problems;
5. search for useful information in the process of problem solving.

### Subject Synopsis / Indicative Syllabus

- **Algebra of complex number**
  - Complex numbers; Geometric representation; n-th roots of complex numbers.

- **Linear algebra**
  - Matrices and determinants; Vector space; Normalization and orthogonality.

- **Ordinary differential equations**
  - First and second order linear ordinary differential equations; Laplace transforms; Convolution theorem; Fourier transforms.

### Teaching/Learning Methodology

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

### Assessment Methods / Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific Assessment Methods</th>
<th>%</th>
<th>Intended subject learning outcome(s) to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Continuous Assessment</td>
<td>40%</td>
<td>✔️ ✔️ ✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>b. 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. A 3-hour examination is held at the end of the semester.

Questions used in assignments, quizzes, tests and examinations are used to assess the student's ability to use mathematical techniques in solving problems in science and engineering.

### Reading List and References

- **Textbook**

- **References**

### Student Study Effort Expected

- **Class contact**
  - Lecture: 28 Hrs.
  - Tutorial: 14 Hrs.
  - Mid-term test and Examination: 5 Hrs.

- **Other student study effort**
  - Assignments and self-study: 73 Hrs.

**Total student study effort**: 120 Hrs.
### Subject Description Form

**Subject Code:** AMA202  
**Subject Title:** Mathematics II  
**Credit Value:** 3  
**Level:** 2  
**Pre-requisite:** Mathematics I (AMA201)

**Objectives:**
- This subject aims to introduce students to the differential and integral calculus of functions of several variables, vector field theory and partial differential equations of mathematical physics. Emphasis will be on the basic theory as well as application of mathematical methods to solving engineering problems.

**Intended Learning Outcomes:**
1. apply mathematical reasoning to analyse essential features of different engineering problems;
2. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations;
3. apply appropriate mathematical concepts and techniques and adapt known solutions to different situations;
4. develop and extrapolate the mathematical concepts in synthesizing and solving new problems;
5. search for useful information in the process of problem solving.

**Subject Synopsis/Indicative Syllabus:**
- **Calculus and functions of several variables:** Infinite series; Power series; Taylor series; Fourier series; Partial differentiation; Maxima and minima; Lagrange multiplier.
- **Partial differential equations:** Formulation of partial differential equations; Method of separation of variables; Initial and boundary value problems.
- **Vector Calculus:** Vectors; Scalar and vector products; Gradient, divergence and curl operators; Multiple integrals; Line, surface and volume integrals; Green's theorem, divergence theorem and Stokes' theorem.

**Teaching/Learning Methodology:**
The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide students with an integrated knowledge required for the understanding and development of problem solving ability.

**Assessment Methods in Alignment with Intended Learning Outcomes:**
- **Continuous Assessment:** 40%  
  - Continuous assessment comprises of assignments, in class quizzes, online quizzes and a mid-term test. A 3-hour examination is held at the end of the semester.
- **Examination:** 60%  
  - A 3-hour examination is held at the end of the semester.

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

Subject Code: BSE463
Subject Title: Design of Mechanical Systems in Buildings
Credit Value: 3
Level: 3
Pre-requisite/Co-requisite/Exclusion: Pre-requisite: ENG232 & EE321 (for Prog. 41070), EE321 (for Prog. 41080)

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:

(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 (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group assignment</td>
<td>10</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>2. Test</td>
<td>30</td>
<td>a b c d e f</td>
</tr>
<tr>
<td>3. Final examination</td>
<td>60</td>
<td>a b c d e f</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 Expected:

Class contact:
- Lectures: 30 Hrs.
- Tutorials: 6 Hrs.
Other student study effort:
- Test: 3 Hrs.
- Self study and assignment: 91 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 Proposal for the Purpose of General University Requirements (GUR)

## Subject Information

**Subject Title:** Fundamentals of Chinese Communication

**Subject Code:** CBS2080

**Credit Value:** 3

**Level:** 2

**Planned Student Intake per Year:**
- Optimal class size: 20
- Planned number of sessions to be offered:
  - Semester 1: 52
  - Semester 2: 52
  - Summer Term: 10

**Subject Offering**
- **Department:** Chinese Language Centre, Department of Chinese & Bilingual Studies

**Pre-requisite and/or Exclusion(s)**
(Note 1)

**Student Study Effort Required**
- **Class contact:** Seminar 42 Hrs.
- **Outside class practice:** 3 x 14 = 42 Hrs.
- **Self-study:** 3 x 14 = 42 Hrs.
- **Total student study effort:** 126 Hrs.

**Intended Learning Outcomes**

- Upon completion of the subject, students will be able to:
  1. Develop effective communication skills in both written Chinese and Putonghua.
  2. Master the format, organization, language and style of expression of various genres of Chinese practical writing such as official correspondences, publicity materials, reports and proposals.
  3. Give formal presentation in Putonghua.
  4. Engage with formal discussion in Putonghua.

**GUR Requirements Intended to Fulfil**

- **Languages and Communication Requirement (LCR)**
- **Broad Discipline Requirement (BDR)**
- **Cluster Area Requirement (CAR)**
  - Human Nature, Relations and Development
  - Community, Organization and Globalization
  - History, Cultures and World Views
  - Science, Technology and Environment

- **China-Study Requirement (CSR)**
  - More than 60% CSR-related content? Yes

- **Eligible for “English Writing” (EW) designation**
  - Include an extensive piece of writing (2,500 words)? Yes

- **Eligible for “Chinese Writing” (CW) designation**
  - Include an extensive piece of writing (3,000 characters) Yes

- **Eligible for “English Reading” (ER) designation**
  - Include a reading of an extensive text (100,000 words or 200 pages)? Yes

- **Eligible for “Chinese Reading” (CR) designation**
  - Include a reading of an extensive text (100,000 characters or 200 pages)? Yes

**Proposed Instructor(s)**
- Academic staff of CLC

**Medium of Instruction**
- English
- Cantonese
- Putonghua
- Others (Please specify: _______)

**Justification(s):**
- This is a Chinese language subject aiming at enhancing students proficiency in written Chinese and Putonghua.

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(Note 1) *In line with the University policy, English will be the medium of instruction except for the Chinese culture- or Chinese literature-related subjects, which will normally be taught in Putonghua as recommended by the Working Group. For other subjects to be offered in Cantonese, Putonghua or other languages, justifications should be provided for special consideration.*

(Note 2) Students whose HKALE result for Chinese Language and Culture is at grade D or below are advised to complete / concurrently take non-credit bearing Chinese Language Enhancement subject(s) as recommended.

(Note 3) This subject aims to enhance and polish the communication skills of the students in both written Chinese and Putonghua for basic usage in the workplace.

(Note 4) Students will be required to read and write intensively for enhancing their proficiency level in written Chinese. They would be required to organize their own ideas, concepts in sensible and logical manner and to express thoughts clearly and concisely. The mastering of effective communication skills in both written Chinese and Putonghua will also facilitate their lifelong learning in various disciplines.

(Note 5) The subject will engage students in the following activities: reading, polishing, interpreting, discussing, writing, revising, and presenting. They would learn to articulate their ideas and thoughts effectively in both written Chinese and Putonghua. Students will be required to read and write intensively for enhancing their proficiency level in written Chinese. They would be required to organize their own ideas, concepts in sensible and logical manner and to express thoughts clearly and concisely. The mastering of effective communication skills in both written Chinese and Putonghua will also facilitate their lifelong learning in various disciplines.

---

This is a Chinese language subject aiming at enhancing students proficiency in written Chinese and Putonghua.
Notes
Please refer to the Development Framework for CAR Subjects when completing this form. (https://www2.polyu.edu.hk/4yearug/Staff/policy.html)

Note 1: Proposed Instructor(s)
Please provide a 2-page curriculum vitae of each of the instructors, specifically tailored to substantiate his/her expertise in the subject area. Please indicate the Subject Leader.

Note 2: Pre-requisite and/or Exclusion(s)
GUR subjects normally should not have any pre-requisites. If pre-requisites are really needed by a given GUR-cluster subject, these pre-requisites should also be GUR-cluster subjects, and the number of pre-requisites should not be more than 1. Departments should identify other subjects which have significant overlaps with the syllabus of the proposed subject and specify these subjects as the subject exclusion requirements.

Note 3: Objectives
This should include a description of the specific objectives of the subject which should be aligned with the overall objectives of GURs, and appropriate for the particular GUR Requirements the subject intends to fulfil. For “W”/ “R” label subject proposals, the objectives should be consistent with the “W”/ “R” designation.

Note 4: Intended Learning Outcomes
Intended learning outcomes should state what the students should be able to do or attain upon completion of the subject. Proposers are also expected to demonstrate that the stated learning outcomes have adequately addressed the following three essential characteristics for qualifying as a GUR subject: Literacy, Higher order thinking, and Life-long learning. For “W”/ “R” label subject proposals, the learning outcomes should be consistent with the “W”/ “R” designation.

Note 5: Subject Synopsis/Indicative Syllabus
Include a syllabus with sufficient detail to demonstrate how the learning outcomes are going to be achieved.

Note 6: Assessment Method
Please give a brief description of the teaching and learning methods to be employed to facilitate learning, and how they are aligned with the intended learning outcomes of the subject.

Note 7: Reading List and Reference
Please indicate clearly in this section if the subject should have an “R” designation. If so, subject proposers should also indicate clearly which items on the Reading List constitute the expected reading requirement and include the page numbers.

Reading List
路德慶主編(1982) 《寫作教程》，華東師範大學出版社。
邵守義(1991) 《論理學》，吉林人民出版社。
陳建民(1994) 《演講的藝術》，語文出版社。
李軍華(1996) 《口才學》，華中理工大學出版社。
鍾文佳(2004) 《漢語口才學》，西南師範大學出版社。
李白堅、丁迪蒙(2004) 《大學體型寫作訓練規程》，上海大學出版社。
邢福義、汪國勝主編(2003) 《現代漢語》，華中師範大學出版社。
于成鯤主編(2003) 《現代應用文》，復旦大學出版社。
于成鯤、陳瑞端、秦扶一，金振邦主編(2011) 《當代應用文寫作規範叢書》，復旦大學出版社。
于成鯤、陳瑞端、秦扶一，金振邦主編(2011) 《當代應用文寫作規範叢書》，復旦大學出版社。
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于成鯤、陳瑞端、秦扶一，金振邦主編(2011) 《當代 aplicación de 文章規範叢書》，復旦大學出版社。
于成鯤、陳瑞端、秦扶一，金振邦主編(2011) 《當代 application de 文章規範叢書》，復旦大學出版社。

Assessment Method
Please indicate clearly in this section if the subject should have an “R” designation. If so, subject proposers should also indicate clearly which items on the Reading List constitute the expected reading requirement and include the page numbers.

Assessment Method
Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed (Please tick as appropriate)
--- | --- | ---
1. Written Assignment | 30% | ✓ ✓ ✓ ✓
2. Oral Presentation | 30% | ✓ ✓ ✓ ✓
3. Final Examination | 40% | ✓ ✓ ✓ ✓
Total | 100% | ✓ ✓ ✓ ✓
Subject Description Form

<table>
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<tr>
<th>Subject Code</th>
<th>CSE462</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Environmental Impact Assessment – Theory and Practice</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<tr>
<td>Level</td>
<td>400</td>
</tr>
<tr>
<td>Pre-requisite / Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

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:

- understand the EIA process;
- analyse major environmental issues for large development projects; and
- conduct necessary monitoring and modeling tasks within an EIA cycle.

Subject Synopsis/Indicative Syllabus

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

Teaching/Learning Methodology
The subject teaching will include the following elements:
(a) Lectures – to introduce the basic concepts and assessment methods;
(b) Tutorials – to answer student questions in the learning processes;
(c) Group discussion and presentations – to let students play different roles in the EIA process;
(d) Reading materials and video presentations – to give students examples in local EIA case studies;

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks | % weighting |
--- | --- |
Continuous Assessment | 50 | ✓ | ✓ | ✓ |
Written Examination | 50 | ✓ | ✓ | ✓ |
Total | 100% |

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 24Hrs.
- Tutorials / Seminars 18Hrs.

Other student study effort:
- Coursework exercise 20Hrs.
- Seminar reports 2Hrs.
- Self Study 62 Hrs.

Total student study effort 126Hrs.

Reading List and References

The following texts provide the majority of the basic materials to be covered in lectures. Students will need to study other publications, including local case studies.


Hong Kong Environmental Protection Department  
http://www.epd.gov.hk/eia/
This course will be augmented by computer modelling and case studies for input to calibrate CSE516 Urban Transport Planning - Theory and Practice. 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 practices. Individual laboratory sessions will be held to demonstrate the application of transport model and computer software in the students' own areas of expertise. This will provide an opportunity for students to appreciate the difference between manual calculation and computer simulation. Laboratory sessions will be scheduled to give students some experience in using transport models and computer software applicable to their own areas of expertise.

It is expected that students will have a fundamental understanding of mathematics and computer. Consistent with undergraduate level study in civil engineering, to provide a comprehensive theoretical basis for solving traffic problems and transport planning. The fundamentals of land use and transport planning; the planning process; goals and objectives of traffic studies; levels of urban transport planning; traffic problems and transport policy. Emphasis is also placed on the application of rigorous transport models and analytical techniques in case studies. Recommended background knowledge:

1. Continuous Assessment 40%
2. Written Examination 60%
Total 100%

Continuous assessment will be based on coursework and case study discussions. The fundamentals of land-use and transport planning; the planning process; goals and objectives of traffic studies; levels of urban transport planning; traffic problems and transport policy. Emphasis is also placed on the application of rigorous transport models and analytical techniques in case studies. Recommended background knowledge:

1. Continuous Assessment 40%
2. Written Examination 60%
Total 100%

Continuous assessment will be based on coursework and case study discussions.
<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Specific assessment methods/tasks</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tr>
<td>Lectures</td>
<td>Examination</td>
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<td>Epitrotese</td>
<td>Class Test</td>
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<tr>
<td>Experiments</td>
<td>Performance &amp; reports</td>
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<tr>
<td>Total</td>
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<td>100%</td>
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</table>

**Subject Title**: Applied Electromagnetics  
**Subject Code**: EE2011  
**Credit Value**: 3  
**Level**: 2  
**Pre-requisite/Co-requisite/Exclusion**: Nil

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

### Intended Learning Outcomes
- Upon completion of the subject, students will be able to:
  - Understand that electromagnetism is based on Maxwell’s equations. Interpret the physical meaning and phenomena behind the mathematical equations. Know the meanings of physical quantities of electromagnetism and their basic relationships.
  - Be able to analyse electromagnetic phenomena related to electrical engineering systems by selecting the most appropriate laws/theorems/solution techniques.
  - Appreciate recent developments in computational electromagnetics.
  - Have had hands-on experience in electromagnetic measurements.

### Subject Synopsis/Indicative Syllabus
1. **Static fields**: Electrostatics: Electric fields, Coulomb’s law, Gauss’s law, potential, capacitance and energy storage. Magnetostatics: Biot-Savart law, magnetic fields, Ampere’s circuital law. Force on a current-carrying conductor, Lorentz force.
2. **Time-varying fields**: Faraday’s Law and Lenz’s Law; self-inductance, mutual inductance and stored energy.
3. **Mathematical preliminaries**: Vectors analysis and coordinate systems. The operators grad, div and curl. Concept of line, surface and volume integrals. Stokes’s and divergence theorems.
6. **Solution of static field problems**: Hand-engraving method of images, numerical and computer-based methods. Estimation of conductance, inductance, capacitance and field quantities from field plots.

### Assessment Methodologies
- Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on analysis and practical applications of electromagnetics are given through critical and analytical thinking. Experiments are encouraged to take extra readings and to look for relevant information. Software is used to help the students understand the physical meanings of mathematical equations.

### Subject Synopsis/Indicative Syllabus
1. **Static fields**: Electrostatics: Electric fields, Coulomb’s law, Gauss’s law, potential, capacitance and energy storage. Magnetostatics: Biot-Savart law, magnetic fields, Ampere’s circuital law. Force on a current-carrying conductor, Lorentz force.
2. **Time-varying fields**: Faraday’s Law and Lenz’s Law; self-inductance, mutual inductance and stored energy.
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6. **Solution of static field problems**: Hand-engraving method of images, numerical and computer-based methods. Estimation of conductance, inductance, capacitance and field quantities from field plots.

### Laboratory Experiments
- Field plotting using the Electrolytic tank.
- Field plotting using the resistive paper.
- Laboratory preparation report.
- Self-study:

### Assessment
- **Examination**: 60%
- **Class Tests**: 24%
- **Laboratory performance & reports**: 16%

Total: 100%

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

### Subject Description Form
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Subject Title</td>
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<td>Credit Value</td>
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<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
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</table>

### Reading List and References
Subject Description Form

Subject Code: EE3011
Subject Title: Analogue and Digital Circuits
Credit Value: 3
Level: 3

Pre-requisite/Co-requisite/Exclusion
Pre-requisite: ENG237 & ENG238

Objectives
1. To familiarise students with the characteristics and operation of analogue and digital circuits for analysis and design purposes.
2. To enable students to understand the common techniques used in circuit design for combinational and sequential logic circuits.
3. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.
4. To enable students to analyse the operation principles of different A/D and D/A approaches and match their properties to serve the purposes of different applications.
5. To enable students to appreciate the limitations of circuit design from practical viewpoints and the importance of sound technical knowledge and team work.

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. On-the-spot assessments are conducted in the laboratory to provide additional incentives for student learning. Experiments are designed to supplement the teaching materials so that the students are encouraged to take extra readings and to look for relevant information.

Mini project:
Circuit design and component selection on logic circuits with given specifications

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>
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<tr>
<td>2. Class Test</td>
<td>12%</td>
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</tr>
<tr>
<td>3. Laboratory performance &amp; reports</td>
<td>16%</td>
<td>x x x</td>
</tr>
<tr>
<td>4. Mini-project &amp; report</td>
<td>12%</td>
<td>x x x</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>x x x</td>
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</tbody>
</table>

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

1. To familiarise students with the characteristics and operation of analogue and digital circuits for analysis and design purposes.
2. To enable students to understand the common techniques used in circuit design for combinational and sequential logic circuits.
3. To provide an appreciation of advantages and limitations of different classes of power amplifiers and hence the implications on their design.
4. To enable students to analyse the operation principles of different A/D and D/A approaches and match their properties to serve the purposes of different applications.
5. To enable students to appreciate the limitations of circuit design from practical viewpoints and the importance of sound technical knowledge and team work.

Subject Synopsis/Indicative Syllabus

Digital Circuits
1. Digital system fundamentals: Boolean algebra, number systems, logic gates and truth tables.
3. Digital integrated circuits: Digital IC families: TTL, CMOS. Basic logic gates, input and output V-I characteristics; transfer characteristics, switching thresholds, noise margins, propagation delay. Inter-famliy interfacing of digital ICs.
4. Sequential circuits: Typical structure, operation, design and applications of flip-flops. Design and analysis of synchronous sequential circuits; states and state variable; structures of registers, counters and memory units. Design of asynchronous circuits, flow tables, stable and unstable states.

Analogue Circuits
5. Large-signal transistor circuits: Classification of power amplifiers; analysis of efficiency, power dissipation and distortion of class A, B, AB and C amplifiers.
6. Signal conversion: Voltage comparator, Schmidt triggers. Sample & hold circuits. A/D and D/A converters: Weighted-resistor D/A converter; R-2R Ladder D/A converter; Parallel-comparator A/D converter; Successive-approximation converter; Counting converter; Dual-slope converter.

Laboratory Experiments:
Logic circuits I – CMOS logic gates characteristics and combinational logic circuit design
Logic circuits II – TTL logic gates characteristics and sequential logic circuits design
Power amplifiers – Classes A, AB & B

Student Study Effort Expected

Class contact:
- Lecture/Tutorial 36 Hrs.
- Laboratory 12 Hrs.

Other student study effort:
- Laboratory preparation/report 12 Hrs.
- Self-study 45 Hrs.

Total student study effort 105 Hrs.

Reading List and References

Textbook:

Reference Books:
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Electromechanical Energy Conversion</td>
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<tr>
<td>Credit Value</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 provide students a general knowledge on common types of electric machines.
2. To provide students the basic techniques of steady-state electric machine analysis.

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

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

### Subject Synopsis/Indicative Syllabus

### Laboratory Experiments:
- Load test, efficiency and speed control of a d.c. motor.
- Performance evaluation of a three-phase cage induction motor.
- Synchronous motor V-curves.
- Temperature rise and ratings.

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
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<tr>
<td>Tutorials</td>
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<td>Laboratory work</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>a b c d</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>a b c d</td>
</tr>
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<td>3. Laboratory work and reports</td>
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<td>4. Assignment</td>
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</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:**
  - Lecture/Tutorial: 36 Hrs.
  - Laboratory: 12 Hrs.

- **Other student study effort:**
  - Revision, self-study, and assignment: 48 Hrs.
  - Write-up of laboratory reports: 9 Hrs.

- **Total student study effort:** 105 Hrs.

### Reading List and References

Subject Description Form

Subject Code: EE3031
Subject Title: Power Electronics and Drives
Credit Value: 3
Level: 3
Pre-requisite/Co-requisite/Exclusion: Nil

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

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

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

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

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

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.

Teaching/Learning Methodology:

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>a</td>
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<tr>
<td>Tutorials</td>
<td>a</td>
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<tr>
<td>Experiments</td>
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Assessment Methods in Alignment with Intended Learning Outcomes:

<table>
<thead>
<tr>
<th>Specific assessment method/tasks</th>
<th>% weighting</th>
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<tbody>
<tr>
<td>1. Examination</td>
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</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>
</tbody>
</table>

Total 100%

Laboratory Experiment:
DC/DC Buck Converter, Introduction to SCR circuits, PSPICE simulation of SCR Bridge.

Reading List and References:

Student Study Effort Expected:

Class contact:
- Lecture/Tutorial: 36 Hrs.
- Laboratory: 12 Hrs.

Other study effort:
- Laboratory preparation/report: 12 Hrs.
- Self-study: 45 Hrs.

Total student study effort: 105 Hrs.
Subject Description Form

<table>
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<tr>
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<tbody>
<tr>
<td>Subject Title</td>
<td>Power Transmission and Distribution</td>
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<tr>
<td>Credit Value</td>
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<tr>
<td>Level</td>
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</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Objectives
- 1. To introduce students to the fundamental knowledge which is essential for all electrical power engineers. It leads to a deeper insight into the design, planning, operation, equipment characteristics and environmental impacts of modern electrical power systems.
- 3. Subject Synopsis/Indicative Syllabus

### Intended Learning Outcomes
- 1. Upon completion of the subject, students will:
  - Have acquired the fundamental knowledge and analytical techniques on electrical power systems.
  - Be able to identify, analyze, and solve technical problems to power system design, planning, and operation, making use of mathematics and engineering techniques.
  - Be able to work in teams when conducting laboratory investigations.
  - Be able to write a technical report and present the findings.

### Subject Synopsis/Indicative Syllabus
1. **Generation, energy and environment**: Renewable and non-renewable resources and generation. Pump storage and wind turbine. Sources of pollution and environmental impacts.
2. **Power system components**: Busbar, Turbine and generator system. Concept of generation control and operating chart. Power Transformers. Line and Cable: RLCG and ABCD parameters and applications.
4. **Surges**: Travelling wave, surge impedance and standing voltage. Lightning and switching surges. Surge mitigation, reflection and refraction. Use of lattice diagram. Protection against overvoltage.
5. **Fault analysis**: Use of per unit notation. Balanced 3-phase fault calculation. Fault current limiting concepts. Unbalanced fault calculation by symmetrical components method including line-to-ground, line-to-line, and double-line-to-ground faults. Sequence current and voltage measurements.

### 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.

### Reading List and References

### Teaching/Learning Methodology

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

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<tr>
<td>Tutorials</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Experiments</td>
<td></td>
<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>a b c d</td>
</tr>
<tr>
<td>2. Class Test</td>
<td>25%</td>
<td>a b</td>
</tr>
<tr>
<td>3. Laboratory Performance &amp; Report</td>
<td>15%</td>
<td>a b c 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 the usual means of examination and test. Experiments and written reports assess those on analytical skills, problem-solving techniques and practical considerations of power system design, as well as technical reporting and teamwork.

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact</th>
<th>36 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>12 Hrs.</td>
</tr>
</tbody>
</table>

Other student study effort:

- Laboratory preparation/report | 12 Hrs. |
- Self-study                  | 45 Hrs. |

Total student study effort: 105 Hrs.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE3051</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: AMA201</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.

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.
6. Compensators and PID controllers: Compensators, PID controllers, Controller tuning.

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

Teaching/Learning Methodology

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

<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>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Experiments</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

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

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

Student Study Effort Expected

Class contact:
- Lecture/Tutorial: 38 Hrs.
- Laboratory: 8 Hrs.

Other student study effort:
- Laboratory preparation/report: 12 Hrs.
- Self-study: 47 Hrs.

Total student study effort: 105 Hrs.

Reading List and References

Reference books:
**Subject Description Form**

**Subject Code**: EE3061  
**Subject Title**: Analysis Methods for Engineers  
**Credit Value**: 3  
**Level**: 3

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Intended Learning Outcomes</th>
</tr>
</thead>
</table>
| 1. To familiarise students with the essential numerical techniques and operations research methods which are applicable in most engineering problems. | 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. |
| 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. |  |

<table>
<thead>
<tr>
<th>Subject Synopsis/Indicative Syllabus</th>
</tr>
</thead>
</table>
| 1. **Basics**: Error propagation, numerical stability, solutions by iterations, Newton’s method, finite difference and interpolation, Lagrange interpolation, solution of linear systems, and applications in power systems, fluid mechanics, and structural engineering.  
2. **Probability & Statistics**: Random variables, probability distributions, sample distributions and means, Central Limit Theorem, significance and hypothesis testing, stochastic processes.  
3. **Optimisation**: Direct search and simplex methods, gradient algorithms, method of steepest descent and conjugate gradient, numerical methods for constrained optimization, applications in power systems and transportation.  
4. **Operations research**: Linear programming, shortest path and maximum flow problems, integer programming, combinatorial optimisation problems, applications in power systems and transportation.  
5. **Numerical methods for partial differential equations**: Boundary value problems, inverse problems, and applications in heat transfer, fluid mechanics, and structural engineering. |

<table>
<thead>
<tr>
<th>Laboratory Experiments</th>
</tr>
</thead>
</table>
| Analysis of errors in numerical algorithms through Matlab  
Sensitivity analysis and performance in electrical systems |

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis Methods for Engineers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class contact:</td>
</tr>
<tr>
<td>Lecture/Tutorial: 38 Hrs.</td>
</tr>
<tr>
<td>Laboratory: 8 Hrs.</td>
</tr>
<tr>
<td>Other student study effort:</td>
</tr>
<tr>
<td>Laboratory preparation/report: 12 Hrs.</td>
</tr>
<tr>
<td>Total student study effort: 100 Hrs.</td>
</tr>
</tbody>
</table>

**Student Study Effort Expected**

- **Class contact**: Lectures 38 Hrs., Laboratory 8 Hrs.
- **Other student study effort**: Laboratory preparation/report 12 Hrs., Self-study and assignments 47 Hrs.
- **Total student study effort**: 105 Hrs.

**Reading List and References**

<table>
<thead>
<tr>
<th>Textbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. F.S. Hillier, Introduction to operations research, McGraw-Hill, 2005</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reference books</th>
</tr>
</thead>
</table>

**Assessment**

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60%</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
</tr>
<tr>
<td>3. Assignments &amp; class works</td>
<td>10%</td>
</tr>
<tr>
<td>4. Laboratory performance &amp; reports</td>
<td>10%</td>
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<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
Subject Description Form

**Subject Code**: EE3111  
**Subject Title**: Project Methodologies  
**Credit Value**: 2  
**Level**: 3  
**Pre-requisite/Co-requisite/Exclusion**: Nil

**Objectives**

1. To develop the students’ project development skills necessary to write effective project proposals.  
2. To develop project plans for securing delivery of the project objectives.

**Intended Learning Outcomes**

Upon completion of the subject, students will:

a. Be able to compose feasible technical project proposals.  
b. Be able to develop effective and systemic project plans.  
c. Be able to develop critical strategies and problem solving methods to ensure delivery of the project objectives.  
d. Have improved competency on communication methodologies.

**Subject Synopsis/Indicative Syllabus**

1. **Basics concepts of project**: Systems thinking; Creative thinking, Project initiation; Searching, Engine; Project selection methodologies.  
2. **Project Proposal**: Project proposal design; Basic sections of project proposal.  
3. **Project Plan**: Work Plan, Scheduling, Tracking and Budgeting of project; Risk management.

**Teaching/Learning Methodology**

The following activities in form of interactive discussion, seminar and workshop will be conducted:

1. **Introductory Lectures** will be presented by various staff members to cover essentially the subject contents including their research and/or practical project execution experiences. Each student will either choose or be assigned a potential supervisor who would probably be his/her final year Project Supervisor who shall introduce the technical aspects of the broad area of the subject to the students.  
2. **Writing Project Proposal**: Students will spend a considerable amount of time writing a proposal for their projects. This is an iterative process where drafts are submitted to the Project Supervisor for comments and revisions. The process continues until the proposal reaches an acceptable standard.

**Teaching/Learning Methodology**

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a b c d</td>
</tr>
<tr>
<td>Lectures</td>
<td></td>
</tr>
<tr>
<td>Writing Project Proposal</td>
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</table>

**Assessment Methods in Alignment with Intended Learning**

<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>a b c d</td>
<td></td>
</tr>
<tr>
<td>1. Quiz</td>
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</table>

**Outcomes**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>2. Project Proposal Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>80%</td>
</tr>
<tr>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

The quiz is a test of the understanding of the basic concepts in project planning, scheduling and management.

The contents of the proposal should include:

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

**Assessment Criteria of the proposal**

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

**Student Study Effort Expected**

Class contact:  
- Lecture/Seminar/Workshop 28 Hrs.

Other student study effort:
- Materials searching 10 Hrs.
- Proposal writing 28 Hrs.
- Discussion with academic staff 4 Hrs.

Total student study effort 70 Hrs.

**Reading List and References**

**Reference books**


**AI - 19**
### Subject Description Form

#### Computer System Principles

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Credit Value</th>
<th>Level</th>
<th>Pre-requisite/Exclusion</th>
<th>Objectives</th>
<th>Intended Learning Outcomes</th>
</tr>
</thead>
</table>
| EE3121       | Computer System Principles | 3 | Pre-requisite: ENG224 | 1. To enable students to establish a broad knowledge of the organization and components of a computer system. 2. To enable students to understand and apply assembly language programming. | 1. Upon completion of the subject, students will be able to: a. Given specifications of an application and the instruction set of the microprocessor, design a program in assembly language. b. Understand the principles of computer architecture and the operation of the microprocessor. c. Design and implement simple microcomputer systems. | **Alignment with Intended Learning Outcomes:**
|               |               |              |       |                         |            | a. To enable students to establish a broad knowledge of the organization and components of a computer system. 2. To enable students to understand and apply assembly language programming. | **Assessment Methods in Alignment with Intended Learning Outcomes:**
|               |               |              |       |                         |            | b. Understand the principles of computer architecture and the operation of the microprocessor. c. Design and implement simple microcomputer systems. |

#### Assessment Methodology

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures and Tutorials</td>
<td>60%</td>
<td>d</td>
</tr>
<tr>
<td>Experiments</td>
<td>10%</td>
<td>d</td>
</tr>
<tr>
<td>Class Test</td>
<td>15%</td>
<td>d</td>
</tr>
<tr>
<td>Project Work</td>
<td>10%</td>
<td>d</td>
</tr>
</tbody>
</table>

#### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact</th>
<th>Laboratory</th>
<th>Other student effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial 36 Hrs.</td>
<td>Laboratory</td>
<td>Self-study 45 Hrs.</td>
</tr>
<tr>
<td>Laboratory 12 Hrs.</td>
<td>Laboratory</td>
<td>Total student study effort 105 Hrs.</td>
</tr>
</tbody>
</table>

#### Reading List and References


**Laboratory Experiment:**
- **Publisher:** Perform basic input/output operations of a microcontroller by assembly language programming.
- **Speed control of a DC motor using a microcontroller and assembly language programming:**
  - **Reading List and References:**

---

**Subject Synopsis/Indicative Syllabus**

1. Processor operation and internal architecture: Operations of data registers, buses and control signals, instruction set, and memory organization.
3. Hardware and the computer system: System bus organization and interfacing techniques, CPU bus timing, system bus structure, design of input/output systems, and operations of LSI chips applied in a computer system including: interrupt controller, timer, UART and PIO.
4. Computer System Hardware and Operations

**Indicative Syllabus**

- **Assembly Language Programming**
  - **Coding and debugging**
    - Conversion of source programs to machine codes, use of software debugging monitor, compilation of assembly source program, linking of object files.
  - **Programming techniques**
    - Arithmetic manipulations, elementary programming constructs, parameter passing, data initialization.
  - **Laboratory Experiment:**
    - Performing basic input/output operations of a microcontroller by assembly language programming.
## Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE3131</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Telecommunication Fundamentals</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
Nil

### Objectives
1. To provide a broad treatment of the fundamentals of telecommunication systems.

### Intended Learning Outcomes
Upon completion of the subject, students will be able to:
- a. Understand the fundamentals of telecommunication systems.
- b. Analyze and evaluate different telecommunication systems.
- c. Learn from practice on important telecommunication techniques.

### Subject Synopsis/ Indicative Syllabus
1. **Introduction to telecommunication systems**: Overview of communication systems. Signal and noise in communication systems. Need for modulation. Key factors to evaluate the communication system performance.
6. **Brief introductions to optical fiber communications**: Light sources in optical communication systems. Light transmission in optical fibers. Light detection.

### Laboratory Experiments:
- Amplitude modulation (AM) System
- Pulse code modulation (PCM)

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

<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>²</td>
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<tr>
<td>Experiments</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>√</td>
</tr>
<tr>
<td>2. Test</td>
<td>25%</td>
<td>√</td>
</tr>
<tr>
<td>3. Laboratory</td>
<td>10%</td>
<td>√</td>
</tr>
<tr>
<td>4. Home work or in-class exercises</td>
<td>5%</td>
<td>√</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</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

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

<table>
<thead>
<tr>
<th>Other student study effort:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory preparation/report</td>
</tr>
<tr>
<td>Self-study</td>
</tr>
</tbody>
</table>

**Total student study effort**: 105 Hrs.

### Reading List and References

#### Reference books:
Subject Title: Electrical Services in Buildings

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 the design of electrical services in buildings.
3. To enable students to assess the suitability of different vertical transportation systems and fire fighting systems for a building.
4. To enable students to integrate the lighting requirements and operating characteristics of light sources to the design of interior lighting and exterior lighting.
5. To enable students to search for information in solving technical problems.
6. To enable students to plan efficient, safe and high quality distribution systems for domestic, commercial and industrial installations.
7. To enable students to examine the effectiveness evaluation of electrical services in buildings.
8. To enable students to develop independent design/planning and technical report writing skills pertinent to the field of electrical services in buildings.

Assessment Methods in Alignment with Intended Learning Outcomes:
- Examination: 60%
- Class Test/Quiz: 25%
- Mini-project & report: 15%

Total student study effort: 105 Hrs.

Textbooks and Reference books:

Case Study:
1. Distribution system design for tall buildings in Hong Kong
2. Co-ordination of various types of protective devices
3. Electrical power quality issues in building services
subject: subject code: ee3502

subject title: summer practical training

subject description:

reflection: students articulate their thinking about each piece in the portfolio, as well as on the entire portfolio. Through this process of reflection, students draw connections between their work experience and university-based learning, construct new knowledge, and become increasingly aware of themselves as learners.

placement within the iae (international association for the exchange of students for technical experience) programme for the exchange of students for technical experience.

through exploring work-based learning, students plan to connect their workplace experiences with their academic studies through personal and workplace applications, preparing themselves for the realities of workplaces and developing their generic skills in a real working setting. in addition to the orientation, students consult with teaching staff on a one-to-one basis.

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

a. develop and deliver a learning portfolio for presenting learning experiences and outcomes.

b. demonstrate the awareness of the practical contexts in engineering.

c. appreciate the work of others in an industrial/engineering working environment.

d. demonstrate good working practices to show a developing maturity and sense of responsibility.

inductive content:

in order to ensure that students have useful experience, the summer practical training must be suitably 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.

class contact:

the student works on his final-year degree project which involves an industrial partner or external client. the student is attached to a workplace abroad during the training.

the student must be advised for the workplace work experience to be an external organization.

the student must meet the specification required by the company client.

the student should have useful experience.

the student works on his final-year degree project which involves an industrial partner or external client.

the student is attached to a workplace abroad during the training.

the student must meet the specification required by the company client.

the student must have useful experience.

the student works on his final-year degree project which involves an industrial partner or external client.

the student is attached to a workplace abroad during the training.

the student must meet the specification required by the company client.

the student must have useful experience.

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the student works on his final-year degree project which involves an industrial partner or external client.

the student is attached to a workplace abroad during the training.

the student must meet the specification required by the company client.

the student must have useful experience.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4011</th>
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</thead>
<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>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: EE3051</td>
</tr>
</tbody>
</table>

Objectives

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

Intended Learning Outcomes

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

a. Analyse the stability, transient response and steady-state response of sampled-data systems.

b. Design digital controllers for sampled-data systems.

c. Analyse discrete-time signals and extract features using different digital signal processing techniques.

d. Design a range of FIR and IIR filters.

e. Write technical reports and present the findings.

Subject Synopsis/Indicative Syllabus


2. Digital control design: Translation of analogue design to digital design, Designs based on frequency response methods, Analytical design method.


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

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>
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</table>

Total 100%

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

Student Study Effort Expected

Class contact:
- Lecture/Tutorial: 38 Hrs.
- Laboratory: 8 Hrs.

Other student study effort:
- Laboratory preparation/report: 12 Hrs.
- Self-study: 47 Hrs.

Total student study effort: 105 Hrs.

Reading List and References

Reference books:

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Electrical Machines</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: EE3021

### Objectives

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

### 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

2. **Appreciation of machine design**: Appreciation of the economic and basic technological factors. Winding design.
3. **Synchronous machines**: Load characteristics of isolated generator. Linearized equations of small oscillations. Natural frequency. Transient and sub-transient reactance, field transient.
6. **Control of machines**: Open loop and closed loop control. Concept of vector control, torque control.
7. **Switched mode driven machines**: Power electronics interfacing to machines, switched reluctance machines, DC brushless machines.

### Laboratory/Mini-project Experiments

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

### Teaching/Learning Methodology

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

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

### Assessment Method in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed
1. Examination | 60% | √ |
2. Class Test | 24% | √ |
3. Mini-project & report | 16% | √ |

Total 100%

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

### Student Study Effort Expected

**Class contact:**

- Lecture/Tutorial: 36 Hrs.
- Laboratory/Mini-project: 12 Hrs.

Other student study effort:

- Mini-project/report: 12 Hrs.
- Self-study: 45 Hrs.

Total student study effort: 105 Hrs.

### Reading List and References

**Reference books:**
2. C.V. Jones, The Unified Theory of Electrical Machines, Butterworths, 1967
<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Credit Value</th>
<th>Level</th>
<th>Pre-requisite/Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE4031</td>
<td>Power Systems</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Objectives
- To provide students with a sound knowledge of modern power systems, which is essential for all electrical power engineers to understand power system operation and control. It also provides a continuation of study of power systems in level 3 subject EE3041 "Power transmission and Distribution" and lead to more advanced topics of power systems study in final year electives.

### Intended Learning Outcomes
1. Have acquired in-depth understanding of power system analysis, stability and operation.
2. Have acquired skills in identification, formulation and solution of power system analysis, operation and control problems.
3. Have acquired ability to evaluate the design and operational performance of basic power systems.
4. Have acquired communication skills with others in a team environment.
5. Have acquired skills in presentation and interpretation of experimental results and communicating in written form.

### Subject Synopsis/Indicative Syllabus
1. **Power system load flow**: Load flow concepts and formulation. Solution methods, including Gauss-Seidal, Newton-Raphson and Fast Decoupled Methods. Applications of load flow study to system operation.

### Teaching/Learning Methodology
- Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences of power system planning, operation and control problems with practical constraints and mini-projects are designed to supplement the theoretical materials so that the students are able to apply the theories learned in class to practical experiments.

### 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, e</td>
</tr>
<tr>
<td>Laboratory</td>
<td>15%</td>
<td>a</td>
</tr>
<tr>
<td>Mini-project &amp; report</td>
<td>15%</td>
<td>a</td>
</tr>
<tr>
<td>Class test</td>
<td>10%</td>
<td>a</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>a</td>
</tr>
</tbody>
</table>

This comprises an examination, class tests, written assignment in the form of reports and mini-projects. This is designed to ensure the student has achieved a sound knowledge of modern power systems, which is essential for all electrical power engineers to understand power system operation and control. The written reports assess the students’ ability to apply the theories learned in class to practical experiments, to interpret the experimental results obtained and to communicate in written form.

### Student Study Effort Expected
- **Class contact:**
  - Lecture/Tutorial: 38 Hrs.
  - Laboratory: 8 Hrs.
- **Other student study effort:**
  - Laboratory preparation/report: 12 Hrs.
  - Self-study: 47 Hrs.

**Total student study effort:** 105 Hrs.

### Reading List and References
- W.D. Stevenson, Elements of Power System Analysis, McGraw-Hill
- Wood & Wollenberg, Power Generation, Operation and Control, J. Wiley.
- Grainger & Stevenson, Power System Analysis, McGraw Hill

### Laboratory Experiments
- Power system load flow and security operation simulation of sample power systems.
- Transient stability assessment of power system.
**Subject Description Form**

**Subject Code**
EE4041

**Subject Title**
Engineering Project Management

**Credit Value**
3

**Level**
4

**Exclusions: LGT3019**

**Objectives**

1. To introduce the concept of modern engineering project management to students.
2. To integrate theory and practical knowledge of engineering project development and execution to students.
3. To apply the principle of engineering project management to practical examples.

**Intended Learning Outcomes**

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

- Understand engineering project management, development & execution stages.
- Analyze engineering project management skills.
- Be aware of new technologies development trends and environmental impacts of engineering projects.

**Subject Synopsis/Indicative Syllabus**

1. **Engineering project definitions and stages**: Characteristics of engineering projects. Life cycle models. Strategic and tactical issues. Factors affecting the success of project management.

**Teaching/Learning Methodology**

Lectures and tutorials are the primary means of conveying the basic concepts and theories. Practical applications are given through case studies and mini-project, in which the students are encouraged to develop critical and analytical thinking to solve problems.

**Teaching/Learning Methodology Outcomes**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Mini-project and report</th>
</tr>
</thead>
<tbody>
<tr>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

**Assessment**

- **Examination**: 60%
- **Class tests**: 20%
- **Mini-project and report**: 20%

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

**Total student study effort**: 105 Hrs.

**Reading List and References**


**Student Study Effort Expected**

- **Class contact**: Lecture/Tutorial 42 Hrs.
- **Other student study effort**: Self-study 50 Hrs.
- **Mini-project and report**: 13 Hrs.
At the middle of the project period, each student has to submit an Interim Report to summarise their progress to date. This gives the supervisor a more formal opportunity to discuss the student's problems and difficulties. Problem areas are brought to the notice of the subject coordinator by supervisors.

The purpose of the Interim Report is to:
- assess the student's progress;
- give the student a chance to discuss their problems and difficulties with their supervisor;
- provide an opportunity for the supervisor to discuss the student's progress with the subject coordinator.

The Interim Report should be submitted to the subject coordinator by the end of the project period.

The Interim Report should include:
- subject code;
- project title;
- choice of project;
- personal details of the student;
- project progress;
- problems and difficulties;
- comments from the supervisor;
- signature of the student and the supervisor.

The Interim Report should be submitted in triplicate to the subject coordinator.

At the end of the project period, each project is assessed by an Assessment Panel of three members, including a Chairman, an independent examiner and the project Supervisor. The Chairman and the independent examiner should be independent of the technical knowledge of the subject area, so as to form an independent opinion of the technical merit of the project and to independently assess achievements.

The Assessment Panel will consider, normally with equal weight, the following aspects:
- a. Intellectual achievement:
  - originality of work;
  - quality and significance of the project;
  - number of publications;
  - variety of experiences.
- b. Departmental achievement:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- c. Student achievement:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- d. Project management:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- e. Overall assessment:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.

In assessing the project, the panel will consider, normally with equal weight, the following aspects:
- a. Intellectual achievement:
  - originality of work;
  - quality and significance of the project;
  - number of publications;
  - variety of experiences.
- b. Departmental achievement:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- c. Student achievement:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- d. Project management:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- e. Overall assessment:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.

The Assessment Panel will then reach their decision after:
- listening to the student's presentation (can be a video clip);
- examining him orally on his work, and
- seeing a demonstration of the project's outcome (can be a video clip).

In assessing the project, the panel will consider, normally with equal weight, the following aspects:
- a. Intellectual achievement:
  - originality of work;
  - quality and significance of the project;
  - number of publications;
  - variety of experiences.
- b. Departmental achievement:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- c. Student achievement:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- d. Project management:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.
- e. Overall assessment:
  - number of students in the project;
  - number of projects in the Department;
  - number of projects in the current year.

If no consensus arises as to the overall grade to be awarded to the project, each panel member (i.e. the Chairman, the project supervisor and the independent examiner) will independently award grades to the project on an assessment form with written justification for their grades. A grade from the Assessment Panel will then be derived.
The final project report should contain the work carried out by the student in the project. The students are advised to form a framework for the report first, then proceed to the formation of the titles of the chapters. The titles and structure of the sections may be further examined and approved by the Assessment Panel. The final report is to be submitted at the outset of the last week of the project. The content of the final report includes:

A. Aims of the project (especially any change from the original aims).
B. Problem definition.
C. Methodology, system design and the block diagram of the system, plus some brief descriptions on the theory of the approach/methodology.
D. Time table / schedule of your work of the entire project.
E. Students are also required to submit an interim report at about the middle of the project duration. This will contribute to 15% of the final grade.

The interim report should include:

A. Aims of the project (especially any change from the original aims).
B. Brief outline of the theory.
C. Work that has been carried out up to the date. 
D. Figures and tables should be included in the progress report.
E. The system design and the block diagram of the system, plus some brief descriptions on the theory of the approach/methodology.
F. Difficulties encountered and the measures taken to solve them.

The Final Report

The final project report should contain the work carried out by the student in the project. The students are advised to form a framework for the report first, then proceed to the formation of the titles of the chapters. The titles and structure of the sections may be further examined and approved by the Assessment Panel. The final report is to be submitted at the outset of the last week of the project. The content of the final report includes:

A. Aims of the project (especially any change from the original aims).
B. Problem definition.
C. Methodology, system design and the block diagram of the system, plus some brief descriptions on the theory of the approach/methodology.
D. Time table / schedule of your work of the entire project.
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C. Methodology, system design and the block diagram of the system, plus some brief descriptions on the theory of the approach/methodology.
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The interim report should include:

A. Aims of the project (especially any change from the original aims).
B. Brief outline of the theory.
C. Work that has been carried out up to the date. 
D. Figures and tables should be included in the progress report.
E. The system design and the block diagram of the system, plus some brief descriptions on the theory of the approach/methodology.
F. Difficulties encountered and the measures taken to solve them.
3. Technical Application
4. Success of the demonstration.
5. Language competence in presentation

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

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

### Teaching/Learning Methodology

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

### Teaching/Learning Methodology Outcomes

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion with the project Supervisor</td>
<td>a b c d e f</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>15%</td>
<td>√ √ √</td>
</tr>
<tr>
<td>3. Final report</td>
<td>50%</td>
<td>√ √ √ √ √ √ √</td>
</tr>
<tr>
<td>4. Presentation and demonstration</td>
<td>30%</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: 5 Hrs.
  - Individual Discussions with supervisor: ~15 Hrs.

- **Other student study effort:**
  - Information search, self study, execution of the project, report writing, preparation of presentation: ~240 Hrs.

Total student study effort: 260 Hrs.

### Reading List and References

Nil
**Subject Description Form**

**Subject Code**  
EE4211

**Subject Title**  
Advanced Power Electronics

**Credit Value**  
3

**Level**  
4

**Pre-requisite/Co-requisite/Exclusion**  
Pre-requisite: EE3031

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

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

- Have acquired a good understanding of basic switched-mode DC/DC topologies, operation, performance and modelling.
- Have acquired a basic understanding of resonant converter and its method of loss reduction.
- Be able to apply the switched mode techniques to inverters.
- Be able to perform study on power electronics circuit simulation.
- Be aware of the impact of electromagnetic interference (EMI) and the reduction of EMI using power electronics techniques.
- Be able to present results of study in the form of simulation, design equation and basic model and work independently and in teams when conducting laboratory investigations and power electronics circuit design.

### Subject Synopsis/Indicative Syllabus
1. **Pulse-Width-Modulated DC/DC converters**: Basic topologies and higher order converters, transformer-isolated topologies, snubbers, discontinuous conduction modes of operation, ripple analysis.
2. **Resonant-Mode DC/DC converters**: Classification, zero-current switching and zero-voltage switching techniques, quasi-resonant converters, resonant transition converters.
3. **Control and CAD for power electronics**: Small-signal model and control, analog and digital circuit simulation for power electronics, simulation techniques.
5. **Electromagnetic interference**: Generation of EMI, power factor, switched-mode EMI filter, International Standards, Reduction of EMI.

**Laboratory Experiments**
- Switched-mode power converters with parasitic components and snubbers.
- Resonant converters
- Mixed-mode circuit simulation
- EMC/EMI setup and measurement

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

### Laboratory Works
Laboratory works is an essential ingredient of this subject:
1. To supplement the lecturing materials.
2. To provide power converter design experience for the students.
3. To provide deep understanding of various power converter design aspects.
4. To enable students to organise principle and challenge ideas.

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

Total 100%

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

### Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture/Tutorial</td>
<td>38 Hrs.</td>
</tr>
<tr>
<td>Laboratory</td>
<td>8 Hrs.</td>
</tr>
</tbody>
</table>

Other student study effort:
- Laboratory preparation/report | 12 Hrs. |
- Self-study | 47 Hrs. |

Total student study effort | 105 Hrs. |

### Reading List and References
2. K.W.E.Chow, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

Textbooks:

Reference books:
## 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>EE4221</td>
<td>Applied Digital Control</td>
<td>3</td>
<td>4</td>
<td>Pre-requisite: EE3051</td>
</tr>
</tbody>
</table>

### 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.

### Intended Learning Outcomes

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

- Understand the concepts of reduced-order modelling, deadbeat control algorithm, system identification and adaptive control.
- Understand the notions of offline and online system identification.
- Design conventional and adaptive controllers based on user specifications.
- Use CAD package for design and simulation.
- Effectively communicate experimental results in written and oral reports.

### Subject Synopsis/ Indicative Syllabus

1. **Process control**
   - Direct digital control algorithms: Modified z-transform, PID algorithm, Cascade control, Fuzzy-settling time control, Dead-time compensation, Internal model control.

2. **System identification**
   - Correlation approach: Correlation method, Identification of process systems, Stage-time identification, Recursive least squares, Recursive least-squares techniques.

3. **Self-tuning control**
   - Introduction to adaptive control, Self-tuning controller.

### Laboratory Experiment:

There will be three laboratory experiments on the topics of reduced-order modelling, 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.

### Assessment Methods in Alignment with Intended Learning Outcomes

- **Examination**: 60% of the final grade
- **Class test**: 20% of the final grade
- **Laboratory and case study reports**: 20% of the final grade

### Teaching/Learning Methodology

- **Lectures**: The primary means of conveying the basic concepts and theories. The students are encouraged to take extra readings and look for relevant information.
- **Tutorials**: Designed to supplement the lecturing materials. The students are encouraged to take extra readings and look for relevant information.
- **Experiments and case study**: Designed to complement the teaching and learning process.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>%</th>
<th>Intended subject learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>60%</td>
<td>a. b. c. d.</td>
</tr>
<tr>
<td>Class test</td>
<td>20%</td>
<td>e.</td>
</tr>
<tr>
<td>Laboratory</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

### Intended subject learning outcomes to be assessed

- **Examination**: 60% of the final grade
- **Class test**: 20% of the final grade
- **Laboratory and case study reports**: 20% of the final grade

### Student Study Effort Expected

- **Class contact**:
  - Lecture/Tutorial: 38 Hrs.
  - Laboratory: 8 Hrs.

- **Other student study effort**:
  - Laboratory preparation/report: 12 Hrs.
  - Case study preparation/report: 12 Hrs.
  - Self-study: 35 Hrs.

- **Total student study effort**: 105 Hrs.

### Reading List and References

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Electric Traction and Drives</th>
<th>3</th>
<th>Pre-requisite/Co-requisite</th>
<th>Indicative Syllabus</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL4251</td>
<td>Electric Traction and Drives</td>
<td>3</td>
<td>Pre-requisite/Exclusion</td>
<td>Lab exercises on traction power load flow simulation</td>
</tr>
</tbody>
</table>

#### Laboratory Experiments:
- Traction power load flow simulation
- Case Study: HK MTR systems

#### Case Study: Electric Traction and Drives
- Video clips together with computer animations are used to supplement conventional lectures.
- Teaching/Learning Methodology
  - 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>Teaching Methodology</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>1. Outline the operation principles of the sub-systems and their components in an electrified railway system.</td>
</tr>
<tr>
<td>Tutorials</td>
<td>2. Elaborate on the impacts of the performance and properties of the sub-systems to the overall system safety and reliability.</td>
</tr>
<tr>
<td>Experiments</td>
<td>3. Engage in self-learning on latest technologies in railway projects, as well as the latest research in railway engineering.</td>
</tr>
</tbody>
</table>

#### Assessment Methods

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures and Tutorials</td>
<td>1. Mini-project (group project) 20%</td>
</tr>
<tr>
<td>Experiments</td>
<td>2. Tests 20%</td>
</tr>
<tr>
<td>Examinations</td>
<td>3. Examination 60%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### Intended Learning Outcomes

- Upon completion of the subject, students will be able to:
  1. Outline the operation principles of the sub-systems and their components in an electrified railway system.
  2. Elaborate on the impacts of the performance and properties of the sub-systems to the overall system safety and reliability.

#### Subject Synopsis/Indicative Syllabus

**1. Introduction**
- The trends of modernization of railway systems.
- Technical and design aspects of railway electrification.
- Fundamentals of design and construction of rolling stock and electrification systems.

**2. D.C. drives**
- Single-phase half-wave rectifier drives.
- Digital control of D.C. drives.

**3. A.C. drives**
- Performance characteristics of induction motors.
- VVVF control: mode transition, pulse dropping; CVVF control; Vector Control.

**4. Railway Signalling**
- Basic functions.
- Fixed and moving block signalling schemes.
- Route and cab signalling principles.

**5. Electromagnetic compatibility**
- Track circuit interference.
- Substation harmonics.

**6. Future trends of transit systems**
- Guided vehicles under computer control.
- Magnetic levitation and suspension techniques.
- Advanced automatic train control.

#### Reading List and References

4. Selected papers from IEE Proceedings – Electric Power Applications

**Student Study Effort Expected**

- Lecture/Tutorial 39 Hrs.
- Seminar 6 Hrs.
- Assignment and self-studies 60 Hrs.
- Total student study effort 105 Hrs.
Subject Description Form

Subject Code: EE4261

Subject Title: Fibre Optics

Credit Value: 3

Level: 4

Pre-requisite/Co-requisite/Exclusion: Pre-requisite: EE3131

Objectives:
1. To introduce students the physical laws that govern the behaviour of fibre-optics components.
2. To give students an understanding of the principles of fibre-optic sensing and optical fibre communications.
3. To equip students with the knowledge to design simple fibre-optics sensor systems.

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

a. Understand the basics of generation, modulation and detection of light signals, and light transmission in optical fibres.
b. Understand the functions and test the performance of various fibre-optic components and sub-systems.
c. Design simple optical fibre sensors and communication systems considering the performance of the fibres (e.g., dispersion, loss) and component constraints.

Subject Synopsis/Indicative Syllabus:
10. Applications of fibre optics in electrical engineering: Optical groundwire. Enhancing power system telecommunications and control with overhead and underground fibre optic cables. Fibre optic sensors for measuring voltage, current, temperature. Location of cable faults by using optical fibre sensing.

Laboratory Experiments/Demonstrations:
Insertion loss measurement of optical fibres using optical power meters and optical spectrum analyzers.

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% | a b c
2. Tests | 28% | √ √√
3. Laboratory experiment report | 5% | √ √√
4. Mini-projects | 5% | √ √ √
5. Examination | 60% | √ √ √
Total | 100% |

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

Student Study Effort Expected

Class contact: Lecture/Tutorial 36 Hrs.

Laboratory 12 Hrs.

Other student study effort:

Mini-projects 20 Hrs.

Self-study 37 hrs.

Total student study effort 105 Hrs.

Reading List and References

5. J. Hecht, Understanding Fiber Optics, 5th edn., Prentice Hall, 2006
# Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4281</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Industrial Computer Applications</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
1. To introduce the applications of computing techniques in solving industrial problems and the following topics are included: Computer process control; Industrial instrumentation and systems; Image processing; Multimedia concepts.

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

- a. Design and develop digital controllers.
- b. Write ladder logic for simple PLC applications.
- c. Understand the use of industrial networks.
- d. Apply image processing techniques in industrial automation.

## Subject Synopsis/Indicative Syllabus

1. **Computer process control**: Modelling of the computer process control system, practical approaches to digital control implementation, PLC and microcomputer-based control systems.
2. **Intelligent instrumentation and systems**: Embedded microcontrollers, industrial process controllers, applications of distributed digital control algorithms, industrial networks and SCADA system.
3. **Image processing**: Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation.
4. **Multimedia concepts and applications**: Multimedia fundamentals, image compression, video compression, hardware peripherals and software tools.

## Laboratory Experiment:
- PC based digital controller for temperature control
- Power failure monitoring using embedded controller
- Sequential control using PLC
- Automatic meter reading using computer vision

## Teaching/Learning Methodology
Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through mini-projects, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.

### Teaching/Learning Methodology Outcomes

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</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>
</tr>
<tr>
<td>Tutorial</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Experiment</td>
<td>✓</td>
<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. In-class Test (x2)</td>
<td>20%</td>
<td>√ √ √ √</td>
</tr>
<tr>
<td>3. Mini-project Report</td>
<td>10%</td>
<td>√ √</td>
</tr>
<tr>
<td>4. Mini-project Demo/Presentation</td>
<td>10%</td>
<td>√ √</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

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

## Student Study Effort Expected

- **Class contact**:
  - Lecture/Tutorial: 36 Hrs.
  - Laboratory (mini-project): 12 Hrs.

- **Other student study effort**:
  - Mini-project report and preparation: 12 Hrs.
  - Self-study: 45 Hrs.

**Total student study effort**: 105 Hrs.

## Reading List and References

### Subject Description Form

#### Subject: EE4291  Intelligent Buildings

**Teaching/Learning Methodology**

- **Lectures**
  - To introduce new concepts and knowledge to the students.
  - To explain difficult ideas and concepts of the subject.
  - To motivate and stimulate students' interest.
  - To provide an opportunity for student-teacher interaction.
- **Tutorials**
  - To supplement the lecturing materials.
  - To add real experience for the students.
  - To provide deep understanding of the subject.
  - To enable students to organize principles and challenge ideas.
- **Mini-project works/Assignments**
  - To supplement the lecturing materials.
  - To add real experience for the students.
  - To provide deep understanding of the subject.
  - To enable students to organize principles and challenge ideas.

**Assessment Methods in Achieving the Intended Learning Outcomes**

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Assessment Methods</th>
<th>% Weighting</th>
<th>Intended Subject Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>Examination</td>
<td>60%</td>
<td>1. To introduce new concepts and knowledge to the students.</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
<td>40%</td>
<td>2. To explain difficult ideas and concepts of the subject.</td>
</tr>
<tr>
<td>Tutorials</td>
<td>Examination</td>
<td>50%</td>
<td>3. To motivate and stimulate students' interest.</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
<td>50%</td>
<td>4. To provide an opportunity for student-teacher interaction.</td>
</tr>
<tr>
<td>Mini-project works/Assignments</td>
<td>Examination</td>
<td>50%</td>
<td>5. To supplement the lecturing materials.</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
<td>50%</td>
<td>6. To add real experience for the students.</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
<td>50%</td>
<td>7. To provide deep understanding of the subject.</td>
</tr>
<tr>
<td></td>
<td>Examination</td>
<td>50%</td>
<td>8. To enable students to organize principles and challenge ideas.</td>
</tr>
</tbody>
</table>

**Subject Synopsis/Indicative Syllabus**

- **Intended Learning Outcomes**
  - Upon completion of the subject, students will be able to:
    1. Describe general design concept and principles of communication systems in intelligent buildings, such as voice communication systems, video communication systems, LAN, wireless LAN, mobile phone systems, data networks, office automation systems, etc.
    2. Describe the general principle, concepts and system configurations of structure cabling, including the features, characteristics and applications of different categories of cables.
    3. Given a technical topic, carry out literature search and present the findings in a technical report.

**Reading List and References**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE4301</th>
</tr>
</thead>
<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>
<td>4</td>
</tr>
<tr>
<td>Pre-requisite/Co-requisite/Exclusion</td>
<td>Pre-requisite: EE3041</td>
</tr>
</tbody>
</table>

### Objectives

1. To introduce students to 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.
3. To describe the communication methods used for protective relays in a power system.
4. To explain the working principle of harmonic bias used in transformar differential protection.
5. To explain the working principle of the Fourier algorithm in digital relay technology.

### Intended Learning Outcomes

Upon completion of the subject, students will:

a. Have acquired a good understanding of the design philosophy and working principle of different protective schemes.

b. Be able to interpret nameplate data and able to select the most appropriate transducers for various protection schemes.

c. Be able to carry out tests and analyse the performance of transducers in the analysis, comparison, and interpretation of various power system protection schemes.

d. Have the ability to apply and adapt knowledge of mathematics, engineering principles, and technology in the analysis, comparison, and interpretation of various power system protection schemes.

### Subject Synopsis/Indicative Syllabus


2. **Transducers**: Input sources for protection systems. 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

1. **Fault simulation and simulation of digital relay in EHV transmission line**: Develop a model of an EHV transmission line and simulate faults at various locations.

2. **Case study**: Explain how source impedance and fault location affect the performance of protection relays.

3. **Laboratory equipment and simulation software**: Use laboratory equipment and simulation software to perform experiments on protection relays.

4. **Digital relay architecture**: Understand the architecture of digital relaying systems and their components.

5. **Protection relays in practice**: Apply the knowledge gained in the laboratory to real-world protection relay systems.
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 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 are also asked 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>
</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>√ 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></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

Class contact:
- Lecture/Tutorial 38 Hrs.
- Laboratory 8 Hrs.

Other student study effort:
- Laboratory preparation/report 14 Hrs.
- Self-study 45 Hrs.

Total student study effort 105 Hrs.

Reading List and References

Reference books:
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Intended Syllabus/Indicative Sylbnum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To apply genetic algorithms to different Electrical Engineering problems.</td>
</tr>
</tbody>
</table>

### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Level</th>
<th>Pre-requisite/ Co-requisite/ Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Nil</td>
</tr>
</tbody>
</table>

| Credit Value | 4 |

### Assessment of Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment method/ticks</th>
<th>%</th>
<th>Intended student learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Mini-project Report and Presentation</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

### Teaching/Learning Methodology Outcomes

<table>
<thead>
<tr>
<th>Lecture/Tutorial</th>
<th>Mini-project</th>
<th>Self-study</th>
<th>Total</th>
<th>Total student effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 Hrs.</td>
<td>12 Hrs.</td>
<td>45 Hrs.</td>
<td>63 Hrs.</td>
<td>105 Hrs.</td>
</tr>
</tbody>
</table>

### Intended Student Effort

- Lecture 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.
- Class contact: 36 Hrs., Laboratory preparation/report: 12 Hrs., Self-study: 45 Hrs., Total student study effort: 105 Hrs.

### Reading List and References

- Reference books:
  4. L.I. Tsai, Intelligent Engineering Applications in Power Systems, Prentice Hall, 1999
  5. L.I. Tsai, Efficient Power System Applications of Artificial Intelligence, Prentice Hall, 1999

### Subject Synopsis/Indicative Syllabus


### Case Study

- Performance of Genetic Algorithms on solving different functions such as De Jong function and Cauchy problem.
- To investigate the effects of the momentum acceleration technique on the performance of genetic algorithms.
Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>EE501</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Alternative Energy Technologies</td>
</tr>
<tr>
<td>Credit Value</td>
<td>3</td>
</tr>
<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 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. Carry out literature search and report the findings in a presentation, when given a technical topic.

Subject Synopsis/ Indicative Syllabus

1. Energy resources and type; Renewable and non-renewable energy resources. World potential and trends. Environmental effects. Alternative energy types and present developments. Role and importance of alternative energy.

Teaching/Learning Methodology

- Lectures and tutorials are effective teaching methods: 40%
- To introduce new concepts and knowledge to the students: 40%
- To explain difficult ideas and concepts of the subject: 40%
- To allow students to feedback on aspects related to their learning: 40%
- Mini-project works/Assignments are essential ingredients of this subject: 40%
- To enable students to organise principles and challenge ideas: 40%

Case studies:

- To give real example for some of the concept presented in the lectures: 40%
- To explain some practical considerations when applying technologies in real projects: 40%
- To motivate and stimulate students interest: 40%

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.

Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</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>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case studies</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini-project/Assignments/Presentations</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed |
---|---|---|
1. Class test | 20% | ✓ ✓ ✓ ✓ ✓ |
2. Mini-project/Assignments/ Presentations | 20% | ✓ ✓ ✓ ✓ |
3. Examination | 60% | ✓ ✓ ✓ ✓ |
Total | 100% | ✓ ✓ ✓ ✓ |

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

Student Study Effort Expected

- Class contact: Lecture/Tutorial: 33 Hrs.
- Seminar/Case studies: 9 Hrs.
- Other student study effort: Mini-project/Assignments: 21 Hrs.
- Self-study: 42 Hrs.
- Total student study effort: 105 Hrs.

Reading List and References

- J. Twidell, Renewable Energy Sources, E&F N Spon
- L.L. Frey, Wind Energy Conversion Systems, Prenium Hall
- Distant, Total Energy, HarperCollins
- Geothermal Energy Resources for Developing Countries, A.A. Balkema Publishers, 2002
- J. Cruz, Ocean Wave Energy: Current Status and Future Perspectives, Springer-Verlag 2008

References:

1. J. Twidell, Renewable Energy Sources, E&F N Spon
Subject Description Form

Subject Code: EE502
Subject Title: Modern Protection Methods
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To introduce the concept of modern power system protection to students.
2. To integrate theory and practical knowledge of power system protection.
3. To understand the working principle of power system protection.
4. To master the analytical techniques.
5. To apply protective relaying in power systems.

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

a. Master the concept and philosophy on power system protection.
b. Apply and adapt applications of mathematics, engineering skills in the analysis, comparison, interpretation of various protection schemes in the power system.
c. Integrate and justify techniques to be used in the planning and operation of power system protection.
d. Solve technical problems for power system protection.

Subject Synopsis/Indicative Syllabus:
2. Fault and transient in power systems: Fault transient behaviour of power system. The use of Electro-Magnetic Transient Program (EMTP) and MATLAB software to simulate the transient behaviour of power system.
3. Current and voltage transducers: Requirement of transducers for measurement and protection. Their features and characteristics under steady state and transient conditions.
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 the assignments, in which the students are expected to integrate and justify modern techniques to be used in the planning and operation of power system protection with critical and analytical thinking. Case studies are designed to supplement the lecturing materials so that the students are encouraged to take extra readings and to look for relevant information.

Assessment Methods in Alignment with Intended Learning Outcomes:
Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed
--- | --- | ---
1. Examination | 60% | a. b. c. d.
2. Class Test | 25% | √ √ √ √
3. Assignments | 15% | √
Total | 100% |

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

Student Study Effort Expected:
- Lecture/Tutorial: 36 Hrs.
- Laboratory: 12 Hrs.
- Self-study: 45 Hrs.
Total student study effort: 105 Hrs.

Reading List and References:
1. L. Hewitson, M. Brown and R. Balakrishnan, Practical Power System Protection, Newnes, 2005
7. Advances in Microprocessor Based Protection and Communication – IEEE Tutorial Course, Publication No. 97TP120-0, 1997
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Level</th>
<th>Credit Value</th>
<th>Pre-requisite/Exclusion</th>
<th>Objectives</th>
<th>Intended Learning Outcomes</th>
<th>Reading List and References</th>
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<tbody>
<tr>
<td>EE505</td>
<td>Power System Control &amp; Operation</td>
<td>3</td>
<td>5</td>
<td>Nil</td>
<td>1. To introduce the concept of modern power system control &amp; operation to students; 2. To integrate theory and practical knowledge of power system control &amp; operation; 3. To understand the working principle of power system control and operation; 4. To apply the theory in power system control &amp; operation; and 5. To understand the industrial practice and tools used in power system control and operations</td>
<td>- Upon completion of the subject, students will be able to: a. Analyse power system security control &amp; operation; b. Analyse interconnected power system interconnection and economic operation; c. Analyse interconnected power system interconnection and economic operation; d. Be aware of new technologies development trends and environmental impacts of modern power system control and operation; and e. Write clear, concise, and precise reports.</td>
<td>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</td>
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### Assessment Methods in Relation with Intended Learning Outcomes

<table>
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<td>Exam / test</td>
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<tr>
<td>Mini project and report</td>
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### Teaching/Learning Methodology

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<th>Lectures</th>
<th>Tutorials</th>
<th>Reports</th>
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<td>Reports</td>
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### Subject Synopsis/Indicative Syllabus

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## Subject Description Form

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<tr>
<td>Subject Title</td>
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<td>Credit Value</td>
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<td>Level</td>
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<td>Pre-requisite/Co-requisite/Exclusion</td>
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</table>

### Objectives

1. To provide students with knowledge to understand the techniques of analysis and design pertaining to high voltage engineering including causes and manner of insulation failure and problems encountered in practice.

### Intended Learning Outcomes

1. Be aware of the design features of high voltage equipment so as to understand the application of common high voltage practices in the industry.
2. Be aware of the breakdown phenomena and applications: vacuum insulators and break-down, breakdown in commercial liquids, purifications, and breakdown in composite insulation.
4. Be aware of the breakdown in solid insulation: breakdown due to treeing, breakdown due to surface flashover, breakdown due to surface tracking, breakdown in composite insulation.
5. Be aware of the partial discharges: classification of partial discharges by origin, partial discharge measurements, partial discharges in solid insulation, partial discharges in gas and oil, partial discharges in composite insulation.
6. Be aware of the high-voltage equipment: applications of the above sections to the design of high-voltage equipment, breakdown in solid insulation, partial discharges in composite insulation, and high-voltage equipment.
7. Be aware of the high-voltage applications: Classification of partial discharges by their effects, partial discharges and partial discharges in composite insulation, partial discharges in high-voltage equipment, partial discharges in solid insulation, partial discharges in gas and oil, partial discharges in composite insulation, partial discharges in high-voltage equipment.
8. Be aware of the high-voltage applications: Classification of partial discharges by their effects, partial discharges and partial discharges in composite insulation, partial discharges in high-voltage equipment, partial discharges in solid insulation, partial discharges in gas and oil, partial discharges in composite insulation, partial discharges in high-voltage equipment.
9. Be aware of the high-voltage applications: Classification of partial discharges by their effects, partial discharges and partial discharges in composite insulation, partial discharges in high-voltage equipment, partial discharges in solid insulation, partial discharges in gas and oil, partial discharges in composite insulation, partial discharges in high-voltage equipment.
10. Be aware of the high-voltage applications: Classification of partial discharges by their effects, partial discharges and partial discharges in composite insulation, partial discharges in high-voltage equipment, partial discharges in solid insulation, partial discharges in gas and oil, partial discharges in composite insulation, partial discharges in high-voltage equipment.
11. Be aware of the high-voltage applications: Classification of partial discharges by their effects, partial discharges and partial discharges in composite insulation, partial discharges in high-voltage equipment, partial discharges in solid insulation, partial discharges in gas and oil, partial discharges in composite insulation, partial discharges in high-voltage equipment.

### Assessment Methodology

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<th>Case study</th>
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<td>Total</td>
<td>12 Hrs.</td>
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</table>

### Reading List and References

1. M.S. Naidu and V. Kamaraju, High Voltage Engineering, 2004
4. T.K. Her, J-E. McDermott, Electrostatic Discharge Control, 1980
5. W. Bartknecht, Dust Explosions, 1989
7. J.S.T. Looms, Insulators for High Voltage, 1988
# Subject Title

**EE510**

**Subject Description Form**

## Teaching Learning Methodology

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## Assessment Methods in Relation with Intended Learning Outcomes

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## Intended Learning Outcomes

1. To provide students with a comprehensive understanding of traction systems from a systems viewpoint.
2. To enable students to understand the implications of design of traction and signalling systems on railway operations and traffic control.
3. To introduce the quality indicators of railway operations and their relationships with the performance of traction drives, power supply and signalling systems.
4. To analyse the operation principles of the sub-systems in an electrified railway system in the state-of-the-art approaches and criticise their advantages and limitations with reference to practical railway lines.
5. To identify the necessary future technologies to improve the services quality in railway systems at the advanced level of study.

## Intended Subject Learning Outcomes to be assessed

- **Methods in**
  - Mini-project (group project) 20%
  - Tests 20%
  - Examination 60%

## Subject Synopsis/Indicative Syllabus

1. **General aspects of traction system**
   - Load flow analysis in traction power system
   - Inductive power conversion and energy management systems
   - Active and passive power filters
   - Harmonic voltages and currents in traction systems
   - Voltage dip and sag in power systems
   - Multi-source power systems
   - Filter design and performance

2. **Traction drives and railway signalling**
   - Single-phase drives; chopper drives; inverter drives
   - Requirement of Inverter substations
   - Principles of powering and regenerative braking; blended regenerative and accumulative brake control
   - Induction motor control systems
   - PWM inverters for AC drives

3. **Computer-aided design and operation of traction systems**
   - Elements of design and analysis of traction systems: cost/benefit analysis
   - Digital simulation of AC/DC power converter drives and traction equipment
   - Computer-based design of block layouts and track circuits
   - Power-factor, performance for optimum headway, schedule speed and energy consumption
   - Use of expert systems for system control and train scheduling
   - Operation of single-sided linear induction motors

4. **Maglev and linear drives**
   - Principle and limitations of electromagnetic techniques of suspension and levitation
   - Levitation using permanent magnet, superconducting magnets and eddy currents induced by mains
   - Operation of single-sided linear induction motors
   - Application of linear drives in high speed transit systems

## Reading List and References

5. Selected papers from IEE Proceedings – Electric Power Applications

## Literature/Experiment

- Textbooks:
  - Selected papers from IEE Proceedings – Electric Power Applications

## Student Effort Expected

- Lecture/Tutorial: 33 Hrs.
- Invited lecture: 3 Hrs.
- Laboratory: 6 Hrs.
- Assignment and self-studies: 63 Hrs.
- Total student study effort: 105 Hrs.
# Subject Description Form

**Subject Code**: EE512  
**Subject Title**: Electric Vehicles  
**Credit Value**: 3  
**Level**: 5  
**Pre-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.** Conduct a systematic analysis of the drivetrain and vehicle mechanics given the pertinent technical data.
- **c.** Understand various underpinning technologies for modern EVs, including electric motor drives, energy storage, batteries, charging methods, infrastructure and auxiliary systems.
- **d.** Explain the emerging technologies such as hybrid electric vehicles (HEVs), fuel cell electric vehicles (FEVs) and energy storage methods.
- **e.** Present the results of study in the form of written reports and oral presentations.

## Subject Synopsis/Indicative Syllabus
1. **Introduction to electric vehicles**: Historical perspective. EV advantages and impacts. EV market and promotion: infrastructure needs, legislation and regulation, standardization.
2. **Electric vehicle (EV) design options**: EV configurations: fixed vs. variable gearing, single- vs. multiple-motor drive, in-wheel drives. EV parameters, driving cycles and performance specifications. Choice of system voltage levels: electrical safety and protection.
3. **Vehicle dynamics and motor drives**: Road load, vehicle dynamics; effect of energy storage and motor drives technologies on vehicle performance and efficiency. System integration of the EV drivetrain system.

## Teaching/Learning Methodology
- **Lectures**
- **Tutorials**
- **Assignment and oral presentation**

| Teaching/Learning Methodology | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Lectures                     | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tutorials                    | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Assignment and oral presentation | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Assessment Methods
- **Examinations**: 100%
  - **Examination weightings**: 60% (a), 20% (b), 10% (c), 5% (d)
  - **Examination tasks**: 100%

## Student Study Effort Expected
- **Class contact**:
  - Lecture: 36 Hrs.
  - Tutorial/Student presentation: 6 Hrs.
- **Other student study effort**:
  - Self-study and revision: 55 Hrs.
  - Assignment: 8 Hrs.
- **Total student study effort**: 105 Hrs.

## Assessment Methods in Alignment with Intended Outcomes

| Specific assessment methods/tasks | % weightings | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z |
| Examination                      | 60%          | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Exam 2                          | 20%          | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Term paper                      | 10%          | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Oral presentation               | 5%           | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total                            | 100%         | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Reading List and References
- **Reference books**:
  4. Selected papers from relevant journals and conference proceedings, such as EVS AI - 45 AI - 45
### Subject Description Form

**Subject Code**: EE514  
**Subject Title**: Real Time Computing  
**Credit Value**: 3  
**Level**: 5  
**Pre-requisite/Exclusion**: Nil

#### Objectives
- To understand the properties of real time languages, operating systems, associated hardware.
- To apply real time system software in engineering applications.
- To test and verify real time systems and software.

#### Intended Learning Outcomes
- Upon completion of the subject, students will be able to:
  a. To appreciate the important issues in real time computing systems, and their relations in engineering applications.
  b. To identify and understand the real time issues in a computing OS system, and their solutions.
  c. Communicate effectively during discussions and presentations.
  d. Have the ability to work independently, and in teams when conducting laboratory work.

#### Subject Synopsis/Indicative Syllabus
1. **Real time computing systems concepts**
   - Characteristics of Real Time Computing.
   - Properties and Speed Requirements of Real Time Systems.
   - Synchronous Real Time Systems: Polled, Main Polled Loop with Interrupts, Cyclic Schedulers.
   - Process Scheduling Example: a Real Time Control System in Coal-Fired Power Plant.

2. **Real time systems design issues**
   - Time Handling: Representation of Time, Time constraints, Scheduling policies, Time Service and Synchronization, the Master-Slave algorithm and the Time Distributed Clock algorithm.
   - Structured Design Approaches: Event Based Model, Process-Based Model.
   - Real Time System Modelling Example: Autonomous Robot Control.

3. **Real time software**
   - Real Time Programming Discipline, Asynchronous and Synchronous Real Time Language.
   - Verification and Validation of Real Time Software: Testing Real Time Properties, Simulation as a Verification Tool, Testing Control and Data flow.
   - Languages for real-time systems; real-time software analysis and design. Properties of Real Time Operating Systems; Allocation and Scheduling, Inter-process and Inter-processor communication; Distributed and Fault Tolerance Systems, Case Study: Real Time Linux.

4. **Real time system applications**
   - Multi-axis Robotic Manipulator using Distributed Real Time Control.

#### Laboratory Experiment
- Appreciation of real time Linux and its application in Motor Control

#### Reading List and References
**Textbooks**:
6. Selected papers from Proceedings of Real-Time Systems Symposium (IEEE)

#### Teaching/Learning Methodology

<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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<tr>
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<td>a. To appreciate the important issues in real time computing systems, and their relations in engineering applications.</td>
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<tr>
<td>Tutorial</td>
<td>√</td>
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<td>b. To identify and understand the real time issues in a computing OS system, and their solutions.</td>
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<tr>
<td>Experiment</td>
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<td>c. Communicate effectively during discussions and presentations.</td>
</tr>
<tr>
<td>Other student study effort</td>
<td>√</td>
<td></td>
<td>d. Have the ability to work independently, and in teams when conducting laboratory work.</td>
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#### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
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<tr>
<th>Assessment Methods</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed</th>
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<tr>
<td>Examination</td>
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<td>Test (x2)</td>
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<td>Laboratory exercise/Report</td>
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#### Student Study Effort

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<th>Class contact</th>
<th>Lectures/Seminar</th>
<th>Laboratory demo</th>
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</thead>
<tbody>
<tr>
<td>√</td>
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</table>

| Other student study effort | √ | √ | √ |

| Total student study effort | 105 Hrs. | |

**Teaching/Learning Methodology Outcomes**

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<tr>
<th>Class contact</th>
<th>Lectures/Seminar</th>
<th>Laboratory demo</th>
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<td>√</td>
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| Other student study effort | √ | √ | √ |

| Total student study effort | 105 Hrs. | |

**Assessment Methods**

- Examination: 60%
- Tests (x2): 20%
- Assignment/Presentation: 10%
- Laboratory exercise/Report: 10%

**Assessment**: The outcomes on concepts, design and applications of real-time systems are assessed by the usual means of examination and test while those on analytical skills, problem-solving techniques and practical considerations, as well as technical reporting and teamwork, are evaluated by opportunities, guided projects, and the reports.

**Student Study Effort**

- Class contact: Lecture/Seminar 36 Hrs., Laboratory demo 6 Hrs.
- Other student study effort: Case Study 15 Hrs., Self-study 48 Hrs.
- Total student study effort: 105 Hrs.

**Textbooks**

6. Selected papers from Proceedings of Real-Time Systems Symposium (IEEE)

**Laboratory Experiment**

- Appreciation of real time Linux and its application in Motor Control
Subject Description Form

Subject Code: EE517

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 fibers.
2. To apply the knowledge learned to design fiber components and devices with specific specifications.
3. To appreciate the applications of fiber 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 fiber development from a historical perspective, understand important role of advanced fiber components in enhancing the performance of modern fiber systems.

b. Know the operating principle of various fiber components, be able to analyze/characterize the performance of fiber components.

c. Know the same function may be achieved by using different technology (e.g., electro-optic and acousto-optic modulation) and understand the advantage and limitations of each technology.

d. Select the most appropriate principles/techniques to design a fiber optic component with required specification, read the data sheet of various fiber optic components.

Subject Synopsis/ Indicative Syllabus:
5. Optical amplifiers: Rare-earth doped fibers, optical fiber amplifiers, semiconductor amplifiers.
6. Photo-detectors: Photomultipliers, photoconductive detectors, junction detectors (p-i-n diode, avalanche photodiode).

Laboratory Demonstration:
Observation of fiber modal patterns Characterization of single mode fibers: loss, dispersion, polarization dependent loss Measurement of source (LED, multi and single mode diode lasers) spectrums and power-

Student Study Effort Expected:
Class contact:
- Lecture/Tutorial 39 Hrs.
- Laboratory demo 3 Hrs.

Other student study effort:
- Self study and assignments 53 Hrs.
- Group project and Report 10 Hrs.

Total student study effort 105 Hrs.

Reading List and References:
5. Selected papers from relevant journals

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 mean of teaching the basic concepts and theories. The understanding of basic principle is further enhanced through tutorials and laboratory demonstrations. Experiences and knowledge on design and applications of various integrated/fiber optic components, and on the use of alternative technologies to realize similar functionalities are gained through the use of examples during lectures and discussions during tutorials, and through assignments and group-study projects.

Teaching/Learning Methodology in Alignment with Intended Learning Outcomes:
Specific assessment methods/tasks | % weighting |
--- | --- |
1. Examination | 60% | a | b | c | d |
2. Tests and assignments | 25% | a | b | c | d |
3. Laboratory Demonstration | 5% | a | b | c | d |
4. Group-project & report | 10% | a | b | c | d |
Total | 100% | a | b | c | d |

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.

Assessment Methods in Alignment with Intended Learning Outcomes:

Reference books:
5. Selected papers from relevant journals
Three examples will be selected from the following list:

a. Optical based position tracking in CD-ROMs and Laser discs.
b. Magnetic head positioning in hard disk drives.
c. Motion control system design in multi-axis robot manipulators.
d. Gantry robot motion systems for SMT component insertion machines.
e. Motion systems in high precision CNC tooling machines.

Case study:
Report on a high performance motion control application example.

### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Presentation</th>
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### Assessment Methods in Alignment with Intended Learning Outcomes

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<tr>
<th>Specific assessment</th>
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<tbody>
<tr>
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<td>Tests (x2)</td>
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<tr>
<td>Report</td>
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<tr>
<td>Presentation</td>
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</table>

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.

### Reading List and References

1. 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>EE521</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>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
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</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 more electric aircraft will be covered.
3. To give industrial concern in power electronics design including passive components, packaging and standards

#### Intended Learning Outcomes
- Upon completion of the subject, students will:
  a. Have acquired 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 had a global view on recent development on power electronics and be aware of applications of power electronics in various industries
  d. Be able to work in teams and independently when conducting power electronics design and testing.

#### Subject Synopsis/Indicative Syllabus
1. **Industrial power systems**: Static power systems, battery systems, AC systems, DC systems and AC-DC power conversion.
2. **Power conversion**: Soft-switching, power factor correction, inverter configurations and static converters.
3. **Special environment power electronics**: Power electronics distribution system, industrial guidelines, variable speed and constant frequency systems, actuation systems, brushless drives and other applications of power electronics in industry.
4. **Industrial power supplies**: Converter topologies, decentralised power, power modules, electro-magnetic compatibility, international standards and reliability.
5. **Devices and packaging**: Hermetic and plastic packages, wire bonding, power devices, high temperature effect and substrates.
6. **Magnetics and capacitors**: High frequency inductors and transformers, winding techniques, core loss analysis, optimisation of magnetics and power capacitors.

#### Laboratory Experiments:
- Computer aided design for power electronics
- Power electronics for DC brushless motor
- Power Factor correction

## Teaching/Learning Methodology

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

### Teaching/Learning Methodology Outcomes

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<thead>
<tr>
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<td>Lectures</td>
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<td>Tutorials</td>
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<td>Experiments</td>
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### Assessment Methods in Alignment with Intended Learning Outcomes

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<tbody>
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<tr>
<td>2. Test (x2)</td>
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</tr>
<tr>
<td>3. Laboratory performance/report</td>
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<td>Total</td>
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One end-of-semester written examination; one mid-semester-test; one end-of-semester test; laboratory performance evaluation (including punctuality, initiative, and technical reasoning); and laboratory report on a particular experiment.

### Student Study Effort Expected

- **Class contact:**
  - Lecture/Tutorial: 30 Hrs.
  - Laboratory: 12 Hrs.

- **Other student study effort:**
  - Laboratory preparation/report: 15 Hrs.
  - Self-study: 48 Hrs.

**Total student study effort**: 105 Hrs.

### Reading List and References

<table>
<thead>
<tr>
<th>Reference books:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. K.W.E. Cheng, Classical Switched Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002</td>
</tr>
</tbody>
</table>
## Intended Learning Outcomes

1. To introduce students to the theory and application of optical fibre communication systems.
2. To introduce students to the state-of-the-art and future techniques for higher-performance fibre-optic systems.
3. To equip students with the ability to analyse fibre-optic digital communication systems.
4. Upon completion of the subject, students will be able to:
   a. Appreciate recent developments in fibre optic communication systems.
   b. Calculate the link budgets of a fibre-optic link.
   c. Select the most appropriate passive and active fibre-optic components for fibre-optic sensor systems and fibre optic communication links.
   d. Calculate the bit-error-rate performance of optical fibre communication systems.
   e. Calculate the power penalty performance aspects of semiconductor laser amplifiers and optical fibre amplifiers.
   f. Calculate the physical meaning and phenomena behind mathematical equations and computed results.
   g. Appreciate the engineering applications of fibre-optics technologies.
   h. Appreciate the advantages of fibre-optic sensors to the electrical engineering industry.
   i. Appreciate recent developments in the use of optical fibre technology in the electrical engineering industry.
   j. Appreciate the importance of fibre optics technology to the development of communications networks.
   k. Appreciate the importance of fibre optics technology to the development of communications networks.
   l. Appreciate the importance of fibre optics technology to the development of communications networks.

## Subject Synopsis/Indicative Syllabus

1. Overview of optical fibre communications: Historical perspective, basic concepts, lightwave systems and components, channel capacity and fibre limitations.
2. Optical transmitters: Modulation response of lasers, external modulators, and system limitations.
3. Optical receivers: Receiver components, design and performance.
5. Introduction to fibre optic sensors: Intrinsic and extrinsic sensors, modulated and distributed fibre sensors, and system limitations.
6. Wavelength division multiplexing: Frequency division multiplexing, intensity multiplexing, and fibre-optic sensor and system limitations.
7. Multiplexed and distributed fibre sensors: Time and frequency division multiplexing, optical fibre sensor and system limitations.

## Reading List and References

5. Other student study effort:
   - Lecture-Seminar: 42 Hrs.
   - Self-study: 54 Hrs.
   - Mini-projects: 9 Hrs.
   - Total student study effort: 105 Hrs.
**Subject Description Form**

**Subject Code**: ELEC524  
**Subject Title**: Open Electricity Market Operation  
**Credit Value**: 3  
**Level**: 5  
**Pre-requisite/Co-requisite/Exclusion**: Nil

### Objectives

1. To enable students to establish a broad knowledge of open electricity market operation and to understand the major market models in the world.
2. To enable students to understand the key issues in open electricity market operation including deregulated power system operation, transmission pricing, procurement of ancillary services, congestion management, available transmission capacity so that students are provided with knowledge and techniques they need to meet the electric industry’s challenges in the 21st century.

### Intended Learning Outcomes

Upon completion of the subject, students will:

- a. Be able to acquire a good understanding of efficient power market models and the operation and to understand the major market models in the world.
- b. Be able to analyse the available transmission capacity and formulate equitable transmission pricing in electricity markets.
- c. Be able to assess ancillary services requirements based on security and economic considerations.
- d. Be able to present technical results in the form of technical report and verbal presentation.

### Subject Synopsis/Indicative Syllabus

1. **Introduction**

2. **Electricity market**

3. **Transmission and ancillary services**
   - Measuring available transmission capacity in energy markets. Purchasing transmission capacity. Network and point to point transmission services. Ancillary services. Transmission planning and management.

4. **Transmission pricing**
   - The costs of transmission services. Embedded marginal cost. Long-run marginal cost. Integrated approach of transmission pricing.

### Teaching/Learning Methodology

#### Methods in Alignment with Intended Learning Outcomes

- **Lectures**
- **Case Studies & Presentation**

#### Assessment

- **Lecture/Tutorial**: 50 Hrs.
- **Presentation**: 6 Hrs.
- **Case study and report**: 51 Hrs.
- **Self-study**: 105 Hrs.

### Reading List and References

**Textbooks**


**Reference books**


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.

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Title</th>
<th>Level</th>
<th>Credit Value</th>
<th>Prerequisite/Exclusion</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>E525</td>
<td>Energy Policy and Restructuring of Electricity Supply Industry</td>
<td>3</td>
<td>5</td>
<td>Nil</td>
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</table>

#### Intended Learning Outcomes

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.
3. To enable students to evaluate the effects of energy policy on development of environmental control measures and alternative energy technologies.
4. To enable students to identify the constraints in making energy utilization sustainable.
5. To enable students to formulate and evaluate energy conservation policies relating to recycling of materials, end-use energy management and integrated resources planning.
6. To enable students to explain the market structures and regulatory framework for electricity supply industry.
7. To enable students to explain and evaluate different pricing concepts and pricing contracts in restructured electricity supply industry.
8. To enable students to present the results of study in the form of written technical reports and oral presentations.

#### Assessment Methods in Relation to Learning Outcomes

- Class contact: 12 Hrs.
- Self-study: 40 Hrs.
- Class Test/Quiz: 25%
- Mini-project Discussion/Report: 20 Hrs.
- Other student study effort: 105 Hrs.

#### Teaching/Learning Methodology

- Lectures
- Tutorials
- Mini-projects
- Case studies/Group discussion
- Self-study

#### Student Study Effort Expected

- Total student study effort: 105 Hrs.

#### Reading List and References

2. S. Hurst and G. Shultsworth, Competition and Choice in Electricity Market, Wiley, 1999
Subject Description Form

Subject Code: EE526
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:

a. Have acquired in-depth understanding of different types of power system stability problems.
b. Be able to model the dynamic behaviours of system components under disturbances.
c. Be able to apply and adapt applications of mathematics and engineering skills in the analysis of stability problems.
d. Be able to discuss the causes and effects of instabilities and recommend possible solutions.
e. Have acquired skills in presentation and interpretation of experimental results and communicate in written form.

Subject Synopsis/Indicative Syllabus:
1. Reactive power compensation: System Q-V Characteristics. Reactive support theory. Load Characteristics. Synchronous condensers; Static Var Compensators (SVC); Thyristor Switched Capacitor (TSC); Thyristor controlled Reactor (TCR).
4. AC/DC Systems and FACTS devices: HVDC link operation. Control of the d.c. terminals to damp a.c. dynamic instability and improve transient stability. Flexible AC transmission devices; power angle control.

Laboratory Experiment:
Power system stability analysis using Power System Stability Tools “DST”.

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

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. Class Test</td>
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<tr>
<td>3. Laboratory Performance &amp; Report</td>
<td>20%</td>
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<tr>
<td>Total</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: 38 Hrs.
  - Laboratory: 8 Hrs.

Other student study effort:

- Laboratory preparation/report: 12 Hrs.
- Self-study: 47 Hrs.

Total student study effort: 105 Hrs.

Reading List and References:
Subject Description Form

Subject Code: EE527
Subject Title: Auto-tuning for Industrial Processes
Credit Value: 3
Level: 5
Pre-requisite/Co-requisite/Exclusion: Nil

Objectives:
1. To facilitate a solid understanding of system identification.
2. To provide students with a solid knowledge of adaptive control.
3. To present a detailed survey of different auto-tuning methods used in industry.

Intended Learning Outcomes:
Upon completion of the subject, students will be able to:
a. Conduct parametric and non-parametric estimation for unknown processes.
c. Design auto-tuning control systems based on relay auto-tuner.
d. Use CAD package for design and simulation.
e. Effectively communicate experimental results in written and oral reports.

Subject Synopsis/Indicative Syllabus:
1. **System identification**: Lower-order modelling, frequency response identification, Continuous-time and discrete-time identification, Identification by correlation, Least-squares algorithm, Recursive least-squares, Extended least-squares. Computer implementation of these algorithms.
2. **Auto-tuning**: PID auto-tuning, Relay auto-tuning, Applications in industry.
3. **Self-tuning control**: Self-tuning algorithms, Minimum variance and generalised minimum variance, Pole-placement algorithms, Model reference adaptive systems.

Case study:
Individual assignment related to above methods. Students will write a report and present their finding to the class.

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

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>a. Lectures</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>b. Tutorials</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>c. Case studies</td>
<td>✓ ✓ ✓ ✓ ✓</td>
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Assessment Methods in Alignment with Intended Learning Outcomes:
Specific assessment methods/tasks | % weightings | Intended subject learning outcomes to be assessed |
---|---|---|
1. Examination | 60% | ✓ ✓ ✓ ✓ ✓ |
2. Case studies | 40% | ✓ ✓ ✓ ✓ ✓ |

Student Study Effort Expected:
- Class contact: 33 Hrs.
- Case study: 9 Hrs.
- Case study preparation/report: 16 Hrs.
- Self-study: 47 Hrs.
Total student study effort: 105 Hrs.

The outcomes on concepts, analysis and design are assessed by the usual means of examination whilst those on technical reporting and presentation are evaluated by the case studies.

Reading List and References:
3. Selected papers from IEEE Transactions and IEE proceedings and other relevant journals
<table>
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<th>Subject Description Form</th>
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<td><strong>Subject Code</strong></td>
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<td><strong>Pre-requisite/Co-requisite/Exclusion</strong></td>
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**Objectives**

1. Provide students with a sound knowledge of system modelling techniques in areas of prediction and control. In addition, modern control design techniques will also be introduced.

2. Upon completion of the subject, students will be able to:
   - Model systems using State Variable and Bond Graph Models.
   - Design optimal controllers for system models.
   - Apply computer packages for control system modelling and design.
   - Report and present the technical findings in logical and organised manner.
   - Practice their knowledge in teamwork.

**Subject Synopsis/Indicative Syllabus**

1. **System models**: State Space Models, State Space Representations of Transfer Functions, Bond graphs, State Space Modelling using Bond Graph Models.
2. **Optimisations**: Multivariable optimisations; Optimisations with constraints.
3. **Optimal control**: Calculus of variations, Formulation of optimal control problems, Pontryagin maximum principle, Riccati equation, Application to linear regulator, Application to time and fuel optimal systems, Bang Bang control.
4. **Case Studies**: Application of the above topics in the solution of engineering problems.

**Teaching/Learning Methodology**

- **Lectures**: 33 Hrs.
- **Tutorials**: 9 Hrs.
- **Laboratory**: 48 Hrs.
- **Experiments**: 108 Hrs.

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

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<tr>
<td>Laboratory performance</td>
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<tr>
<td>Assignments &amp; class works</td>
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**Student Study Effort Expected**

- **Class contact**: 33 Hrs.
  - Lecture/Tutorial 33 Hrs.
  - Laboratory 9 Hrs.
- **Laboratory preparation/report**: 15 Hrs.
- **Self-study and assignments**: 48 Hrs.

**Total student study effort**: 105 Hrs.

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

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<td>10%</td>
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<tr>
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<td>Lectures</td>
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<tr>
<td>Tutorials</td>
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<tr>
<td>Experiments</td>
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</tbody>
</table>

**Reading List and References**

Subject Description Form

Subject Code: EE529

Study 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 revolution in utility applications: Power Electronics and utility needs; control of power flow in the utility grid, power transfer and voltage support, distributed generation, improvement of electrical energy efficiency, power quality, an overview of power electronics systems and their applications.
2. Inverters for high power applications: Basic principles of current and voltage source inverters for high power applications, Multi-level Inverters, Analysis of their performance, AC and DC harmonics, Interaction with power grid.
3. Transmission systems: High power issues, Source side model, power transfer and voltage control issues, Damping of oscillation issues, Power Electronics solutions.
5. Reactive power compensations: concepts of reactive power, traditional means of controlling reactive powers, Power Electronics applications for Static Var Compenasion (SVC), control of SVC, Harmonic issues, Analysis of performance and instabilities, Damping capabilities, Voltage Source Static Condensers (STATCON).

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

Assessment Methods in Alignment with Intended Learning Outcomes:

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<tbody>
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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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</table>

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

Student Study Effort Expected:

- Lecture: 30 Hrs.
- Tutorial/Student presentation: 12 Hrs.
- Mini-project/report: 15 Hrs.
- Self-study: 48 Hrs.

Total student study effort: 105 Hrs.

Reading List and References:

Textbooks:
4. K.W.E. Cheng, Classical Switch Mode and Resonant Power Converters, The Hong Kong Polytechnic University, 2002

Reference books:
### Subject Description Form

**Subject Code**: EE530  
**Subject Title**: Electrical Energy-saving Systems  
**Level**: Nil  
**Credit Value**: 5

#### 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, their associated issues of grid connection and technical considerations.
4. To enable students to understand the potential of solar energy and characteristics & applications.
5. To enable students to understand typical energy storage systems, their associated issues of grid connection and technical considerations.
6. To enable students to understand typical energy storage systems, their associated issues of grid connection and technical considerations.

#### Intended Learning Outcomes
- a. Describe the operation principle of various energy storage systems and their applications.
- b. Evaluate the energy management systems and their applications.
- c. Describe the operation principle of various energy storage systems and their applications.
- d. Identify different energy-saving control strategies and their applications.
- e. Describe the operation principle of various energy storage systems and their applications.
- f. Describe the operation principle of various energy storage systems and their applications.
- g. Describe the operation principle of various energy storage systems and their applications.
- h. Describe the operation principle of various energy storage systems and their applications.
- i. Describe the operation principle of various energy storage systems and their applications.
- j. Describe the operation principle of various energy storage systems and their applications.

#### Reading List and References
5. S. Yannas, Solar Energy and Housing Design, Architectural Association, 2004  

#### Laboratory/Experiments, Seminars, Site Visits:
1. Demonstration on operating principles of energy-saving systems in Hong Kong.
The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in academic contexts.

**Methodology**

The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving drafting and evaluating texts, mini-presentations and discussions. Students will be encouraged to develop their oral and written communication skills through the use of authentic materials.

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

**Assessment**

Specific assessment methods include:

1. **Short academic text** (60%)
2. **Team oral presentation** (40%)

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

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

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

**Student Study Effort Expected**

- **Class contact:**
  - Seminars: 28 Hrs.
- **Classwork-related and project-related preparation and self-access work:** 56 Hrs.

- **Total student study effort:** 84 Hrs.

**Subject Synopsis/Indicative Syllabus**

- **1. Written academic communication**
  - Identifying and employing functions common in written academic discourse, particularly noting and using rhetorical strategies to achieve specific communication goals.
  - Reading and writing for different purposes such as input to tasks, and for developing specific reading or listening skills.
  - Using a dictionary to obtain lexical, phonological and orthographical information.

- **2. Spoken academic communication**
  - Recognising the purposes and differences between spoken and written communication in English in academic contexts.
  - Identifying and using appropriate tone and style in academic writing.

- **3. Reading and finding in academic contexts**
  - Recognising personal and academic strategies in reading and finding for different purposes, particularly in academic contexts.
  - Using a dictionary to obtain lexical, phonological and orthographical information.

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

**Intended Learning Outcomes**

- Upon completion of the subject, students will be able to communicate effectively in an academic context through:
  - Developing effective oral presentations.
  - Communicating ideas fluently and accurately in English in academic contexts.
  - Using appropriate referencing skills in academic writing.
  - Using a dictionary to obtain lexical, phonological and orthographical information.

**Subject Code**

ELC2501

**Subject Title**

University English I

**Credit Value**

2

**Level**

2

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

Nil

**Assessment Methods with Indicative Weighing and Outcomes**

<table>
<thead>
<tr>
<th>Specific assessment methods</th>
<th>Weighing</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous assessment</td>
<td>a</td>
<td>b</td>
<td>c</td>
</tr>
<tr>
<td>a. Explanations of the appropriateness of the assessment methods in assessing the intended learning outcomes:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Students' oral and writing skills are evaluated through assessment tasks related to the learning outcomes. Students are assessed on the accuracy and the appropriacy of the language used in fulfilling the assessment tasks, as well as the selection and organisation of ideas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. To achieve the above outcomes, students are expected to use language and text structure appropriate to the context and to critically select relevant information to develop a theme in a text.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Student Study Effort Expected**

- **Class contact:**
  - Seminars: 28 Hrs.
- **Classwork-related and project-related preparation and self-access work:** 56 Hrs.

- **Total student study effort:** 84 Hrs.

**Recommended readings**

## Subject Description Form

### Subject Code
ELC2502

### Subject Title
University English II

### Credit Value
2

### Level
2

### Pre-requisite / Co-requisite
ELC2501 University English I

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

### Intended Learning Outcomes
Upon completion of the subject, students will be able to communicate effectively in an academic context through:

1. Participating actively in academic discussions
2. Writing academic argumentative essays

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

### Subject Synopsis/Indicative Syllabus
This syllabus is indicative. The balance of the components, and the corresponding weighting, will be based on the needs of the students.

**Written Academic Communication**
- Understanding and applying principles of the text structure of persuasive and argumentative academic texts;
- Further developing paraphrasing, summarising and referencing skills;
- Improving editing and proofreading skills;
- Achieving appropriate tone and style in academic writing.

**Spoken Academic Communication**
- Identifying and practising the verbal and non-verbal interaction strategies in academic discussions;
- Explaining and presenting ideas that require the development and application of creative and critical thinking.

**Reading and Listening in Academic Contexts**
- Understanding the content and structure of ideas delivered orally and in print;
- Distinguishing between ‘fact’ and ‘opinion’.

**Language Development**
- Further improving and extending relevant features of grammar, vocabulary and pronunciation.

### Teaching/Learning Methodology
The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in academic contexts. The study is primarily seminar-based and includes regular, mandatory, mini-presentations and discussions. Students may be referred to material on the internet and the ELC’s Centre for Independent Language Learning.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Percentage</th>
<th>Specific Assessment Method</th>
<th>%</th>
<th>Intended Subject Learning Outcomes to be Assessed (Please tick appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Contact</td>
<td>25%</td>
<td>Classroom-assessed project-related preparation and self-study work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar Discussion</td>
<td>40%</td>
<td>a</td>
<td></td>
<td>a. Communicate effectively in academic contexts through discussion.</td>
</tr>
<tr>
<td>Discursive Essay</td>
<td>60%</td>
<td>b</td>
<td></td>
<td>b. Participate actively in academic discussions.</td>
</tr>
</tbody>
</table>

### Student Study Effort Expected

- **Class contact:**
  - Seminars: 28 Hrs.

- **Other student study effort:**
  - Classwork-related and project-related preparation and self-access work: 56 Hrs.

- **Total student study effort:** 84 Hrs.

### Reading List and References

- **Coursebook**
  - English Language Centre. (2009). University English II. Hong Kong: The Hong Kong Polytechnic University.

- **Recommended readings**

### Additional Notes
- All learning materials developed by the English Language Centre are used throughout the course.
- Additional resources are recommended as required.

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**AI - 59**
### Subject Description Form

**Subject Code**: ELC3504

**Subject Title**: English for Effective Workplace Communication

**Credit Value**: 2

**Level**: 3

**Pre-requisite / Co-requisite / Exclusion**: ELC2501 University I & ELC2502 University English II

### Objectives

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

### Intended Learning Outcomes

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

a. interacting professionally in a job interview;

b. writing appropriate correspondence related to engineering professions; and
c. writing logical and coherent reports. To achieve the above outcomes, students are expected to use language and text structure appropriate to the context, select information critically, present ideas systematically and logically, and provide support for stance and opinion.

### Subject Synopsis / Indicative Syllabus

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

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

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

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

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

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

### Teaching/Learning Methodology

The subject is designed to introduce students to the communication skills, both oral and written, that they may need to function effectively in their future professions. The study method is primarily seminar-based. Activities include teacher input as well as individual and group work involving planning, drafting and evaluating tasks, mini-presentations, and the exchange and evaluation of ideas.

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment methods/tasks</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class contact</td>
<td></td>
<td>a. Job interview and other related discussions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Workplace correspondence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Workplace reports</td>
</tr>
<tr>
<td>Other student effort</td>
<td></td>
<td>a. Classwork-related and project-related preparation and assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Additional student study effort</td>
</tr>
<tr>
<td>Total student effort</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

### Student Study Effort Expected

- **Class contact**: 28 Hrs.
- **Other student study effort**: 56 Hrs.
- **Total student study effort**: 84 Hrs.

### Reading List and References

- **Coursebook**: ELC3504 English for Effective Workplace Communication. Hong Kong: The Hong Kong Polytechnic University.
- **Recommended readings**:
Subject Description Form

Subject Code: ENG224
Subject Title: Information Technology
Credit Value: 3
Level: 2
Pre-requisite / Co-requisite/ Exclusion: Nil

Objectives:
To provide the foundation knowledge in computers, computer networks and data processing 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 computer hardware and software components.
2. Understand the architecture and functions of a computer operating system and be able to use the services it provided for managing computer resources.
3. Understand the basic structure of a database system and be able to set up and configure a simple database system.
4. Understand the principles of computer networks and be able to set up and configure a simple computer network.

Category B: Attributes for all-roundedness
5. Solve problems using systematic approaches.

Subject Synopsis/Indicative Syllabus:
1. Introduction to computers
   - Introduction to applications of information technology in different engineering disciplines.
   - Introduction to computer hardware components: CPU, RAM, ROM, I/O devices and internal busses.
   - Software components: applications, utilities and operating systems.
   - Case study: Linux – user Interfaces, file management and process management.
   - (10 hours)

2. Computer Networks
   - Introduction to computer networks: LAN and WAN, client-server and peer-to-peer architectures, network topology, OSI 7-layer model, TCP/IP protocol: UDP and TCP, port multiplexing, IP addressing and routing protocols, Internet applications, Networking devices: DSL modem, hub, bridge, switch, and router.
   - Case studies: Ethernet – cabling, topology and access methods.
   - (18 hours)

3. Introduction to data processing and information systems
   - Database systems – architecture, relational database concept, structural query language (SQL), database management systems, Web and database linking, database application development. Introduction to Information systems. Workflow management.
   - Case study: Database design, implementation and management.
   - (14 hours)

Teaching/Learning Methodology:
There will be a mix of lectures, tutorials and laboratory works to facilitate effective learning. Students will be given case studies to understand and practice the design and usage of database 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 (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>40%</td>
<td>✔️</td>
</tr>
<tr>
<td>Examination</td>
<td>60%</td>
<td>✔️ ✔️ ✔️ ✔️ ✔️</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

The assessment methods include an end-of-subject examination (60%), three tests (15%), and two laboratory work (10%), tutorial sessions with four tests (10%), three assignments (5%).

The examination cover intended subject learning outcomes A1, A2, A3, A4 and B1.
The continuous assessments (three tests from the lecture portion, 4 tests from the tutorial portion and 3 Assignments) cover intended subject learning outcomes A1, A2, A3, A4. The lab works (with 1 test) cover intended subject learning outcomes A2, A3 and B5.
The examination is a 2.5-hour, closed-book examination, and all of the tests are closed book. The laboratory sessions give the student a hands-on experience of an Unix OS (assessed by an end-of-lab test) and the construction of a database (assessed by an end-of-lab report).

Student Study Effort Expected:

- Class contact:
  - Lecture: 28 Hrs.
  - Tutorial: 9 Hrs.
  - Laboratory: 17 Hrs.

- Other student study effort:
  - Assignment Preparation and Laboratory Report Writing: 36 Hrs.
  - Self study: 36 Hrs.

- Total student study effort: 126 Hrs.

Reading List and References:

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Assessment Methods in Alignment with Intended Learning Outcomes</th>
<th>Intended Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stops and 24 x 7</td>
<td>Tutorials, mini projects, case studies and experimental works</td>
<td>1. To enable students to establish a broad knowledge base on the atomic structure and properties of materials with an emphasis on using this knowledge to solve engineering problems related to stress, strain and fracture of materials.</td>
</tr>
<tr>
<td></td>
<td>Laboratory works</td>
<td>2. To select appropriate materials and manufacturing processes for different products, taking into consideration of issues in cost, quality and environmental concerns.</td>
</tr>
<tr>
<td></td>
<td>Other student study effort</td>
<td>3. To familiarize and apply thermodynamic properties of common substances, such as air and water, for the reversibility and efficiency considerations of energy balance, usage and waste disposal in processes so that (students) are able to select those that are appropriate taking into consideration of green design and environmental issues.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific assessment methods</th>
<th>% weighting</th>
<th>Intended subject outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tutorials</td>
<td>20</td>
<td>1. to enable students to establish a broad knowledge base on the atomic structure and properties of materials with an emphasis on using this knowledge to solve engineering problems related to stress, strain and fracture of materials.</td>
</tr>
<tr>
<td>2. Assignments including project reports, laboratory reports and case study reports</td>
<td>20</td>
<td>2. To select appropriate materials and manufacturing processes for different products, taking into consideration of issues in cost, quality and environmental concerns.</td>
</tr>
<tr>
<td>3. Written examination</td>
<td>60</td>
<td>3. To familiarize and apply thermodynamic properties of common substances, such as air and water, for the reversibility and efficiency considerations of energy balance, usage and waste disposal in processes so that (students) are able to select those that are appropriate taking into consideration of green design and environmental issues.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class contact:</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Laboratory works</th>
<th>Other student study effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturers:</td>
<td>24 hrs.</td>
<td>12 hrs.</td>
<td>4 hrs.</td>
<td>36 hrs.</td>
</tr>
<tr>
<td>Total student study effort:</td>
<td>126 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading List and References</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Subject Synopsis/Indicative Syllabus</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic Structure and Bonding</td>
<td>Conductors and insulators; Semi-conductor materials; (LED) and optical detectors; Laser; Light propagation in optical fibers.</td>
<td>Electrical and Physical Properties of Materials: Conductors, insulators, semi-conductors and semiconducting behaviour; Elastic properties of materials; Fracture and fatigue.</td>
<td>Manufacturing and Machining Processes and Material Properties: Machining processes and material properties for process capability.</td>
<td></td>
</tr>
</tbody>
</table>
Subject Description Form

Subject Code: ENG236
Subject Title: Computer Programming
Credit Value: 3
Level: 2
Pre-requisite / Co-requisite / Exclusion: Nil

Objectives:

(i) To introduce the fundamental concepts of computer programming
(ii) To equip students with sound skills in C/C++ programming language
(iii) To equip students with techniques for developing structured computer programs
(iv) To demonstrate the techniques for implementing engineering applications using computer programs
(v) To develop a good computer program using C/C++ programming language.

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.
(f) Be able to solve problems by using systematic approaches in a team.

Subject Synopsis/ Indicative Syllabus:

1. Introduction to programming - Components of a computer; Programming environment; Process of application development.
2. Bolts and Nuts of C/C++ - Preprocessor; Program code; Functions; Comments; Variables and constants; Expressions and statements; Operators.
3. Program Flow Control - Branching and looping; Function parameters passing; Return values; Local and global variables; Scope of variables.
4. Program Design and Debugging - Structured program design; Modular programming; Exceptions and debugging. Case study: Using the Visual C++ debugger.
5. Basic Object Oriented Programming - Objects and classes; Private versus public; Implementing class methods; Constructors and destructors.
6. Pointer and Array - The stack and the free store; Create and delete objects in the free store; Pointer arithmetic; Passing function arguments by pointer; Returning values by pointer; Array of objects; Array and pointer; Array of pointers; Pointer of array; Character array; Command-line processing.
7. Stream I/O - Input and output as streams; File I/O using streams.
8. Using C/C++ in Engineering Applications - Solving practical problems using C/C++; Developing graphical user interfaces for engineering applications.

Teaching/Learning Methodology:

The subject is delivered through weekly lectures. Tutorials in terms of exercises related to the lecturing materials follow in the same week. Tutors will aid the lecturers in helping the students finishing the exercises, and interactive Q&A will take place. The lectures and tutorials aim at achieving the learning outcomes a, b, c, d and e.

Assessment Methods:

To enhance the students' problem solving skill in a given programming environment, open-book programming tests are arranged regularly. The learning outcomes a, b, c, d, and e can be evaluated at different check-points.

After all the subject materials have been delivered, students are asked to finish a mini-project in a team. The project involves a practical engineering problem of some stated specifications. Apart from meeting the learning outcomes a-e, the students have to practice solving problems using systematic approaches in a team. The learning outcome f should be reflected from the mini-project result.

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Assessment Methods</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>10</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Closed-book tests</td>
<td>20</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>4. Programming tests</td>
<td>30</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>5. Mini-project</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 and closed-book tests are for assessing the understanding of fundamental concepts. The in-class exercises and programming tests are conducted within the programming environment to help students familiarized with it. The problems to be solved by the students are typically presented as practical engineering problems. Through conducting the mini-project that lasts for several weeks, students would be able to experience how to solve problems by using systematic approaches in a team.

Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class contact</th>
<th>Total student study effort 146 Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>65 Hrs.</td>
</tr>
<tr>
<td>Tutorial</td>
<td>27 Hrs.</td>
</tr>
<tr>
<td>Test/Quiz</td>
<td>11 Hrs.</td>
</tr>
<tr>
<td>Mini-project presentation</td>
<td>1 Hrs.</td>
</tr>
<tr>
<td>Self-studying</td>
<td>52 Hrs.</td>
</tr>
<tr>
<td>Homework</td>
<td>17 Hrs.</td>
</tr>
<tr>
<td>Mini-project/Report</td>
<td>12 Hrs.</td>
</tr>
</tbody>
</table>

Total student study effort 146 Hrs.

Textbook:

Reference Book:
Subject Description Form

### Subject Code
ENG237

### Subject Title
Basic Electricity and Electronics I

### Credit Value
3

### Level
2

### Pre-requisite / Co-requisite / Exclusion
Nil

### Objectives
1. Introduce the fundamental concepts of operation of electric circuits applicable to all engineering students.
2. Develop the ability on solving problems involving electric circuits.
3. Develop skills for experimentation on electric circuits.

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

- a) acquire a good understanding of the electric circuit operating principles;
- b) solve simple problems in electric circuits;
- c) use suitable instrumentation to carry out experimental investigations to validate the theoretical investigations.

### Subject Synopsis/Indicative Syllabus

1. **DC Circuits**

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

3. **Transformers**

4. **Steady-state Analysis of AC Circuits**
   - Average and rms values. Phasors (rotating vectors). Steady-state analysis of circuits driven by single fixed frequency sinusoidal sources. Impedance and admittance. Analysis approach 1: phasor diagrams for simple circuits. Analysis approach 2: systematic complex number analysis, i.e., same treatment as DC circuits but with complex numbers representing phase and magnitude of AC voltages and currents. Real and reactive powers. Power factor.

5. **Digital Logic Circuits**

### Laboratory Experiments:

1. Instrumentation and circuit theorems
2. First order transient
3. Simple digital circuits

---

### Teaching/Learning Methodology

<table>
<thead>
<tr>
<th>Teaching/Learning Methodology</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>a</td>
</tr>
<tr>
<td>Tutorials</td>
<td>b</td>
</tr>
<tr>
<td>Experiments</td>
<td>c</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 (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>60</td>
<td>√</td>
</tr>
<tr>
<td>Class Tests</td>
<td>16</td>
<td>√</td>
</tr>
<tr>
<td>Assignments</td>
<td>12</td>
<td>√</td>
</tr>
<tr>
<td>Lab Logbooks &amp; Report</td>
<td>12</td>
<td>√</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

### Student Study Effort Required

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

### Reading List and References

**Textbooks:**
Subject Description Form

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

Teaching/Learning Methodology

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

Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weighting</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Examination</td>
<td>60</td>
<td>√</td>
</tr>
<tr>
<td>2. Test</td>
<td>24</td>
<td>√</td>
</tr>
<tr>
<td>3. Laboratory</td>
<td>16</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 examination (60%), two tests (12% each), and four laboratory works (8% for formal report and 8% for logbook). The examination and continuous assessments (two tests and four laboratory works) cover intended subject learning outcomes a) and b). The examination is a three-hour, closed-book examination and the two tests are closed book and 1.5 hours each. A logbook with four laboratory recordings and a formal report on one particular laboratory work will be assessed.

Student Study Effort Expected

Class contact:
- Lecture 42 Hrs.
- Tutorial (13 hrs) and laboratory (11 hrs) 24 Hrs.

Other student study effort:
- Self study 33 Hrs.
- Report writing for laboratory 6 Hrs.

Total student study effort 105 Hrs.

Reading List and References

### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>ENG307</th>
</tr>
</thead>
<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>
</tbody>
</table>

#### Pre-requisite / Co-requisite/ Exclusion
Nil

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

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

### Intended Learning Outcomes

**Continuous Assessment:** 60%  
**Examination:** 40%

#### 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>a</td>
<td>b</td>
</tr>
</tbody>
</table>

1. Continuous 60%

- Group weekly learning activities (40%)
- Final presentation (individual presentation) (30%)
- Group report and individual reflection report (30%)

2. Examination 40%

Total 100%

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

Continuous Assessment: 60%  
Examination: 40%

### Student Study Effort Expected

- Lectures and Review: 30 Hrs.
- Tutorial and Presentation: 12 Hrs.
- Research and Preparation: 60 Hrs.
- Report writing: 14 Hrs.

Total student study effort: 116 Hrs.

### Reading List and References

#### Reference books:

#### Reading material:

- **Engineering journals:**
  - Engineers by The Hong Kong Institution of Engineers
  - Engineering and Technology by The Institution of Engineers and Technology

- **Magazines:**
  - Times
  - Far East Economics

- **Current newspapers:**
  - South China Morning Post
  - China Daily
  - Ming Pao Daily

### Teaching/Learning Methodology

- **In class:** There will be short lectures to provide essential knowledge and information on the relationship between society and the engineer under a range of dimensions.
- **Discussions:** There will be discussions, case studies, seminars to engage students’ in-depth analysis of the relationship.
- **Case analysis:** Students will form into groups and throughout the course, students will work on engineering cases by completing the following learning activities:
  1. Case analysis; students will base on the case analysis, and provide weekly summary report on the relationship of dimensions to the project.
  2. The final report will be the Case portfolio which includes

### Subject Synopsis/Indicative Syllabus

- **Syllabus:** Impact of technology on society: Innovation and creativity, the history and the trend of technology on the social and culture on society.
- **Environmental protection and related issues:** Role of the engineer in energy conservation, ecological balance and sustainable development.
- **Outlook of Hong Kong’s industry:** Its supporting organizations and impact on development from the China Markets.
- **Industrial health and safety:** Including the work of the Labour Department and the Occupational Health and Safety Council and the legal dimension such as contract law and industrial legislation.
- **Professional Institutions:** Both local and overseas. Washington Accord and the qualification and criteria of professional engineers.
- **Professional ethics:** Bribery and corruption including the work of the ICAC. Social responsibilities of engineers.

- **In class:** There will be short lectures to provide essential knowledge and information on the relationship between society and the engineer under a range of dimensions.
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 including electrical installation practice, lighting and electrical system design, LV switchboard and power monitoring, integral building system and basic electronic practice.

Intended Learning Outcomes
Upon completion of the subject, students will be able to:
a) identify relevant engineering theories and principles and to apply them in hands-on training exercises to determine system feasibility;
b) compare and contrast conceptual design, develop actual work sequences and methods for various electrical installations;
c) undertake the design, construction, testing and commissioning of electrical distribution systems in buildings on the basis of recognize the engineering standards, regulations and practices;
d) apply intelligent building control technology effectively and evaluate new building automation/intelligent control schemes; and
e) apply their knowledge and skills for system analysis.

Subject Synopsis/Indicative Syllabus

Lighting and Electrical System Design (TM0367)
- Interior lighting design and calculation; daylight illumination consideration; lumens and reflectors; T5, T8 and T11 lamps; energy conservation.
- Introduction of low-voltage power distribution systems and code practices of electrical design in Hong Kong; examine architectural drawings; design lighting and electrical services; prepare layout drawings and schematics.

Low-voltage Switchboard and Power Monitoring, AC control and PLC (TM0389)
- 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.

Integrated Building Systems (TM0383)
- Proprietary and open systems (BMS, EIB and DALI); sensors and actuators; wiring circuit, scenes control; system design, programming and commissioning; intelligent building system integration.

Electrical Installation and Basic Electronic Practice (TM0373)
- Wiring for conventional low voltage installations and intelligent building control systems (EIB and DALI); final lighting and power circuits, control gears and protective devices; inspection, testing.
- Identification of electronic circuit components, soldering and de-soldering, Dry film process, Etching process.

Learning Methodology
The teaching and learning methods include lectures, workshop tutorials, and practical works to convey general principles, techniques and related technologies to students. Their learning knowledge will be strengthened through the practical exercises and case studies in a problem-based format for the development of system integration skills, and to effectively apply those on real world environments.
### Assessment Methods in Alignment with Intended Learning Outcomes

<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  b  c  d  e</td>
</tr>
<tr>
<td>TM0367 Lighting and Electrical System Design</td>
<td></td>
<td></td>
</tr>
<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>
<td></td>
</tr>
<tr>
<td>TM0389 Low-voltage Switchboard and Power Monitoring, AC control and PLC</td>
<td></td>
<td></td>
</tr>
<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>
<td></td>
</tr>
<tr>
<td>TM0383 Integrated Building Systems</td>
<td></td>
<td></td>
</tr>
<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>
<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.

Report writing 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

- Lecture/Tutorial/Demostration: 30 Hrs.
- Workshop Practices: 88 Hrs.
- Test: 2 Hrs.
- Other Study Effort: 0 Hr.
- Total Study Effort: 120 Hrs.

### Reading List and References

1. Training material, manual and articles published by the Industrial Centre.
The entrepreneurship project is designed to develop students' appreciation and understanding of entrepreneurship and the commercialization process by attending training workshops and writing business plans. Students will be encouraged to enter entrepreneurship competitions such as the Global Challenge Club.

Subject: Entrepreneurship Project (12 hours*)

- Freshman Seminar for Engineering

The seminar will be given by renowned speakers to introduce students to the engineering broad discipline and to enthuse them about their major study. The seminar will also cultivate students' global outlook. It will be composed of three parts: the opening part, the main part and the interactive part. During the seminar, students will be encouraged to ask questions and discuss with the professors.

- Departmental Seminars (7 hours)

Four departmental seminars will be delivered by chair professors and reputable professionals in the engineering discipline to arouse students' interest in engineering and to cultivate their sense of belonging to the engineering profession. After attending the departmental seminars, students will be required to write a reflective essay to summarize their understanding (3 hours).

- Freshman Project (36 hours*)

The freshman project aims at developing students' creativity, problem-solving skills and teamwork abilities through hands-on tasks. Students will work in small groups under the guidance of instructors to design and implement an engineering solution to some given problems. The project will be assessed through the following methods and tasks:

- Online quizzes and reflective essays (20%)
- Log book writing, demonstration, presentation, and reports (40%)
- Individual project reports and demonstration (40%)

Upon completion of the subject, students will:

a. Be able to demonstrate an understanding and an enthusiasm about the engineering broad discipline and their major study
b. Be able to develop their problem-solving ability and global outlook
c. Be able to learn and understand entrepreneurship, develop a project plan and manage a project with initiative
d. Be required to write a reflective essay to summarize their understanding (3 hours).
<table>
<thead>
<tr>
<th><strong>Entrepreneurship Project</strong></th>
<th>40%</th>
<th>✓</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Online quizzes for the renowned speaker seminar and reflective essays for the departmental seminars can measure the students' understanding about the engineering discipline. Through log book, students' participation and progress in the freshman project can be assessed. Through project demonstration and project reports, students can demonstrate their creativity, problem-solving skills and teamwork abilities. Through the business plan, the students' understanding about entrepreneurship can be assessed. They can also demonstrate their ability to search for information, formulate a project plan, and manage a project with initiative.

<table>
<thead>
<tr>
<th><strong>Student Study Effort Expected</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class contact:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Projects</td>
<td>48 Hrs</td>
<td></td>
</tr>
<tr>
<td>• Seminars</td>
<td>9 Hrs</td>
<td></td>
</tr>
<tr>
<td><strong>Total student study effort</strong></td>
<td>57 Hrs</td>
<td></td>
</tr>
</tbody>
</table>

**Reading List and References**

### Subject Description Form

**Subject Code:** IC2132  
**Subject Title:** Engineering Drawing and Industrial Safety  
**Credit Value:** 2 Training Credits  
**Level:** 2

#### Pre-requisite/Exclusion
- Nil

#### Objectives
- This subject covers the fundamentals of Engineering Drawing, CAD and Industrial Safety for Engineering students.

#### Intended Subject Learning Outcomes
- Upon completion of the subject, students will be able to:
  
  a. Explain the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modeling and practice with application in mechanical, electrical, mechanical systems, electrical, electronic and information engineering.

  b. Explain basic occupational health and industrial safety requirements for engineering practice.

#### Subject Synopsis/Indicative Syllabus

<table>
<thead>
<tr>
<th>Syllabus</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Engineering Drawing &amp; CAD (TM8050 - 48 hours)</td>
<td></td>
</tr>
<tr>
<td>1.1. Fundamentals of Engineering Drawing and CAD (39 hours)</td>
<td></td>
</tr>
<tr>
<td>- Principles of orthographic projection; sectional drawing; dimensioning; sketching; general design criteria; surface finish; screws and fasteners; types of drawings including part drawing, assembly drawing.</td>
<td></td>
</tr>
<tr>
<td>- Introduction to CAD; 2D drawings and basic concepts; 3D computer modeling including extruding, revolving, sweeping, sweeping, slicing, and boolean operations.</td>
<td></td>
</tr>
<tr>
<td>- Solid modeling; assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly.</td>
<td></td>
</tr>
<tr>
<td>- Virtual validation and simulation; generation of 2D drawings from 3D parts and assemblies; drawing annotation including dimensioning, tolerancing, and part list.</td>
<td></td>
</tr>
<tr>
<td>1.2. Electrical Drawing (3 hours)</td>
<td></td>
</tr>
<tr>
<td>- Wiring diagram and wiring table for electronic and electrical installation; functional representation of circuit; system block diagram; schematic capture and representation; placement of components, electronic parts, and labels.</td>
<td></td>
</tr>
<tr>
<td>1.3. Electronic Design Automation (6 hours)</td>
<td></td>
</tr>
<tr>
<td>- Introduction to electronic design automation software; circuit schematic capture and representation; placement of components, and simulation and analysis.</td>
<td></td>
</tr>
</tbody>
</table>

#### Teaching/Learning Methodology
- The teaching and learning methods include lectures, tutorials, and practical in-class assignments. The lectures are aimed at providing students with an overall understanding of the key issues in engineering drawings and that of the industrial safety. The tutorials and practical in-class assignments are aimed at enhancing students' in-depth knowledge and ability in applying the knowledge and skills learnt.

#### Alignment of Assessment and Intended Subject Learning Outcomes

<table>
<thead>
<tr>
<th>Specific Assessment Method/Task</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>%</td>
</tr>
<tr>
<td>Assignment</td>
<td>Refer to individual Module Description Form</td>
</tr>
<tr>
<td>Tests</td>
<td>%</td>
</tr>
</tbody>
</table>

#### Specific Assessment Method/Task
- Continuous Assessment: a.
- Assignment: Refer to individual Module Description Form
- Tests: b.

#### Total 100%

**Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:**
- The assignments are designed to facilitate students to apply the knowledge and skills learnt.
- The tests are designed to facilitate students to review the breadth and depth of their understanding on specific topics.
## Student Study Effort Expected

<table>
<thead>
<tr>
<th>Class Contact</th>
<th>TM8050</th>
<th>TM2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lecture</td>
<td>20 Hrs.</td>
<td>14 Hrs.</td>
</tr>
<tr>
<td>• Tutorial</td>
<td>13 Hrs.</td>
<td></td>
</tr>
<tr>
<td>• In-class Assignment/</td>
<td>15 Hrs.</td>
<td>1 Hr.</td>
</tr>
<tr>
<td>Hands-on Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Study Effort</strong></td>
<td></td>
<td>63 Hrs.</td>
</tr>
</tbody>
</table>

## Reading List and References

**Reference Software List:**
1. AutoCAD from Autodesk Inc.
2. SolidWorks from Dassault Systèmes Solidworks Corp.
3. PADS from Mentor Graphics Inc.

**Reference Standards and Handbooks:**
1. BS8888 Technical Product Specification (TPS) Specification
3. IEEE Standard 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols for Electrical and Electronics Diagrams
4. IEC 61082 Preparation of Documents used in Electrotechnology

**Reference Books:**
Training material, manual and articles published by Industrial Centre
# Subject Description Form

## Subject Code
ISE404

## 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

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:

1. **Select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies**;
2. **Measure the cost of poor quality and process effectiveness to track performance quality and to identify areas for improvement**;
3. **Understand proven methodologies to enhance management processes, such as benchmarking and business process reengineering**;
4. **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 Management**
   - Core values and paradigms for TQM, including corporate excellence, Deming Prize, Baldrige Quality Award, European Quality Award
   - Quality Function Deployment (QFD)

2. **Customer Needs**
   - Internal and external customers
   - Voice of the customer, Customer satisfaction

3. **Economics of Quality**
   - Classification and analysis of quality costs
   - Implementing quality costing systems
   - Economic value of customer loyalty and employee loyalty

4. **Total Quality Management (TQM)**
   - Quality Function Deployment (QFD)
   - Benchmarking: Business process reengineering

5. **Organizational Learning**
   - Organizational renewal
   - Change management

### 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 Method in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>% weight</th>
<th>Intended subject learning outcomes to be assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>35%</td>
<td>a)</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>b)</td>
</tr>
<tr>
<td>3. Examination</td>
<td>45%</td>
<td>c)</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>d)</td>
</tr>
</tbody>
</table>

### Class Contact

- **Lecture**: 2 hours/week for 14 weeks
- **Tutorial/Casestudy**: 1 hour/week for 14 weeks

### Assessment and Effort Expected

<table>
<thead>
<tr>
<th>Specific assessment and report writing</th>
<th>% weight</th>
<th>Student study effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignments</td>
<td>35%</td>
<td>28 Hrs.</td>
</tr>
<tr>
<td>2. Tests</td>
<td>20%</td>
<td>14 Hrs.</td>
</tr>
<tr>
<td>3. Examination</td>
<td>45%</td>
<td>50 Hrs.</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>120 Hrs.</td>
</tr>
</tbody>
</table>

### Reading List and References

4. Selected articles in Quality Progress and the web site of American Society for Quality

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### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>MM2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Management &amp; Organisation</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>Exclusion: People and Management (MM2191)</td>
</tr>
</tbody>
</table>

#### Role and Purposes

This subject contributes to the achievement of the BBA (Hons) Programme Outcomes by enabling students with an understanding of management functions, group and individual dynamics within organisations and to apply such concepts to analyse and solve problems in business situations (Outcomes 7 and 11). The subject also provides students with knowledge and skills in leadership, teamwork, and decision making (Outcome 8). In addition, it prepares students on how to analyse and resolve ethical issues in various business settings (Outcome 5).

#### Subject Learning Outcomes

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

- a. explain the nature of managerial work in a variety of forms of organisations, and analyse the impact of the external environments, both domestic and global, on managers’ jobs (Outcome 7);
- b. explain and analyze the functions of management in organisations, i.e. planning, organising, leading, and controlling (Outcomes 7 & 11);
- c. apply the essence of human behavior in teamwork, leadership, and decision making and evaluate the implications for the management of organisations (Outcomes 8 and 11);
- d. analyse and compare the arguments surrounding social responsibility and ethical behavior in organisations and businesses (Outcome 5).

#### Subject Synopsis/Indicative Syllabus

**Management Functions**

The major elements of the management functions: planning, organising, leading, and controlling, and their importance for the effective management of business organisations.

**Planning**


**Organising an Enterprise**

Review of a variety of organisational structures and the identification of the conditions under which they are appropriate. Managerial communication and information technology. Staffing and human resource management.

**Leading**

The manager’s role as a leader. Foundations of human behaviour. Leading and motivating employees – individuals and groups.

**Controlling**


**Social Responsibility and Managerial Ethics**

Arguments for and against social responsibility as a business objective. Factors affecting managerial ethics. Approaches to improving ethical behaviour.

#### Teaching/Learning Methodology

The two-hour weekly lecture will be structured to guide and promote students’ understanding of relevant management and organisation concepts. In addition, there will be one tutorial of one hour per week. The tutorials will adopt a student of centred approach, including case study, in-class exercises, newspaper and professional articles for discussion and team-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 (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>50%</td>
<td>a. b. c. d.</td>
</tr>
<tr>
<td>1. Individual Work - 20%</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>2. Group Project - 15%</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>3. Participation - 15%</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>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.

**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 –

- Read the key chapters of the recommended textbooks and indicative journals in subject outline;
- Demonstrate the basic understanding of management functions which are presented in the lectures;
- Analyse business situations and problems in contemporary business settings;
- Identity teamwork, leadership and decision making process in the business environment;
- Discuss the ethical issues arising from the cases and other questions;
- Participate in in-class exercises, case study, professional articles or discussion question to be presented in the lectures.
Feedback is given to students immediately following the presentations and all students are invited to join this discussion.

<table>
<thead>
<tr>
<th>Student Study Effort Expected</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class contact:</strong></td>
<td></td>
</tr>
<tr>
<td>• Lectures</td>
<td>28 Hrs.</td>
</tr>
<tr>
<td>• Tutorials</td>
<td>14 Hrs.</td>
</tr>
<tr>
<td><strong>Other student study effort:</strong></td>
<td></td>
</tr>
<tr>
<td>• Preparation for lectures/ seminars</td>
<td>42 Hrs.</td>
</tr>
<tr>
<td>• Preparation for individual work/ group project/ examination</td>
<td>42 Hrs.</td>
</tr>
<tr>
<td><strong>Total student study effort</strong></td>
<td>126 Hrs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reading List and References</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended Textbooks</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reference Textbooks</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicative Journal Readings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Academy of Management Journal</td>
<td></td>
</tr>
<tr>
<td>Academy of Management Review</td>
<td></td>
</tr>
<tr>
<td>Asia Pacific Journal of Management</td>
<td></td>
</tr>
<tr>
<td>Journal of Management</td>
<td></td>
</tr>
<tr>
<td>Journal of Organizational Behavior</td>
<td></td>
</tr>
<tr>
<td>Human Relations</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicative Periodicals &amp; Newspapers Readings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Annual Reports</td>
<td></td>
</tr>
<tr>
<td>The Asian Wall Street Journal</td>
<td></td>
</tr>
<tr>
<td>The Economist</td>
<td></td>
</tr>
<tr>
<td>South China Morning Post</td>
<td></td>
</tr>
<tr>
<td>Business Week</td>
<td></td>
</tr>
</tbody>
</table>
### Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>MM4521</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>China Trade 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>

### Role and Purposes
This course covers the business environment and key issues about doing business in China. The course offers a broad survey of a wide range of topics related to China business rather than in-depth study of particular aspects. The primary objectives are to introduce the students to the broad terrain, and help them to explore those aspects in their future pursuit.

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

a. understand, analyse, and evaluate the nature and changing shape of business connection between Hong Kong and the Chinese Mainland.

b. explain and assess the institutional and legal issues of doing business in China.

c. describe, analyse and evaluate business strategies and practices in China.

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.

e. have further developed their oral and written communication skills

### Subject Synopsis/ Indicative Syllabus
- The economic system and economic reforms in China
- Understanding the Chinese bureaucracy
- China's integration into the global economy
- China - Hong Kong Business relations
- The regulations of China's foreign trade
- China's tax system
- Foreign direct Investment and management
- Marketing strategies in China

### Teaching/Learning Methodology
Lectures, tutorial discussion, group project (presentation and written report)

### Assessment Methods in Alignment with Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Specific assessment methods/tasks</th>
<th>%</th>
<th>Intended subject learning outcomes to be assessed (Please tick as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td>50%</td>
<td>a  b  c  d  e</td>
</tr>
<tr>
<td>1. Group Project – 30%</td>
<td>✓  ✓  ✓  ✓  ✓</td>
<td></td>
</tr>
<tr>
<td>2. Presentation – 15%</td>
<td>✓  ✓  ✓  ✓  ✓</td>
<td></td>
</tr>
<tr>
<td>3. Written Report – 15%</td>
<td>✓  ✓  ✓  ✓  ✓</td>
<td></td>
</tr>
<tr>
<td>4. Class Participation – 20%</td>
<td>✓  ✓  ✓  ✓  ✓</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td>50%</td>
<td>✓  ✓  ✓  ✓  ✓</td>
</tr>
</tbody>
</table>

Total 100 %

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

<table>
<thead>
<tr>
<th>Class contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
</tr>
<tr>
<td>tutorial</td>
</tr>
</tbody>
</table>

Other student study effort:

| Group project | 20 Hrs. |
| Reading       | 28 Hrs. |

Total student study effort 90 Hrs.

### Reading List and References
This course does not have a textbook. Readings are drawn from *China Hand*, a database compiled and edited by the Economist Intelligence Unit, and *China Business Review*, a publication of the US-China Business Council, and other sources. The readings have been uploaded to WebCT.

**References**

Tim Clissold’s *Mr. China* (Constable & Robinson, 2004)


Appendix II

Foundation Year
1. Introduction

Foundation programme was offered to non-local students, mostly from the Chinese mainland, as a preparatory study, in order to prepare them for their intended proper 3-year undergraduate programmes. The programme was a one-year study and each student was required to complete a total of 32 credits. The graduates directly entered the first year of studies of their chosen undergraduate programmes.

From September 2005, the foundation study was merged into the programmes offered by individual departments who became the hosts. The foundation year then formed an integrated part of a 4-year undergraduate degree curriculum. Students in the foundation year with the Department are regarded as the year 1 students of the 4-year BEng (Hons) programme.

2. Programme Structure

Duration
A student normally takes four years full-time with an option of an additional year for sandwich. The maximum period of registration is eight years.

Final Award
The award is a Bachelor degree with honours in Electrical Engineering.

Programme
The students will complete 10 subjects, 30 credits, as well as 2 credits on the subjects of Foundation Year Seminars, in the first year, i.e. a total of 32 credits. There are 5 compulsory subjects (common to all non-local students) and another 5 subjects stipulated by the Departments. The typical foundation year study is as follows:

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Compulsory subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG1001</td>
<td>Foundation Year Seminar I</td>
</tr>
<tr>
<td>APSS184</td>
<td>Understanding the Hong Kong Community</td>
</tr>
<tr>
<td>ELC1004</td>
<td>English for University Studies I</td>
</tr>
<tr>
<td>AMA103</td>
<td>Foundation Mathematics I for Science and Engineering</td>
</tr>
<tr>
<td>AP101</td>
<td>College Physics I</td>
</tr>
<tr>
<td>CBS2050*</td>
<td>Elementary Cantonese</td>
</tr>
</tbody>
</table>

* Compulsory for non-Cantonese speakers. Cantonese speakers may choose one of the following subjects in lieu, subject to approval.

- GEC225 Exploration of the Cosmos
- GEC270 History of Hong Kong
- APSS185 Discovering Psychology

<table>
<thead>
<tr>
<th>Semester Two</th>
<th>Compulsory subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG1002</td>
<td>Foundation Year Seminar II</td>
</tr>
<tr>
<td>AMA104</td>
<td>Foundation Mathematics II for Science and Engineering</td>
</tr>
<tr>
<td>ELC1005</td>
<td>English for University Studies II</td>
</tr>
<tr>
<td>AMA105</td>
<td>Logic: Qualitative and Quantitative</td>
</tr>
<tr>
<td>AP102</td>
<td>College Physics II</td>
</tr>
</tbody>
</table>
### Elective subject

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Elective subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEC230</td>
<td>Ecological Perspectives – The Challenge of Our Times</td>
</tr>
<tr>
<td>APSS186</td>
<td>Understanding Ethics in Daily Life</td>
</tr>
<tr>
<td>ELC1003</td>
<td>Extended Writing Skills</td>
</tr>
<tr>
<td></td>
<td>* Compulsory for non-Cantonese speakers. Cantonese speakers may choose the following subject in lieu, subject to approval.</td>
</tr>
<tr>
<td></td>
<td>GEC274 Appreciation of Chinese Art and Design</td>
</tr>
</tbody>
</table>

In the subsequent three years, the students follow the identical study pattern in the 3-year programme as described in the main content of this document. As a result, the students should finish a total of 134 credits, as well as fulfilling the training and language requirements, when they graduate. The 2011/12 Foundation Year students joining Year-1 of the Undergraduate programme in 2012/13 will follow the curriculum and associated regulations applicable to the 2012/13 cohort of students of the programme.

**Foundation-year Mentor**

The students in the foundation year are full members of the Departments. A departmental foundation-year mentor will be assigned to them. The class representative will be a member of the Student-Staff Consultative Committee.

### 3. Registration & Assessment

The same set of regulations on registration and assessment, as stipulated in Section 6, applies.

While the graduation requires the completion of 134 credits and the GPA calculation includes the results of all subjects throughout the four years, the WGPA calculation, which leads to award classification, excludes all subjects in the foundation year. In other words, the award classification only considers the students’ performance on the subjects taken in the normal 3-year programme.
Appendix III

Major Programme in Electrical Engineering
With the growing demand of graduates having broad educational qualifications, in addition to those with specialised skills, the University is introducing degree programmes combining “Major” and “Minor” disciplines. In response to this, the Department of Electrical Engineering has been offering a Major in Electrical Engineering option for students starting from 2001/02 academic year.

Starting from 2011 cohort, students taking this option must obtain 81 credits in the Major Programme in Electrical Engineering and 18 credits from a minor programme. If the 18 credits taken are a free collection of electives in any combination of disciplines in conjunction with a Major programme, these students will graduate with a Major only. For the Minor programme, at least 9 credits must be level 3 or above.

In order to graduate, students should take 3 additional credits on a subject from level 1 to level 4 so that the total number of credits taken is 102, the same credit requirement as stipulated by the BEng programme in Electrical Engineering.

1. Programme Requirement

Students are required to complete the following 81 credits for graduation in the Major Programme in Electrical Engineering. They must include the following credits:

(a) all first-year subjects in Electrical Engineering, except the business subject (33 credits);
(b) all second-year subjects, except the business subject (30 credits);
(c) the compulsory final-year subjects (15 credits);
(d) one EE level-4 elective (3 credits)
(e) all training credits.

All subjects are in common with the BEng(Hons) degree in Electrical Engineering offered by the Department of Electrical Engineering.

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

- Satisfying the WIE and IC Training requirements
- Having a Grade Point Average (GPA) of 2.0 or above at the end of the programme
- Having sat for GSLPA# in both Chinese and English (unless exemption is given)
- Satisfying the co-curricular activities requirements
- A pass in Foundation Mathematics (AMA106)*

# The mandatory requirements for GSLPA will be abolished with effect from the 2011/12 cohort of intakes, including students on Foundation Year programmes in 2010/11 who progress to Stage 1 of FT undergraduate degree programmes in 2011/12. However, students admitted to Senior Years in 2011/12 either on advanced standing or under the Senior Year quota are required to take GSLPA before graduation.

* It is only applicable to admittees who do not have a “pass” in the A-level Mathematics subject(s) and who have not been given credit transfer for the subject AMA201 stipulated in the curriculum. These students are required to take a mandatory Mathematics Benchmark Test (MBT) prior to the commencement of their studies. Those who pass the MBT are exempted from this graduation requirement and they follow the normal study pattern. Those who fail or do not attend the MBT are required to take a non-credit bearing subject AMA106 “Foundation Mathematics”, which is a pre-requisite for AMA201. A pass in AMA106 is thus a graduation requirement for such students.
2. Programme Curriculum

To be eligible for graduation in the major in Electrical Engineering, students are required to complete 81 credits as specified. All the subjects in the table below are compulsory. The tables below illustrate the typical progress pattern.

Typical First Year Study:

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Semester One</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMA201 Mathematics I</td>
<td>AMA202 Mathematics II</td>
</tr>
<tr>
<td>ELC2501 University English I (2 credits)</td>
<td>CBS2080 Fundamentals of Chinese Communication</td>
</tr>
<tr>
<td>ENG224 Information Technology</td>
<td>ELC2502 University English II (2 credits)</td>
</tr>
<tr>
<td>ENG232 Engineering Science</td>
<td>EE3061 Analysis Methods for Engineers</td>
</tr>
<tr>
<td>ENG236 Computer Programming (2 credits in semester 1)</td>
<td>ENG236 Computer Programming (1 credit in semester 2 )</td>
</tr>
<tr>
<td>ENG237 Basic Electricity and Electronics I</td>
<td>ENG238 Basic Electricity and Electronics II</td>
</tr>
<tr>
<td>GEC2801 or equivalent</td>
<td>GEC2801 or equivalent</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(1 subject from the Minor Programme)</td>
<td></td>
</tr>
</tbody>
</table>

| IC2131 Freshman Seminars for Engineering (57 hours in Semester 1 and 2) (2 training credits) |
| IC2132 Engineering Drawing and Industrial Safety (63 hours in Semesters 1, 2 and 3) (2 training credits) |
| IC2112 IC Training I (EE) (4 weeks in summer) (4 training credits) |

Typical Second Year Study:

<table>
<thead>
<tr>
<th>Semester One</th>
<th>Semester One</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELC3504 English for Effective Workplace Communication (1 credit in semester 1)</td>
<td>ELC3504 English for Effective Workplace Communication (1 credit in semester 2)</td>
</tr>
<tr>
<td>EE3011 Analogue and Digital Circuits</td>
<td>EE3011 Analogue and Digital Circuits</td>
</tr>
<tr>
<td>EE3041 Power Transmission and Distribution</td>
<td>EE3041 Power Transmission and Distribution</td>
</tr>
<tr>
<td>EE3131 Telecommunication Fundamentals</td>
<td>EE3131 Telecommunication Fundamentals</td>
</tr>
<tr>
<td>GEC2xxx Broadening General Education Subject (2 credits)</td>
<td>GEC2xxx Broadening General Education Subject (2 credits)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(1 subject from the Minor Programme)</td>
<td></td>
</tr>
</tbody>
</table>

| EE3021 Electromechanical Energy Conversion |
| EE3031 Power Electronics and Drives |
| EE3111 Project Methodologies (2 credits) |
| EE3121 Computer System Principles |
| EE321 Electrical Services in Buildings |

(1 subject from the Minor Programme)
**Typical Final Year Study:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE3051</td>
<td>Systems and Control</td>
</tr>
<tr>
<td>EE4021</td>
<td>Electrical Machines</td>
</tr>
<tr>
<td>EE4031</td>
<td>Power Systems</td>
</tr>
<tr>
<td>EE4041</td>
<td>Engineering Project Management</td>
</tr>
</tbody>
</table>

(1 subject from the Minor Programme)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG307</td>
<td>Society and the Engineer</td>
</tr>
</tbody>
</table>

One EE level-4 elective

An additional subject of 3 credits (any subject from level 1 to level 4)

(2 subjects from the Minor Programme)

3. **Professional Recognition**

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

4. **Admission and Registration**

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

5. **Award Classification**

For students who have completed a Major and a Minor programme or a Major programme combined with free electives, their award classification will be based on both their “Major GPA” and “Minor GPA”.

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

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

“Minor GPA” is derived based on the 18 credits of Minor study (either a specific Minor or free combination of electives). “Minor GPA” is unweighted.
The “Major GPA” and the “Minor GPA” will be presented separately to the Boards of Examiners for consideration.

In order to be eligible for a particular award classification, a student should have comparable standard of performance in both his/her major and minor studies.

In cases where the attainment of students in the minor study warrants the granting of one classification lower than that the students deserve for his major study, the Board of Examiners has the discretion to recommend the upper classification which reflects the performance on the major study better. This is based on the fact that the award parchment to be granted to students who enrol on a major programme will only state the award title for the major programme.